

Of Human Reactions And Nuclear Reactors

The accident at Three Mile Island in March 1979 focused world attention on the safety of nuclear power reactors. It also put a spotlight on the human as a major player in the safe operation of a power plant. At Three Mile Island, a series of human errors complicated a mechanical failure that should have been easily handled.

Before TMI, the nuclear industry was more concerned with designing a better machine. But even then, there were indications that the human did not play just a supporting role. Records kept by the Nuclear Regulatory Commission show that 30-40 percent of all reported incidences of breach in safety are due to human error. And a year before the accident, researchers in BNL's Department of Nuclear Energy began realizing that the human was a primary driver in the handling of accidents.

Says engineer Robert Hall, "We were doing probability risk assessment studies, which are analyses of plant system response in a statistical framework. The human kept popping

up, even though that was not the focus of our work. Then Three Mile Island happened, and funding suddenly became available in this area."

With NRC support, an effort was begun within Hall's group to study the human as a major element in the operation of a power plant. Four years later, the group is now an appropriate mix of engineers and sociologists, with psychologists consulting part-time.

According to Hall, the BNL group is unique in that they are studying human performance, not human factors. "Human factors include such things as lighting, noise level, shapes, colors, sizes," he explains. "In human performance, we study how the human makes a decision. One interesting aspect of this decision process is decision-making when all bets are off, when there are no normal operating procedures to follow since what has happened is out of the ordinary."

A main thrust of the group's efforts is developing mathematical models that predict human performance. Hall

cautions that these models are developed for very specific situations. Then using data from documented accidents, unexpected events and small scale experiments, the models are adjusted to fit what has actually happened in the past. When they have been sufficiently verified as reliable indicators of human performance, they will be applied to estimates of the safety of commercial nuclear power plants and will help in the development of new and better designs of the man-machine interface.

Two Wrongs Don't Make A Right

One of the concerns in human performance is multiple failures. If a human makes an error on the first try, what is the probability of repeat errors? Hall says this is an important question because of the level of redundancy designed into power stations. In general, only by defeating these redundant systems can the safe operation of a facility be jeopardized. For example, when a maintenance person on a routine check turns a valve the wrong way, what are the chances that the same person will repeat the mistake on a back-up system?

A model of multiple failures has been developed by Pranab Samanta and is being tested with the help of researchers at SUNY Stony Brook. There, experimental trials will be done using people responding to repeated computer-based prompts. The object is to measure the conditional probability of errors. In other words, given that an error has occurred, what is the chance of a second error occurring?

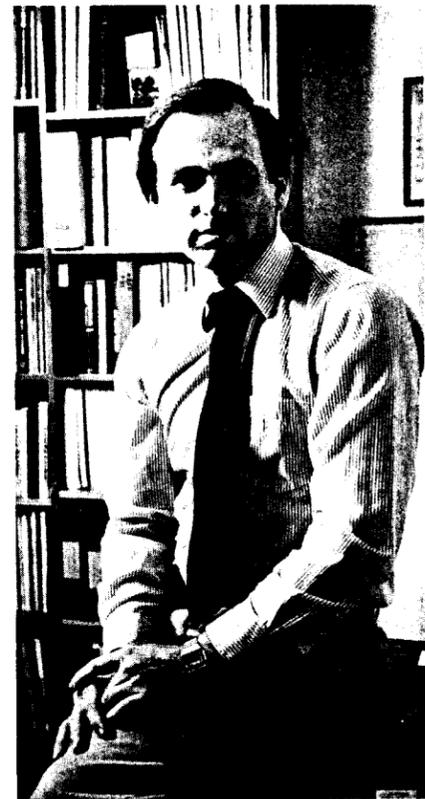
Performances will be measured against levels of task complexity, time and other parameters. The experimental data will then be compared with predictions made by the model, and the model will be revised as necessary.

Time Is Crucial

A second model was recently completed. Called OATs, for Operator Action Trees, it is a first attempt to statistically quantify human errors of problem solving in a severe accident environment.

"Human errors are different from machine failures," says Hall. "That's intuitively obvious. It's also been documented by research. Human errors can be corrected if time permits and the person has correct feedback information. Also, human actions strongly exhibit purposeful behavior. In other words, once a given goal is identified as necessary, people are often resourceful in pursuing it. But if the person has failed to identify the correct goal, all further actions could be wrong. A correct first time diagnosis of the problem is usually crucial in recovering from the problem."

Hall says the conditions observed during real accidents suggest that successful diagnosis cannot be taken for granted. In real accidents, often no



Robert Hall

particular single error is to blame. He cites aircraft accidents, which show that even when procedures are well established and operators have received extensive training with the most sophisticated simulators, the crucial errors are not usually those of omitting steps from procedures or misreading an instrument. Instead, the crucial errors are more subtle, being errors in judgment under uncertain conditions.

Plant operators spend uneventful hours in the control room, except for an occasional heart-pounding moment when an emergency occurs, and flashing lights and wailing alarms call for quick thinking and action.

Under those conditions, time is a crucial factor in making a correct decision. The OATs model uses this time available for decisions to quantify performance success and failure. (See box on OATs.)

Hall says the OATs model is just the beginning of quantifying operator decision errors. It provides a skeleton for further modeling of human behavior under accident conditions.

"In general, the study of quantifying human performance is in its infancy. Eventually, it could lead to changes in training, procedures and even control room design. Already, we see the need for training the operators to expect the unexpected," says Hall.

"Maybe some of the short time frame decision-making will be taken away from humans. But the human will never be taken completely out of the decision process. When the inconceivable accident happens, the human can think of new and original solutions to problems. That's something a computer can't do."

— Mona S. Rowe

Ways To A Faulty Decision

You are a reactor operator in the control room of a nuclear power plant. Suddenly, the alarms go off, perhaps a hundred of them at one time. With the horns and flashing lights assaulting your senses, you have to diagnose the nature of the accident and then choose an appropriate response.

Brookhaven researchers studying the human element in the operation of a nuclear power plant have developed a method for quantifying operator errors in response to accidents. Dubbed OATs, the method uses an analytical device called an operator action tree and a time reliability correlation.

The basic operator action tree can be described this way: in response to an event, 1) the operator observes it, 2) diagnoses the problem and 3) carries out the appropriate response. This kind of behavior that requires thought processes and knowledge is called cognitive or problem solving behavior.

Failures in cognitive behavior can be grouped as follows:

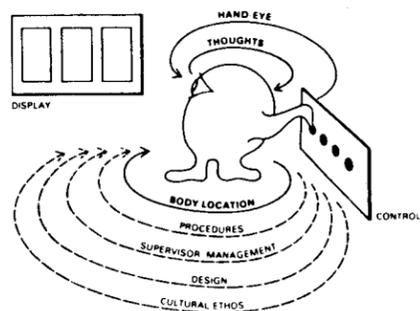
- **Perseveration.** This is the kind of behavior in which a person makes a decision and does not reconsider its correctness even in the face of information that directly contradicts the decision.
- **Task fixation.** Related to perseveration, this is a behavior in which operators become preoccupied with one particular task, usually trivial, to the exclusion of other tasks that are usually more important. An example from aircraft incidents illustrates this. On December 29, 1972, an Eastern Airlines flight crashed into the Florida Everglades. The cockpit crew had fixed its attention on a faulty indicator, which was reading unsafe nose-gear, and they neglected to monitor and maintain altitude.
- **Alternation.** This is when a person constantly changes a decision while the basis of information is not changing.
- **Short-term human memory.** Short-term memory initially receives the information, such as meter readings and procedural statements, that operators need for making decisions. But short-term memory has limited capacity and retention time. Under the turbulent conditions of an accident, items stored in the short-term memory can be lost in the course of gathering more information or performing other tasks.
- **Internal models.** Operators build in their minds internal models which are simple representations of how the plant behaves, in their experience. Using these models, they become proficient in responding to events speedily and accurately. The problem, though, is that the models are stored in the subconscious region of the brain. Operators may be unable to realize the limits of such internal models and may continue to use them when the plant state has gone beyond such limits. This is particularly so in nuclear plant accidents, which are so rare that most operators will never experience one in their careers.

Each of these conditions is modified by time. Perseveration and task fixation will cease eventually if sufficient stimuli can overcome some threshold that shuts out other information. With alternation, time allows for "calming down." Limitations in short-term memory or in internal models can be overcome if time permits the operators to reread instruments or procedures, or to recognize differences between the behavior of the plant and their expectations.

Therefore, with regard to cognitive behavior, time is a very crucial factor in success. For this reason, the operator action tree approach uses the time available for action as the main basis for estimating the reliability of action.

The OATs model is now being used in probability risk assessment, to quantify human performance under accident conditions. Researchers are also beginning to derive from the model ideas for better training, procedures and machine design — changing the machine to give the human more response time.

— M.S.R.



Basically, a plant operator can be thought of as a processor of information from his or her environment. Discrepancy between an operator's mental model of the plant and the real state of the plant is a common cause of human error. An operator's mental model is affected by training, experience and assumptions regarding plant operation; it is dynamic, continuously responding to feedback. This figure shows seven levels of feedback available to the operator. Solid lines indicate immediate, on-site feedback; dotted lines are increasingly remote, delayed feedback.

A Time To Plant

Everyone's heard of Johnny Appleseed, who wended his way westward across the young nation, scattering apple seeds as he went. But have you heard of J. Sterling Morton?

J. Sterling Morton, a native of New York State, also went west, settling in Nebraska in 1854. There, on the fringes of the generally treeless Great Plains, Morton conceived the idea of Arbor Day.

As a member of the State Board of Agriculture, (he later became U.S. Secretary of Agriculture) Morton introduced a resolution that a day be set apart for planting trees in Nebraska. On that first Arbor Day, April 10, 1872, more than a million trees were planted. In 1885, Arbor Day became a legal holiday in Nebraska, to be observed on April 22, Morton's birthday.

Most states do not observe Arbor Day as a legal holiday, but do commemorate the occasion on the last Friday in April. Thus today is Arbor Day in New York, and trees will be planted at ceremonies across the state. This morning, the Long Island Flower Growers Association and the Cooperative Extension Association will celebrate Arbor Day by dedicating a "Sunny Perennial Garden" at the Suffolk County Farm & Education Center in Yaphank.

The National Park Service is interested in restoring the formal gardens that once landscaped the William Floyd Estate in Mastic Beach. While the buildings and furnishings there have been restored, limited funds have prevented work on the garden areas. To involve other Long Island garden clubs in preparing a plan for this restoration, the Moriches Bay Garden Club will host a reception at the Estate on Saturday, May 21 (rain day, May 22), from 2-4 p.m. Club representatives or interested individuals are invited, in hopes that they might then be willing to serve on or contribute ideas to a committee designated to draw up a plan. Anyone interested in attending the reception should call 289-4810 by May 7.

French Folk Songs

The BNL French Group will present Elizabeth Palmedo, soprano, and Patrick Caruso, guitar, in a concert of French folk songs, Tuesday, May 3, at 8 p.m. in Berkner Hall. There will be a \$3 fee for non-members. Coffee and pastry will be served.

Carryover Deadline

It's time to start planning a vacation. As announced by the Director last year, vacation carryover must be reduced to 31 days by the last pay period in September. If not, the excess days will be lost. Therefore, all employees should reduce their vacation balance to 31 days or less by September 23, 1983. This includes vacation days accrued during the month of September. Any exceptions to this policy must be approved by the Director. Questions may be referred to Personnel, Ext. 2113.

What Happened To The Birds?

Virtually the entire adult bird population of the mid-Pacific atoll of Christmas Island has mysteriously disappeared, and thousands of nestlings that remained behind have starved to death, the National Science Foundation (NSF) reported recently.

Dr. Ralph W. Schreiber, curator of ornithology at the Natural History Museum of Los Angeles County, California, told the NSF that about 17 million seabirds have either abandoned the island or perished. Schreiber, who has studied birds and mammals in the central Pacific Ocean islands for more than 15 years, said this is the first such massive disappearance of a total bird population ever recorded from a tropical atoll.

The bird population "crash" occurred during "El Niño," a warm equatorial current associated with changes in wind patterns, salinity, ocean currents and sea levels. Schreiber believes that during this unusual interaction ocean conditions changed so drastically that the birds' food supply of fish and squid may have left the area or perished, and that the birds had to go elsewhere for food.

Schreiber is returning to Christmas Island to try to find out exactly what caused the mass abandonments and deaths by starvation of 14 million sooty terns, at least 1.5 million wedgetailed shearwaters, and one million birds of 16 other species. He also wants to determine when — or even if — the birds will return to the island, what reproductive cycles they will reestablish and what their diet and reproductive success will be during recovery.



Members of the Affirmative Action Advisory Committee are: (seated from left) Otto White, S&EP; Audrey Blake, Technical Information; Bruce Medaris, Plant Engineering; Sarah Ebron, Plant Engineering; (standing from left) Victor Gonzalez, Central Shops; George Grigg, NSLS; Mona Rowe, Director's Office; Frances Scheffel, DNE; and Rebecca Williams, DEE.

A Continuing Commitment

Affirmative action is for you and you and you and you... It's for everyone.

That general philosophy was expressed during an interview this week with several members of the Lab's Affirmative Action Advisory Committee. The nine-member committee is appointed by the Director to advise him as to the effectiveness of affirmative action programs and to make recommendations for improvement.

Chairman Otto White commented, "We don't believe in special attention for minorities and women. We just believe that they should have the same opportunity as everyone else." He added, "A supervisor may not like the way someone dresses, for example. That's really no different from discriminating because of color or sex. Remove all the biases in the workplace, and all employees will benefit."

The committee feels that although many gains have been made, areas of

underutilization of minorities and women still exist, warranting a strong, continuing commitment to these groups.

Victor Gonzalez said, "People should be on guard against what I call 'quota filling.' That's when people think, 'we have our one, we've done enough.' An attitude like that closes off opportunities for others."

Part of the committee's function is to maintain a communication network, said Frances Scheffel. Committee members meet with affirmative action representatives in each department and division. "This is one way we find out where problems lie, and if the Laboratory's policy is being carried out," she said.

Brookhaven's goal is equality of opportunity in all aspects of employment, including recruitment, placement, training and promotion. The achievement of these goals is everyone's responsibility.



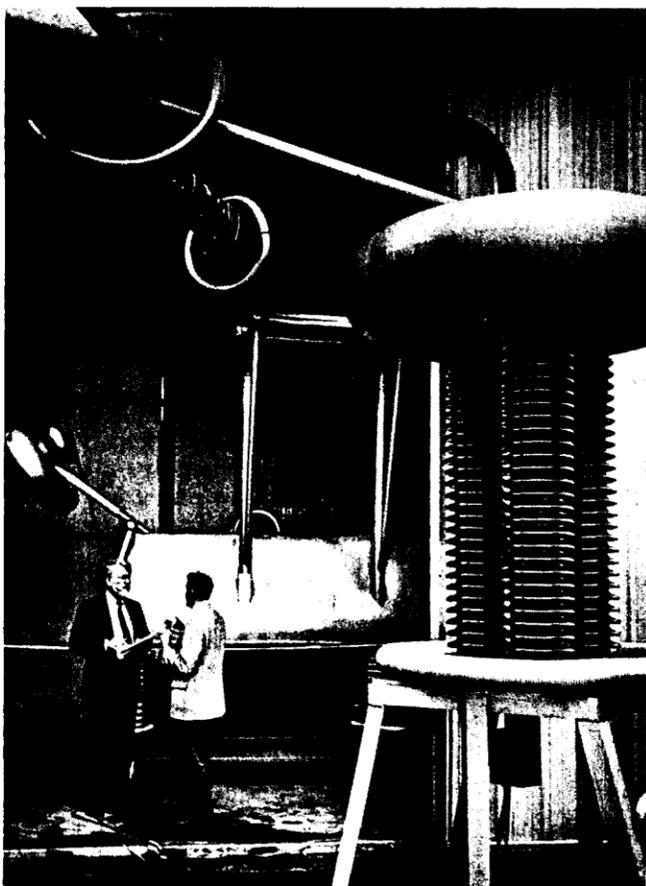
The Brookhaven Council, an advisory group formed in 1962, reports to the Director and makes recommendations on matters pertaining to the scientific staff. Members are elected to three-year terms by the senior scientific staff of the departments they represent. Those on the 1983-84 BNL Council are (seated, from left) Jack Fajer (DEE), Samuel Krinsky (SLIM), Carl Anderson (Biology), Carol Creutz (Chem.), Joe Fischer (SLIM), Laurence Passell (Physics), Hugh Brown (Accel.), Lawrence Leipuner (Physics)-*chairman*; (standing, from left) James Reilly (DEE), Vance Sailor (DNE & Reactor), Stanley Seltzer (Chem.), Robert Chrien (Physics), Claire Shellabarger (Med.), and Myron Ledbetter (Bio.). SLIM members represent S&EP, NSLS, Instrumentation and Applied Math. Missing from the photo are Bertrand Brill (Med.), Robert Louttit (Accel.)-*secretary*, and James Powell (DNE & Reactor).

In Memory Of Clarke Williams

The Department of Nuclear Energy will host a reception and tea in memory of Clarke Williams on Monday, May 2, in Room B of Berkner Hall at 3:30 p.m. All his friends and colleagues are welcome to attend.

Physics Conference Next Week

A conference on Monte Carlo Methods and Future Computer Architectures will be held at the Brookhaven Center, Monday, May 2, through Thursday, May 5. For further information, call Claudio Rebbi, Ext. 3855.



Alex Reben

Earlier this month, a visit to Brookhaven was on the agenda of Ronald Williams (left), technical consultant to the House Committee on Science and Technology. Here, he tours the facilities of the Power Transmission Project with Eric Forsyth, Project Head.

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Service Awards

The following employees received service awards during the month of April:

Thirty-Five Years

Henry E. Boyd Staff Services
Raymond Davis, Jr. Chemistry
Marilyn C. Galli Technical Info
Alfred Hamilton, Jr. Accelerator
Kenneth P. Thomson Cent. Shops

Thirty Years

Thomas F. Prach Medical

Twenty-Five Years

Frank J. Abbatiello Accelerator
Fred B. Griswold Reactor
James A. Grubber Plant Eng.
William E. Johnston Plant Eng.

Twenty Years

David E. Cox Physics
Frank A. Crifasi S&E Prot.
Harold E. Gassner Accelerator
George L. Landahl Plant Eng.
Barney Peltz Biology
Walter Schlichteroll Plant Eng.
Abe Seifert Plant Eng.
Werner Tramm Accelerator
Charles M. Watson, Jr. Plant Eng.
Josephine M. Weltz S&M

Ten Years

Mary C. Rustad Technical Info
Suresh C. Srivastava Medical
Jeanne R. Wysocki Biology

Open Meeting On Nuclear Arms

A group of people have been meeting at lunch, on a monthly basis, to discuss the problems of nuclear war, disarmament and defense. Mark Sakitt, one of the organizers of the group, invites all concerned people to a meeting that is being called for Tuesday, May 3, at noon in Room B, Berkner Hall. He says that "at the meeting we will consider what activities would be appropriate for us to undertake in the current national defense debate." For further information call Sakitt on Ext. 3812, or Andy Hull on Ext. 4210.

Arrivals & Departures

Arrivals

Andrew T. Jesaitis .. Saf. & Env. Prot.

Departures

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

James A. Grandi Accelerator
Harvey McChesney Accelerator

Bowling

Purple League

E. Sperry had games of 204/237/200 /641 scratch series, E. MacDougall 207, G. Spira 233, K. Riker 200, E. Meier 220, B. Barberich 212, B. Benson 201, B. Jones 205/235/610 scratch series.

Red/Green League

High games were bowled by A. Almasy 235, E. Sperry IV 234, N. Combatti 232/203, H. Arnesen 223, J. Connelly 218/202, K. Asselta 210, J. Morris 210, E. Sperry 207, J. Petro 207, T. Prach 203, R. Larsen 202.

White League

J. Griffin rolled a 226/212/636 scratch series, J. Ferrante 224, G. Gales 223, D. Adams 214, J. Roesler 211, G. Hassell 207/207/604 scratch, K. Vogel 203, S. Long 179/191, P. Manzella 191, M. Apelskog 187.

Pink League

S. Long bowled a 202, M-G Meier 164/160/188, R. Rosati 179, K. Kissel 168, C. Beckner 168.



Behind these stacks of bridges in Stage II, contest coordinators Janet Tempel (left) and Jackie Mirzadeh check either end of a 19-foot list which includes the names of the 750 high school students who originally registered for BNL's 1983 Model Bridge Contest. Over 450 models were ultimately submitted. Each was checked to see if it met stringent rules regarding dimensions, materials and method of construction. About 300 balsa wood bridges — twice as many as last year — qualified for the final test. Donald Horne (DEE), Carl Klamut (DEE) and Martin Woodle (CBA) will conduct the strength-to-mass ratio stress tests on Saturday, May 7, to determine which model can hold the greatest number of pounds per gram of bridge mass.

Swimming Pool

A new four-month pool season will begin on Monday, May 2. Season tickets may be bought at the pool during scheduled open hours starting on that day.

Fees:

Season Tickets (fees not prorated)
Individual Membership \$23.00
Family Membership 33.00
Daily Admissions
Employee/Family Member 1.25
Guest 1.75

Schedule:

Monday through Friday
(Employees Only)
11:00 a.m. to 1:30 p.m.
(Employees/Families/Guests)
5:00 p.m. to 9:30 p.m.

Saturday and Sunday

(Employees/Families/Guests)
1:00 p.m. to 6:00 p.m.

Note: The swimming pool is closed on all Laboratory holidays.

Guest Ruling (Applies to all recreation facilities)

One Guest - An employee is allowed to bring one guest per visit without special permission or prior arrangement. The guest must be accompanied by the employee.

Two to Five Guests - Advance arrangement for two to five guests may be made at the Recreation Office. (No more than five guests per employee is ever permitted.) When such an arrangement is made, the Recreation Office issues an admission card stating the sponsor's name and life number, the number of guests permitted, the date of visit, and the facility to be visited. Guests must be accompanied by the employee, who will be requested to show the admission card at the main gate and at the swimming pool ticket desk.

Did You Know....

That BNL employees may use the library at the State University of New York at Stony Brook? Inquire at the SUNY library about receiving a borrower's card.

Volleyball

B Division Playoff Results

Outstanding performance by Kathy Norden and Linda Farmer enabled TNT to edge Semi-Tough, 15-13, 15-12, in what turned out to be the last games of the season.

Congratulations to new B Division champions, Tirre and Linda Farmer, Marty Leach, Kathy Norden, Tom Kelly, Kathi Greene, Frank Gaetan, Cathy McNeely, Denise Miesel, and Bob Brown.

Tickets are available for the Volleyball awards party from your team captains, or call Bob Marascia, Ext. 4672.

Soccer

The Soccer Club will start playing outdoors at the BERA field starting Monday, May 2. Pickup games will start at about 5:30 p.m. All are welcome to play. For further information, contact Ken Batchelor (Ext. 4674), or Enrique Abola (Ext. 4383).

Cafeteria Menu

Week Ending May 6, 1983

Monday, May 2

Spinach egg drop soup (cup) .65
(bowl) .75
Broiled chicken livers & 1 veg. 1.80
Beef stroganoff on egg noodles 1.95
Hot Deli: Roast turkey breast (bread) 1.85
(roll) 1.95

Tuesday, May 3

Lentil soup (cup) .65
(bowl) .75
Salisbury steak & 1 veg. 1.85
Baked ham w/fruit cocktail sauce & 1 veg. 1.90
Hot Deli: Sandwich steak w/peppers & onions (bread) 1.95
(roll) 2.05

Wednesday, May 4

French onion soup (cup) .65
(bowl) .75
Swedish meatballs on egg noodles 1.85
Seafood platter 2.15
Hot Deli: Sausage & pepper hero 1.95

Thursday, May 5

Split pea soup (cup) .65
(bowl) .75
Pork and cabbage crisp on toasted Chinese noodles 1.95
Yankee pot roast & rice pilau 2.00
Hot Deli: Barbeque chicken cutlet hero 2.15

Friday, May 6

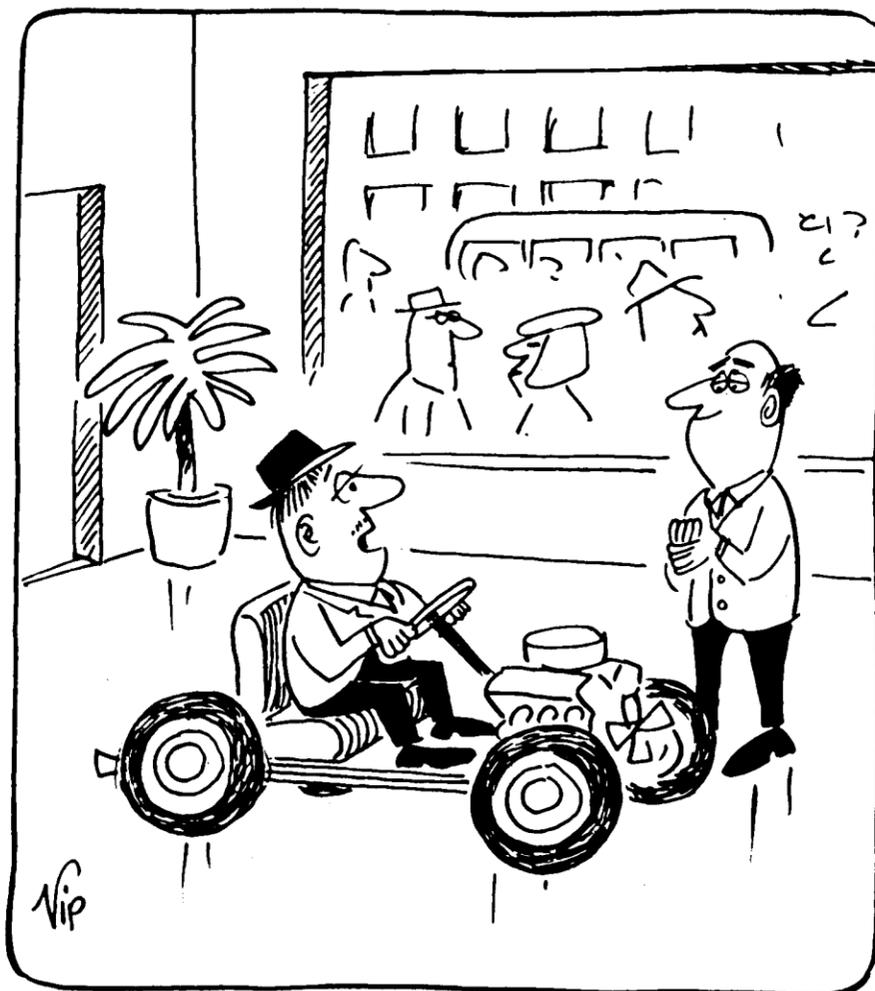
Seafood chowder (cup) .85
(bowl) 1.00
Beef hash & 1 veg. 1.85
Broiled fresh fish fillet & 1 veg. 1.85
Hot Deli: Top round of beef (bread) 1.95
(roll) 2.05

Hospitality News

The Hospitality Committee's next morning get-together will be held Tuesday, May 10, from 9:30 to 11:30 a.m. at the Brookhaven Center. Normally, the get-together is held the first Tuesday of every month. This time, however, it will be held on the second Tuesday.

The application of acrylic nails, as well as a talk on certain types of cosmetics, will be presented by Debbie Rinaldi.

Wives of Laboratory employees and guests are welcome, as are children. Babysitting will be provided free of charge. Coffee, tea and danish will be served.



"How much for the extras?"

Classified Advertisements

Placement Notices

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

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

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

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

LABORATORY RECRUITMENT: Opportunities for present Laboratory employees.

1854. CUSTODIAN, GROUP LEADER - (Temporary 5/15/83 to 10/14/83) Staff Services Division.

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

1855. CARPENTER (Temporary Openings) - under minimum supervision lays out, constructs, modifies and maintains buildings and component parts from construction drawings, rough sketches or verbal instructions. Works with wood, wood substitutes, and combination materials and flooring, roofing and wall materials. Plant Engineering Division.

1856. PAINTER A (Temporary Openings) - Under minimum supervision, performs wide variety of interior and exterior skilled painting operations on buildings, furniture, and Laboratory equipment. Must know use and application of paints, synthetics, bleaching materials, stains and similar products. Plant Engineering Division.

1857. STEAMFITTER A (Temporary Openings) - Requires substantial experience in the commercial/industrial sector as a steamfitter. Will be responsible for the layout, construction, installation, maintenance and repair of heat, steam, and water distribution systems, related facilities and auxiliary equipment. Plant Engineering Division.

1858. SENIOR STATIONARY ENGINEER (Temporary Opening) - Requires demonstrated experience in the maintenance, repair and operation of high pressure boilers firing #6 fuel oil. Current stationary or marine engineer license is highly desirable. Plant Engineering Division.

1859. EXPERIMENTAL MACHINIST - Requires experience in job print interpretation, layout, and machine set-up. Candidates must demonstrate ability and imagination in all phases of machine work. Will function as all-round machinist for non-production work in research and development shop. Project assignments range from raw material work in research to final assembly. Central Shops Division.

Autos & Auto Supplies

81 CHEVY CITATION - 24,000 mi., 4 spd., radio, stereo, cassette, mint cond., \$4,800. 589-4111 eves.

79 PLYMOUTH HORIZON - excel., a/t, 4 dr., radio, \$2,800 or best offer. 924-3928.

80 HONDA HAWK MOTORCYCLE - CB400T, excel. cond., low mi., extras, \$995. 286-8814 after 5:30 p.m.

75 VEGA - 4 cyl., excel. running, new shocks, exhaust, fm/tape, no rust, 79,000 mi., \$1,400. Whitey, Ext. 2913 or Ramona, 928-3088.

73 PONTIAC CATALINA - 2 dr., runs good, reliable transportation, \$400. 744-9802 eves.

TIRES - Sears Dynaguard 20, 78-14 w/Dodge rims, like new plus (2) snows, good cond., \$100. 654-0769 eves.

DODGE SEAT - full fold down, fits Dodge pickup club cab. \$25. Francois, Ext. 2898 or 363-7620.

72 HONDA MOTORCYCLE FRAME - custom rigid frame w/fender & seats, oil tank, many extra parts. 654-2076 eves.

VW PARTS - muffler assemblies, \$28; bumpers, \$27; 009 distributor, \$36; full line of new parts at discount prices, call for needs. Augie, Ext. 2419 or 289-4211 eves.

80 KAWASAKI - 650, LTD, red, crash bars, helmet, excel., \$1,850. Bob Johnson, Ext. 3354.

75 TOYOTA CORONA - s/s, 2 dr., engine & interior good, \$950. 924-5100 or 878-8144 eves.

81 DATSUN 210 - 38 mpg, excel. cond., \$4,150. Ext. 4395.

73 BUICK ESTATE WAGON - 59,000 mi., \$500. Don, 286-1205.

82 YAMAHA YZ - 125J, water cooled, never raced, mint cond., \$1,100. Mark, 399-2632.

78 BUICK CENTURY - unique 2-tone, 4 dr., 6 cyl., new tires & brakes, low mi., stereo/CB, p/b, p/s, pinstrips, showroom cond., \$4,600 neg. 751-6418.

81 FORD ESCORT GL - sport series, excel. cond., 4 dr., must sell, 26,000 mi., \$5,400. Tom, Ext. 2311.

77 SAAB SPORT COUPE - 99EME, sunroof, luggage rack, Perelli tires, gold alloy rims. Jim, 667-3909.

81 SUZUKI MOTORCYCLE - GS650G, 4 cyl., shaft drive, triple discs, soft saddlebags, extras, red, immac., \$2,000. Bob, Ext. 3354 or 399-3609.

69 OLDS NINETY-EIGHT - good running cond., all power, needs minor work, asking \$600. Steve, 929-6877.

75 TRIUMPH TR6 - needs work, \$1700. Ext. 5053 or 472-1735 after 5 p.m.

74 BLAZER - 36" tires, new 350, rollbar, \$2,250; fiberglass Blazer top, fits 74-'75, \$750 or best offer, must sell, getting divorced. 744-3968, leave message.

74 AMC SERVICE MANUAL - oil filters, tune-up kit for 6 cyl. engine. Jerry, Ext. 4487.

FORD CARBURATOR - pass. or truck, 1965 thru 1974 with instr. sheet, \$25. 732-5004.

79 HONDA MOTORCYCLE - 750F Super Sport, 2,700 mi., professionally maintained, polyglycolated, garaged, \$2,100. 473-7809.

81 CHEVETTE - 2 dr., 4 spd., am/fm/tape, like new ext., deluxe int., radials, \$3,700. 473-2473.

YAMAHA MOTORCYCLE - 75 cc, fair cond., 3 yrs. old, \$250. Dinos, Ext. 4666 or 477-1783.

CASSETTE DECKS - (2) am/fm, \$50-\$75. Bob Kiss, 981-6092.

80 PONTIAC TURBO TRANS AM - p/s, p/b, p/w, a/c, T-top, excel. cond., am/fm, asking \$8,500. Steve, 475-6375.

80 CHEVETTE - 4 dr., hatchback, 4 cyl., 4 spd., very good cond. Bob Kiss, 981-6092.

73 TOYOTA PICKUP - 4 spd., recent valve job, good cond., \$1,600. Al, Ext. 5128.

80 MAZDA RX7 - 5 spd., charcoal grey, alum. wheels, tape deck, well maintained. Ken, Ext. 2008 or 928-5875 after 6 p.m.

USED CARS - \$1,000 and up. Steve, 929-6877 after 5:30 p.m.

77 VW RABBIT - fuel injected, new tires, brakes, fuel pump, clutch, runs perfectly, leaving Lab, \$2,500. Ext. 3042.

67 DODGE DART - 4 dr., good running cond., new brakes, 3 spd. trans., asking \$350. Ext. 3042.

72 PINTO - good running, 6,000 mi. on tires, body N.G., \$125. 924-6354.

77 BMW - 530i, 55,000 mi., a/c, sunroof, stereo, bronze w/tan leather, 6 cyl. OHC, excel. cond., \$6,250. Peter, Ext. 3867.

76 CHEVY PICKUP - 4x4, p/s, p/b, am/fm, 38K mi., clean, cap, new tires, 3/4 ton, reg. gas. 744-0471.

79 MAZDA - 626, 2d/sc, excel. cond., 5 spd., met. blue, rust-proofed, 30-35 mpg, \$4,750. Larry, Ext. 4107 or 472-0721.

73 TOYOTA - 4 cyl., a/t, good tires, runs well, new brakes, good body, \$1,200. 744-4386.

75 OLDS - 2 dr., all new tires and accessories, good cond. mech., some rust, \$700. 727-4925.

TIRES - good rubber, (2) 8:00-16.5, (2) 8:75-1.65, \$30/pr., see Gregg at service station. 399-4213.

VEGA PARTS - reasonable, 3-spd. tranny, drive-shaft rear & more. 924-8740.

72 TOYOTA CORONA - 5 spd. manual, runs well, some rust, \$700. Glenn, Ext. 3336 or 472-1419.

78 MUSTANG - mint, 60,000 mi., 4 cyl., 4 spd. Kathleen, Ext. 3604.

WIRE WHEEL COVERS - 15", fits 1976 thru 1982 Caddy, set of 4. Ext. 4584.

68 BUICK SPECIAL WAGON - 350, V8, auto., it runs, \$200. Lloyd, Ext. 3381.

80 HONDA HAWK MOTORCYCLE - Sport Model CB400T, excel. cond., low miles, extras, \$895. 286-8814 after 5:30 p.m.

CHEVY SHORT BLOCKS - 350 ci, (1) 4 bolt needs line boring, (1) 2 bolt, both apart, \$75/ea. Bill, Ext. 4434.

RIMS - (2) Ford/Mercury, 14", 5 hole, \$20. Tony, Ext. 3658.

TIRES - set of 4, P215/75R15(G78-15), w/w, s/b radial, very good rubber, \$65. Jim, Ext. 4040 or 289-0876.

Boats & Marine Supplies

18' SPEEDBOAT - 1969, Chris Craft, mahogany, 283 ci, collector's item, mint cond., \$4,000. Mike, 289-0602 eves.

14' BLUEJAY SAILBOAT - fiberglass over wood, old, asking \$500, make offer. Ken, Ext. 7959 or 581-1169 eves.

21' RENKEN - 1980, 120 Volvo Penta engine, I/O many extras, canvas, compass, 50 hrs. use, excel., asking \$7,000. 981-0989.

16' HOBIE - 1982, blue hulls, white sails, Tramp trailer, stored inside, mint. 475-4645.

17' THUNDERBIRD - cathedral hull, 90 HP Mercury, Trailax alum. trailer, asking \$2,000. Borg, Ext. 3568 or 286-0428.

17' IMPERIAL BOWRIDER - 1979, 70 HP Evinrude, Holtsclaw galvanized trailer, full canvas, anchor, skis, excel., \$3,995. 698-6544.

14' FIBERGLASS BOAT - Chrysler, semi-v, 1981 galvanized Highlander trailer w/buddy hubs, 40 HP Johnson, all new controls, canvas, bow rail, CB/antenna, gas tanks, battery, \$1,500 neg. Tony, 584-7544.

18' HERESHOF CAT BOAT - 1973, fully equipped, 1976 outboard, excel. cond. 286-1024 for info.

20' OWENS WOOD BOAT - w/cabin, 1959; 1973 Chrysler, 105 HP, new power pack, tune-up, winterized, runs perfect, \$900 for both or \$700 for engine & \$250 for boat. Linda, Ext. 2733.

16' DIXIE BOWRIDER - 1977, all glass, 55 HP Johnson, galvanized trailer, canvas, new battery, 6 gallon gas tank, \$3,200. 567-5131.

JOHNSON ENGINE - 9.9, like new cond., used once, \$500 firm. Sheldon, Ext. 3354.

15' THUNDERBIRD - fiberglass, 35 HP Johnson, in water, \$650. 298-4475.

ZINCS SHAFT COLLARS - rudder buttons, out-drive, OMC Merc. Volvo, etc. Bill, Ext. 4664 or 298-4089.

67 EVINRUDE - 100 HP, good cond., \$295. 298-9581.

21' VENTURE SAILBOAT - sleeps 4, double life lines, trailer, motor, \$3,795. Jerry, Ext. 7611.

17' FIBERGLASS SAILBOAT - sleeps 4, loaded with extras, outboard, trailer, 3 sails, mooring, dinghy, \$3,500. Fred, Ext. 2057 or 261-5735.

Yard Sales

MASTIC - multi-family sale, furniture, household goods, etc., April 30 & May 1, 10 a.m.-3 p.m., 910 Mastic Road. Ext. 2346.

YARD-GARAGE SALE - (group), April 29-May 1, household tools, lots more, Halsey Manor Rd., Manorville.

Miscellaneous

VEGETABLE PLANTS - 6/pack flower, 4/pack plant, \$.75/pack, delivery around May 1. 727-6818.

GRAY FOX - mounted in natural pose on log, \$125 firm. Bob, Ext. 3354.

TUB ENCLOSURE - 5 ft., glass, \$20. Bill, Ext. 3355 or 472-4684 after 6:30 p.m.

CHINA CLOSET - w/oval table, light pecan, 4 chairs, extra leaf, \$500. 289-4994.

ANDIRONS - solid brass, \$25; ladies wet suit vest, med., new, \$10; easel, \$5. Diane, Ext. 4142 or 727-6214.

WOMEN'S GOWN - size 10, blue flowered, short sleeve, new. Angela, 744-5871.

SYNTHESIZER - Multivox MX2000, excel. cond., \$400. 363-2614 after 6 p.m.

LAWN MOWER - Toro, gas reel; Clemson push mower, best offer; Schwinn antique bicycle, all the extras, fair cond. John, Ext. 7611.

FREEZER - 20 cu. ft., upright, manual defrost, excel. cond., \$175. Paul, Ext. 4156.

R/C KRAFT SPORTSERIES - 4 servos, charger, motor, 3 planes, extras, \$325. Ext. 7187 or 981-9474.

TAPE DECK - Sony, excel. fidelity, w/(4) 7" TDK tapes, \$45. Henry, Ext. 4815.

G.E. COMPACTER - working cond., \$25; ping pong table, as is, \$10; Lazy Susan by Nichols & Stone, 22" dia., black w/gold stencil, \$40; (2) twin oak beds, complete, \$80. Francois, Ext. 2898 or 363-7620.

FREEZER - Westinghouse upright, 3-section, old but working fine, \$65. Lois, Ext. 2959 or 751-0023.

ANTIQUÉ DRESSER - solid oak w/beveled glass mirror, professionally stripped, ready for refinishing, needs assembly. Walt, Ext. 7154.

INSTRUMENT SPEAKER - Music Man, 12", 75 W., \$60 list, asking \$25. 473-3151.

NATIONAL GEOGRAPHIC MAGAZINES - many complete years, some back to 1919, also Scientific American. Tomesch, 475-9065.

MEN'S MOTORCYCLE JACKET - classic, Heingericke, black leather, size 44, like new, \$110. Mary, Ext. 4132.

BAR - homemade; sewing machine; Bell & Howell sound movie camera & projector, best offer. 331-1572.

SOFA - early American, brown Herculon, perfect for playroom. Bruce, Ext. 5091.

DINING ROOM SET - solid pine, colonial, like new. 286-9315.

LAWN MOWER - Sears, 19", electric, 3 HP, heavy duty fiberglass catcher, 1-1/2 yrs. old, \$135; G.E. air conditioner, 5500 BTU, very quiet, like new, \$95. Ext. 5277.

GOLF CLUBS - bag, cart, McGregor, used 1 yr., like new, excel., \$175; trailer hitch, class III, 10K lbs. carrier & head, \$75. 732-5004.

SEWING MACHINE - Kenmore, new, \$150; Coleman metal cooler, \$20; fan, \$15. Wick, Ext. 4372 or 924-0582 eves.

POOL TABLE - AMF Grand Prix, slate top, automatic ball return, excel. cond., all accessories, \$1,095; man's golf clubs, 3,4,5,6,7,8 and 9 irons, 3 & 4 woods, & putter, old but makes good starter set, \$20. Linda, Ext. 2733.

SPACE HEATER - Sears, gas, 75,000 BTU, 2 blowers, excel. cond., \$135. Hugh, Ext. 4669 or 924-3522 after 6 p.m.

OFFICE DESK - Century, 60"x30" with chair, \$200; Oster kitchen set, complete, \$80; sofa, excel. cond., \$150; slow-cooker, removable pot, \$15; desk-top telephone, \$10. 924-4250.

DRYER - RCA Whirlpool, gas, 3 cycle, \$50; Westinghouse refrigerator, 16 cu. ft., side by side, \$75. Bob Kiss, 981-6092.

FREEZER - 14 cu. ft. chest, old but it works, \$35. P. Wanderer, Ext. 7687 or 744-1112.

TELEPHOTO LENS - Minolta, 135mm, f2.8, case & lens shade. Rick, Ext. 3803 or 467-1090.

CASEMENT WINDOWS - heavy duty aluminum screens, storms, inc. various sizes, \$20/ea. Niels, Ext. 4124.

DEHUMIDIFIER - Sears, 30 pint, 1 yr. old, excel. cond., asking \$160. Ext. 4576 or 281-3093.

CAMERA - Polaroid One-Step, w/case, like new, used twice, excel. cond., \$15; sofa-bed, beige/brown stripe, makes into queen bed, good cond., \$50. 286-1097.

COLOR TV - 19", works great, just rebuilt, \$200. Ext. 4405.

BEE HIVES - with bees & queen, produce your own honey, \$150/ea. Hugh, Ext. 4424 or 924-3293.

SEARS BATTERY - 40 month, used 3 months, \$25. 924-6354.

HAIRSETTER - Clairol Kindness Compact, elec. w/20 rollers, excel., \$15; rotary meat slicer, excel., \$15; child seat for bicycle, new, padded steel constr., \$12. Tom, Ext. 4084 or 878-1060.

AIR CONDITIONER - Fedders, 6000 BTU. Sal, Ext. 2460.

ORGAN - Wurlitzer, double keyboard, rhythm pedal, built in tape recorder, excel. cond. 821-0080 after 5 p.m.

TV DESCRAMBLER - for "Spotlite," east ender's only, \$75. Paul, 727-4859.

DISHWASHER - portable, works well, \$50. 928-8379 eves.

BLANK CASSETTE TAPES - BASF, CrO₂, ProII, \$2.75/ea. Ext. 2521.

ROLLAWAY WASHER - apartment size, Hoover 0512, pump needs work, \$10. You pick up. 286-9158.

TABLES - (3) contemp., fruitwood, good cond., (1) square, (1) coffee, (1) step, \$125. Jerry, Ext. 7427 or 475-5591 after 5 p.m.

LOG SPLITTER - heavy duty, needs work, \$275. 281-8274.

GROUND POOL - 30' x 16', oval, all aluminum, extractor & pump, tank; convertible sofa bed, good cond., \$50. 924-0960.

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 - south 25A, 3 b/r ranch, eik, d/r, l/r, full bsmt., appliances, fully carpeted, 1/3 acre, swimming pool, Shoreham/Wading River schools, \$65,000. 744-3509.

MEDFORD - older home, income property, mother/daughter, 3 apts., (2) furnished & rented, property 115'x300'+, nice residential area, reasonable taxes, \$65,000, 86 Oregon Avenue. Contact James Houlik, 581-4882 or write Wilma Eriksen, 102 W. Caribbean, Port St. Lucie, Fla., 33452.

EAST MORICHES - Newport Beach, 3 bdrms., 2-1/2 baths, 2-car garage, laundry room, fireplace, fenced backyard, 2-zone heating, 1/2 acre, deeded private beach rights, docking space/launching ramp avail., near the Hamptons, \$70,000. Ext. 2733 or 878-8491.

RIDGE - (3) one acre wooded building plots, each 100' x 400', quiet residential area, \$13,900/ea. 924-3236.

MASTIC - 3 bdrm. ranch, family room, excel. cond., avail. immed., \$55,000 or rent \$500/mo. 928-9222 or 698-4197.

For Rent

N. SHIRLEY - 5 min. from Lab, single person, lovely 1 bdrm. apt., furnished, \$375 includes all Kathy, 281-5605, 6-8 p.m.

VERMONT CHALET - on pond, stoney fireplace, swimming, nature trails, nearby canoeing, tennis, antiquing, theatre, music festivals, horseback riding, rental by week. 757-5599 after 4 p.m.

EAST MORICHES - share 3 bdrm. house on temporary basis, approx. 6 mos., female, no children or pets, use of washer/dryer, near the Hamptons, all utilities except telephone, \$70/week. Linda, Ext. 2733.

VERMONT - 3 bdrm. house, f/p, fully equipped, beautiful view, woodland trails, boating, fishing, alpine slide, tennis, golf, antiques, etc., family oriented, avail. weekly or weekends. 732-6499 after 6 p.m.

MASTIC - 2 furnished rooms w/private entrance, 10 min. to Lab. 281-6099.

PATCHOGUE - 4-1/2 rm., 1 bdrm. apt., includes heat, hot water, laundry, garbage pickup, cable TV, dock space avail., 1st floor, full end apt., \$460/mo., avail. immed. 286-8368.

Carpools

STONY BROOK/STRATHMORE VICINITY - established carpool needs 4th rider/driver. Morris, Ext. 4192.

BAYPORT AREA - on time carpool needs new member. Ext. 4085.

RIVERHEAD - paying rider needs transportation, Lincoln St. to Lab, 8:30-5. Vanette, Ext. 7991 or 369-2783 after 6 p.m.

PORT JEFF. STATION - form 2-man carpool, Canal Rd. area. John, Ext. 5279.

Found

FOUND - dental bridgework in women's rest room at the Brookhaven Center. Ext. 2345.

Free

SCREEN & STORM WINDOWS - regulation sz. 18 of each, pick up. Healey, 281-9127.

Wanted

POP-UP HARDTOP - sleeps 6 for family of 4.