

New Biocatalysts Help Extract, Purify Heavy Crude Oil; BNL Patents Licensed Exclusively to LI Company

Tiny, naturally occurring bacteria, used in a new technology invented and patented by Eugene Premuzic and Mow Lin, Department of Applied Science (DAS), and licensed exclusively to BioCat of Setauket may solve two problems in the oil industry.

First, special bacterial biocatalysts used in this technology can be injected directly into oil wells to help break down the 60 percent of crude oil reserves which is left in the ground using conventional extraction techniques. The crude is then more easily recovered.

This form of microbially enhanced oil recovery could soon get its first test in China, in one of the world's largest oil fields.

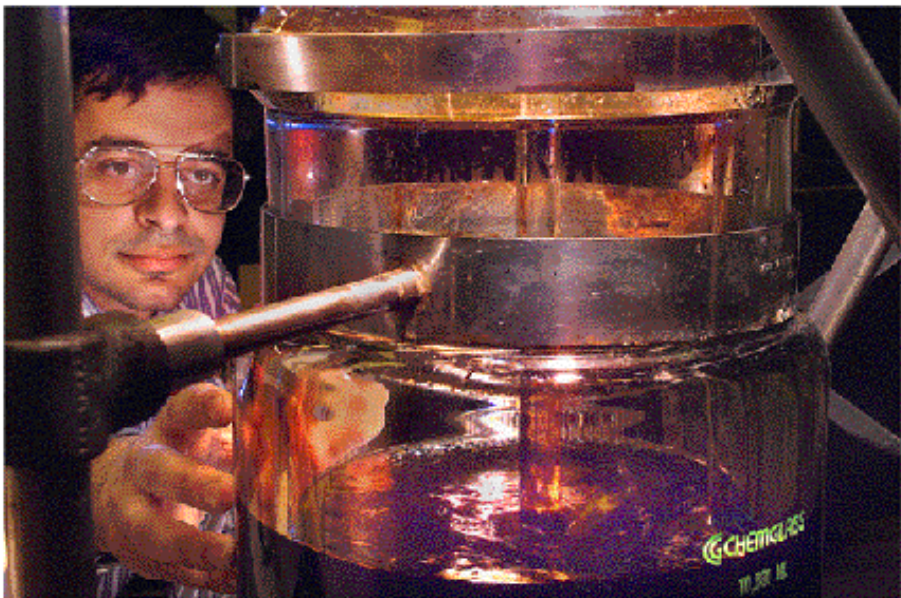
Also, the new biocatalysts have been shown to remove up to half of the impurities, such as sulfur, nitrogen and heavy metals, from crude oil before or after it is removed from the ground. With this treatment, crude oil could be used that is now too heavy and too impure to refine easily into clean-burning fuel.

In either application, the biocatalysts improve crude oil's physical and chemical properties, increasing its commercial value and reducing emissions when the refined crude is used as fuel.

Because of these advantages, such major oil companies as Chevron, Shell and Texaco are working with BioCat to complement a current BNL program to develop this technology for industrial use.

Said Premuzic, "This approach holds the key to the cost-effective recovery of even the heaviest crudes, which make up over 60 percent of the world's known oil reserves but which are now trapped below the surface and are difficult and costly to recover by conventional methods."

"This approach looks beyond the short term to meet the long-term strategic needs of the nation and the world. Oil resources once deemed out of practical reach will now be made available for processing so that the resulting



Mike Bohenek, DAS, is seen with BioCat's optimized reaction vessel for bacterial crude-oil biocatalyst research.

fuels will burn more cleanly," added Phil Palmedo of BioCat, a technology-based oil-industry service corporation which was established in 1996. BioCat has exclusively licensed all five of the (continued on page 2)

DOE Assistant Secretary, Deputy Visit BNL

To learn about the Lab's long-established work on the nonproliferation of nuclear, chemical and biological materials, and on the safeguarding of nuclear materials, Rose Gottemoeller, who has the new position of DOE Assistant Secretary of Energy for Nonproliferation & National Security (N&NS), and Kenneth Baker, N&NS Principal Deputy Assistant Secretary, visited BNL on April 7 to speak with members of the Department of Advanced Technology (DAT) and Biology Department. Among the programs discussed at DAT were the BNL-developed technologies: CIVET (Controlled Intrusiveness Verification Technology), which can be used to verify warhead dismantlement; and the mini-Raman Lidar system for noncontact detection and identification of chemicals and chemical agents. Gottemoeller and Baker also became better acquainted with BNL support for the DOE Materials Protection Control & Accountability Program designed to enhance safeguards on nuclear materials in the former Soviet Union. In addition, the visitors talked with Biology scientists about a program under way using protein crystallography to determine the structures of bacterial toxins and virulence factors that may be used as agents for biological warfare and domestic terrorism — information that will reveal the mechanisms by which toxins work, providing a pathway to the development of antidotes and vaccines.

— Liz Seubert



Among those who welcomed Rose Gottemoeller (center), DOE Assistant Secretary of Energy for Nonproliferation and National Security (N&NS), and Kenneth Baker (front, fifth from left), N&NS Principal Deputy Assistant Secretary, to BNL and joined in the talks are: (front, from right) Adrian Roberts, former BNL Associate Laboratory Director, Applied Science & Technology (AS&T); Richard Diem, safeguards & security specialist, DOE Brookhaven Group (BHG); George Malosh, BHG Manager; (sixth from left) Joseph Indusi, DAT's Global Security Division (GSD) Head; Steven Centore, BHG emergency planning specialist; Carl Anderson, BNL Biology Chair-elect; (back, from left) Robert Bari, Interim Associate Laboratory Director, AS&T; Paul Freimuth, Biology; and Peter Vanier, GSD Deputy Head.

BNL Again Reports to DOE Chicago Operations

As of Monday, May 3, BNL again began reporting to the Chicago Operations Office, a relationship that has not existed since 1997.

On Wednesday, April 21, Secretary of Energy Bill Richardson announced changes to DOE's organization and management structure to eliminate multiple reporting channels and improve communication throughout the DOE complex.

The reestablishment of the relationship between Chicago and DOE's Brookhaven Group (BHG), and, thereby, BNL, is one of these changes.

Each of DOE's major operations and field offices will now directly report to one of three headquarters program offices. BHG will once again report to the Chicago Operations Office, which, along with the Oakland and Oak Ridge Operations Offices, will report directly to Headquarter's Office of Science, headed by Martha Krebs.

"This is a very positive step for the Department," said George Malosh, manager of DOE's Brookhaven Group. "The restructuring better defines authority and accountability from Headquarters, through operations and field offices, all the way to national laboratories."

Since the 1997 termination of the Associated Universities, Inc., contract, Brookhaven and BHG have been reporting directly to the Office of Science. According to Lab Director John Marburger, the change signals a "normalizing" of relations with DOE.

"This change reestablishes an important relationship for the Laboratory, and clarifies our communication pathway as well," said Marburger. "We welcome it."

Headquarters program offices, like the Office of Science, will be responsible for site integration and operations, while field managers, like the Chicago Operations Office, will be responsible for day-to-day site program execution, operations, and contract management.

Previously, DOE's field offices reported to a single office in headquarters and to various program offices on mission activities. According to DOE, policy offices at headquarters sent policy initiatives directly to field and contractor sites rather than through the program offices responsible for funding decisions and budget allocations. These multiple reporting relationships created confusion as to overall responsibility for operations and for funding safety and health, maintenance and other activities.

In February, Secretary Richardson asked senior DOE executives to reexamine these relationships, interview key people in and outside of the department, and make recommendations. These changes, announced April 21, result from that review.

For more information on the reporting-structure changes, go to home.doe.gov/news/releases99/aprpr/pr99089.htm on the World Wide Web.

— Pete Genzer

Coming Up

The National Synchrotron Light Source Annual Users' Meeting & Workshops will be held Monday to Wednesday, May 24-26, in Berkner Hall.

On Tuesday, May 25, John Norvell, Assistant Director of the National Institute of General Medical Sciences, National Institutes of Health (NIH), will give the keynote address, "NIH Involvement in Synchrotron Science and Structural Genomics," at 1:50 p.m.

Then, at 3:55 p.m., Kwang-Je Kim, Associate Division Director of Research, Advanced Photon Source, Argonne National Laboratory, will give a scientific highlight address on "Towards Coherent 1-Angstrom Radiation Via High-Gain Free Electron Lasers."

The meeting's full agenda is on the World Wide Web at www.nsls.bnl.gov/Intro/usrmtg/meet99.htm.

BNL Awards Gertrude S. Goldhaber Prize

In a ceremony held in the Physics Department seminar room on March 29, Angelika Osanna (in picture at right, second from left) received the 1999 Gertrude S. Goldhaber Prize. Administered by Brookhaven Women in Science (BWIS), the \$1,000 prize is awarded annually in memory of the late Gertrude Scharff-Goldhaber, whose image is seen projected on the wall. A renowned nuclear physicist, Scharff-Goldhaber was the Lab's first woman Ph.D. The prize recognizes substantial promise and accomplishment by a woman graduate student in physics who is either enrolled at the State University of New York at Stony Brook (USB) or is performing thesis research at BNL. At the ceremony, Osanna, who expects to earn her Ph.D. this summer, met with Maurice Goldhaber (second from right), who is also a renowned nuclear physicist, was the Lab's third Director and was Scharff-Goldhaber's husband. Osanna did most of her research as a graduate student at BNL's National Synchrotron Light Source, and after the ceremony, she presented a seminar on her work, entitled "Soft X-Ray Spectromicroscopy With a Cryo Scanning Transmission X-Ray Microscope." Among those on hand to congratulate Osanna were Lab employees and BWIS board members Pamela Mansfield (left) and Dorry Tooker (right), and Chris Jacobsen, Osanna's advisor and a USB associate professor of physics.

BERA Indo-American Association Classic Indian Concert on Mother's Day

This Mother's Day, Sunday, May 9, a rare treat for music lovers will be offered by the BERA Indo-American Association: a concert of classical Indian Carnatic music by violin maestro "Sangeet Choodamani" Lalgudi Krishnan, accompanied by musician Balachandar, who will be playing the mridangam, which is a type of percussion special to South India.

The concert will be held from 1:30 to 4:30 p.m. at Berkner Hall. Admission for members is \$9, for nonmembers, \$10. Children under 18 years may enter free. For tickets and information contact Srinivasan Iyer, Ext. 7655; Achyut Topé, Ext. 5672; or Dhruba Ghimiray, Ext. 5702.

Plant Trees on Site May 17 & 18

Many more trees will be growing at BNL after Monday and Tuesday, May 17 & 18, when BNLeers are invited to plant trees, provided by the environmental organization Global ReLeaf, on site from 4 p.m. onward. In addition to the trees, only a few shovels will be provided, so BNLeers who volunteer are asked to bring their own shovels, work gloves, plastic buckets, tick repellent, family members, and plenty of muscle.

For more information and to register, call Elaine Lowenstein, Community Relations Office, Ext. 2400.

Biocatalysts (cont'd)

BNL patents and various patent applications relating to the process.

Making Heavy Crude Usable

Crude oil is a dense, dark fluid containing many varieties of complex hydrocarbon molecules, along with organic impurities containing sulfur, nitrogen, and heavy metals. The hydrocarbons are the raw material for the entire petroleum industry, providing the basis for everything from gasoline to plastic.

Different grades of oil range from heavy oil, with high concentrations of large hydrocarbon molecules, to lighter crude, with smaller hydrocarbons.

The heavier a crude oil is, the more difficult and expensive it is to extract and purify into products. Also, new air-pollution regulations have further restricted the amount of impurities, such as sulfur, that can remain in

petroleum products used as fuel. Oil companies have therefore focused on bringing up the lighter oil.

However, industry predictions show that the supply of light crudes is dwindling. In fact, most of the Western Hemisphere's remaining oil is heavy crude; as a result, there is a strong incentive to find new ways to extract and use it.

Knowing this, BNL scientists have worked for several years to develop bacterial biocatalysts that can withstand the extreme temperature, pressure and harsh conditions of oil wells while chemically and physically altering crude oil.

This research has been supported largely by DOE's Office of Fossil Energy, including its National Petroleum Technology Office in Oklahoma. Also, the Petroleum Industry Research Association has acted as a valuable consultant to the project.

The BioCat biocatalysts are based



Michael Herbert

Farmers' Market

Baked goods and much more are available at the BNL Farmers' Market, now back in its every-Wednesday place on the grass near the parking lot of Berkner Hall. Come and check out what's on the market.

Service Awards

The following employees celebrated service anniversaries during April:

40 Years	
Dennis D. Greenberg	Medical
35 Years	
Raymond H. Mayo	Plant Eng.
Jack Van't Hof	Biology
30 Years	
Georgia L. Irving	Budget
Cornelius Jackson	Info. Services
25 Years	
Doris M. Alkes	Info. Services
Edward J. Brosnan ...	Info. Technology
William Marin	Info. Services
20 Years	
Selestine E. Brown	Adm. Support
Philip M. Cerniglia	RHIC
Natalie I. Feng	Biology
Donna M. Grabowski	Instrumen.
Francis X. Karl	AGS
Anthony Lenhard	NSLS
Robert M. Medina	Plant Eng.
Charles E. Pearson	AGS
William V. Rabatin	Emerg. Services
Louis R. Russo	AGS
John Tighe	Fin. Services
Arlean Van Slyke	S&H Services
Sharon Zuhoski	Applied Science
10 Years	
Patrick D. Borello	Instrumen.
Bryce D. Breitenstein	OMC
Thomas A. Daniels	Reactor
Dane M. De Fio	Plant Eng.
Patricia Durcan	Budget
Daniel J. Errante	Waste Management
S. John Gatley	Medical
William L. Gildersleeve	Plant Eng.
Manuel C. Grau	RHIC
Mary Lynn Heinrich	Budget
Peter A. La Salla	Safeguards & Sec.
Paul A. Lang	Reactor
James E. Leskowitz	AGS
Lori A. Malachowsky	Medical
John T. Morris	AGS
Steven T. Mulhall	RHIC
Joy L. Sandberg	OMC
Hal E. Van Deroef	RHIC

10 Years	
Patrick D. Borello	Instrumen.
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Thomas A. Daniels	Reactor
Dane M. De Fio	Plant Eng.
Patricia Durcan	Budget
Daniel J. Errante	Waste Management
S. John Gatley	Medical
William L. Gildersleeve	Plant Eng.
Manuel C. Grau	RHIC
Mary Lynn Heinrich	Budget
Peter A. La Salla	Safeguards & Sec.
Paul A. Lang	Reactor
James E. Leskowitz	AGS
Lori A. Malachowsky	Medical
John T. Morris	AGS
Steven T. Mulhall	RHIC
Joy L. Sandberg	OMC
Hal E. Van Deroef	RHIC

Arrivals & Departures

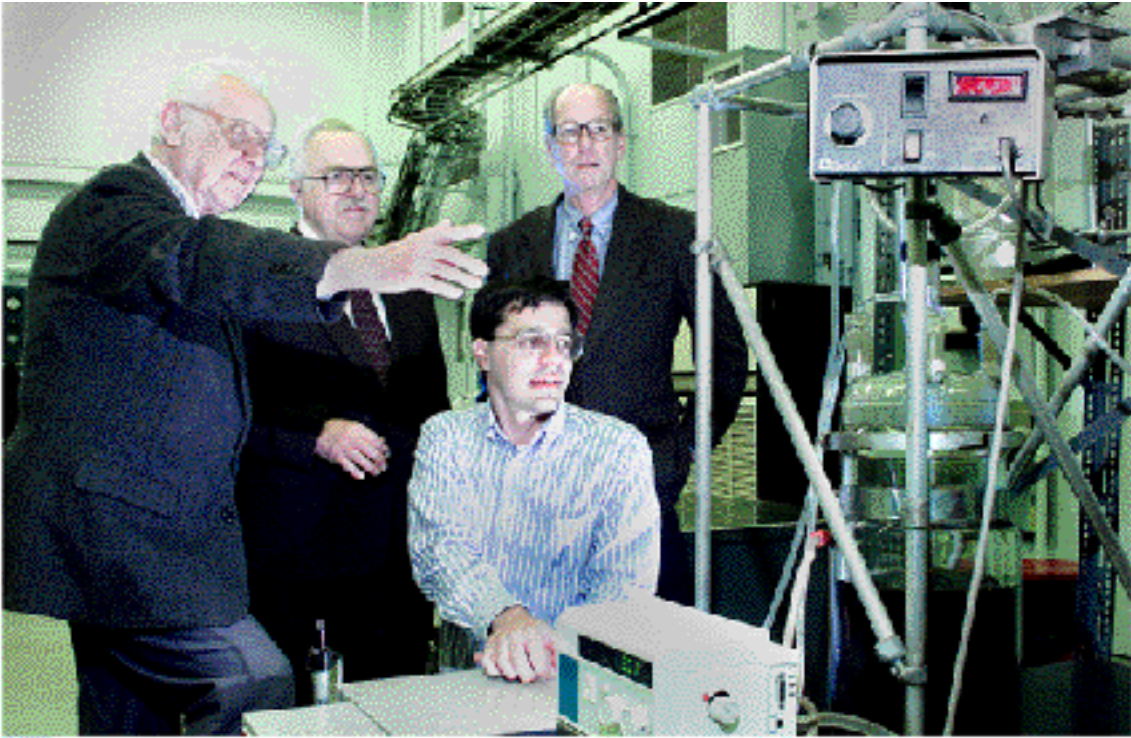
Arrivals	
Gina A. Bianco	Financial Serv.
Noel D. Blackburn	Environ. Res.
Diane F. Kinney ...	Waste Management
Ramon R. Miranda	Biology
Departures	
Zhi-Xiong Cai	App. Science
James Cardinal	Plant Eng.
Isabell Harrity	Physics
Clarence A. Hicks	Plant Eng.
Robert G. Lynn	Central Shops
Lynn C. McBrien	NSLS
Diana L. Toledo	Biology

on bacterial strains called extremophiles because of their ability to thrive in extreme conditions. These strains are capable of converting heavy hydrocarbons to cleaner feedstocks. Lab-scale tests have shown they reduce organic sulfur and nitrogen concentrations by up to 40 percent, and the concentration of metals by up to 50 percent. Thus, besides enhancing the overall efficiency of the refining process, the results of these biocatalysts may reduce factors that contribute to global climate change.

Under controlled conditions, the biocatalysts can be adapted to work on different forms of crude oil, whether from California, Mexico, Venezuela, Saudi Arabia, or Canada. The patented process involves gradual adaptive changes under experimental conditions, rather than genetic manipulation of the original bacterial strains.

— Kara Villamil with Liz Seubert

In front of the prototype BioCat equipment are: (back, from left) co-inventor and patent-holder Eugene Premuzic, DAS, Axel Johnson and Phil Palmedo, both of BioCat, and (front), BNL research team member Mike Bohenek, DAS. Not present are co-inventor and patent-holder Mow Lin, DAS, and DAS research team members Geeta Joshi-Tope, Ludmila Shelenkova, Richard Wilke and Wei Min Zhou.



Roger Stontenburgh

Battelle, BWIS Start Female Student Award

To encourage more young women to pursue careers in science and mathematics, Battelle and Brookhaven Women in Science (BWIS) have established an annual Battelle & Brookhaven Women in Science Award. At a ceremony in June, five awards of \$1,000 will be presented to five female high school students who a strong interest and aptitude for science or mathematics. Each student will come from one of five school districts — Longwood, Riverhead, William Floyd, Shoreham-Wading River and Eastport/South Manor — and will be selected from the 1999 graduating class by the principal of each high school within that district. Each school will be given a plaque, which will be updated annually with the most recent winners' names.

Battelle is the nonprofit applied science and technology company that, together with the Research Foundation of the State University of New York (SUNY) for SUNY at Stony Brook, formed BSA to manage BNL under contract with DOE. BWIS is a not-for-profit organization at Brookhaven Lab that promotes the advancement of women in the scientific professions. Children of Brookhaven National Laboratory employees are not eligible for this award.



Lab employees and BWIS board members Pam Mansfield (left) and Dorry Tooker, who is holding the check issued by Battelle for the scholarship funds, thank Adrian Roberts, former BNL Associate Laboratory Director, Applied Science & Technology, for securing the funding for the award from Battelle.

Volleyball Party

The annual Volleyball League party will be on Saturday, May 15, featuring open play at the gym 10 a.m.-1 p.m., outdoor play at the gazebo 2-6 p.m, and buffet and soda. No alcohol will be served. Tickets at \$5 a person are on sale from Denise Meisell-Bingham, Bldg. 97, Ext. 5873. Children under 12 years of age may attend for free.

Rifle & Pistol Club

The BNL Rifle & Pistol Club will next meet on Wednesday, May 12, at noon in the second-floor conference room, Bldg. 911. For more information, call Ted Robinson, Ext. 5489, or the club's hot-line, Ext. 2658; or go to its Web page at www.berahome.bnl.gov/clubs/rpc.html.



Watchhill Camping

The BNL Mountain & Canoe Club invites employees, facility-users, other Lab guests, and their families to join its members for a weekend of camping at Watch Hill on Fire Island, from Friday, May 21, to Monday, May 24. For more information, call Nancy Nagy, 821-2652.

BROOKHAVEN BULLETIN

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BNL Holds Women in Science H.S. Career Day

In early April, 40 female students from four local high schools — Center Moriches, Longwood, Westhampton Beach and William Floyd — learned first-hand how women scientists at BNL had followed educational and career paths that brought them success in their chosen fields.

Coordinated by BNL and the Cornell Cooperative Extension of Suffolk County, the Women in Science High School Career Day featured panel presentations by BNL women in various scientific and technical fields, including biology, chemistry, medical technology, materials science, physics, computing, nuclear safeguards, environmental technology, and science writing.

The students were also treated to breakfast, lunch and a tour of the Lab site, including brief presentations on BNL's Scanning Transmission Electron Microscope (STEM); boron neutron capture therapy, an experimental therapy to treat a form of brain cancer; and BNL's educational programs.

The project was in part supported by a grant from the Long Island Fund for Women and Girls, Selma Greenberg Memorial Fund.



Among the participating students and teachers in the photo are some of the Women in Science High School Career Day's organizers from BNL's Community Involvement, Government & Public Affairs (CIGPA) Division, including: organizer Janet Tempel (second row, sixth from right); Diane Greenberg (second row, fourth from left), and Louise Hanson (last row, left of the flag). Also pictured are some of the event's panelists, including: CIGPA's Kara Villamil (second row, seventh from right) and the Information Technology Division's Susan Eng Wong (second row, eighth from right). Other BNL participants included: Laboratory Director John Marburger, who gave the welcoming address to the students; Marsha Kipperman, Human Resources Division, who provided statistical information on jobs in science and engineering; panelists Maria Bewley, Biology Department; Diane Cabelli, Chemistry Department; Michiko Miura, Medical Department; Vinita Ghosh — who also helped organize the event — Department of Applied Science (DAS); Eva Emmerich, Alternating Gradient Synchrotron Department; Ruth Kempf, Department of Advanced Technology; Linda Nunnemacker, DAS; and Martha Simon, Biology Department, who showed the students through the Scanning Transmission Electron Microscope facility, and Jacek Capala, Medical, who explained boron neutron capture therapy for cancer to the students.

Defensive Driving

The training group of the Safety & Health Services Division will offer a six-hour defensive driving course on Saturday, June 5, 9 a.m.-3:30 p.m., in Berkner Hall, Rooms B & C. A Metropolitan Life instructor will teach the course, which is open to BNL, BSA and DOE employees, BNL facility-users, and their families, at \$23 per person.

Completing the course entitles participants to a 10-percent discount on vehicle collision and liability insurance for three years, and to have up to four points deducted from their driving records if they were incurred during the 18 months before the completed course.

To register, call Scott Zambelli, 249-3000, Ext. 5877 (not the on-site Ext. 5877).

In Memoriam

Pat Manzella, Human Resources Division

Patricia Manzella, a Human Resources Representative who had been associated with the Human Resources (HR) Division for 21 years, died on Tuesday, April 20, after a short illness. She was 55.

Manzella was initially hired on July 31, 1978, with a guest appointment as a BERA attendant. Said M. Kay Dellimore, HR's Recreation Supervisor, "Pat was indeed an asset to BERA — for seven years, she was the cheerful, helpful BERA Sales Clerk in the Sales Office in Berkner Hall."

Continued Dellimore, "But my fondest memories of Pat were of her playing BERA softball back in the days when there was only an all-female team. Then, when mixed league play was introduced, she brought along her husband, Vito, and their family.

"After leaving BERA Sales in 1985, she volunteered as the BERA Recording Secretary and did most of BERA's correspondence for many years. She helped build BERA team spirit and was valued and appreciated for all her work on behalf of the recreation association," Dellimore concluded.

Manzella left BERA Sales to become a full-time BNL employee, joining the Personnel Records Group on October 21, 1985.



Pat Manzella

"In Records, Pat quickly learned her new responsibilities," said Bonnie Miller, who supervised Manzella at that time. "She was always ready to learn more, and she would always help out others even when she was busy herself. Her eagerness and good spirits made it a pleasure to have her as part of our group."

Miller recalled that in 1984, Manzella had returned to school, and, under the BNL Tuition program, she

continued attending classes at night until, in 1994, she had attained her goal of an AAS degree in business administration. "Pat was always committed to whatever she undertook," Miller said.

In 1988, Manzella transferred to the Office of Scientific Personnel (OSP).

"Patricia was a favorite of foreign visitors and employees who required visa services," said OSP Manager Gail Williams. "Her diligence on their behalf in assuring timely issuance of visa documents will not be easy to match. In recent years, she was actively involved in a BNL project to recruit U.S. nationals to serve in staff positions at the International Atomic Energy Agency, Vienna."

Added Williams, "On a personal note, her colleagues all appreciated her wide range of general interests and good sense of humor. She was always a pleasure to work with, and she is greatly missed."

Pat Manzella, who was a resident of Center Moriches, is survived by her husband Vito Manzella; a son, Robert; three daughters, Jeanette, Jeanine and Lenora; and one grandchild. The family requests that donations in Pat Manzella's memory be forwarded to the American Cancer Society.

Next BSA Recital: 6/2

Since Berkner Hall is booked, the BSA Lunchtime Recital Series will take a break during May. The next recital is therefore scheduled for Wednesday, June 2, to be given by cellist Tomoko Fujita and pianist Amanda von Goetz.

More information on the performance will be announced in the Bulletin of May 28.

H.S. Summer Program

For more information, contact Louise Hanson, Office of Educational Programs, Ext. 5849 or hanson2@bnl.gov.

Application Deadline Today

The deadline is today for advanced math and science students from local high schools who have completed their junior or senior years to apply for the Lab's Community Summer Science Program (CSSP).

This six-week program, which will run from June 28 through August 6, includes morning science lectures by BNL staff and afternoon internships.

Staff Volunteers Needed

BNL researchers are needed to sponsor CSSP students as interns in their labs during the afternoons of the program. The CSSP interns participate in research under these staffers' direction, but at no cost to the sponsoring department.

Those interested in sponsoring CSSP students may review their applications between Monday, May 10, and Friday, May 28, at the Science Education Center, Bldg. 438.

Classified Advertisements

Placement Notices

The Lab's placement policy is to select the best-qualified candidate for an available position. Candidates are considered in the following order: (1) present employees within the department/division and/or appropriate bargaining unit, with preference for those within the immediate work group; (2) present employees within the Laboratory; and (3) outside applicants. In keeping with the Affirmative Action Plan, selections are made without regard to age, race, color, religion, national origin, sex, disability or veteran status. Each week, the Human Resources Division lists new placement notices, first, so employees may request consideration for themselves, and, second, for open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people. Except when operational needs require otherwise, positions will be open for one week after publication. For more information, contact the Employment Manager, Ext. 2882; call the JOBLINE, Ext. 7744 (344-7744), for a complete list of all job openings; use a TDD system to access job information by calling (516) 344-6018; or access current job openings on the World Wide Web at <http://www.bnl.gov/JOBS/jobs.html>.

LABORATORY RECRUITMENT - Opportunities for Lab employees.

DD7374. SECRETARIAL POSITION - (reposting) Requires an AAS degree in secretarial science or equivalent experience, and knowledge of MS Word. Must be able to handle frequently changing priorities. Will provide varied secretarial support for different groups within the Reactor Division. Additional duties will include preparing procedures, correspondence and reports, and maintaining and organizing files. Reactor Division.

DD8049. SECRETARIAL POSITION - Requires an AAS degree in secretarial science or equivalent experience, with demonstrated and excellent organizational, communication and PC skills (WordPerfect 8, MS Office 97). Knowledge of BNL policies and procedures, and experience in PeopleSoft Webreq, IPAP, and BNL travel system required. Must be able to handle multiple tasks and prioritize work. Will perform a variety of administrative and secretarial duties, including preparing correspondence, procedures, reports, and presentations; handling telephones and filing; maintaining project library; and operating document-control system. Brookhaven Graphite Research Reactor Decommissioning Project, Director's Office.

NS7377. ENGINEERING POSITION - Requires a BS degree in engineering or a related science (advanced degree preferred) and several years of job-related experience, including two years of nuclear experience. A working knowledge of appropriate engineering, industry, and regulatory codes (NRC, DOE, electrical, mechanical, civil), and excellent communication and basic computer skills are necessary; PE registration and prior supervisory/managerial experience are desirable. Will be responsible for overseeing engineering modifications to the HFBR and BMRR, overseeing the RD Project Management System, and managing professional and technical staff. Reactor Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

MK8161. SCIENTIST - To do numerical modeling of heat transfer, thermal stresses and wave propagation in grouted boreholes for geothermal heat pumps, and