

Roger Stoutenburg

DAS Researchers Aim to Make Natural-Gas Vehicles More Marketable

At the National Synchrotron Light Source, James Wegrzyn, (foreground) Department of Applied Science, and Malcolm Capel, Biology, use small-angle x-ray diffraction to determine the pore structure of activated carbon adsorbents for possible solutions to problems of fuel storage in natural-gas vehicles.

By the year 2010, about 5 million natural-gas vehicles are expected to be on the road, according to U.S. Department of Energy (DOE) estimates. Today, only a tiny fraction of that number — some 30,000 — are in use.

"To make natural-gas vehicles more acceptable to the general public," said James Wegrzyn, Department of Applied Science (DAS), "their present driving range of 100 to 200 miles would have to be at least doubled. A new fuel storage system needs to be designed that holds more fuel under lower pressures — a space-saving and safety improvement. If the fuel-storage problem can be solved along with improvements in fuel-economy, then the natural-gas vehicle can become the car of the future."

Wegrzyn is managing a BNL program that is looking for a solution to the fuel-storage problem. BNL has signed a \$1.6 million, two-year contract with an international research

consortium, the Atlanta Gas Light Adsorbent Research Group, to develop a new, low-pressure fuel storage system for natural-gas vehicles. This research has been undertaken in response to several federal mandates, which require that an escalating percentage of fleet vehicles in the U.S. run on alternative fuels.

Also contributing to this research are C.R. Krishna, Tom Lee, Robert Sabatini and Harold Wiesmann, all from DAS; Malcolm Capel, Biology; Jessie Dearo, University of California, Santa Barbara; and Mark Nelkin, a former Cornell University professor who is a consultant in the project.

Natural-Gas Advantages

Natural-gas vehicles have environmental and economical advantages over those that are gasoline-powered. Provided that they are newly built rather than converted from gasoline-powered vehicles, natural-gas vehicles are cleaner-burning than the latter, so they are better for the environment. In fact, their exhaust emissions are lower than the stringent standards recently set in California.

Further, widespread use of natural-gas vehicles may help the nation's economy. According to DOE and the Energy Information Administration, the U.S. will consume more than 21 million barrels of petroleum daily by 2010, and the amount of imported petroleum is expected to almost double by that time. Since natural gas is abundant in the U.S., a five percent natural-gas fuel share of the transportation market could reduce the U.S. trade deficit by \$2 billion per year.

A Dual Approach

The goal of Brookhaven's natural gas research is to replace the currently used high-pressure, compressed-gas storage system with an adsorbent storage system that can hold

(continued on page 2)

Northrop Grumman Completes First 30 RHIC Dipoles

At the Northrop Grumman Corporation's Long Island facility in Bethpage, where superconducting magnets are being made for BNL's Relativistic Heavy Ion Collider (RHIC), management and technical staff celebrated the completion of Phase I, which called for the production of 30 dipole superconducting magnets. Not only was the 30th magnet delivered on September 30, as promised, but all 30 magnets exceeded performance specifications.

Attending the September 30 celebration, RHIC Project Head Satoshi Ozaki (front row, second from right) congratulated Northrop Grumman "on the excellent tooling, manufacturing expertise and superior workmanship demonstrated in the production of these magnets."

With the successful completion of Phase I, BNL has given Northrop Grumman the go-ahead for Phase II, which is the full-production phase of the contract awarded in 1992 to build 373 dipole magnets for RHIC.



DOE Recognizes Several BNLers for Trimming Their Wastes

Cleaning up pollution is a messy, expensive business, so it's no wonder that people are working to prevent it in the first place. The U.S. Department of Energy (DOE) has even started giving awards to employees at DOE facilities who come up with the most money-saving and effective ways to keep pollution out of the environment — and this year's winners include several BNLers.

Last May, BNL Pollution Prevention Coordinator George Goode traveled to Denver, where he accepted certificates of appreciation for Art Jens, Central Shops Division (CSD); Richard Skelton, Alternating Gradient Synchrotron (AGS) Department; and Roy McWilliams, Plant Engineering (PE) Division — all finalists in several categories of the national Pollution Prevention competition. Another nominee, John Scharpeger of the Supply & Materiel Division, made it to the next round and became a national runner-up in his category. All four were nominated by Associate Director for Reactor, Safety & Security M. Sue Davis.

What did these BNLers do to merit these awards?

Jens helped the Lab save more than \$95,000 per year in waste disposal, man-hours and purchasing by substituting a new cutting lubricant for one that required more cleaning and waste.

McWilliams, together with PE's Oscar Blevins, instituted a Labwide recycling program that saves Brookhaven \$51,000 in disposal costs each year and sends many tons of recyclable materials to be converted to new uses.

Skelton encouraged the AGS to replace toxic solvents with more "environmentally friendly" detergents, and played a key role in a radioactive waste segregation and characterization program that eases the disposal process.

And Scharpeger's ongoing efforts in "affirmative procurement" — buying goods for the Lab made from recycled materials — help close the "recycling loop."

Although the DOE awards do not carry a monetary reward, Goode reminds BNLers that pollution-prevention suggestions not made in fulfillment of employee's assigned duties can be accepted by the Employee Sug-

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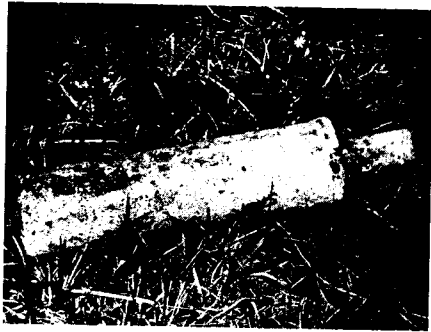
Roger Stoutenburg

At a gathering to present DOE Pollution Prevention Awards are: (back, from left) Pollution Prevention Coordinator George Goode; Oscar Blevins, Plant Engineering (PE) Division; finalist Roy McWilliams, PE, who shared his award with Blevins; (front, from left) finalist Richard Skelton, Alternating Gradient Synchrotron Department; M. Sue Davis, Associate Director for Reactor, Safety & Security, who nominated the BNLers; finalist Art Jens, Central Shops Division; and national runner-up John Scharpeger, Supply & Materiel Division.

A Dangerous Find Prompts Safety Warning for BNLeers

Yet another relic of the BNL site's military past surfaced last week when a still-live World War I or II ordnance was found by two employees strolling through the woods.

The discovery of the device, which was later destroyed off site by Suffolk County's police, has prompted the Lab's safety officials to tell employees and guests again about the safest way to deal with such finds: Stay away from unknown objects on the grounds, and call Ext. 2222 to alert emergency personnel.



What looked like a rusted muffler found in the BNL woods turned out to be a live munition.

On the evening of Tuesday, October 18, two employees of the Relativistic Heavy Ion Collider (RHIC) Project were walking in the woods near a RHIC construction area when they spotted a corroded, pipe-shaped object on the ground. Curious, they picked it up, carried it to their vehicle and drove it to Bldg. 835 to clean it. But when they uncovered what looked like a detonator on the pipe's end, they realized that the strange artifact might in fact be dangerous. They left the device near the building and, the next morning, called the Police Group of the Safeguards

& Security Division (S&SD) to report their find.

Their decision to alert authorities was proper, says Robert Casey of the Safety & Environmental Protection (SEP) Division. But, he emphasized, employees should never even touch unknown, old-looking devices that they come across anywhere on the Lab's grounds. "Be careful at all times," Casey said. "If you see interesting or different-looking items, be careful about them. You're better off to call attention to police or fire personnel to have it evaluated."

And, S&SD's Al Berretta added, the area where the object has been found should be marked with a stick or a rock to help authorities locate it later.

In the case of last week's incident, Berretta said, S&SD personnel responded to the employees' call immediately. After a Police Group lieutenant trained in armament identification confirmed that the device carried a detonator, the area was roped off by SEP's Fire/Rescue Group and the Suffolk County Police bomb squad was called in.

Then, the device was taken to the county's detonation facility in Westhampton, where a charge was attached to it and detonated. Although that explosion destroyed the device, Berretta said, a secondary explosion indicated that the corroded pipe had indeed been a live munition.

In the wake of the incident, Berretta reminded BNLeers and contractors that

construction areas are especially likely to contain remnants of military equipment left over from the U.S. Army's Camp Upton, which formerly occupied the Lab site. A safety bulletin on the subject will again be sent to all employees and guests, Casey added. Additional copies can be obtained by calling the SEP Training Group at Ext. 7368.

— Kara Villamil



Emergency personnel from BNL and Suffolk County cordoned off the area surrounding the device, which was later safely detonated off site.

Trimming Wastes

(cont'd)

gestion Program. And, such suggestions may pay 10 percent of the Lab's savings back to the suggestor. In other

words, if you help trim BNL's waste as the award winners did, you may find your wallet getting just a little fatter.

— Kara Villamil

Learn How to Prevent Pollution

Concerned about hazardous chemicals and materials in your laboratory? Want to learn how to reduce the amount of hazardous waste you create? Sign up for an upcoming workshop on "Pollution Prevention Opportunities in a Laboratory Setting," to be held in Berkner Hall on November 10, from 10 a.m. to 4:45 p.m.

Top experts in microscale chemistry procedures, waste reduction and radioactive waste minimization will offer their expertise to researchers from BNL, hospitals and universities, as well as to local teachers and industrial scientists. Participation in the U.S. Department of Energy-sponsored workshop is free. To register, contact Nicole Bernholz at Ext. 2027 or e-mail bernholz@bnl.gov.

Natural-Gas Vehicles

(cont'd)

a similar amount of fuel, but at lower pressures. A low-pressure tank is safer than a high-pressure one because it is less likely to rupture, for instance, in a vehicle collision.

"This research involves a two-pronged approach," said Wegrzyn. "First, we are studying the structure of carbon adsorbents — high surface-area materials that can store a significant amount of gas in their micropores, tiny spaces less than five molecular diameters thick. Using these adsorbents would allow greater fuel storage at lower pressure."

He continued, "Also, because of the lower operating pressure, we're investigating the feasibility of replacing the conventional cylindrical-shaped natural-gas tank with a flat or conformably shaped tank that matches the contour of the vehicle."

Under otherwise similar conditions, more natural-gas can be stored under high pressure than low pressure. But if carbon adsorbents are added to the storage tank, they adsorb gas molecules much like a sponge soaks up water. Each gram of the material has a surface area up to 2,500 square meters — the equivalent area of a football field. This large surface area creates micropores, which permit natural gas to be stored at lower pressures.

Brookhaven researchers have been characterizing the structures of carbon adsorbents to determine which one would

do the job best. Last year they evaluated a dozen carbon adsorbents submitted by industry using small angle x-ray diffraction at beam line X12 at the National Synchrotron Light Source, as well as other standard laboratory techniques such as electron and x-ray diffraction.

"So far, the carbon adsorbents submitted by Allied Signal, Atlanta Gas Light and Westvaco have proven to be the best for natural-gas storage in terms of the amount that can be stored under low pressure and price," Wegrzyn said. "Besides wanting to reduce storage pressure by a factor of six, we also have to keep the natural-gas vehicle affordable — about the same price as gasoline-powered vehicles. Natural gas, as a fuel, is already cost-competitive with gasoline."

Wanted: Storage Tank Designs

Traditionally, natural-gas tanks are cylindrical, but substituting a larger noncylindrical tank that fits the contour of the vehicle is one way to increase the driving range. Calculations show that 40 percent of a current natural-gas-powered vehicle's storage space is wasted with a cylindrical-shaped tank. Thus, Brookhaven is soliciting proposals from industry for a new design for natural-gas tanks. To be considered, the design must conform to the vehicle's available storage space and make better use of so-called dead space. Further, the tank's cost must not exceed \$1,000. BNL researchers will evaluate proposals, with the aim of choosing the best for

'94 Recycling: Terrific Tonnage, In Just 9 Months

The calendar year isn't over yet, but already, the organizers of BNL's recycling program are thanking the Lab community for doing a great job at separating and sorting recyclable items.

During the first nine months of 1994, 583.9 metric tons of material were sent to be recycled, instead of to be added to the landfill. In metric tons, item totals were as follows:

- Construction Debris — 311.9
- Bottles & Cans — 16.4
- White Paper — 88.3
- Mixed Paper — 87.0
- Cardboard — 55.9
- Tires — 24.4

Recycling Coordinator Oscar Blevins, Plant Engineering Division, encouraged all BNLeers to keep up the good work in "rethinking, reducing, and recycling." And when the calendar year ends, remember to add to 1994's recycling total: Recycle your calendar!

commercialization.

According to Wegrzyn, the current cylindrical storage systems are suitable for fleet market applications in which the driving range is known and less than 200 miles. To be viable in the noncommercial vehicle market, the driving range would have to be doubled to 400 miles. To reach this higher range, fuel economy has to be improved, along with the storage system.

The Partnership for the Next Generation Vehicle, a collaboration between the federal government and a consortium of the "big three" U.S. car manufacturers — Chrysler, Ford and General Motors — was put into effect by an executive order last year to further research for achieving a threefold-better fuel economy. To make natural gas the fuel of choice for this car of the future, BNL is working on the storage problem under this federal initiative.

— Diane Greenberg

In Memoriam

Harold Hill Smith, a senior geneticist in the Biology Department from 1955 until his retirement in 1978, died on October 19 at the age of 84.

Smith was a world-renowned geneticist who used tobacco plants to study the genetic basis of tumor formation. His wide-ranging interests



also led him to use plant systems to investigate the effects of radiation and the basic principles of evolution.

In 1976, Smith headed a team of researchers in the Biology Department that successfully fused a human cell with a tobacco plant cell, combining widely differing genetic systems for the first time. The paper describing the unique demonstration made the cover of *Science*. In all, Smith had published 125 scientific papers and was the editor of several scientific publications.

Smith received his master's and doctoral degrees in genetics from Harvard University in 1934 and 1936, respectively. From 1936-43, he worked as a plant geneticist for the U.S. Department of Agriculture. He served in the Navy during World War II, and, from 1946-56, was a professor of plant genetics at Cornell University.

"Harold Smith's pioneering work formed the basis for modern plant breeding and biotechnology," said Biology Department Chairman William Studier. "On a personal note, he was a real gentleman and we all enjoyed having him as a colleague."

A resident of Shoreham, Smith is survived by a son, Frederick, of Anaheim, California; three daughters, Lucy Keane of Mount Sinai, New York, Hilda Hodges of Santa Cruz, California, and Susan Graham of State College, Pennsylvania; seven grandchildren, three step-grandchildren and three step-great-grandchildren.

Donations in Smith's name may be sent to the Alzheimer's Association, Nassau-Suffolk Counties Chapter, 579 Monroe Street, Cedarhurst, NY 11516.

In Concert

The Fox Family Bluegrass will return to Berkner Hall on Friday, November 4, at 8 p.m.

Tickets cost \$8 each for adults and \$5 each for children under 12, students and senior citizens. Purchase them at the BERA Sales Office, at the door, or in advance from: Kay Dellimore, Bldg. 185, Ext. 2873; April Donegain, Bldg. 134A, Ext. 2459; Andrea Epple, Bldg. 535A, Ext. 4424; Skelly Frei, Bldg. 750, Ext. 2760; August Hoffmann, Bldg. 510C, Ext. 3884; Elliott Levitt, Bldg. 134, Ext. 2495; Louis Nieves, Bldg. 179B, Ext. 4031; Rosalie Piccione, Bldg. 355, Ext. 3160; Bridget Ramos, Bldg. 197C, Ext. 3452; Ed Sperry IV, Bldg. 902A, Ext. 2697; or Arlene Wolochuk, Bldg. 902C, Ext. 3428.

BERA's Indo-American Association will sponsor a concert by Tejendra Narayan Majumdar, a classical musician from India who plays a stringed instrument known as the sarod, in Berkner Hall on Saturday, November 5, at 7:30 p.m. Tickets are \$15 for adults and free for children under 12. Purchase them at the door or in advance from Hasna Khan, Ext. 7028, or Mahbub Khandaker, Ext. 7249.

The next BERA concert of the 1994-95 season will feature a performance by promising music students from the State University of New York at Stony Brook. It will be held in Berkner Hall on Wednesday, November 9, at 8 p.m., and a \$6 donation is suggested.

Bash Sold Out!

Tickets for the Halloween Big Band Bash tonight, October 28, have been sold out. The BNL Ballroom, Latin & Swing Dance Club will buy back any tickets you may not be able to use and resell them to people now on the waiting list. If you have tickets to sell, call Rudy Alforque, Ext. 4733.

Hospitality News

M. Kay Dellimore, BNL's Recreation Supervisor in the Personnel Division, will be the guest speaker at the next Hospitality Committee get-together on Tuesday, November 1, at 9:30 a.m., in the lounge of the Recreation Building in the apartment area. She will talk about some interesting things to see and places to visit in New York City.

Spouses of Lab employees and guests are welcome. Bring the children along with a toy or two. Coffee, tea and cookies will be served.

Rockhaven National Slab Haunted by Flintstones?

No, this isn't a picture from the Stone Age — it was only last year at this time that the costumed caperers in the photo at right rocked BNL's Halloween in their Flintstones' costumes as part of an annual tradition. But don't start taking them for granite; the group has slated a new, secret disguise for this year, one that they say will be much boulder and scarier than the gneiss Bedrock residents. However, they won't cave in to the Bulletin's enquirers and divulge it. When shale the group take vacation time to make this Halloween's rounds of selected offices and the Cafeteria? Monday, Rocktober 31, of quartz! In the meantime, meet the Flintstones of 1993, all Department of Advanced Technology employees: (back, from left) Ann Fort as Fred; Kathleen Nasta as Wilma; Jeanne Madaia as Betty; Sonja Santos as Barney; and (front) Patty Ennis as Pebbles, with Dino.



Roger Stoutenburgh

Ghouls & Boos Together

What is Halloween about, after all, but kids, costumes, and candy? The cute little goblins at left were captured on film last Halloween at the Upton Nursery School, where teacher Alane Fleming (back row) encourages her three- and four-year-old charges to dress in their trick-or-treating costumes each year. The nursery school, a parents' cooperative that meets Mondays, Tuesdays and Thursdays, still has eight openings for ghouls and boos. Call Jane Throwe, 929-8513, or Elizabeth Shane, 744-2438, for more information.

AUI Auctioning Station Wagon

A used station wagon owned by Associated Universities, Inc. (AUI), is being offered for auction to current AUI and BNL employees or retirees, permanent contractor employees with guest numbers and on-site personnel of the U.S. Department of Energy.

The vehicle is a 1987 Chevrolet Caprice nine-passenger station wagon, vehicle identification number 1G1BN81Y4HX217835, with 77,991 miles. The car may be seen in the parking lot on the northeast corner of Brookhaven Avenue and Center Street, Monday to Friday, October 31 to November 4, 8:30 a.m. to 5 p.m.

Bidders may not start or drive the vehicle, but it is in running condition, and full maintenance records are in the Transportation Office, Bldg. 179B.

The minimum bid is \$3,000 and bids must be submitted to the BNL Cashier, Bldg. 134, by the end of the day on Friday, November 4. The successful high bidder will be notified by Thursday, November 10.

Only sealed bids submitted on an official form or photocopy will be considered. For bidding forms, complete auction rules or more information, contact the Transportation Office, Bldg. 179B, Ext. 2535.

Note to Employees:

Attendance at lectures, meetings and other special programs held during normal working hours is subject to supervisory concurrence.

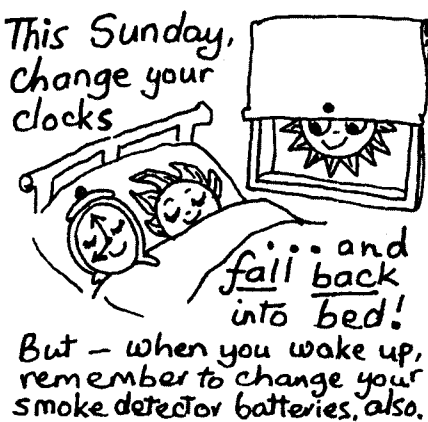
Volleyball

Standings as of October 25

Open League		League 1	
Men and Me	8-1	Rude Dogs	3-0
GTEAM	4-2	Underdogs	2-1
Farside	3-3	Network News	2-1
The Roofing Co.	2-4	Koopas	1-2
Bud Men	1-8	Safe Sets	1-5
League 2		League 3	
Fossils	6-0	Silver Bullets	3-0
Jolly Veggies	4-2	Take Five	3-0
Mon. Night Live	4-2	Do Dat	2-1
Safe Sets II	4-2	High Volley'em	2-1
Spiked Punch	3-3	Harlem Knights	1-2
Net Wits	1-5	Bonnie's Bombers	1-2
Nuts & Bolts	1-5	Upton Ups	0-3
Night Court	1-5	For Play	0-3

Addled Addresses

- Upton Lake, NY 12514
- Brookhaven Natural Gas
- JFK Airport New York Receiving Section, Bldg. 89 Upton, NY 11973
- Luke Haven Laborator



Quit Smoking Once and For All

Combine the power of hypnosis with standard behavior-modification techniques — and you may quit smoking after just one session of the Green Seminar.

On Monday, November 7, from 4:30 to 6:30 p.m. in the Brookhaven Center, the Green Seminar will be offered to all employees and their dependents who wish to kick the smoking habit without gaining weight. To be presented by Stuart Green, the president of GSI, a New York company specializing in wellness programs, the one-session program will cost \$10 per person for new attendees; it's free for those who have attended before.

Participants will receive an audio-tape and written material for use at home, to reinforce what was presented at the seminar. To reserve a place, call Mary Wood, Ext. 5923.

Arrivals & Departures

Arrivals	
Robert S. Lieberman	SEP
Departures	
None	

Cafeteria Menu

Monday, October 31	
Soup: Beef barley	90/1.20
A la Carte: Kielbasa w/potato salad	3.85
Fitness: Vegetarian lasagna	3.50
Deli: Pastrami	3.20
Grill: Philly cheesesteak	3.30
Tuesday, November 1	
Soup: Chicken noodle	90/1.20
A la Carte: Sausage & pepper calzone	3.50
Fitness: Macaroni & cheese	3.65
Deli: Virginia ham	3.20
Grill: Denver omelet	3.30
Wednesday, November 2	
Soup: Sausage/tortellini minestrone	90/1.20
A la Carte: BBQ spareribs	4.25
Fitness: Spinach & feta quiche	3.65
Deli: Roast beef	3.20
Grill: Meatball hero	3.30
Thursday, November 3	
Soup: Senate bean	90/1.20
A la Carte: Bonnie's chicken	3.85
Fitness: Pork chops	3.85
Deli: Corned beef	3.20
Grill: Grilled ham & cheese	3.30
Friday, November 4	
Soup: New England clam chowder	90/1.20
Display cooking: Grilled chicken Caesar	4.65
Fitness: Pasta primavera	3.65
Deli: Roast turkey	3.20
Grill: Tuna melt	3.30

CCD Offers UNIX Training

Several UNIX-based classes will be offered by the Computing & Communications Division starting in December. To register for one or more classes, send an ILR for the appropriate amount to Pam Mansfield, Bldg. 515, one month prior to the beginning of each selected class. For more information, contact Ed McFadden, Ext. 4188, or e-mail, mcfadde1@bnl.gov.

Course Title	Date	Time	Fee
Advanced C++ Programming	Dec. 5-9	9 a.m.- 4:30 p.m.	\$500
Introduction to UNIX	Dec. 12-16	9 a.m.- noon	\$250
C Shell Programming	Dec. 12-16	1 p.m.- 4:30 p.m.	\$250
Advanced C Programming	Jan. 9-13	9 a.m.- 4:30 p.m.	\$500
UNIX LAN Connectivity	Jan. 23-24	9 a.m.- noon	\$250
PERL Programming	Jan. 23-24	1 p.m.- 4:30 p.m.	\$250
Solaris Internals	Feb. 6-10	9 a.m.- 4:30 p.m.	\$500

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