

Another Application for Polymer Concrete: Insulating Dikes for Gas Storage Tanks

A little Dutch boy with his finger in the dike is not enough to hold back a spill of liquefied natural gas.

It takes an insulating polymer concrete developed by Jack Fontana of the Process Sciences Division, Department of Applied Science, to hold back liquefied natural gas that has spilled from its storage tank into a surrounding dike.

Fontana's insulating polymer concrete is used not to plug up a hole in a dike, but to line it as an overlay of insulation. In case of a gas-storage tank rupture, an insulated dike can significantly reduce the evaporation of explosive natural gas, and the risk to people and property in the surrounding area.

To date, the material has been used to insulate the surfaces of three dikes: in 1985, one in Greenpoint, Brooklyn, owned by Brooklyn Union Gas Company (BUG); in 1986, a second Greenpoint dike owned by BUG; and, in 1987, one owned by the Long Island Lighting Company (LILCO) and situated in Holtsville. There are about 100 dikes in use across the country, of which 50 are candidates for insulation.

Insulate or Buy More Land

Natural gas, which consists mostly of methane and is used for fuel, is stored in liquid form in tanks holding on average 25 million cubic feet of

gas, or about 175,000 barrels. These tanks are situated in large dikes, which are high-walled, excavated areas deep enough to contain the contents of a storage tank should it leak accidentally.

If a spill were to occur, however, all of the liquefied natural gas would not remain liquid. Because the boiling point of methane is about -259°F, some of the liquefied gas would boil off as the cold liquid hit the warm surfaces of the dike. Heat transfer between the dike and the liquefied gas would occur quickly, as within four to eight minutes after a spill, the evaporation rate would peak.

The explosive vapors of natural gas would mix with the atmosphere, and, depending upon the wind and humidity, this flammable vapor cloud could travel beyond the gas company's grounds and could possibly cause destruction in the surrounding area.

Department of Transportation requirements allow an atmospheric mixture of no more than 2.5% methane to go beyond a gas company's property line. So, as Fontana explains, "The gas companies have two options: buy more property, or insulate their dikes. If their tanks sit in built-up residential, commercial or industrial areas, they can't afford to buy more land. So, to reduce the risk, they have to insulate."

LILCO's liquefied natural gas storage tank in Holtsville sits in a dike surfaced with BNL's insulating polymer concrete. Inspecting the completed installation are (from left) Dave Elling, Jack Fontana, Walter Reams and Barry Galen, who worked on the insulating polymer concrete at the Lab and in the field.



Mort Rosen

Reduce Heat Transfer

Studies by the natural gas industry indicate that the hazards associated with accidental spills of liquefied natural gas from storage tanks can be reduced by insulating the dike areas surrounding these tanks. By insulating a dike, the rate at which natural gas boils off is reduced because the rate of heat transferred from the dike to the liquefied gas is decreased. An insulated dike releases less methane to the air, thus reducing its atmospheric concentration and the associated risks.

Until the insulating polymer con-

crete came about, however, no cost-effective insulating material that is strong and durable had been found in the past 15 years. At present, dikes are lined with gravel or conventional concrete, merely as a road surface to allow utility vehicles access to the tanks within the dikes.

To insulate a dike, about half an inch of insulating polymer concrete is placed over a four-to-six-inch base of Portland cement concrete. With the insulating polymer concrete lining a dike, Fontana estimates that the boil-off rate of natural gas is about ten times less than what it would be if only conventional concrete were used.

Portland vs. Polymer

"Insulating polymer concrete was developed to have particularly good insulating properties, low water absorption, good durability and relatively high strength," says Fontana. In addition, it can be worked with in a similar manner to Portland cement concrete.

Insulating polymer concrete is related to the original polymer concrete developed at BNL by Fontana and his colleagues during the 1960's, which has been improved upon and modified for different applications ever since. Polymer concrete in its many forms has been one of the most successful technologies transferred from the Lab to private industry.

Polymer concretes are like conventional concrete in that, when they cure, they become hardened and stonelike. The similarities between conventional and polymer concretes end here, however (see chart).

Though insulating polymer concrete is more costly than conventional concrete, utilities such as BUG and LILCO decided that its advantages outweigh its expense. What is most important for this application is that polymer concretes do not conduct heat well. Fontana took advantage of this property to evolve his insulating polymer concrete.

To make insulating polymer concrete, instead of cement, the binder is an organic polymer, specifically, a specially formulated epoxy or polyester resin; in place of sand and gravel, the aggregate is lightweight, in this

(Continued on page 2)

Concrete Comparisons

	Insulating Polymer Concrete	Polymer Concrete	Portland Cement Concrete
weight/cubic foot	50 lb.	145 lb.	150 lb.
max. load/cubic foot	2,500 lb.	15,000 lb.	4,000 lb.
cost/cubic foot	\$80	\$40	\$4
thermal conductivity Btu/hr-ft-F° at 70°F	0.12	2.0	2.5

DNI Lecture: When Stars Explode

It's been just under a year since Supernova 1987a burst into view in the skies over the Southern Hemisphere, providing those on earth with the first chance to observe the death of a nearby star since the invention of the telescope. Since then, astrophysicists and other scientists have taken full advantage of this possibly once-in-a-lifetime opportunity, and their efforts are paying off with great quantities of new information — not only about supernovae, but also about neutrinos and elementary particle physics in general.

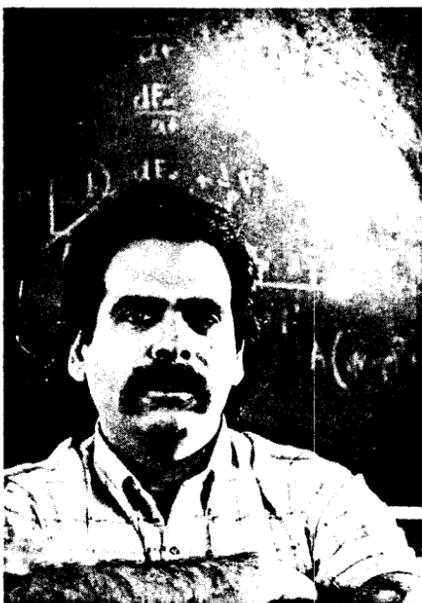
In the thick of this astrophysical adventure is Assistant Physicist Jerry Cooperstein, Physics Department. He will share the newest insights into "When Stars Explode: Supernova 1987a," at the 241st Brookhaven Lecture, on Wednesday, February 17, at 4:30 p.m., in Berkner Hall.

In his talk, Cooperstein will explain that the fiery display, visible on earth on February 23, 1987, signaled the death of a massive star in the Greater Magellanic Cloud, just outside our Milky Way Galaxy. He will discuss such things as how the astrophysical community came to label the explosion a supernova Type II and the progenitor star a blue giant, and to determine that the force of the event equaled about 10^{53} ergs (the explosion of a ton of TNT releases about 10^{16} ergs).

Almost all of the 10^{53} ergs released

by Supernova 1987a were in the form of neutrinos traveling at or close to the speed of light. About 10^{27} of the 10^{58} neutrinos released struck earth, 150,000 light years away. Most of them passed through unnoticed, but 18 were detected.

The two underground detectors that recorded the arrival of neutrinos from Supernova 1987a were both designed to test theories of proton decay. One experiment is run in Japan, by the University of Tokyo; the other, called the IMB experiment, is a collaboration



Mort Rosen

Jerry Cooperstein

of the University of California, Irvine, the University of Michigan and BNL, and is located near Cleveland, Ohio.

Cooperstein will explain how "many wonderful things" have been learned from the analysis of the neutrino data collected by the Japanese and IMB groups.

For example, the data show that the neutrinos stayed tightly bunched over the incredibly long distance they traveled, indicating that they must have an extremely low mass. Based on these data, the new estimate of the neutrino mass is from 10 to 15 electron volts, much lower than the previous estimate of less than 30 electron volts, which was based on physics experiments.

In addition, 1987a has provided a proving ground for theories about explosions of supernovae and the formation of neutron stars. Cooperstein will describe the theory of prompt explosion, on which he has worked for several years with BNL Physicist Sidney Kahana; Ed Baron and Gerald Brown, both of the State University of New York (SUNY) at Stony Brook; and Hans Bethe, Cornell University. He will explain how the appearance of 1987a has verified many aspects of their theory.

There are still other mysteries for Supernova 1987a to unravel. Soon, the debris around the dead star should thin out enough to permit observation

(Continued on page 2)

Coming Up

The New Zurich String Quartet will present an all-Beethoven concert on Wednesday, February 24, at 8:30 p.m., in Berkner Hall. The ensemble will perform three quartets by Ludwig van Beethoven: Opus 18, No. 6; Opus 59, No. 3; and Opus 132. Tickets may be purchased at the door for \$9, general admission; \$6, students and those over 65; and \$5 for those under 18.

The Afro-American Culture Club will host a Talent Show on Saturday, February 27, as part of a month-long celebration of Black History. Beginning at 7 p.m. in Berkner Hall, students from high schools throughout Long Island will compete for prizes by performing various acts. All tickets are \$3 and may be purchased from: April Donegain, Ext. 2459, Mary Durham, Ext. 7143; Frances Ligon, Ext. 3709; Bruce Penn, Ext. 7213; or Public Affairs, Ext. 2345.

Computer Users Needed for Survey

The Central Scientific Computing Facility (CSCF), in cooperation with the Lab's Computer Policy Committee, is requesting your participation in a Computer Usage Survey. Your input will help formulate a VAX Cluster upgrade strategy.

The survey may be completed in one of two ways:

1. A hard copy of the survey is available from the CSCF manual library in the Applied Mathematics Department, Bldg. 515.

2. An on-line version may be accessed on VAX Cluster nodes BNLCLI, BNLCL2 or BNLCL3 by typing SURVEY to the Username prompt.

Results of the survey will be published in the Brookhaven Bulletin in the near future. For more information, call Jonathan Hanson, Ext. 4378.

BNL Lecture (Cont'd)

of x-rays and gamma rays. Will they reveal a neutron star, or will astrophysicists find only a black hole? Cooperstein will explain the possible scenarios and what can be learned from each of them.

Jerry Cooperstein received his Ph.D. in Physics in 1982, from SUNY at Stony Brook, where he wrote his thesis on "The Equation of State and Neutrino Transport in Supernovae." He did his postdoctoral research at Stony Brook, from 1982-86.

From 1979-86, Cooperstein was a Visiting Scientist at BNL. He joined the Lab as an Assistant Physicist in Physics' Nuclear Theory Group, in October 1986. He has also held visiting positions at Nordita, Denmark, where he was Visiting Scientist in 1981 and 1983-84; and at Texas A&M University, where he was Visiting Assistant Professor in 1986.

Cooperstein is the author or co-author of over 25 publications related to supernovae, and he has been invited to contribute to numerous meetings on this subject during this decade, such as the Neils Bohr Centennial Symposium on Nuclear Structure, held in Copenhagen in May 1985, and the Cornell Supernova Conference in Honor of Hans Bethe's 80th Birthday, in October 1986.

All those interested in getting together after the lecture are invited to go with the lecturer to a restaurant off site. To be part of this group, call Neil Baggett, Ext. 4949.

Pick a Student

Staff members are invited to review applications to select students to work under their supervision for the 1988 Summer Student and Summer Intern Programs, which will run from June 13 through August 19. Applications will be available for review in Room 2-107, Bldg. 490, Medical Department, from February 17 through March 1. Please enter through the main door and follow the signs.

Guidelines regarding selection of students have been distributed to research department offices. If interested, please contact your department coordinator.



Last summer, workmen installed insulating polymer concrete to overlay the LILCO's Holtsville dike.

Polymer Concrete (cont'd)

case multicellular glass nodules. By mixing the resin and the aggregate together and allowing them to cure in place, an insulating polymer concrete is formed. In addition, a flame retardant is bound into the mixture to make this composite resistant to fire.

Fourth Generation

Because it has a closed shell structure, insulating polymer concrete does not absorb water and is resistant to weathering. Therefore, it maintains its low thermal conductivity independent of its environment and is expected to last at least as long as a gas storage tank, if not longer.

In addition to this application, "Insulating polymer concrete should be considered for building materials,

like building blocks, prefabricated panels or roof tiles," says Fontana.

His work on this material began in 1983, with a grant from the Gas Research Institute, Chicago. Fontana's research continued with funding from BUG, for the development and inspection of the insulating polymer concrete used for BUG's Greenpoint dikes, and it was furthered with funds from LILCO to work on another insulating polymer concrete, for the Holtsville dike.

"In the last two months, we began working on a fourth generation insulating polymer concrete," Fontana adds, "this time for the Gas Research Institute again. If we can get the thermal and physical properties right, we should be able to reduce the installation cost by 50 percent."

— Marsha Belford

Inside Info

At the 154th Annual Meeting of the American Association for the Advancement of Science now being held in Boston, four papers are being given by Brookhaven staff. Today, at the section on Atmospheric and Hydro-spheric Sciences, Meyer Steinberg of the Department of Applied Science (DAS) is presenting "Advanced Technologies for Reduced CO₂ Emissions," which is co-authored by Hsing Cheng, also of DAS. On Sunday, Nicholas Samios, BNL Director, will present "Ultra Relativistic Heavy Ion Collisions," at the section on Nuclear Physics: from Quarks to Supernovae. Jerry Cooperstein, Physics, will speak on "Nuclear Physics and Supernova Collapse," at the same section. Robert Palmer, Assistant to the Director, will give "Large Scale Application of the New Superconductivity," on Monday, at The New Superconductivity section.

Once again, BNL is mentioned in an exhibit at the Smithsonian Institution in Washington, D.C. This time it is in connection with the display on "The Manufacture of Metal in the Ancient Near East," which may be viewed at the recently opened Arthur M. Sackler Gallery. In a discussion of the properties of metals, the brochure accompanying the exhibit notes, "... the main sources of silver in antiquity were silver-bearing lead ores. . . . The principal silver-bearing lead ore is galena (lead sulfide). Research by Pieter Meyers, then of the Brookhaven National Laboratory and the Metropolitan Museum of Art, has shown, however, that the secondary lead mineral cerussite (lead carbonate) was an important source of silver in antiquity. Analyses of Sasanian silver show that it was extracted from cerussite, not galena."

Norman F. Ramsey, Harvard University, received the Oersted Medal for physics teaching at the 1988 Joint Meeting of the American Association of Physics Teachers and the American Physical Society, held in Arlington, Virginia, January 25-28. Ramsey was one of the founders of Associated Universities, Inc., and the first chairman of BNL's Physics Department, from 1946-47.

Seymour Baron, BNL's Associate Director for Applied Programs, has been appointed to the National Laboratory Technology Transfer Committee established by the American Society of Mechanical Engineers. The committee was formed in response to a Presidential Executive Order of April 10, 1987, to see that "federal agencies and laboratories assist universities and the private sector in broadening our technology base by moving new knowledge from the research laboratory into the development of new products and processes."

Richard M. Lambrecht, a Research Collaborator with the Chemistry Department, was selected by the New Haven Section of the American Chemical Society to receive the Section's 1987 Maurice R. Chamberland Award.

The award, presented to Lambrecht last November, recognizes the recipient's application of chemistry to improve the quality of life. Lambrecht, who is Chairman of Radionuclide and Cyclotron Operations at the King Faisal Specialist Hospital and Research Center, Saudi Arabia, was chosen for the award for his contributions toward the enhancement of societal well-being through innovative peaceful uses of radioactivity and radiochemistry.

Meet the Mountain Club



Sixteen adults, one baby and three dogs joined the Mountain Club on Saturday, January 30, for its annual hike across the Great South Bay. The day was so warm that it was literally a walk on water as the group sloshed through puddles on top of the ice. On the Fire Island side, the ice was thin near the shore and cracked as hikers walked along. As the water in that area is only about a foot or so deep, there was no real danger, but fortunately no one even got wet. The group enjoyed viewing the ocean and some deer behind the dunes, and eating lunch on the deck of a closed summer house. On the trip back, they had to change course once to avoid becoming embroiled in a scooter race.

The Mountain Club will meet on Wednesday, February 17, at 7 p.m., in the Recreation Hall. Anyone interested in joining or finding out more about the club is invited to attend. Slides of previous outings will be shown and refreshments will be served. Call Don David, Ext. 4821 or 286-2267, for further information.

Experience Jazz & Blues

The synchopated rhythms of jazz and the melancholy strains of the blues will permeate Berkner Hall on Saturday evening, February 20. That's when the Afro-American Culture Club will continue its celebration of Black History Month with a Jazz & Blues Experience, beginning at 7:30 p.m.

Featured on the program will be Gwen Cleveland, accompanied by the International Jazz Ensemble; Doug "Harmonica" McLean and his five-piece Blues Band; and the MJBs, a five-piece jazz group.

Gwen Cleveland is currently the vocalist with the Arts-in-Education Program of the International Art of Jazz (IAJ), a jazz-promotion group that is based at the State University of New York at Stony Brook. For her Berkner performance, she will be accompanied by an ensemble of five musicians from the IAJ.

Born in Fredericksburg, Virginia, Cleveland began her singing career in the church. She also sang with her father, and the duo won many contests. After attending Shaw University in North Carolina, she moved to Puerto Rico in 1960, where she performed in clubs, colleges and universities during her five-year stay.

Returning to the states, Cleveland worked in clubs in New York, New Haven, Augusta and Chicago. In McTriff's in New Haven, she cut her first album, *Big Soul at McTriff's*. In the New York area, she performed in some of the top jazz clubs, with such greats as Clark Terry, Gus Johnson, Jimmy Cleveland and Al Cohn.

In 1980, Cleveland became the project coordinator for the IAJ, with which she is still affiliated.

Doug "Harmonica" McLean last performed at BNL in 1983. The well-known Long Island musician began playing the harmonica or "blues harp" at the age of 14. Today the cards he gives out aver, "Blues is my business."

McLean plays an innovative and sensitive acoustic harmonica, as well as an intense, wailing, electrified blues harp. After building his reputation and playing as a street musician in numerous rhythm and blues combos, McLean's career really began to move when he was asked to tour the U.S. with legendary bluesmen Peg Leg Sam and Louisiana Red, including performances at the Newport Jazz Festival in 1976 and the Montreal Jazzfest in 1980.

With the tour completed, McLean



Gwen Cleveland

embarked on a solo career, and today, he and his Blues Band have become an integral part of the blues scene. Over the years, he has worked with such blues greats as B.B. King, Muddy Waters and John Lee Hooker. He also accompanied blues pioneer Lightnin' Hopkins in his final performance, about a week before Hopkins's death in 1984.

Completing the bill on February 20 will be the MJBs. BNL's Bill Sells plays drums for the group, which also includes vocalist Jean Sells, pianist Margaret Fonville, bassist Ray Williams and Paul Kendall, who plays all the wind instruments. The group has

performed throughout Long Island, New York City and New Jersey for almost 30 years. Playing their musical mixture of pop and jazz, they have appeared with Roland Kirk, Mel Lewis and Thad Jones.

Advance tickets to a Jazz & Blues Experience are \$8 for adults, \$5 for children. If purchased at the door, tickets will be \$10 for adults, \$7 for children.

To purchase advance tickets, contact April Donegain, Ext. 2459; Mary Durham, Ext. 7143; Frances Ligon, Ext. 3709; Bruce Penn, Ext. 7213; or Public Affairs, Ext. 2345.

New Hours at P.O.

Beginning Tuesday, February 16, the U.S. Post Office at Upton will open at 8:30 a.m., rather than 8 a.m. The new hours will be 8:30 a.m. to 4:45 p.m., Monday through Friday.

Wanted: Volunteers For Medical Study

Volunteers are needed for a Medical Department study of magnesium absorption from the gastrointestinal tract. Volunteers must be over 18 years old and in good health. For information on fees and study details, please call Ext. 3672.

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I'M SO GLAD - you let me inside your corner of the world. Be mine — always.

TO MY WIFE GAIL - and daughters Jill and Kristen. Be my Valentines. Love to you all.

J.L.S. - I feel "secure" when I'm with you. Happy Valentine's Day.

HAPPY VALENTINE'S DAY - "My only true love." You're one helluva woman, till death do us part. Bill.



HI RAINE - This is just another way to say how much I care and love you. Dom.

JOHN - You are! Happy Valentine's Day. Love, Susan.

PSE&A GROUP - Thank you for these years so fine, won't you all be my Valentine? Ann.

MEIN LIEBLING - Ich liebe Dich! für immer! Happy Valentine's Day. Your little Popuné.

SUN KISS - You're the sweetest.

TO THE GIRLS AT QUICK COPY - Thanks for being so special and caring at the times that we're down. Happy Valentine's, Mike & Jerry.

TO MY HONEY - You make my life complete. Can't wait to celebrate our first anniversary on May 16th. Love, Me.

ENJOY, ENJOY - Happy Valentine's Day. Love, Marty.

HON - You are in my heart and mind always. Love, NLB.

BOO - Let them eat their hearts out, cause now we're talking love.

SUE - Thanks for being you and for our sharing. I love you. Jim.



MIRIAM - globe, Ge, my non-epiphany, your ice-cream soda.

DEAR GARY - My dreams today will be a reality tomorrow. Waiting patiently. Love, Colleen.

TO SARAH - I don't say it enough, but I love you. Jimmy.

DEAR HARRIET - Just a note to remind you that I love you and that 3 buttons are still missing from my suits.

TO TONY - The best lead man on site. Love, the boys from Water Treatment Plant.

ATILLA - Grow old with me ... the best is yet to be! Love always, Hun.

MAGGIE & JUDY - We love you! The Gang.

LOIS - Happy Valentine's Day. This is it, the first of many. Amen.

MARLENE - Thanks for 34 wonderful years. I love you more than yesterday, but less than tomorrow.

MY DARLING - When spray-painting the parking lot won't do, the Bulletin board will have to: I love you! Your darling.

POTATO HEAD - I love you.

DJ - For us candy kisses. Love, JL.

JL - We're better than ever. Love, DJ.

BABY - A good man is hard to find ... be my Valentine. Lambchop.

MACHO - You make coming to work worth it. Keep flexing those muscles.

DEAR HONEY - Remember, I'll always miss you, need you and love you. Happy Valentine's, Me.

PIZZAMAN - You are the wind beneath my wings. I love you. L.S.

PETE, MY BEST BUDDY - Well, I've had the time of my life, and I owe it all to you. Love, Sue.



JELLYBEAN - Happy Valentine's Day. We love you lots and lots — Dots and little Dots.

TO H.K. - Happy Valentine's Day to a flower of a man. From your not-so-shrinking violets.

TERRY BEAR - Some bunny loves you very much! Happy Valentine's Day! OOO and XXX, Squeeks.

TO MY ARGENTINA PRINCESS MARTHA - Happy Valentine's. Your love, Fred.

HAPPY VALENTINE'S DAY - to the best P.O. I know. Love always, your Lady.

CORNELIA - My own sweet love, now and forever. Sydney.

TO MY SWEETHEART SARA - from Bill.

CAROL - Thanks for being the best wife & mother a man could ask for. I love you more each year. Love always, Irish.

CINDY - Here's lookin' at you kid. Happy Valentine's Day. Your hubbie, Pete.



SWEETIE - I'm sure you've forgotten that anonymous Valentine's Day card, but I haven't. Wink, wink!

NONA - My love for you will grow for the rest of my life. Love you forever, Bob.

TO MY HONEY BUNNY - Happy Valentine's Day. Love always.

TO MAIR - You're someone special and dear to my heart. Love always, Dave.

PAL - Just to let you know that I love you very much! Love, Budso.

BOB - 30 years of JOY. Five kids, 5 grandchildren, innumerable animals and, best of all, YOU. I love you. Arlene.

DREAM GIRL - Dreams do come true: check the package wrapped in blue.



DEAR P&GA - In the grand design, we pix you, and we're not being pressed to say that! We shutter to think where we'd be without you. You're just our type. Fonts a lot for setting us straight each week. Do you copy? Love, BB.

DEAREST JACKIE - I love you for so many reasons, large and small; I love you just because you're you.

TO MY PUD - You're my one and only. Hugs and kisses. Love, Puddin'.

DEAR DAUGHTER - You light up my life. I have been truly blessed. Love you forever, Dad.

LOVE FROM ONE BEAR TO ANOTHER BEAR - April 10, 1988. Love, Doug.

T.W. - Happiness is being together. You'll always be my Valentine. Love, J.W.

TWIG - Michele and I are so lucky to have you. I love you very much. Patti.

I LOVE U SVELTZ - Happy Valentine's Day. Marmelade head with cherry eyes.

TO ALL MY FRIENDS IN BIOLOGY - You are all very dear to me. Love, J.J.L.P.

THE DAY MAY BE SPECIAL - but the words are the same: I love you, Joanie, you set my heart aflame.

THANKS - for all the good times, Kiddo. I love you tons and tons. Ted.

KINS - Love does not consist in gazing at each other, but in looking outward together in the same direction. BRT.

HEY JOYCE - It's a great 25 years. You are more beautiful than ever. Be ready for me tonight! Rich.

LET'S DO SOMETHING NUTTY - for Valentine's Day. Let's go out for lunch.

MARTY - Our 10th Valentine's Day together — and I still fall in love again every time I look at you. Love, Nietzsche.

TO ALL THE YOUNG LADIES IN PUBLIC AFFAIRS - I will be your love slave forever. Rich.



CHIP-N-DALE - a.k.a. Jake-n-Elroy: considering comparing yourselves to the calendar twins? Don't! The Sec's.

MAVENS - Heard it through the grapevine, that you want to take us out to dine! And that's fine! The Raisinettes.

HEY MAVENS - Didn't think we'd really do it, did ya? The Mavenettes.

DEAR B.B. - You're the best thing, that ever happened to me. Love, Me.

BJ - To me you're the greatest; I love you. Can't wait until the 27. Grumps.

W-4 Forms in Payroll

To change your withholding allowances for your 1988 taxes, you must complete a new form W-4. The 1988 version of form W-4 is now available at Payroll, Bldg. 134.

PSI News

Jon Connelly of Dynamic Hypnotherapy will speak about what hypnosis can do for you, at the next meeting of the Upton Chapter of Professional Secretaries International. The meeting will be held on Tuesday, February 16, at 6 p.m., in Berkner Hall, Room C.

HMO Enrollment

Representatives of the five Health Maintenance Organizations (HMO) that are being offered to active BNL employees as additional health care options will be at Berkner Hall on Wednesday, February 17 and 24, between 11 a.m. and 1:30 p.m., to answer employees' questions about their plans. Employees are reminded that the deadline for HMO enrollment is February 26, with coverage effective March 1. Those wishing to enroll in one of the optional HMO plans must contact the Personnel Services Office, Bldg. 185, Ext. 2877, to obtain the necessary forms.

Bowling

Red/Green League

R. Mulderig bowled a 215, C. Scarlett 214, K. Asselta 211, J. DiNicola 210.

Purple League

Ed Meier had a 208, Dick Adams 203, Carl Murray 203/201, Mary Grace Meier 184.

Pink League

Donna Cunningham rolled a 175.

White League

Ken Riker had a 263/629 scratch series, John Niemczyk 225, Ben Belligan 219, Sandy Asselta 183/183.

Note to Diners

The Center Club will be closed Sunday, February 14, the day preceding Presidents' Day. However, it will be open on Monday evening, February 15, at 5 p.m.

The Cafeteria will be open from 9 a.m. to 2 p.m., on Saturday, Sunday and Monday, February 13, 14 and 15.

The vended food service in Building 912 will be in operation continuously.

Cafeteria Menu

Week of February 15

Monday, February 15	
Presidents' Day	
Snack bar service only — 9 a.m. to 2 p.m.	
Tuesday, February 16	
Beef barley soup	(cup) .75
	(bowl) .95
Salisbury steak w/gravy & 1 veg.	2.95
Pork chop suey over rice w/noodles	2.85
Hot deli: Chicken patty on a bun	2.85
Wednesday, February 17	
Split pea soup	(cup) .75
	(bowl) .95
Roast turkey w/stuffing & 1 veg.	3.05
Stuffed fish w/Creole sauce & 1 veg. (lite-weight)	2.95
Hot deli: Baked ham	(bread) 2.75
	(roll) 2.85
	(hero) 2.95
Thursday, February 18	
U.S. Senate bean soup	(cup) .75
	(bowl) .95
Sautéed baby beef liver w/onions & 1 veg.	2.85
Italian lasagna w/meat sauce & garlic toast	2.95
Seasonal fresh fruit plate (lite-weight)	2.25
Hot deli: Pastrami	(bread) 2.75
	(roll) 2.85
	(hero) 2.95
Friday, February 19	
Turkey rice soup	(cup) .75
	(bowl) .95
Baked fish supreme w/1 veg. (lite-weight)	2.95
Baked macaroni & cheese w/1 veg.	2.75
Hot deli: Chili dog	(each) 1.35

Safety Shoes

The on-site safety shoe representative will be on vacation next week, through February 19. Normal hours will resume on Monday, February 22.

Arrivals & Departures

Arrivals

Thomas P. Kim NSLS
Piero Sferlazzo Physics
Clas-Otto Wene DAS
Stephen G. Will Biology

Departures

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

Arthur W. Price Physics
Teresa M. Scheuerer Fiscal

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 and/or appropriate bargaining unit, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants. In keeping with the Affirmative Action plan, selection decisions are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

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

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

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2792. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent experience, a thorough knowledge of laboratory policies and operations, and excellent communication skills. Will provide support for Police Group management personnel. Responsibilities will include preparing correspondence and reports on MICOM word processor, establishing and maintaining file and record systems, and arranging/processing travel. Will handle classified documents and sensitive information. Ability to obtain and maintain DOE "Q" or "L" clearance highly desirable. Safeguards and Security Division.

2793. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent experience. Responsibilities will include preparation and distribution of operating manuals and training materials, establishing and maintaining training records on data base for Training and Procedures Group. Previous IBM/PC XY Write experience as well as Xerox 860 experience desired. The ability to obtain and maintain DOE "L" clearance required. Reactor Division.

2794. CLERICAL POSITION - Requires good knowledge of office practices including IPAP/J-CARS data entry system. Previous experience involving A/P and billing desired. Familiarity with word processing helpful. Additional duties to include distribution of mail, typing and telephones. Accelerator Development Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2795. TECHNICAL POSITION - Requires AAS degree or equivalent extensive experience as a mechanical technician. Must have a working knowledge of vacuum and cryogenic technology with experience in assembly of small to medium sized mechanisms. Familiarity with basic machine shop practices is necessary. Will assemble and maintain UHV X-Ray beam lines and work from blueprints and sketches. Physics Department.

2796. TECHNICAL POSITION - Requires AAS degree in electro-mechanical technology or equivalent background and experience in the construction, testing, and leak checking of vacuum systems. Will work in the vacuum group on the modification and maintenance of the new AGS vacuum system. Alternating Gradient Synchrotron Department.

Motor Vehicles & Supplies

73 MALIBU WAGON - V8, a/t, a/c, good transportation, \$350 firm. 744-9677.

82 DATSUN 200SX - 5 speed, a/c, SL pkg., 99k mi., excel. cond., asking \$2,800. John, Ext. 7770 or 4480.

82 NISSAN STANZA - hatchback, 4 dr., a/t, a/c, am/fm stereo, new carb., brakes, battery, tires, mint cond., asking \$2,800. Ext. 2679.

86 MITSUBISHI MIRAGE - low mileage, am/fm cass., 4 speed, like new, \$3,800. 878-2739.

TIRES - 2, P-195R-14, mud & snows, on Chevy wheels, almost new, other sizes available. 289-8212 eves.

SNOW TIRES - 2, 195-14, low mileage, \$40/pair; bucket seats, beige, for Honda Accord, \$10. 924-3082.

CYLINDER HEADS - reconditioned for VW Bug, also Weber Carb. & assorted studs, \$100/all. Fred, Ext. 4407 or 4435.

83 FORD EXP - white, bucket seats, sunroof, front wheel drive, mint cond., 26k mi., \$3,500. Kevin, 736-5216.

82 CHEVETTE L/S - damaged, many excel. parts, 45k mi., best offer over \$300. Dave, 281-0062.

78 AMC CONCORD WAGON - a/t, p/s, radio, 83k mi., good cond., \$750. John, Ext. 4101 or 286-0918 eves.

68 FORD MUSTANG - 302 V8, a/t, new trans., dual exhaust, p/s, clean in/out, \$2,000. Eric, 286-3403.

80 BUICK REGAL - V6, a/t, a/c, 69k mi., \$2,450. 981-3898 eves.

RIMS - 14", 4-lugs; 14", 5 lugs; 16". Ext. 2950.

79 THUNDERBIRD - black, 88k mi., am/fm cass., a/t, full power, good cond., \$1,300. Jerry, Ext. 7427 or 475-5591.

86 CAMARO - blue, am/fm, tilt wheel, p/s, p/b, low mileage, \$8,000 firm. J. Reddy, Ext. 5142 or 924-0441.

80 AMC SPIRIT - 2 dr., hatchback, a/t, p/s, a/c, runs well, new parts, \$800. Jackie, Ext. 2884 or 744-1786 after 6 p.m.

79 HONDA CIVIC - 4 speed, good gas mileage, runs well, good cond., \$850 neg. 732-8216.

80 MERCEDES BENZ 240D - excel. cond., \$8,500. Ext. 4112 or 727-1782.

TIRES - 2, Michelin radials, 215-75R/15, like new, \$50; 2 steel belted radial snows, on Mercury rims, \$50. Ext. 4023 or 929-3721.

81 CHEVETTE - 4 dr., hatchback, a/t, a/c, new tires & parts, mint body, low mileage, \$1,300. Ext. 2873.

SLIDE-ON CAMPER - 11', refridg., heat, hot water, shower, toilet, king-size bed, completely self-contained, \$2,000. Ext. 4142 or 345-3915.

77 MERCURY MARQUIS - fully loaded, 450 engine, needs body work, runs well, \$350. Ext. 4023 or 929-3721.

81 CHEVY CHEVETTE - new brakes, exhaust, clutch, no rust, am/fm cass., sunroof. Mark, Ext. 4132 or 924-4328.

Boats & Marine Supplies

22' SEAFARER SAILBOAT - 1974, 3 sails, Volvo outboard, full keel, asking \$4,000. Fred, Ext. 4407/4435 or 499-1214.

12' SEAGULL SAILBOAT - fiberglass, needs minor work, 2 jibs. Rick, 744-6059.

14' CHECKMATE - 1968, trailer, new seats, tanks, controls, carpet, good cond., asking \$600. Rich, Ext. 4688.

Miscellaneous

BUNK BEDS - w/new mattresses & boxspring, can be used as twin beds, excel. cond., \$150; matching dresser, \$50; 7' solid oak bench. 744-5801.

STEREO CONSOLE - Colonial, am/fm radio, hard-rock maple, 17"wx55"lx27"h, \$100. Ext. 4312.

TV CONSOLE - 19", color; Panasonic, VHS VCR, both working. Rogers, Ext. 4222.

PING PONG TABLE - folds; skis, Hart, fiberglass, metal edges; Tyrolia bindings; Henke boots, black. 727-0499.

WOOD SCREENS - & storm windows, 14 ea., \$50. Ext. 3794.

WEIGHT BENCH - Marcy Monster, orig. \$110, asking \$75; walk/run treadmill exercizer, orig. \$280, asking \$100. G.T., Ext. 2198 or 744-4662.

MOVING SALE - 3-cushion sofa; 6', antique, cherry dresser; lamps; chairs; etc. 758-7562 eves.

GUITAR - Vox Bass w/case, good cond. \$50. 924-3082.

SHOWER MASSAGER - 2, new, \$20/ea.; hand loom, \$100; 2 bikes, need work, \$25/ea. Ext. 5069.

DINING ROOM - hutch, table w/2 leaves, pads, 6 chairs, Colonial, fantastic cond., \$1,300. Mary, Ext. 2238.

PLAYPEN - \$15; 6 qt. pressure cooker, \$10; ratchet pipe threader, new, \$60; sewer handsnake, \$30. 878-6637.

DINING ROOM - pine, table & 4 chairs, \$150. Joann, 878-4298 before 3 p.m.

LOFT BED - built on 4 drawers, 2 cabinets, 2 bookcases, & half closet, solid oak stained walnut, must see. Jack, Ext. 4447 after 5 p.m. or 744-3919.

SOFA - good cond., \$50. Linda, 266-9167.

COLONIAL HUTCH - & table, w/chairs, \$500; sofa/sleeper, velour fabric, \$200. 924-7723 eves.

PC JR. - and/or accessories, bargain prices, memory expansion, modem, more. Bernie, Ext. 4842.

SEWING MACHINE - working cond., electric, heavy duty, 1917 vintage, \$25. 475-1826 after 6 p.m.

STEREO CAMERA/VIEWER - Linex, \$65; Leica manual, \$10; Leica photo mags., 1948-68, \$25. Susan, Ext. 4267.

REFRIGERATOR - G.E., 18 cu. ft., 1 yr. old, \$600; matching sofa bed & love seat, like new, \$400. 924-2084.

GOLF CLUBS - driver, 3 wood, 5 wood, excel. cond. \$50. Joe, Ext. 2575.

BOWLING BALLS - 1 yellow dot, 1 white dot, both Columbia, \$10/ea. Joe, Ext. 2575.

TANDY 1000 COMPUTER - DMP 130 printer, color monitor, two 5 1/4" disk drives, 384K memory, \$800. Ed, 878-1200 days or 286-0654.

STATIONARY EXERCISE BIKE - Ross Regency, excel. cond., asking \$100. Ext. 2051 or 689-8685 eves.

TV - b&w, 5 1/2", with am/fm radio, new in box, \$35. Jim, Ext. 7971.

BRIEFCASE - brown leather w/brass trim, suede interior, combination locks, never used, \$75. Darcy, Ext. 3362.

AM/FM CASSETTE PLAYER - Jensen R-200, 5 watts per channel, \$35. Ext. 5400 or 878-6098.

STUFFED CHAIR - gold floral pattern, good cond., needs cleaning, \$40. Jane Monhart, 325-1797 eves.

SCROLL SAW - floor standing, w/table & motor, Sears, \$75 firm. Ext. 4142 or 345-3915.

FURNITURE - bedroom set, dining room set, \$375/ea.; contents of house in Amityville. Ext. 3395 or 325-1537.

MATTRESS & BOXSPRING - Stearns & Foster, twin-size, excel. cond., \$60. Steve, Ext. 7862.

SKILL SAW - metal case, prof., \$20; clarinet, wood, Eikhonn, w/case, \$50; bass fiddle, German, old, \$250. 924-3082.

COLOR GRAPHICS ADAPTER - IBM, fits PC, XT & AT, asking \$50. Ext. 2521 or 924-2134 eves.

PUPPIES - Golden Retriever, AKC, excel. temperament, field champion stock, vet checked, shots, available Feb 12, \$300. 286-1024 after 6 p.m.

BLENDER - Waring, 7 speed, \$8; GE toaster oven, \$10; VHS cassette rewinder, \$5; 12" University, 3-way speakers, \$25/pr. Bob, Ext. 4551.

BED - Sealy Posturepedic, \$250; bureau, chest, end tables, \$350. 727-0578 eves.

AUTO & MACHINE SHOP EQUIPMENT - compressor, jacks, stands, parts, hand tools, lathe, bench mill, etc. Bill or Joe, 281-5988.

Lost & Found

FOUND - pair of Honda keys. Ext. 4109.

FOUND - man's brown leather glove, right hand. Ext. 4109.

Free

MAGAZINES - Guitar Player, 1975-85. Willy, Ext. 4960.

19" COLOR TV - needs some adjustment, watchable. Antonio, Ext. 3369.

LOVING KITTEN - 8 mo. old, long-haired, black & white, spayed, has all shots. Fern, Ext. 3969.

Car Pool

MORICHES/CENTER MORICHES - want to join. Dick Hahn, Ext. 4337 or 874-2380.

Real Estate

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

For Rent

YAPHANK - small 3 rm. bungalow, single preferred, \$400/incl. elec. 924-3946.

HILTON HEAD, SC - 2 bdrm. condo, sleeps 6, beach, pool, golf, tennis, Feb. & March, \$320/wk. 585-9149.

MIDDLE ISLAND - Artist Lake Condo, 1st floor apt., tennis, pool, w/d, d/w, w/w, \$600/mo. Incl. heat, 1 mo. sec. 924-0001 after 5 p.m.

YAPHANK - spacious 3 bdrm. ranch, 1 1/2 acres, den, f/p, deck, garage, avail. March, \$900/mo. + 924-4872.

CORAM - 1 bdrm. apt., l/r, dining rm., kitchen, full bath, avail. Feb., incl. all util. Ext. 5136.

NORTH SHIRLEY - 1 bdrm. apt., fully carpeted, 5 min. to Lab, mature working couple or single preferred, no pets, non-smoker, \$550/mo. incl. util. 924-6877.

EAST SETAUKET - 3 bdrm. hi-ranch, l/r, d/r, 1 1/2 baths, economical coal stove, avail. immed., \$925/mo. + util. Ext. 3791 or 928-7154

For Sale

MANORVILLE - lovely 3 bdrm. ranch, garage, on quiet cul-de-sac, 1 1/2 baths, 1+ acre, immed. occupancy, South Manor schools, \$145,000. Ext. 5400 or 878-6098.

ROCKLEDGE, FL - block & stucco, 2 bdrm., 2 baths, d/r, kitchen, l/r, family rm., 12x25 combination porch, excel. location, \$64,500. 305-631-2840.

HILTON HEAD, SC - 3 bdrm. condo, sleeps 8, 2 baths, washer/dryer, wet bar, 6 tennis courts, whirlpool, 3 swimming pools, golf, ocean view, asking \$89,000, will rent. 929-8912.

PORT JEFFERSON - 4 bdrms., 2 1/2 baths, family rm., deck, bsmt., wooded 1/3 acre, 3 village schools, \$198,000. 928-0281.

RIVERHEAD - mobile home in adult park on Peconic River, 2 bdrms., 1 1/2 baths, new carpeting & floors, new bath, wood burning stove. 369-2838.

PALM COAST, FL - 1/4 acre, Greenbelt, approx. 3-5 miles to ocean, 24 miles to Daytona, water & sewer util., \$5k & take over payments, \$142/mo. for 8 yrs. Tom Nolan, Ext. 5265 or 7160.

RIDGE - 3 bdrm. Strathmore Ridge townhouse, 1 1/2 baths, 5 appl., 5-zone heat, central a/c, attic, storage shed, fenced patio, low commons, \$20,000 assumable, \$95,000 neg. 924-9276.

MASTIC BEACH - 3 bdrms., waterview, public water. 399-1249.

Wanted

ALUMINUM "JOHN" BOAT - approx. 4'x12', light, complete, good cond. Ext. 3794.

PASTA MAKER - Osrow, Simac or similar. 928-0281.

SITTER - for 4 1/2 yr. old boy, temporary, starting April, on-site or Wading River area. 929-3207 after 6 p.m.

TRAILER FOR BOAT - 2400 lb., 18', deep vee haul. Joe, Ext. 3464 or 281-7683.

DESK - full-size, for college student, good cond., reasonable. Annamarie, Ext. 2352 or 473-9016.

WOMAN BOWLER - Thursday nights at Shirley, mixed BNL league. Joan, Ext. 2910.

STUDIO/1 BDRM. APT. - near Lab, below \$450/all, female, quiet, clean, non-smoker. Kate, Ext. 2647.

VACUUM CLEANER - cannister type, w/hose & attachments. Joe, Ext. 2898.

ROOM FOR RENT - Ext. 2058.

CAST-IRON WEIGHTS - for old farm scale, 50 lbs., 100 lbs., 200 lbs. 878-6637.

TABLE SAW - electric, used, in good cond., Bill, Ext. 3199.

BABY'S HIGH CHAIR - in good cond.; color TV, working. Judith, Ext. 4379 or 864-1684 eves.

PERSON - w/Hitachi, 25" console, model #CT2533, need info, will pay for your time. 796-3416.

BABY CARE - for 9 mo. old girl, looking for part-time sitter on-site or close by. Judith, Ext. 4379 or 864-1684 eves.

Classified Ad Policy Deadline is 4:30 p.m. Friday for publication Friday of the next week.