

Cleaning Up Coal's Act

As indicated in last week's Bulletin ("Liquid Coal in Your Future?"), BNL scientists are actively researching new ways of using coal in their determined effort to ease our current energy shortage. While last week's story described research in conversion of coal to liquid fuels, this week the direct combustion of coal and the problems associated with doing so cleanly are examined.

The primary reason that coal has fallen from grace in recent years is its notoriously dirty nature. The major culprit in its contribution to air pollution is sulfur, and until scientists began devising ways to "clean up" the combustion process, burning coal produced a dirty gas which released this sulfur into the atmosphere in the form sulfur dioxide (SO₂).

In conventional coal-burning plants, the coal is first pulverized to a fine powder, then burned over a grate at very high temperatures; typically about 3000° Fahrenheit (1650° C). The most popular current desulfurization technique is to "scrub" the stack gases after the coal has been combusted and before the flue gases go up the



Ming Shen examines sulfated cement pellets which have absorbed SO₂ in an experimental run. The sulfur will be extracted from them and they will be reused.

stack. The scrubber that has reached popular and commercial status is an aqueous solution of lime or limestone. These materials combine with the SO₂ in the flue gases to form sulfates.

More Efficient Combustion

An alternative and more efficient method of burning coal is called Fluidized Bed Combustion (FBC). Because the initial investment required for an FBC plant is higher than that needed for a conventional plant, FBC plants have not been popular in this country until this time. Now, however, FBC plants are receiving closer scrutiny by researchers. Meyer Steinberg, Head of the Process Sciences Division, who, along with Ming Shen, heads BNL's coal desulfurization project, explains; "Fluidized Bed Combustion is a means of burning coal in a dispersed medium in a larger volume. When you have an excess of air in such a system, it tends to lift the coal particles and distribute them. The coal is reacting more slowly and at lower temperatures around 1700° Fahrenheit (900° C). It's a more efficient way of burning and of transferring heat from the hot media to the heat transfer surfaces for making steam."

Better Desulfurization

Fluidized Bed Combustion also lends itself particularly well to a desulfurization technique in which a "sorbent" is injected directly into the combustion system to react with and extract the sulfur in the coal, before it even finds its way into the flue gases. The sorbent which has been widely

used in FBC systems is limestone. "The limestone particles act as a bed material," says Shen. "When we pass through air and gas, this bed material is fluidized in the reactor. 'Fluidized' refers to the solid limestone in the gaseous media of the reactor. It's a solid-gas mixture which is constantly in motion." When lime is used as a sorbent, the SO₂ which is formed by combustion reacts with the calcium in the lime to form calcium sulfate. But in order for the sulfur from the coal and the calcium from the limestone to react with each other, they must react at temperatures significantly below the maximum combustion temperature of coal, and they must have sufficient time to react with each other. "Otherwise the sulfur won't react," says Steinberg, "it'll just pass right through. You need a lower temperature and you need time to react, and both of these are part of the principle of the fluidized bed combustor."

Problems with Limestone Sorbent

Thus, FBC is well-suited to a sorbent desulfurization system. But the limestone itself presents serious problems if it is to be used on a long-term basis. "You're taking the sulfur out of the coal, and fixing it on a solid to form calcium sulfate," says Steinberg, "Now that's another waste material. In the vernacular, you're taking black coal and white limestone and making grey waste. It's a disposal problem. If FBC is going to come in in a big way, we're going to have tremendous volumes of waste calcium sulfate to dispose of. So the purpose of this program is twofold: to find a better sorbent than limestone, and to determine how to regenerate the sorbent by extracting the sulfur and concentrate it.

There are other difficulties with limestone. "Because of the high chemical stability of the calcium sulfate formed, it is difficult to reuse limestone," explained Shen. The regeneration of limestone requires temperatures higher than 2000° Fahrenheit

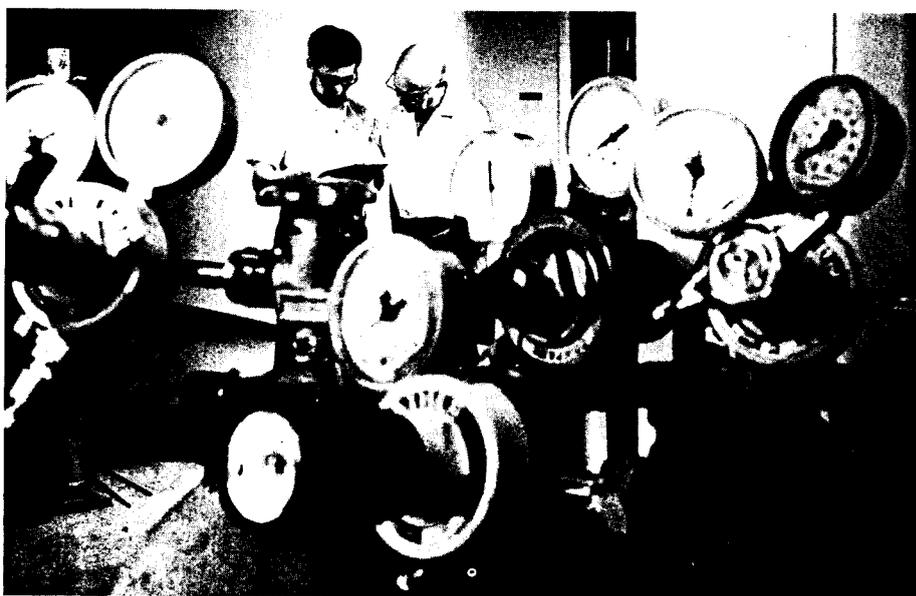


Frank Kainz loads a sorbent sample into the pressurized Thermogravimetric Analyzer. In this machine the sorbent may be analyzed for weight gain vs. time and per cent conversion to sulfates (during sorption), and for weight loss vs time (during regeneration).

(1100° C); higher than the fluidized bed combustion temperature itself. At these temperatures, the limestone pellets start to splinter and erode, a phenomenon known as attrition. Also, the sorption capacity of limestone is quite limited; four parts of calcium are required for each part of sulfur to be removed. Finally, limestone is a naturally occurring substance, not man-made, so that the reactivity varies from batch to batch. And although limestone is cheap, the continuing need to replenish it as a sorbent ultimately makes it more expensive than a regenerable sorbent would be. All of these problems compound the main difficulty with limestone; it creates a new waste disposal problem. Clearly, if fluidized bed combustion, indeed if coal combustion in general is to hold any great promise as a future energy source, a regenerable sorbent with good attrition resistance is required.

BNL Finds a Better Sorbent

This is precisely the problem which
(Continued on page 2)



The experimental apparatus uses gases stored in tanks to simulate actual Fluidized Bed Combustion conditions. Here Ming Shen (left) and Gerald Farber review data prior to making an experimental run.

—photos by Humphrey

Report On TRANSVAN

After nearly two months as participants in the pilot TRANSVAN program, drivers and passengers from Queens, Stony Brook and Patchogue are enthusiastic and hope that vanpooling is here to stay. "It took a long time coming," says Jean Tracy who is on the Stony Brook run, "but when it did, the timing was perfect. We hope it becomes permanent."

Although not having to deal with the gas shortage is a boon to passengers, it has been a problem for the drivers who have had to gas up wherever and whenever they could find it. The vans only get about 10 miles to the gallon and that can mean a lot of trips to the gas station. Barney McAlary applied for exemptions from the odd-even ruling for all three vans, but, so far, has received them only for Stony Brook and Patchogue. Inexplicably, the exemption for the van coming the longest distance - from the city - has not yet arrived.

Even with gas problems, and the fact that they can only get two round trips on a tank of gas from Queens-Nassau, passenger Harvey Thomas says TRANSVAN is still "the best thing to come down the pike." They run a full van from that area every day. When they know a regular passenger is going to be away, they notify someone on the waiting list to take his or her place. Thomas feels that for such a long daily haul, about 104 miles, there should be several certified backup drivers, otherwise the driving could become a strain. This group has had one mechanical mishap, a flat tire. When they went to put on the spare, it, too, was flat. However, they still managed to get to work with only a half-hour delay.

John Barry, who drives the Patchogue van, says "I have had no problems at all, not with the van or the passengers, and whenever I was down half a tank and saw a place open, I would jump in." Rider Marge Stoeckel says "it was costing me \$40 a month to run my car. By TRANSVAN it is \$23.81 a month, plus the wonderful convenience of not having to drive."

As a former member of a 6-person carpool, Stony Brook driver, Paul Mohn, has not found driving the van a burden. "It isn't all that different from driving in a carpool," he says. I have tried to develop the route so that the difference in time between the first and last pickup is as short as possible." Dave Kassner, a Patchogue passenger, also belonged to a carpool. He finds that people who are vanpooling are more punctual than carpool members. "We pick up 11 people in less than 10 minutes," he says.

From the apparent success of the vanpooling pilot to date, "it seems likely that the program will continue," says McAlary. "However, in what form and just when expansion might take place, is still being discussed."

AMD Appointments

Effective July 2, Ronald F. Peierls, chairman of the Applied Mathematics Department, announced that Arnold M. Peskin had been appointed Deputy Chairman of the department, while Sidney Heller was made Head of the Technical Support Division.



New site entrance for ISABELLE contractors only.

Contractors' Entrance Gate

On June 28th, a new entrance gate was opened to the ISABELLE construction site. This entrance is located several hundred feet north of the present Laboratory North Gate on Upton Road. It has been established for the exclusive use of the contractors' forces and suppliers engaged in the construction of ISABELLE. Under no circumstances should Laboratory employees attempt to enter through this construction gate.

Laboratory personnel should continue to use the existing north gate. There is no

change in the posted hours. However, with the increase in traffic, caution is advised upon entering and leaving the site.

The ISABELLE site is a restricted area to all those without prior approval and has been declared a "Hard Hat Area."

Controlled access to the ISABELLE site from the Laboratory is via Railroad Street and is restricted to those on official business. It is extremely important that all Laboratory personnel cooperate in this effort.

"Safety is no accident."

Mini Tour Features Inhalation Toxicology

This weekend's mini tour will highlight the Medical Department's new Inhalation Toxicology Facility. Here, laboratory animals are maintained in sealed glass enclosures in which they are exposed to chemicals found in air pollution. Researchers are able to precisely control the proportions of toxic or carcinogenic compounds in the animals' environment. They are thus able to assess the effects of these pollutants much more accurately than in field studies. Through animal research at the Inhalation Toxicology Facility, scientists will gain important insights into the harmful effects of air pollution on people.

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

On The Threshold Of A Career In Engineering



Seven students who have been accepted at Howard University's School of Engineering are in residence at Brookhaven for five weeks before they enter college. The students will study mechanical, electrical, civil, or chemical engineering this fall and are at the Laboratory under the sponsorship of DOE and Howard University. Known as the Preface Program, this is the sixth year that incoming Howard students have been given an opportunity to see engineering in practice at BNL. Assigned to Accelerator, Energy & Environment, or Safety & Environmental Protection, the students (from left) are Phillip Beckford, Melva Bradford, Sheree Ruffner, Judy Thaxton, John Blackshear, Myra Gallop and Vincent White. Renee Flack (far right) is coordinator of the program.

—photo by Humphrey

Inside Info

Two Brookhaven scientists have been appointed to panels concerned with investigations of the incident at the Three Mile Island nuclear power plant.

Associate Director Victor P. Bond is a member of the health effects panel set up by the President's Commission to investigate the incident. Dr. Bond is also serving on an 11-member committee which will oversee Pennsylvania State studies on possible health effects of the evacuation and other factors arising from the events at Three Mile Island. This supervisory committee is headed by Dr. Leroy Burney who was U.S. Surgeon General from 1956-61.

Herbert Kouts, chairman of the Department of Nuclear Energy, has been appointed to an independent panel of scientists and engineers who will review the safety studies now being undertaken by the N.Y. Power Pool at five operating nuclear power plants in New York State and one nearing completion. The panel will review the Power Pool's findings.

Clean Coal

(Cont'd)

Steinberg and Shen's team has been studying, and, like many great ideas, their sorbent is jarringly simple; it is of all things, cement.

The term "cement," explained Shen, is actually a generic term for the class of compounds known as calcium silicates and having the molecular formula CaO_xSiO_2 . The subscript "x" means that the proportion of calcium oxide varies with respect to the amount of silica, depending on the type of cement. The silica is an important component in the absorption process; one feature which makes the cement a significantly more efficient sorbent is the fact that the coal itself provides a good deal of the silica; "The original idea was to see if we can use the materials that already exist in coal," explained Steinberg, who loathes waste of any kind, "and when coal is burned, silica is found in the fly ash." "The ash from Illinois number 6 (a standard coal), explained Shen, contains up to fifty per cent silica. Thus, the burning coal contributes material that was previously considered a waste product, to help form the sorbent.

Cement (the type the BNL team is finding favorable is the commonly available portland cement) is proving to be a superior sorbent in other respects, too. It shows higher reactivity under FBC conditions than limestone does. Unlike limestone, it is a man-made product, so that reactivity is consistent and predictable. It is manufactured in the form of small spherical pellets which are as durable and as hard as, well, cement. Thus its resistance to attrition is vastly superior to a relatively soft limestone sorbent. By far the most important advantage of cement, however, is its regenerability; it can be efficiently reused as many as ten (and possibly more) times.

The cement regeneration process runs efficiently at relatively low temperatures. This has two important implications. One is that the sorbent is subjected to less rigorous conditions, lowering the attrition rate and the need to replenish the sorbent even further. Secondly, remember that FBC is a low temperature process. This means that both the combustion and the regeneration processes can be run together, at the same temperature. This "isothermal regeneration" represents a vastly more efficient system in which the sorbent is continuously used and regenerated in one relatively self-contained plant.

Cheaper and Cleaner

The cost of running the system could be reduced even further by selling the sulfur which is extracted from the used sorbent.

Retired



George Adler, a Chemist with the Chemical Sciences Division of DEE, retired at the end of June after 23 years at the Laboratory. In 1956 he joined the Nuclear Engineering Department where he worked in radiation induced catalysis. His principal research interests have been organic solid state chemistry, colloids and polymers. He was committee chairman and editor of the proceedings of the 1st International Symposium on Organic Solid State Chemistry in 1968. He was a member of the committee, or session chairman, at each subsequent meeting, as well as editor of the proceedings of the 5th symposium. Adler now intends to write a book on the organic solid state and to continue part-time teaching.

—photo by Rosen

The sulfur is first extracted in the form of SO_2 , for which a small market exists, according to Steinberg, "But there's a much larger market for sulfuric acid. Sulfuric acid has a market problem, though. It can't be shipped too far or stored too long because it's so corrosive and shipping costs are high. But it could be sold in the vicinity of the power plant. The third way would be to reduce the SO_2 back to elementary sulfur. Then it's a solid and could be stored, marketed or even put back into the ground."

Thus, a fluidized bed combustion system with a regenerable cement sorbent happily violates the usual energy maxim; "cleaner equals more expensive." The system reduces pollution and is ultimately cheaper. But the key word here is "ultimately," cautions Steinberg, "You don't get all this immediately for nothing; you have to pay for the process. You have to make an investment in equipment." Although costs will rise as more FBC plants come into operation, he says, "The economics are such that right now the cost of limestone and the waste disposal are not that bad for the one or two plants in operation." But then, Steinberg and Shen would not be working so hard on this project if their only concern was for "right now."

—Bradley Stolzer

Arrivals & Departures

Arrivals

Stephen J. Hannon.....Medical
Patricia A. Miller.....Energy & Env.
John P. Russell.....Contr. & Proc.
John W. Tradeski, Jr.....Accelerator

Departures

Clifford L. Anderson.....Accelerator
Joann M. Conte.....Medical
Lipwah Louie.....Accelerator
Shirish S. Mulherkar.....Energy & Env.
Helen Nicolaras.....Nuclear Energy
Mark C. Zabek.....Physics

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In Memoriam

It has been learned that Thomas H. Epps, who retired last year as an electronic technical specialist in the Accelerator Department, died suddenly on July 4. He is survived by his wife, Vivian, a son and a daughter. Epps was a resident of Shoreham.

Reducing Heat Loss At Wall Outlets

An easily overlooked cause of home heating loss is the cold air leakage that can occur at switches and electrical outlets mounted on exterior walls. This may be due to the insulation blanket having been disturbed when the junction box was installed or, in the case of a double wall, to the hole made in the inner wall for installation of the box. A test can be made in cold weather by placing your hand over the area and feeling for a draft of cold air coming through the holes in the cover plate. Although the heat loss resulting at one outlet may be relatively small, the effect of 10 to 20 such locations in a home could add up to a considerable heat drain.

The problem can easily be cured using 1/8-inch thick Styrofoam or ethafoam plus Saran wrap.

For single or multiple wall switches, the Styrofoam is cut slightly larger than the cover plate. The Saran wrap is folded in a double layer and cut to an even greater size. Holes for the one or more switch arms are cut in both pieces. The Saran wrap is then placed against the wall over the switch arm, followed by the Styrofoam, and finally the cover plate. A sharp pencil can be used to poke holes so that the cover plate screws may be inserted. When the plate is screwed down the Styrofoam is compressed and air leakage is stopped.

For electrical outlets the Styrofoam is cut to the same size as the cover plate and a rectangular hole is cut to clear the receptacle unit. A double layer of Saran wrap is laid over the outlet and the cover plate plus Styrofoam is pressed in place. As the receptacle protrudes through the holes in the cover plate the Saran is stretched tight. After poking a hole for the cover plate screw the plate is secured. A knife is then thrust into each section of the receptacle making slots in the Saran for the insertion of plugs. Excess Saran around the edges of the cover plates may be trimmed off with a razor blade.

—David E. Alburger
Physics Dept.

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

Mountain Club

There will be a beach party tomorrow, July 14, starting at 2 p.m. at Fire Island National Seashore, one quarter mile west of the ranger trailer at Smith's Point. It will be a "bring your own" party and everyone is welcome. No open fires are permitted on the beach, so if you plan to cook supper, bring a camping stove. For further information, call Don David at Ext. 4821 or 286-2267.

Cafeteria Menu

Week Ending July 20, 1979

Monday, July 16	
Tomato vegetable soup	(cup) .30
	(bowl) .40
Macaroni & cheese & 1 veg.	1.15
Grilled ham steak & 1 veg.	1.45
Hot Deli - Pastrami	(on bread) 1.30
	(on roll) 1.40
Tuesday, July 17	
French onion soup	(cup) .30
	(bowl) .40
Vegetarian eggs & fr. fr.	1.25
Meatloaf & hash browns	1.30
Hot Deli - Corned beef	(on bread) 1.40
	(on roll) 1.50
Wednesday, July 18	
Pepper pot soup w/spaetzle	(cup) .40
	(bowl) .50
Tuna noodle casserole	1.25
Southern fried chicken w/corn fritters	1.35
Hot Deli - Veal pattie & peppers hero	1.30
Thursday, July 19	
Chicken noodle soup	(cup) .30
	(bowl) .40
Pork & cabbage crisp	1.35
Manicotti & 1 veg.	1.25
Hot Deli - Baked Virginia ham	(on bread) 1.30
	(on roll) 1.40
Friday, July 20	
Manhattan clam chowder	(cup) .40
	(bowl) .50
Fish filet cheese melt & 1 veg.	1.40
Hot chili con carne on rice w/corn bread	1.40
Hot Deli - Sandwich steak	(on bread) 1.40
	(on roll) 1.50

— SAGA FOODS —

They Like Friday The 13th



Val and Nils Segerdahl were the first couple to retire from the Laboratory at the same time, December 31, 1966. When they retired, Val was secretary to Dr. Lewis K. Dahl, then Chief of Staff of the Medical Research Center, and Nils was a Technical Specialist with the Accelerator Department. Today they are celebrating their 50th wedding anniversary in Sarasota, Fla. They were married July 13, 1929.

On The Brookhaven Circuit



Vaudeville comes to Brookhaven again this summer. And if it's sultry outside, it will be even sultrier inside the Brookhaven Center when Angela Castellano, Sandy Lane and Ruth Basile (above) give their rendition of "Big Spender" from the musical "Sweet Charity." The vaudeville acts were so popular last year, that the Theatre Group has assembled another show which they will present in a cabaret atmosphere for your enjoyment. The performances will be on Saturday, July 21 at 8 p.m., and on Sunday, July 22, at 4 p.m. A cash bar is available. Tickets are \$2; \$1 for senior citizens and persons 18 or under.

—photo by Humphrey

A (Rainy) Blast From The Past?

One thousand and eight years ago on July 15, the body of an all but forgotten anglican bishop was moved to a grave in the restored church of Winchester, England. Contemporary writers claim that on that day, miracles occurred and the fame of the previously uncelebrated bishop, Saint Swithun, was spread. Of all the legends which survive concerning Swithun and his day, July 15, possibly the most well-known is this weather myth:

Saint Swithun's day if thou dost rain

For forty days it will remain;

Saint Swithun's day if thou be fair

For forty days 'twill rain na mair.

So watch the skies on Sunday not only for remnants of Skylab but for "rain or fair" and keep Saint Swithun in mind.

Golf Tournament

The Brookhaven Golf Association's 1979 Golf Tournament will be held at Flag Country Club on Tuesday, July 17, from 11:30 a.m. to 1:00 p.m. Tee-off times will be assigned, so the \$1.00 entry fee must be sent to Dick Murgatroyd in Building 925 by July 13th. This tournament is open to all BNL employees, their spouses, and all retired BNL employees.

Summer Rec Program

The Children's Summer Recreation Program began last Wednesday with anxious children ready to learn how to swim, create art projects and have a good time.

The program for children of on-site residents was quickly organized by the recreation staff. Some of the youngsters plunged into craft projects while others chose to play a variety of games.

Swimming lessons are open to children of all employees. They are given by certified instructors. The children learn the basics of swimming and are enjoying the thrill of the diving board.

Every Friday will be "special day" for both recreation programs. Today a scavenger hunt is scheduled for the on-site program, and a penny fetch will take place at the pool at 3:15 for all children.

Next Friday's specials: "circus day" for the on-sites and kickboard races at the swimming pool.

It's not too late to register your children in the program. Do it today!

Other Activities

Tennis instructor John Ingoglis reminds all boys and girls that there is a free tennis clinic Monday through Thursday between 3 and 4 p.m. on the tennis courts.

During the same days and same hour, Gary Milleisen coaches organized sports activities in the gymnasium.

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.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all nonscientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment, as indicated below. Except when operational needs require otherwise, positions will remain open for one week following publication date.

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

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

ENGINEER - Research and assessments in water resources. Contact: Dr. Peter M. Meier, National Center for Analysis of Energy Systems, Department of Energy and Environment.

ENGINEER - Research and assessments in electric utility systems. Contact: Dr. Peter M. Meier, National Center for Analysis of Energy Systems, Department of Energy and Environment.

LABORATORY RECRUITMENT: Opportunity for present Laboratory employees.

1037. **STAFF ASSISTANT (OR SENIOR STAFF ASSISTANT)** - Requires a BS in business administration plus several years of financial administration in a technical environment or its equivalent. Position reports directly to Department Administrator and includes responsibilities in budget preparation, control and analyses; participation in the preparation of project and research proposals; and serving as liaison with Laboratory personnel and with outside agencies. Candidates should possess excellent analytical and communication skills and have knowledge of the development and utilization of information systems. Physics Department.

1040. **ELECTRONIC TECHNICIAN** (weekly or monthly) - AAS degree or equivalent in electronic technology with a good background in high energy physics, experimental and instrumentation. Accelerator Department.

1041. **SECRETARY** - Requires excellent secretarial and office skills, ability to adapt to changing priorities. Position involves technical typing. Experience with or ability to learn word processing essential. Department of Energy and Environment.

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

1042. **OPERATIONS ENGINEER** - BS or equivalent in physics or electrical engineering. Experience with power supplies, computers controls, peripherals and/or rf systems desirable. Responsibility includes troubleshooting, liaison with experimenters, electronics design and/or programming and supervision of AGS shift operations. Rotating shift work. Accelerator Department.

1043. **BIOLOGY ASSOCIATE** - Requires BS in biology or environmental sciences or equivalent experience in ecological research. Will principally be involved in constructing computer simulation models of ecological systems. Department of Energy and Environment.

Autos & Auto Supplies

78 HONDA CB400 HAWK - a/t, sissy bar, luggage rack, crash bar, windshield, quartz-halogen light, 60 mpg, reg gas. \$1450. Gail, Ext. 2903, 265-1688.

66 NOVA - race-ready, narrowed frame, Dana rear, extra fiberglass hood. Negotiable. Ext. 7996, 929-6034 eves.

69 BMW 2400 - 4 dr sedan, 4 spd, radials, mounted snows, 70,000 mi. \$2000. 751-3062.

67 CHEVY IMPALA - 2 dr, a/t, p/s, runs well, good tires. \$300. P. Calabrese, 587-9486 after 6.

72 PLYMOUTH STA WGN - Sport Suburban, a/c, ps/pb, cruise control, full tank. Hugh, Ext. 4078, 744-8901.

74 CAMARO CARB - Rochester 4 bbl. \$20. 588-5833.
74 CHEVY IMPALA - 4 dr, a/c, ps/pb. \$1500. Ext. 2460, 744-9822.

MAG WHEELS - Cragar S/S, Pontiac or Olds factory mags, 14"x7" & 14"x6". Ron, Ext. 2677.

TIRES - (5) Firestone "721" steel belted radials, GR78-15 w/w, brand new, never used. \$225 or \$50 ea. Artie, Ext. 4758.

MOPED - Jawa, 700 mi, 100 mpg, excel cond. \$310. 281-8274.

69 FORD CLUB VAN - V8, a/t, 308, a/c, AM radio, 8-trk stereo, rebuilt trans, rebuilt eng, new paint job. Fred, 289-1085.

73 PLYMOUTH CUDA - 340 c.i., a/t, 68,000 mi, ps/pb, a/c, AM/FM-8 trk. \$1800. 473-7853.

71 CHEVY MONTE CARLO - blue, a/c, 350 eng, needs front nose. \$550. Ext. 3992.

69 PONTIAC BONNEVILLE - a/c, ps/pb, new tires, tape deck, needs muff. B. Azzara, Ext. 2050.

70 CHEV SUBURBAN - K-20, 4 w/d, ps/pb, 350 c.i., beach tires & mags, AM/FM 8-trk stereo. \$2700. John, 744-4386.

73 GRAND PRIX - a/c, etc, AM/FM radio. 475-0532.

TIRE - 15" new steel belted radial w/rim. \$40. Ext. 7982, 286-0638.

CLASS I TRAILER HITCH - 2000 lbs, for 1972 Plymouth. \$20. Ext. 3319.

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

77 CAMARO - ps/pb, a/c, AM/FM, sm V8, good mpg, excel cond. 928-7619 after 5:30.

67 VW BLOCK - blown motor, willing to sell car as is or for parts. \$125. Ext. 2021.

76 DODGE - Tradesman 100, 6 cyl, 3 spd, p/s, FM stereo cassette, pkwy windows, roof vent, 2 mags, sleeping bunk, fully carpeted plus insulation, 33,000 mi, excel. \$5000. Betty, Ext. 2208, 289-5688.

77 GRAN PRIX - a/t, a/c, ps/pb, p/w, AM/FM tape deck, adj s/w, low mi, S/B rads, 22 mpg highway, reg gas. \$4700. Don, Ext. 7658.

69 BUICK STA WGN - a/c, good driv cond. \$525. G. Wendin, Ext. 3798/3188.

73 CHEVY PICKUP - C-20, 4 w/d, excel cond, 4 spd. \$2850. Eric, 878-1790.

74 MAVERICK - 6 cyl, a/t, p/s, a/c, 37,000 mi, excel mech cond, some dents. Asking \$1600. Ext. 4418.

71 BUICK SKYLARK - 2 dr, a/c, a/t, p/s, good cond. \$900. Ken, Ext. 2443, 751-0637.

72 FORD TORINO WGN - good running cond, 4 dr, p/s. \$700. Bob, Ext. 3497.

73 PLYMOUTH DUSTER - 6 cyl, a/t, p/s, a/c, Sears road handlers, hd susp, new exhaust & brakes. \$1600. Rich, Ext. 3381, 924-5939.

77 DODGE ASPEN WGN - a/t, a/c, ps/pb, 20,000 mi. Asking \$3000. 473-2473.

TIRES - (5) R78-14 w/w radials; (4) tires less than 3 mi; 5th tire spare, brand new. Ext. 2951, 727-4515 after 5:30.

67 PLYMOUTH FURY III - 4 dr, a/t, good tires, burns no oil, very mech cond. \$250. 281-9497.

TIRE - G78-15 bias-belted b/w, less than 1000 mi. George, Ext. 4406.

73 CUTLASS S - 2 dr htdp, ps/pb, a/c, 40K mi, new tires, reg gas. \$2200. Ext. 2472, 473-8146 nights.

5 WIRE WHEEL MAGS - & new tires, G78-15's. \$270 firm. Al, Ext. 3280, 588-4703 or 265-0540 after 6.

76 FORD GRANADA - 6 cyl, AM/FM radio, 8 trk, p/s, a/t. \$2695. Ext. 4189, 472-0739 eves.

71 BUICK SKYLARK - 2 dr htdp, loaded, w/bckts & console, very clean & neat-looking car. 744-9785.

74 MONTE CARLO - blk, 350-2 bbl, brand new tires, ps/pb, 70,000 mi, tilt steering wheel, AM/FM stereo. Asking \$2500. Ext. 2021.

Boats & Marine Supplies

2 FOLDING FISHING CHAIRS - wood w/Lees chrome plated gimbals. \$35 ea. Lou, Ext. 4615.

18' CACCI CRAFT - 1973, fiberglass, 65 hp motor (Evinrude), good cond. \$1400. George, 286-1716.

17' FIBERGLASS BOAT - 100 hp & canopy, trailer, 18 gal tank, excel cond. \$1000. 727-1588 after 5.

19' ODAY MARINER - 4 hp Evinrude, head, running lights, cover, etc. Ask \$3900 or rent Aug at PJ marina. 473-2473.

16' THOMPSON - 40 hp outboard w/Gator trailer, fully equipped, full canvas, good cond. Sal, 732-5711 eves.

7' DINGHY ATLANTIQUE - glass, oars, & locks. \$115. Ext. 2876, 654-3175.

20' GARVEY - 7' beam, cabin, good work boat (heavy), glass over wood. \$650 or best offer. Lawrence, Ext. 4107, 472-0721.

16' LARSEN - new Merc, controls, teleflex, 15 gal ss tank, 73 Cox trailer incl. \$850. 472-0739.

17' O'DAY DAY SAILER - fiberglass hull, main, jib, spinnaker, in water, excel cond. \$950. A. Nauman, Ext. 3404, 286-3764.

17' FIBERGLASS SAILBOAT - 3 dacron sails, lg deep cockpit, good family daysailer. \$600. P. Fallon, Ext. 3043, 878-2266.

27' SPORTSCRAFT I/O - fiberglass, new 350 eng, head depth finder, flying bridge, CB, stove, refrig, new carpeting, clean. \$7300. Ext. 3451, 473-7853.

25' TROJAN - 1965 cruiser, 185 Gray, rebuilt 1977, sleeps 4, legal head. Best offer. 734-7527.

33' PACEMAKER - twin Chrysler Crowns 125 hp, sleeps 5, camper back, in water, dinette, galley, stand-up head. Make offer. Ext. 2876, 654-3175.

Yard Sales

LAKE PANAMOKA - Lakeside & Forest Trails, July 14-15, 10am-5pm. 929-6007.

Miscellaneous

L/R SOFA - contemporary, by Horizon, eggshell wide whale cord. Cost \$425, sell \$175, ike new. Doris, Ext. 3488, 924-7832 after 5.

END TABLE - round, lg magnificent wood top, white, gold pillars. Asking \$150. Ext. 3596, 821-1039.

COLOR TV - 20" RCA console, excel wood cabinet, needs transformer, Free. GR5-8658 after 6.

Real Estate

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

For Sale

MEDFORD - spacious 3 bedrm, 2 bath ranch house on Industrial prop, 1 1/2 acres, oversized 2-car gar, above-ground pool, fenced-in yard, bocce court, brick patio. \$60,000. Muriel, Ext. 2470, 289-1608.

CALVERTON - mother/daughter 3 bedrm ranch, oil fired heat & water, s/s, fin bsmt, assumable 7 1/2% mtg, 1 acre prop. \$31,000. Ext. 2022, 727-9058.

BELLPORT VILLAGE - cozy 2-story house, 4 med sized bedrms, eik, comb L/R-D/R, 1 1/2 baths, laundry rm, porch, 80'x147' corner, near schools, low taxes. Low 30's. Charlie, Ext. 4201, 234-8530.

FT. MYERS, FLORIDA - The Villas. 2 bedrms, 1 bath, a/c, Florida rm, L/R, din area, patio, near beach, shopping & churches. 654-2972.

BELLPORT VILLAGE - mod well-insulated colonial in gas-saving location close to stores, water, tennis & golf, 8 rms, 2 1/2 baths, fp in den, full bsmt, 2-car gar. Ext. 7730, 286-8097.

COOPERSTOWN - 160 acres, secluded country farm. Reasonable. Terms. Ext. 3688, 363-7032.

RIDGE - 3 bedrm ranch, 2 baths, L/R, D/R, eik, full bsmt, 2-car gar, 1.3 acres. \$48,500. Ext. 3372, 924-7637.

ROCKY POINT - Tide area, 3 bedrm ranch w/fin bsmt, 1/2 acre, prvt beach, near shopping center, many extras. Sam, Ext. 3911, 821-1810.

ROCKY POINT - 5 yr old ranch, 3 bedrms, L/R, D/R, eik, full bsmt, gar, walking distance to beach, assumable 9% mtg. \$39,000. Ext. 2621, 744-8334.

SELDEN - mother/daughter ranch, 4 bedrms. \$27,000. Ext. 2534, 732-2460.

SHOREHAM - 3 bedrms, 1 1/2 baths, 2-car gar, full bsmt + 1 rm, fp, gas heat, a/c, L/R, fam rm, hall w/w, fenced-in yard, 1/2 acre. \$43,900. Ext. 4829, 744-0007.

MILLER PLACE - immac 4 bedrm colonial, L/R, w/fp, formal D/R, fam rm, 1 1/2 baths, full bsmt, 2-car gar, flagstone patio, wooded, prestigious area. \$51,900. Ext. 3305, 734-5527.

BELLPORT - 3 bedrm ranch, L/R-D/R combo, 1 bath, att 1-car gar, lg bsmt, near schools, corner lot, assumable mtg. \$38,000. Ext. 4446, 286-0925.

HOLTSVILLE - condo, transferred, must sell, 2 bedrm Townhouse, a/c, DW, W&D, new w/w, economical gas heat, mint cond. \$26,990. Ext. 2876, 654-3175.

ST. JAMES - Head-of-the-Harbor, 5 bedrm, 2-story older home, 2 1/2 baths, 3 fp, forma D/R, 1 1/2 secluded acres lg flr & veg gardens. \$62,000. Ext. 3404, 584-5685.

N. SHIRLEY - mother/daughter hi-ranch, 4 bedrms, L/R, den, patio, landscaped 1/2 acre, fenced, s/s, carpeting, fp, oven stove. \$39,500. Ext. 3696, 878-9022.

SETAUKET - 3 bedrms, 2 baths, ranch, lg eik, fp, central air, full bsmt, 1/2 acre w/harbor view, s/s, w/w, 2-car gar. \$75,900; also willing to rent. Ric, Ext. 2266, 689-9210 eves.

YAPHANK - 3 bedrm ranch, full bsmt, fully insulated, 3 mi from Lab, has sm machine shop in bsmt. Ext. 3084, 924-6895.

SETAUKET - N/25A, 4 bedrms, 2-car gar, 2 baths, L/R & fam rm ea w/fp, D/R, 1/2 acre landscaped. \$70,000 firm. Ext. 2337, 751-1283.

MASTIC ACRES - 6 rms, full bsmt, baseboard heat, usable attic, 1/4 acre. Ext. 2547, 281-5498.

For Rent

MASTIC BEACH - furn rm for quiet male, 10 min from Lab. \$35/wk includes linens, towels, kit & yard privileges. Ext. 3651, 399-4692.

SOUND BEACH - 1 bedrm furn apt, clean, avail mid-Aug, all util incl. \$300. Ext. 2926, 281-0268.

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

SOUND BEACH - 5 rm apt (house), quiet community, util incl. \$350. Rich, Ext. 4308, 665-6189.

BROOKHAVEN HAMLET - sm 3 rm cottage for rent July, Aug & Sept. Ext. 3489, 286-0972 after 4.

BLUE POINT - bulkhead canal front, 2 bedrm house, sitting rm w/balcony overlooking bay, 1 1/2 baths, secluded area, big yard. \$450/mo. Beitel, Ext. 4223, 363-2101.

E. PATCHOGUE - 3 1/2 rm apt, prvt ent, util pd. Smol Ext. 4490, 475-1683.

PT JEFFERSON - house to rent for family Sept/Oct through Feb, or to individual to share same period or longer. Ext. 2412, 928-2954 eves.

SHOREHAM - contemporary ranch, 3 bedrms, 2 baths, 1 1/2 blocks from beach, prvt beach rights, avail Aug. \$450/mo. Ext. 2440, 929-8165.

HOLBROOK - rms for rent, about 15 min from Lab, nice quiet neighborhood, 2 rms to choose from. \$25 & \$40/wk. Ext. 2022, 588-8357 after 5

Wanted

ON-SITE RESIDENT - for day care of 8 yr old girl week of July 16-20. Ext. 4335 or 286-9458.

FISH TANK STAND - for tank w/base dimensions of 18x36. Dennis, Ext. 4259.

GOLF BAG - full size & in good cond. John, Ext. 4212, 878-8874.

HOTPLATE - Corningware ceramic. 473-5585.

OUTBOARD MOTOR - reliable 15-25 hp, w/tank. Ext. 2408, 472-1243 after 6.

VW FRONT AXLE TUBE ASSEMBLY - from Beetle 1967 thru 1972, to replace rotted 69 assembly. F. Kuehl, Ext. 4823, 588-2268.

STEP LADDER - 6' wooden. Rich, Ext. 3381.

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

1 BEDRM APT - near BNL, furn or unfurn. Ext. 4528.

TENT - 2-man w/rain flap. Ext. 2372, 928-2784.

BIKE - for 6-yr old child. Yosepha, Ext. 3403, 345-3079 eves.

FREEZER - of any type. 298-4093.

HOMES - for 3 playful kittens. S. Fiarman, Ext. 2925, 331-3445.

VIOLIN - used but good, 3/4 size, for 10-yr old. 751-3885 after 6.

RIDE - need ride to Boston on any weekend; share driving expenses, of course. S. Potter, Ext. 3552.

SITTER - for Pt Jeff Village 2-bedrm apt & 2 lovable cats, 8/12-8/25. 473-3193.

OSCILLOSCOPE - dc, in good cond. Jim, Ext. 3372.

SCALE - vegetable, 0-10 lb size. George, Ext. 4612.

FORD PICK-UP RIMS - 2 ea 16.5x6.75. Ext. 4688, 475-4557.

CAMPING EQUIPMENT - sleeping bags, mats, tent, lamp, gas, camp-cooler. Yosepha, Ext. 3403, 345-3079 eves.

PICNIC TABLE - about 6 ft w/separate benches. 928-5737 after 12:30.

Car Pools

SO. STATE PKWY - vicinity Exit 32. Plotkin, Ext. 4717; Blackmur, Ext. 4670.

MILLER PLACE AREA - person to share driving in car-pool. M. Kendig, Ext. 4420.

CORAM - ride wanted 9:30-6:00, will share expenses. Alan, Ext. 4367, 698-3347.