

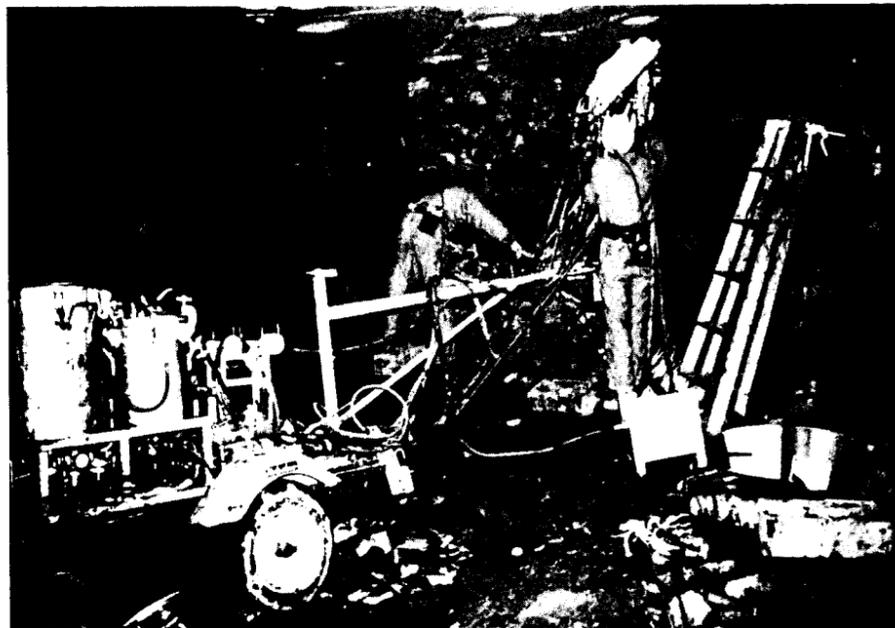


Meyer Steinberg (center) with some Brookhaven staff and coal miners at the Island Creek Mine, West Virginia, about to descend on mine lift to the 1500 foot level.



Meyer Steinberg (left) and Charles Waide at first test of pumpable roof bolt in mine. "Pony tails" hanging from the roof are glass fiber reinforcement for bolt.

Setting up a jack which will position pumping head for placing roof bolt are from left Dave Wales, Jack Amaro, Charles Waide and Jim Powell. — photos by Rosen



In White Pine Copper Mine, 2000 feet below the surface, two BNL technicians work with the pumpable roof bolt machine at mine face.



From left, Dave Wales, Jack Amaro, Bob Sick and Charles Waide, part of the team that worked many hours underground installing the pumpable roof bolts.

Keeping The Roof Up 1000 Feet Down

Ever since men started digging coal from the earth, a cave-in due to a poorly supported mine roof has been a constant threat.

Arising out of their work on polymer chemistry and polymer concrete, Meyer Steinberg and his Process Technology Division have developed a Pumpable Rock-bolt Method and Apparatus which greatly strengthens the mine roof and increases the safety of coal mining. Bernard Manowitz, Associate Chairman for Environmental Programs, DAS, was instrumental in obtaining funds and in overseeing the project. Patents have recently been granted to Steinberg, Manowitz and Charles H. Waide for this invention. The research was sponsored by the Bureau of Mines.

Coal is dug out of the earth about 1,000 - 3,000 feet below the surface. As a miner digs out the coal, for a distance of about 18 feet, the mine roof, consisting of rock superimposed by sandstone, starts shifting.

In the early days of hand digging, two wooden uprights reinforced by horizontal wooden beams served as the support structure overhead. This was inefficient and cave-ins were always a danger.

In the 1940's when continuous mining went into effect, it was found that the wood interfered with the mining operation and, therefore, with the rate of production. "Then somebody got the bright idea," says Steinberg, "that the roof could be supported by drilling a hole in it, inserting a rod and expansion anchor - like a 'molly' bolt." After tunneling the coal, a 3/8" steel bolt in a 1 1/2" hole was put into the rock every four feet and the roof was pinned up.

The principal drawback in this procedure is that when a miner drills a hole in the roof of this small area (it is only four feet high), he is close to unsupported rock and the rock may start to crumble. Also, if the rock isn't strong enough, the bolt may fall out. Steinberg quoted an old saying down in the mines, "If you see a rock falling that is twice the size of your head, you're finished."

In 1970 the Brookhaven group initiated a project to develop a machine that would stand outside the area and pump a strong bolt into the overhead rock, thus freeing the miner from possible entrapment. The work to develop the system took about three years in the laboratory and in the field.

The first thing they tackled was the design of the bolt. It had to be liquid which would solidify when pumped in, and it had to have a strength of about 8,000 pounds per square inch. After a lot of experimentation, the group came up with a styrene type material, made up of a chlorostyrene and a polyester, which was non-toxic and inflammable, with pumpability and strength. A two-pot system is used for delivering the mixture to the drill hole. One pot contains a catalyst and the other, a promoter. When they are put together, a chemical reaction causes the material to harden. For added strength, flexible continuous glass fiber strands were placed simultaneously in the hole with the polymer mix. In laboratory tests using a simulated mine roof, the bolt proved so strong it was impossible to pull out.

A prototype machine was built at Brookhaven, and in 1972 it was tested at the White Pine Copper Co. in White Pine, Michigan, one of the largest hard rock metal mines in the world. Charles Waide,

the project manager, and eleven BNL technicians spent six weeks there working underground around the clock.

Coal mines operate 24 hours a day, and for maximum production, bolts have to be placed rapidly. The Brookhaven method is fast and continuous and it eliminates the delay in the old method of stopping to screw in a bolt.

At White Pine the Brookhaven team put in 12 bolts underground at one time and six months later inserted another 170 bolts. "It was a massive job," says Steinberg, "and they worked above and beyond the call of duty." The Spokane Mining Research Center of the Bureau of Mines arranged the tests and served as liaison with the White Pine Co. The bolts stood the test well and the Bureau of Mines later awarded a contract to a company in Salt Lake City to build a production machine. Steinberg's group was given the subcontract to build the bolting head for the machine and gave the company their concrete polymer technology. The machine is still in production and is, apparently, of great interest to the mining industry.

Improving on their original idea, the DAS group has put forward a plan to mount a combination drilling rig impregnator and a pumpable roofbolt head on the coal mining machine, merging the three steps into one. The continuous forward mining operation would not only be safer but would increase production. According to Steinberg, the Bureau of Mines is slowly developing this idea, but the operation runs into the millions and funding is not yet readily available.

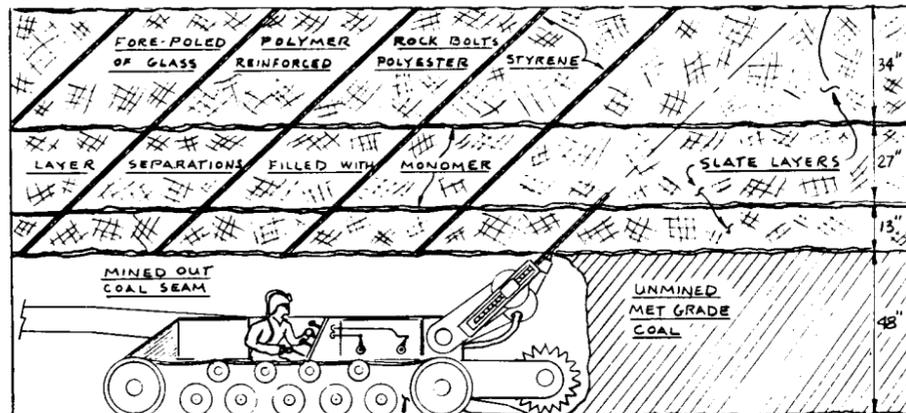
Another problem in mine safety is measuring the sagging of the roof to spot potential cave-ins. An experienced miner can detect how the roof is moving by listening to the kind of "cracking" sound it makes. He also uses a little hammer to tap the roof. What he hears determines whether he stays or moves out fast.

James Powell, a nuclear engineer in DAS, suggested using the Hough-Powell device (HPD) scanner to monitor the roof. This device pioneered at Brookhaven, was used to scan photographs of events taking place in the bubble chambers.

Powell mounted markers on the mine roof and scanned them with the camera. He returned every couple of hours to see how much the markers moved and showed how they could be calibrated. The HPD scanning technique can detect a movement of five thousandths of an inch at a distance of 30 feet. It was concluded after testing at the mine that if reliable reference points could be installed in the mines, computer scan techniques could be used for quick, cheap and accurate monitoring of mine movements.

Besides those already mentioned, a number of people worked long and hard on this project. Morris Reich, a mechanical engineer in DAS, was responsible for a lot of the work on computer calculation of structures. Engineer Don Huszagh worked on the design and construction of the pumpable roof bolt. The technicians included Jack Amaro, George Arnold, Walt Becker, Gerry Farber, Joe Fedelem, Barry Galen, Hank Ruge, Jim Klein, Bob Sick, Bill Vogel and Dave Wales.

And all of them learned a lot about coal mines.



Continuous mining operation for roof control as envisaged by Brookhaven team: drill angled hole ahead of miner and coal face; pump monomer into hole to fill voids in roof strata; pump the glass roving reinforced-viscous polyester styrene bolt into hole; then mine coal.

On The Way

On Monday, March 22, the second shipment of spent fuel elements to travel to South Carolina via the Orient Point ferry went without incident.

Demonstrators and press, which were very much in evidence during the first shipment on March 15, were reduced almost to the vanishing point, except for a helicopter manned by a camera crew from WNBC-TV.

Selected Reading

Bull. At. Sci. 32, March 1976

A nation's science and technology. J.C. Polanyi. 8-12

Chinese science policy: A comparative analysis. M.N. Richter, Jr. 13-16

Development, resources and world security. A statement of the Pugwash Council summarizing the findings and conclusions of this year's session. 24-9

Why not just build the house right in the first place? R.W. Bliss. 32-40

New Sci. 69, January 8, 1976

'Damn hard science...'. A profile of Sir Kenneth Berrill, head of the CPRS. A. Croome. 60-2

J. Chem. Educ. 53, February 1976

The chemistry of winemaking and brewing. D. W. McClure. 70-3

Phys. Today 29, March 1976

ERDA and NSF gain in Fiscal 1977 budget request. 85-6+

The future of nuclear power in meeting the nation's energy needs. Remarks by Edward A. Mason, Commissioner, U.S. Nuclear Regulatory Commission before a Panel of Energy Resources for the Future, Massachusetts Institute of Technology, Cambridge, March 4, 1976.

March Retirees



Mary G. Adamczewski Roderick Rohrbach

Mary G. Adamczewski, a Laundry Operator in Plant Engineering and a Laboratory employee since April 17, 1961, will be retiring on March 31, 1976.

Roderick Rohrbach, a Technical Associate in the Accelerator Department and a Laboratory employee since March 15, 1948, will be retiring on March 31, 1976.

Cafeteria Menu

Week Ending April 4, 1976

Monday, March 29

Cream of Mushroom Soup
Chicken a la King on Rice 1.10
Cheese Omelet & 1 veg. 1.00

Tuesday, March 30

French Onion Soup
Chinese Pepper Steak on Rice 1.20
Roast Fresh Ham & 1 veg. 1.20

Wednesday, March 31

Split Pea Soup
Breaded Flounder Filet & Fr. Fr. 1.10

Special

Spaghetti w/Meat Sauce
and Garlic Bread

All You Can Eat \$1.00 plus tax

Thursday, April 1

Cream of Chicken Soup
Beef Hash & 1 veg. 1.05
Veal Pattie Parmigiana & 1 veg. 1.20

Friday, April 2

Fish Chowder
Broiled Filet & 1 veg. 1.10
Boiled Pastrami w/Mustard Sauce
& 1 veg. 1.20

What's Happening

What's that they're doing next to Berkner Hall? They're building a house. It's called the "Arkansas House" and is a model of the energy conserving home. Owens-Corning Fiberglas Corporation is building it as an exhibit for Brookhaven's Energy Fair May 12-16. Details of these new construction techniques will appear in the *Bulletin* soon.



Austin N. Heller, Assistant Administrator for Conservation, ERDA, (center) visited Brookhaven March 19. During a tour of the Laboratory, he talked to Eric Forsyth, head of the Superconducting project, (left) and Joseph Hendrie, DAS Chairman, in the Power Transmission lab.

Wanted: Craftspeople

The Hospitality Committee is looking for persons skilled in leather working, wood carving, and rug hooking. If you are interested in demonstrating these crafts at the Hospitality Committee's spring tea party, please contact Stephanie Morris, 981-8370, or Lela Radeka, 286-0854.

Stony Brook Events

Playwright Isaac Bashevis Singer, author Elie Wiesel, Pulitzer Prize winning poet Louis Simpson, painter Chaim Gross and ethnomusicologist Ruth Rubin will share the spotlight with a varied sampling of art, film, music, craft, dance and lecture presentations when SUNY hosts the first Long Island Jewish Arts Festival, beginning Sunday, April 4 and continuing through Saturday, April 10. The public is invited to attend the week-long series of day and evening events.

Most Festival activities are free but some evening events, including the traditional Friday night dinner, will require admission. It is the largest and most diversified offering of Jewish arts ever presented on a university campus and will give Long Island residents an opportunity to enjoy many forms of these arts not usually presented outside of New York City. For further information, call Richard Siegel, 246-6842.

Changing Direction

Three new craft apprentices will start learning a trade on April 19, and in a big turn-around, two out of the three will be women. Out of a field of 31 applicants, Cynthia Morgan, a secretary in DAS; Donna White, a technician at the HFBR; and Joel Magee, a materials handler at Supply & Materiel, have been selected as apprentices.

One hundred women were eligible to apply, but only seven did. Morgan and White agree that they finally decided to give it a real try only after attending a meeting organized by Janet Whitehead, Assistant Personnel Manager, to encourage women to compete for the openings.

Joel Magee is a good example of "if at first you don't succeed, try again." He entered the lists last year but did not make it, so this year he went after it once more. He will be an air conditioning and refrigeration apprentice. The 36-year old Magee was brought up in Louisiana and moved to the Island in 1956. He served four years in the U.S. Air Force as a communications specialist. After various jobs, he came to the Laboratory in November 1971 and worked as a custodian before transferring to Supply & Materiel early this year. He attended Suffolk County Community College for three years studying data processing at night. He also completed three BOCES courses in electricity and electronics.

Donna White, who will also be an air conditioning and refrigeration apprentice, has been at the Laboratory since May 1975 and, in her job at the HFBR, runs chemical analyses on water. Brought up in Manhattan, the 21-year old Ms. White attended Tufts University for one year, took technical courses at the New York City Community College and is now a part-time student at SUNY, Stony Brook. She has held various jobs interspersed with her course work

Official & Special Events

Monday, March 29

Technology Workshop on Blanket/
Power-Systems for Fusion Reactors
Rm. A, B and C (March 29-April 2)
ERDA Brookhaven Power Transmission
Project Review

Tuesday, March 30

Evaluated Network Meeting
(March 30-31)
ERDA Hydrogen Program Review
(March 30-31)

Thursday, April 1

DAS Visiting Committee
(April 1-2)

Tuesday, April 6

Columbia University Science Writers'
Visit (April 6-7)

Thursday, April 8

ACS Tour

Arrivals & Departures

Arrivals

Carol K. Bodin Applied Science
Frank P. Pisco Plant Engrg.
Madeline R. Stawski Plant Engrg.

Departures

Carl R. Flatau Mech. Engrg.

Stockrooms Close April 9

In order to complete the annual Physical Inventory of stores materials, all stockrooms will be closed on Friday, April 9, 1976. Users are requested to withdraw sufficient supplies prior to the normal stockroom closings at 3:00 p.m. on Thursday, April 8, 1976. Emergency requirements can be obtained by calling the Supply and Materiel Division office, Ext. 2972 for approval and withdrawal instructions.

The closing of stockrooms does not effect departmental stockrooms or the delivery of Liquid Nitrogen, Liquid Helium, Dry Ice, or Compressed Gases. Your cooperation in keeping emergency requests at a minimum is appreciated.

Reports Available

The following reports are now available to the Laboratory Staff and to affiliates of the AEC, AUI, and BNL. Others may purchase them from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22151. Staff members should call Ext. 3484:

BNL-50489 \$4.50
Instruments and Data Analysis Methods for Volume Measurements. February 1976
S. Suda

BNL-50493 \$4.50
Attic Concentrator Type Solar Energy Collector. February 4, 1976
J.G. Cottingham

BNL-50495 \$5.00
Thermohydraulic LMFBR Safety Experiments. Quarterly Report for Period October - December 1975. February 1976
M.S. Kazimi, J.C. Chen, and W.R. Gustavson

To Make The Grass Grow

According to the Cooperative Extension, spring seeding of lawns in this area should be done between March 15 and April 15. Seeding can be done by hand, with a rotary seeder, or with the usual type of seed and fertilizer spreader. They suggest that the seed should be divided into two equal lots. The second lot should be seeded at right angles to the first, with each lot covering the entire lawn.

For recommended lawn grass species, write to Cooperative Extension, 246 Griffing Avenue, Riverhead, N.Y. 11901, and ask for the Fact Sheet on Suggested Suffolk County Lawn Seed Mixture.



Three newly-selected craft apprentices who will start on-the-job training April 19 are from left, Donna White, Joel Magee and Cynthia Morgan.

at college. She says she has always been interested in technical fields and considers the apprentice program an occupational and educational opportunity.

Cynthia Morgan is the electrician apprentice. She started out to be a teacher and received a B.S. in 1962 from Farmington State Teachers College in her native Maine. After a year of actual practice she decided teaching was not for her. She worked briefly as a veterinary assistant before settling down as an administrative assistant in a furniture company on Long Island for ten years. At the Laboratory she has worked for the Fast Reactor Safety Division since her arrival in July 1974. She is married to Gerry Morgan, a physicist in the Accelerator Department, who, she says, "felt I could do the job all along and wasn't surprised when I got it."

The apprentices were selected by the Joint Apprenticeship Committee, which is composed of three Laboratory management representatives and three IBEW members, after being evaluated on education, experience and the results of an interview. They now embark on a four-year program which includes on-the-job training by the union and a minimum of 144 hours per year related study, principally through the International Correspondence School, which they do on their own time. Every six months their progress will be reviewed by the Joint Apprenticeship Committee.

Nine apprentices have graduated from this training program since its inception in 1969. Currently, there are six other apprentices now being trained in carpentry, refrigeration and air conditioning, and as machinists.

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In Memoriam

Paul Temme, who was in the carpentry shop from November 5, 1951 to June 29, 1962, died in Brookhaven on March 22, 1976.

Rambling Around

These are bits and pieces picked up from here and there with occasional observations by the Editor:

- According to a major credit company, scientists are among those most likely to pay their bills. They landed in the top group after being rated on customer and employment stability, credit history and outstanding debt. Female office workers ran a close second, and bartenders were considered the poorest risk.
- A new light bulb that uses 70 per cent less electricity and may last up to 10 years is in the works. ERDA has tested some of the bulbs and, according to press reports, has given the inventor a one-year technical and marketing contract. The bulbs are expected to sell for between \$7 and \$10 each.
- Fourth graders in Findlay, Ohio had some ideas on how to solve the energy crunch:

"Everyone that visits a foreign country with a lot of oil, bring back a quart of oil with them."

"Keep a dog in the car that is trained to bark if the car goes faster than 50."

"Learn how to change water into oil."

- Q. What current employee has the lowest life number?

A. Martin Plotkin, Accelerator Dept., #28.

Reminder

Sponsored by BERA, Stephen Month will present a piano concert Sunday afternoon, March 28 at 3:00 p.m. in Berkner Hall.

BNL Cooking Exchange

Come to the Cooking Exchange meeting on Wednesday, March 31, and taste all those goodies your mother never made - unless you had a "Jewish Mamma." On the menu will be home-made bagels, lox, tsimmes, matzoh ball soup and blintzes.

All this at the Recreation Building at 12:30 p.m., for 75¢ plus 25¢/child (for babysitting).

Golf News

Once again with the coming of spring, it is time to re-organize the BNL Golf League for the coming season.

New officers have recently been elected: Tony Baltz became President; Ed O'Connell, Vice-President; and Herman Vargo, Secretary/Treasurer.

Those who were in the Golf League last year will receive a form to return indicating interest in participating this season. New members are welcome. All BNL employees (and spouses) are eligible.

As in previous years, the basic matches will be between two-man partnerships with appropriate handicaps. If you have a partner indicate who he or she is when you return your form. New golfers may enter the league with or without a partner by contacting one of the officers. If you don't have a partner we will match you up with one.

Plans are to begin league matches about the first week of May. An organizational meeting to deal with such matters as rules and match scoring will be held at the Recreation Building at 5:00 p.m. on Friday, April 9.

A pre-season tournament will be held in late April. Watch the *Brookhaven Bulletin* for further details.

Faces, Places



Maureen Asendorf is a dietary aide who works in the hospital kitchen at Medical. She is responsible for the precise weighing, serving and labeling of cold foods for patients on special diets. Among her other duties, she also prepares special dietetic luncheon salads and desserts. She has been at the Laboratory four years and lives in Mastic Beach with her husband, Patrick (Biology Dept.) and their six children.



Dolores Krupski is an offset technician in Photography and Graphic Arts. In her job she does proofreading, makes line corrections, monitors type quality, does positive film stripping, galley and page proofing and is responsible for report file maintenance. "It's certainly different," she says. Dolores has been at the Laboratory five months and lives in Riverhead.

Bowling News

Cathy Van Noy

Purple and White League

The "Pinsplitters" are still holding first place with a ten point lead on the second place "Spares." High games for the evening were Marge Stoeckel 186-177-178-541 series. Joyce Vail 176, Kay Conkling 163, Helen Keeley 170, Betty Jellett 158-150, Mary German 154, Pat Oster 152, Renie Rosati 153-152. Cathy Van Noy converted the 4-7-10 split.

Black and Blue League

Diane Schug made it look easy as she nonchalantly converted the 6-8-10 split. High games were Frank Bugala 201, Dick Murgatroyd 200, Debbie Antonio 173-164, Ellie Murgatroyd 164, Wilma Eriksen 163, Audrey Bangel 163. High gross pots were won by Frank Bugala 234 and Wilma Eriksen 223.

Green League

The "Got-A-Hit-Ums" still keep rolling along as they took eleven from the "Charley Browns." The "Super Cools" maintain a cool second as they took seven from the "Old Timers." The "Blue Jays" took eight from the "Designers" but the "Trouble Shooters" lost eleven. 200 games were J. Mayeski 204, F. Stahman 204, F. Green 222 and G. Speidell 223.

Red League

"Congrats" to S. Kiss for winning his club awards with 230-212-616 scratch and 700 gross. W. Kristiansen missed his award but still bowled great with 218-212-589 scratch. E. Meier close to 600 again with a 218-585 scratch. Other 200 games were C. Buzzo 236, R. Wilson 221, R. Adams 209, E. Gill 204, R. Jones 203.

Purple and White League

With three of the four quarters completed, the "Flounders" have taken first place twice and the "Sea Gulls" once. The "Plutoniums" and the "Question Marks" opened the last quarter tied at five points each. High for the evening were Betty Roche 453 series, Marie Terrano 170 game, Alma Tomesch 160, Ken Asselta 220-546, John Usher 221, Gene Hassell 204 and Charlie Tomesch 199.

Highlights of the Men's L.I. Industrial Tournament

After the second week of the tournament, the team moved from second to fifth place in the standing and fourth in the incentive. With two weeks to go, there is still time to move up. The high games were Bob Jones 214 and Ralph Nelson 220.

Note

Anyone interested in keeping score in the Suffolk County Women's tournament would be welcome. We could use you on Saturdays and Sundays at Port Jeff Bowl and Smithtown. Marge Stoeckel and Marie Brenner bowled very well in the doubles event this past Saturday.

Soccer

John Skalyo

PHYS-AMD-INST clinched first place this past Friday with only one more week to go in the indoor league season. They were 3 points up with a possible swing of 8 points left in the season at the beginning of play on Friday. The first game was PHYS-AMD-INST versus the second place DAS-CHEM-MED club. This was a must win game for both clubs and resulted in an intense, hard-fought contest. While the ending was never certain until the final whistle, PHYS-AMD-INST scored what proved to be the winning goal early in the first half. Emery took the ball into the left corner and managed to fire a centering shot into a melee of players in the goal area. The hobbled goalie was screened and didn't move as the ball ricocheted off his leg into the goal, 1-0. This was a big win placing PHYS-AMD-INST 5 points ahead with 6 points to swing.

Their big win led to a letdown against AGS; a tie game would have clinched at least a tie for the league championship. AGS surprised PHYS-AMD-INST by winning 1-0 on a goal by Fleischman from 40 feet out that got by a screened goalie.

The door was still open for DAS-CHEM-MED; however, it was quickly closed. AGS played its spoiler role well as goals by Fleischman and Jickles resulted in a 2-0 win over DAS-AMD-INST, thus assuring PHYS-AMD-INST their third title in the last four years. Congratulations!

League Results (3/19 inclusive)

	W	L	T	Pts.
PHYS-AMD-INST*	15	10	8	38
DAS-CHEM-MED	13	14	7	33
AGS	14	18	1	29

*Clinched league title

SJU Redmen Down BNL 2-1

The BNL soccer club traveled to the home of the St. John's University redmen on the first day of spring and lost in a hard fought contest 2-1. It was the first outdoor game of the year for the BNL squad and indications are positive that the team will improve by eliminating some errant play. A rematch is tentatively scheduled for April 10 at BNL.

Runners' Corner

Another challenge has been extended to the BNL runners. This time it is Westinghouse in Pittsburgh.

Jim Guppy, a recent arrival in DAS (and a fine runner), paid a visit to his old running pals at Westinghouse and extended an invitation which was promptly accepted.

The race starts April Fool's Day and must be completed by July 4. The ground rules will be the same as before, but the time limit of about three months has been chosen to complete 3,000 miles. All previous runners will be contacted and new participants will be welcome.

Maps with legal distances for the various courses will be available soon. Information may be obtained from Jim Guppy, extension 2698; Bill Thomlinson, 3978; Gus Prince, 2901.

This race should provide an excellent training opportunity for the BNL spring run which will be held on Sunday, May 9, 1976.

Since this is the Bicentennial year, it has been decided to have a 17.76 relay consisting of teams that will run 10, 5 and 2.76 miles. The procedure in choosing teams and whether or not handicaps will be used has not been firmly established. The race will be open to all BERA members, their families and invited guests.

On another note, three BNL runners recently participated in the Earth Day Marathon on March 21 (remember that windy day?).

Bob Tucker (Phys. Rev.) trying to better his Central Park Marathon time was forced to stop after 20 miles due to leg immobilization. Art Harris (AMD) was thrilled to have finished his first marathon in about 4½ hours.

Gus Prince (DAS), with a 3:26, was on cloud nine, having qualified for the Boston Marathon (Patriots Day, April 19). A little icing on the cake was provided by the fact that he took 3rd place honors in his class division. He says he owes it all to his coach Steve Amoretty (Library).

Badminton Wind-Up

Monday, March 29 will mark the final day of play in the 20 week badminton ladder tournament but many requests have been received for an elimination tournament before the tennis season begins.

Ed Platner, Ext. 3922, will accept the names of entrants, will do the seeding and will post the schedule of matches to begin on Tuesday, March 30. It is anticipated that the tournament will be completed in two weeks. It is requested that players do not reserve a court during the first week unless engaged in a tournament match.

Players being entered are K. Fuchel, A. Saxena, D. Mackenzie, J. Elmore, E. Platner, H. Bhagat, W. Love, M. Kramer, Y.Y. Chu, J. Detweiler, J. Binnington, N. Combatti, G. Thompson, E.M. Franz, H. Connell, J. Guthy.

Others who are interested in participating, please notify E. Platner.

Mets Tickets Sales

Tickets for the 1976 New York Mets baseball season have been received and will go on sale at the BERA Sales & Services Office in the Cafeteria on Wednesday, March 31, at 7:30 a.m.

Seat locations are the same as previous years and are again priced at \$4.50 each.

Schedules will be available at the Sales Office and the Recreation Office on Monday, March 29.

Trip To New York City

The Hospitality Committee is planning a group railroad trip to the city on Wednesday, April 7. Departure will be at 8:59 a.m. from the LIRR station in Patchogue. The round trip fare for adults is \$2.45; children under 6 years ride free.

Reserve a ticket by sending your fare to Rosemary Jewett, P.O. Box 322, Upton, N.Y. 11973 no later than April 1.

Scuba Diving Classes

Many of our employees have expressed an interest in scuba diving classes. To satisfy this interest, BERA is sponsoring a series of classes under the direction of instructors from the Porthole Dive Shop in Port Jefferson.

The course is open to BNL employees and their immediate family members (minimum age 14 years). All prospective students must have had a physical examination within the last three months.

The series will consist of 9 indoor sessions, at the BNL Pool, and 3 open water sessions. Classes will be held on Saturday mornings from 9 to 12 with the first class scheduled on April 3.

Registration is now taking place at the Recreation Office in Building 185. A fee of \$30 will be due at the time of registration (checks payable to the Porthole Dive Shop).

Detailed information sheets are available at the Pool and at the BERA Sales & Services Office in the Cafeteria.

Classified Advertisements

Placement Notices

Each week the Personnel Office lists personnel placement requisitions, currently being processed. The purpose of these listings is, first, to give notice of all non-scientific staff positions being filled and, second, to give employees an opportunity to request consideration for themselves through the Personnel Office. In filling vacancies, the Laboratory's objective is to give first consideration to present employees, as follows: employees within the immediate group having the vacancy, employees within the department or division, employees within the Laboratory as a whole.

For further information regarding a placement notice, or to request consideration for an available position, contact Supervisor, Personnel Placement & Development, extension 2874 or 2882.

62. LABORERS - Temporary assignments. Application deadline: April 7, 1976. Plant Engineering Division.

63. LAUNDRY OPERATORS - Temporary assignments. Application deadline: April 7, 1976. Plant Engineering Division.

64. SECRETARY - Department of Applied Science.

65. LABORATORY CUSTODIANS - Application deadline: April 7, 1976. Plant Engineering Division.

Autos & Auto Supplies

67 SUNBEAM - Minx, 4 dr, 4 cyl, r/h, a/t, 25 mpg, runs good. \$450. Ext. 4532.

WHEELS - (2) 15" Chevy, 6 holes, w/good snow tires 800-15. \$40. Ext. 4265 during lunch.

67 PLYMOUTH - Barracuda, auto, ps/pb, starter exhaust & carb replaced last 3 yrs, new brakes, windshield, hoses & tires, some body rust. 80,000 mi. \$525. 698-5818 after 5.

73 OLDS - Toronado, fully equipped, 23,000 miles. \$3800. 472-0531.

RIMS - (2) 13", (2) 14", (2) 15". \$3 each. O. Booker, Ext. 4719.

73 GMC - 454 Sierra Grande, ¾ ton pickup w/hitch & cap, part finished interior. 727-2597.

59 CHEVY - 6 cyl, auto, running cond. \$75. 281-6042.

70 HONDA - 175 cc, good cond. 300. 399-1553.

73 JEEP WAGONEER - V8, 4 wheel drive, 4 dr, a/t, ps/pb, a/c, tinted glass, luggage rack, deluxe int & ext, excel cond, 20,000 mi. \$4200. 654-0863.

66 VW - Bug, excel running cond, many new parts, clean in & out, must sell. \$525. Ioannis, Ext. 2626, 475-6544.

72 CHEVY - Custom camper, ¾ ton, 350 engine, 4 wheel drive, A-1 shape. 744-8425 after 6.

65 PONTIAC - Tempest, 2 dr, hardtop, good cond. 732-3549.

66 MERCURY - Colony Park station wagon, 9 pass, a/c, am/fm, very clean, 93,000 mi. \$500. Paul, Ext. 2476.

74 PLYMOUTH - Fury III, 4 dr, hard top, ps/pdb, a/c, am/fm, more, must sell immediately. Reasonable offer. Mike, 751-2149.

YAMAHA - DT-100, \$450. 924-6372 after 5.

69 CHEVY - Impala, very good cond, good tires. \$850. Frank, Ext. 2957, 929-8317 after 5.

TIRE - 6-45-14 polyester cord, blackwall. \$5. Bill de Caro, Ext. 3354.

70 YAMAHA - Enduro, 220 cc, very good cond. \$300. 924-3783.

71 SUZUKI - TS 185 cc, road & trail, 2 cycle, oil injection, good cond, w/helmet. Joe, Ext. 4254, 281-7683.

72 HONDA - 350 cc, excel cond. \$700. Howard, Ext. 3260.

74 MOTORCYCLE - Monarck, 125 cc. 653-5630.

68 PLYMOUTH - Valiant, 2 dr, 6 cyl, auto, 65,000 mi, no dents or rust, runs like new. \$895. 286-9260 eves.

71 MATADOR - Station wagon, 6 cyl, standard trans, good tires, excel gas mileage. \$725. 286-0326 after 5.

71 MUSTANG - V8, auto, ps/pb, 55,000 mi, stereo radio. Carol, Ext. 4398.

71 TOYOTA - Corolla, new clutch, good tires, good body, needs muffler, carb work. Wholesale price. Ext. 4008.

72 CAMARO - Z-28, gold & black, rare car, immaculate cond, must see to appreciate. \$3100. Bill, 475-3415 after 5.

65 RAMBLER - American. \$250; 69 Pontiac Tempest, \$595. 281-3626.

71 TOYOTA - Corolla 1200 station wagon, 27 mpg, need 2 tires. \$800. 475-0126 after 5.

TIRES - (2) E70-14 Big Boss by Firestone, used 2 mo, excel cond. 589-1069.

74 GMC - Jimmy 4-wheel drive, 350 V8, 16,000 mi, excel cond inside & out, many extras. \$4700. Frenchie, 472-1875 after 5:30.

76 BUICK - Century custom, white w/red interior, radial tires, mags, am/fm stereo tape deck, a/c, Hearst Hatch sun roof. 981-5993 after 6.

WHEELS - (4) Chevelle 13", like new. Bailey, Ext. 3260.

HOUSE TRAILER - 17', fully equipped. 924-4789.

Boats & Marine Supplies

23' SPORTFISHERMAN - Pembroke, flying bridge, d/f, canvas, 6 cyl, extras, good cond. \$1650. Laird, Ext. 4068, 298-5092.

14' RUNABOUT - 25 hp, Evinrude motor, navy top, all controls. \$175. 345-4489 days, 669-1874 eves.

28' JORGENSEN - Skiff, fwc Chrysler crown. 286-8991.

23' INCA IMP - 73, 225 hp OMC engine, in/out board, convertible w/camper top. \$7300. 475-2253, 249-7665 after 6:30.

12' STARCRAFT - Aluminum, good cond. \$200. John, Ext. 3675, 924-3528.

20' SPORTCRAFT - 1967, 155 hp, OMC IO w/tandem galvanized highlander trailer, very clean. \$2700. Frank, 325-0750.

25' OWENS - Cabin cruiser, sleeps 5, 283 flagship engine, accessories, very good cond. Fred, 281-6468 weekends & eves.

16' RUNABOUT - Penn Yan, full canvas, 1962, no trailer, no motor, good cond. \$250. 261-6964.

Miscellaneous

REFRIGERATOR - 15 cu ft Hotpoint, separate freezer door, good cond. Bob, Ext. 4551, 289-2159.

STOVE - 30" Hardwick, bottled gas, clean, very good cond. \$20. Bob, Ext. 4551, 289-2159.

BOYS BICYCLE - Raleigh colt, 3-speed, 26" wheel, 20" frame, hand & coaster brake, excel cond. \$55. James Watson, 286-3679.

STEREO - 8-track, 12V w/speakers. \$25. Ext. 4265 during lunch.

OVEN - Elec, wall or counter, use as extra to keep kitchen cool, very good cond. \$10. Ext. 4240, 286-0295.

TYPEWRITER - Smith Corona w/carrying case. \$25; 8 MM movie camera & projector, \$30. Ext. 4265 during lunch.

COFFEE TABLE - Pennsylvania House, dark pine, \$35; GE hair dryer w/hood, 2 speed, \$10; ladies lavender pant suit, size 10, never worn, \$15. 698-5818 after 5. ANTIQUE VANITY - W/mirror. \$30. 744-2493.

CHAIR - Colonial wing chair, gold. \$50. 744-2493.

RECLINER - Lazy Boy, very good cond. \$130. 744-2493.

DINING RM TABLE - Large, old. \$15. 744-2493.

WORK BENCH - Heavy duty, metal. \$25. 744-2493.

DINETTE SET - Maple, table & 4 chairs, opens to seat 8. \$110. 744-2493.

HOLIDAY TRAVELER - 21', rear bath, excel cond, 1972. \$5800. 727-2597.

CRIB - Good shape. \$10. 924-7079.

ELEC TEST EQUIP - For radio & TV, chairs, new tubes, toto facts, etc. Walter, 727-2223.

SLENDER CYCLE - 2-speed, motor driven. 727-2223.

74 TRAILBIKE - Zundapp, 125 cc, excel cond. \$400. Oscar, Ext. 4719.

FAN - Attic ventilating, 20" w/shutter, top industrial quality, like new. Cost \$170, will sell for \$50. Nancy, Ext. 4619.

GIUITAR - Univox bass, amp 200 watts, 2 channels, (4) 12" speakers in 2 cabinets, Ventura bass, good cond. \$325. Mark, 289-0886.

SPORT JACKET - Cashmere, custom tailored, size 38-40, new cond, \$35; wool business suit, \$55. Joe, Ext. 4069.

TV - Motorola, 19", table model, working cond, \$35; headboard, king size, \$30. Ext. 4532.

TURNTABLE AMPLIFIER - Dynavox, 2 speakers, headphone jack. \$25. Ext. 4532.

SOFA BED - Rolls out from bottom to sleep 2, foam rubber mattress. \$100. Ext. 4532.

CHANDELIER - Black, 10 arm. \$40. Ext. 4532.

NYC OPERA - 4 tickets for Ashmedai, April 1, second ring seats. \$6.50 each. M. LeVine, Ext. 4581.

FURNITURE - Colonial living set, couch, chair, rocker, end & coffee table, 2 lamps. Michael Iarocci, 289-3283.

GIRLS BICYCLE - Like new, 24", \$25; spring coat, girls, size 12, red/white/blue check, \$15; Sears teeter-totter, new, \$7. Stan, Ext. 2428.

COFFEE TABLE - Mahogany. \$25. Rudy, 751-3883.

RUGS & PADS - Excel cond, green 11"x16", \$75; purple, 10"x11", \$125. Rudy, 751-3883.

FILTER - Dynaflo, model 430, like new, will service 20 gal fish tank. Bought for \$23, will sell for \$18. Toni, 878-4318.

TAPE RECORDER - Roberts 770, reel to reel, excel cond, \$150; Great Books of the Western World, complete set & Syntopico, \$200. C. Kramer, 744-8632.

SHEETS - Child's sheets & pillow case for twin size bed, perm press percale; child's dishes, new, never used. S. Spark, Ext. 4111.

PLAYPEN - W/matching mattress, mesh sides, 40"x40", good cond. S. Spark, Ext. 4111.

TENT-CAMPER - '75 Cox pop-up, sleeps 5, kitchenette, stove & sink. \$1100. Kathy, 666-7238.

DRUM - Beginners snare drum on stand, 10" cymbal, adjustable drum seat. \$20. Ext. 2625, 473-9016.

CLOTHING - Infant thru toddler; b/w TV; oval antique table, adult clothing, coats, dresses, other misc. items. 732-8273.

SWIMMING POOL - Above ground, 21' round, 48" deep, aluminum, w/accessories, cover, 3 yrs old. \$400. Hoffman, Ext. 2443.

MENS BICYCLE - 25" Raleigh Grand Prix, 10-speed racer, clincher tires, quick release hubs, simplex gear changer, center pull brakes, like new. 473-0178.

TYPEWRITER - Remington, quietrite, portable w/carrying case. \$35. John, 281-3291.

PA/AMPLIFIER - Bogen, 50 watt, excel cond. \$40. 581-0932 after 6.

YOUTH BED - W/rails, 2 mattresses, excel cond. \$30. Joan, 727-2861.

STOVE - 4 burner, oven, broiler, 20" wide x 24" deep, excel cond, you pick up. \$30. 727-0524.

Ads left out of this issue because of lack of space need not be re-submitted in order to run in next week's issue

BATHROOM SINK - W/faucets, \$10. Bill, Ext. 4526.

BICYCLE - Mens 10-speed Schwinn w/back mouse trap, used 5 times. \$150 new, will sell for \$75. Ext. 2910, 286-1541.

CRIB - All wood, excel mattress. \$15. Steve, Ext. 3822, 929-6527.

DINING ROOM TABLE - Round, w/4 chairs; cocktail table; table lamp. Lois, Ext. 3046, 751-0023.

SHAKER REPRODUCTION - Pine hutch secretary, 82"x26". \$395. 472-0136.

AIR CONDITIONER - Fedders, 10,000 btu, 7½ amp, 110 V, excel cond. \$125. 472-0136.

DEHUMIDIFIER - Portable, on wheels. \$40. 475-4386.

FILE CABINETS - (1) 4-drawer, tan, legal size; (1) 1-drawer, tan, legal size. \$10 each. 475-4386.

STERLING SILVER - Flatwear, (1) 8-pc place setting, Lunt Modern Victorian pattern, never used. 744-6288 after 6.

COCKTAIL RING - Ladies diamond ring, ½ carat, total weight, new cond. Retail \$650, asking \$375. Richard, Ext. 4134.

3M COPYING MACHINE - Model 051, portable, new, warranty still valid. \$199. Richard, Ext. 4134.

WASHER - Westinghouse automatic, front loading. \$45. 744-4066.

COACHMAN TRAILER - '72, 18', bath, shower, many extras. 698-4935 after 6.

TV - 10 yr old Sylvania, color. \$25. 289-0532 after 6.

NIKON - F body, Nikkor 43-86 zoom. \$325. 744-1724 weekends.

POOL TABLE - 4'x8', slate top w/cue stick & balls, excel cond. \$100. 289-6653 after 5.

BRANDENBURG ENSEMBLE - 4 orchestra seats at Lincoln Center, Sun afternoon, March 28. \$6.50/seat. Judy, Ext. 4331, 331-1396.

MENS BICYCLE - Gitane Interclub, 10-speed, good cond. Make offer. Josh, 286-8724 after 5.

MENS BICYCLE - 25" Raleigh, Grand Prix, 10-speed racer, like new. \$125. 473-0178 eves.

Real Estate

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

For Sale

SHIRLEY - 4 yr old ranch, 4 bedrms, living rm, dining rm, 2 baths, basement, porch & patio, carpeting, 100x125 fenced yard, near stores & transportation. \$33,000. 281-3721.

BELLPORT - 100'x175' lot, split level, mother-daughter, 11 rms, 2 separate entrances, 2 kitchens. 286-9051 after 7:30.

CUTCHOGUE - 1 acre building lot, water view, beach rights, near school & shopping. Asking \$15,000. G. Laird Stubbings, Ext. 4068, 298-5092.

NORTH CENTEREACH - 3 bedrm, dining rm, eat-in kitchen, living rm, 24' family rm, garage, appliances, full basement, fenced, landscaped, extras. Sanchez, Ext. 3354, 732-5197.

PATCHOGUE VILLAGE - 3 bedrm ranch, 50x100 corner lot, expansion attic, semi-finished full basement, some appliances, country kitch, attached garage, near schools & shopping, ext. maintenance free. \$34,000. Ext. 2290, 475-7694.

ROCKY POINT - 4 bedrm, colonial, central a/c, 2½ baths, nicely landscaped, backed by woods. Priced very low to qualified buyer. 928-2954 after 6.

SMITHTOWN - 3-4 bedrm ranch, eat-in kitchen, formal dining rm, 2 car garage, lg screened porch, finished basemt, extras, SD #1. Reduced to \$47,500. Ext. 4008, 265-1436.

BROOKHAVEN - Colonial 4 bedrm, 2½ baths, 2-car garage, full basement, fireplace in lg living rm, formal dining, country kitchen, den, ¾ acre plot. Middle Island Schools. \$49,900. 286-0158.

RIDGE - Levitt Strathmore duplex townhouse, 3 bedrm, 1½ bath, wooded location, a/c, w/w carpeting, 5 appliances, fenced patio, low maintenance, landscaped. Owner sacrifice, low 30's. 924-3361.

NORTH SHIRLEY - 5 min to Lab, 4 bedrm, 1½ baths, living rm, dining rm, kitchen, carpets, 15'x25' family rm, patio, garage, appliances. \$36,500. Julie, Ext. 4216, 281-1571 eves.

For Rent

CALVERTON/RIVERHEAD - Townhouse, 3 bedrm, 1½ baths, ac, all appliances. \$289/mo + util. Ext. 2445, 488-2497.

SAYVILLE - 3 bedrm ranch, living rm, kitchen, laundry rm. \$300/mo + security. 289-0413.

CORAM - Secluded cottage, 2 bedrm. \$200/mo + util. 732-3681 before 2.

MEDFORD - 1 bedrm apt, unfurnished/semi-furnished, 15 min to Lab, avail May 1. \$225 incl util. Ext. 3336, 475-8456.

BROOKHAVEN TOWN - Lg, furnished apt, private entrance, living rm, bath, bedrm, 3 min from boat docking space, lg yard bordered by woods, avail April 1. 286-2450 between 6 & 7.

ROCKY POINT - 1 bdrm, furnished, waterfront apt. \$260/mo. K. Fuchel, Ext. 4116.

VERMONT VACATION - 3 bedrm mobile home w/fireplace on 10 acres, 10 min to Okemo Mt, close to 7 major ski areas, weeks or weekends. Bob, 473-8186.

WADING RIVER - Lg 1 bedrm basemt apt, furnished, private beach, 15 min to lab. \$250/mo incl util. 929-8443.

Wanted

CAMPBELL'S LABELS - Soup & bean, needed by St. John School to get gym mats. Send to F. Chandler, Bldg. T-89.

USED ROTOTILLER - In reasonable cond at reasonable price. Bob, Ext. 4551, 289-2159.

OLD VW'S - Any year, any cond, also misc used VW parts for sale. 281-3460.

MOTORCYCLE SEAT - For 1970 450 CB Honda. M. Kinney, Ext. 4316, 924-3783.

COLOR TV'S - Reasonable prices paid for used working or broken sets. Ext. 2022.

VAN SEATS - Used front, low-back, bucket style from 71-75 Ford van. R. Hildenbrand, Ext. 3273.

BABY SITTER - For occasional Sat or Sun night, Medford area. 475-5591.

SIMPLE PLANS - For a model boat, for youngster interested in wood carving. Bob, Ext. 4184.

PEOPLE - Who want to sell handicrafts. Sharon Hoefner, 878-2591 after 6:30.

ROOMMATES - To rent a house on North or South Shore. Doug, Ext. 2091.

GIUITAR TEACHER - 286-0542.

WOMEN TO INTERVIEW - Women 40-55 to supply psychological, sexual, emotional histories in taped interviews for book on understanding successes & failures of passage thru middle age. Anonymity guaranteed. 751-1401.

KITCHEN COUNTER TOP - Bottom cabinet & sink about 5-6'. Ext. 2290.

WICKER SOFA - 928-0348 eves.

JAPANESE TUTOR - Willing to help 3 teenage girls maintain their proficiency in Japanese language. Roy, Ext. 4600, 928-0466.

5 LB. LP TANK - And regulator. Ray, Ext. 2952.

PIANO - Small Spinet, good cond. Ext. 3783, 765-2001.

LP GAS HEATER - At least 30,000 btu, good working cond important only, reasonable. Irene Merritt, 589-5126.

CANOE - Good cond. Bob, 698-9733.

HOUSE - Low 30's, 3-4 bedrms, Pt Jeff/North Shore area or east. Sanchez, Ext. 3354, 732-5197.

BABY STROLLER - For twins, cond not important, just usable. Ext. 4128.

REFRIGERATOR - Small, to buy for non-profit organization. W. Winsche, 286-0517.

TENNIS RACKET - Good cond. 744-5553.

MATTRESS - Standard baby crib. 744-5553.

Car Pools

NORTHPORT - Overtime, 8:30 am to 7 pm, also Sat. Pete, Ext. 3310.

Services

ROTOTILLING - Lawn & garden, modest rates. Bob, 732-9517.

POTTERY CLASSES - 878-1958.

BABYSITTING - Reliable, your house, no transportation, avail after 3 pm weekdays, any time weekends. Laura Louttit, 744-3225.

AUTO REPAIRS - Tune-ups, brakes & most all repairs, good rates. Ray, 878-2486.

CROCHET - Shawls, vests, hats, caps, etc. 878-2486.