HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

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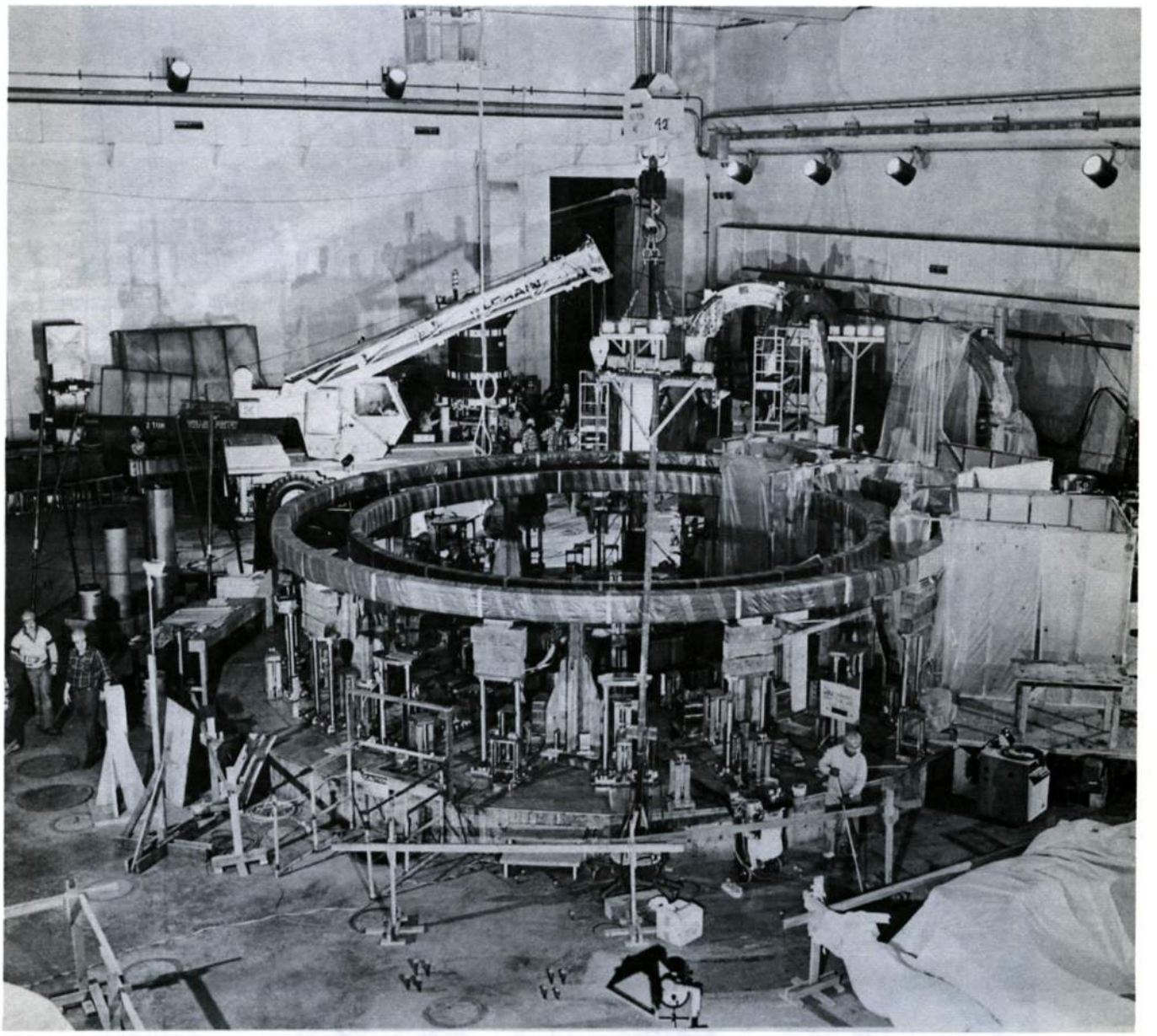
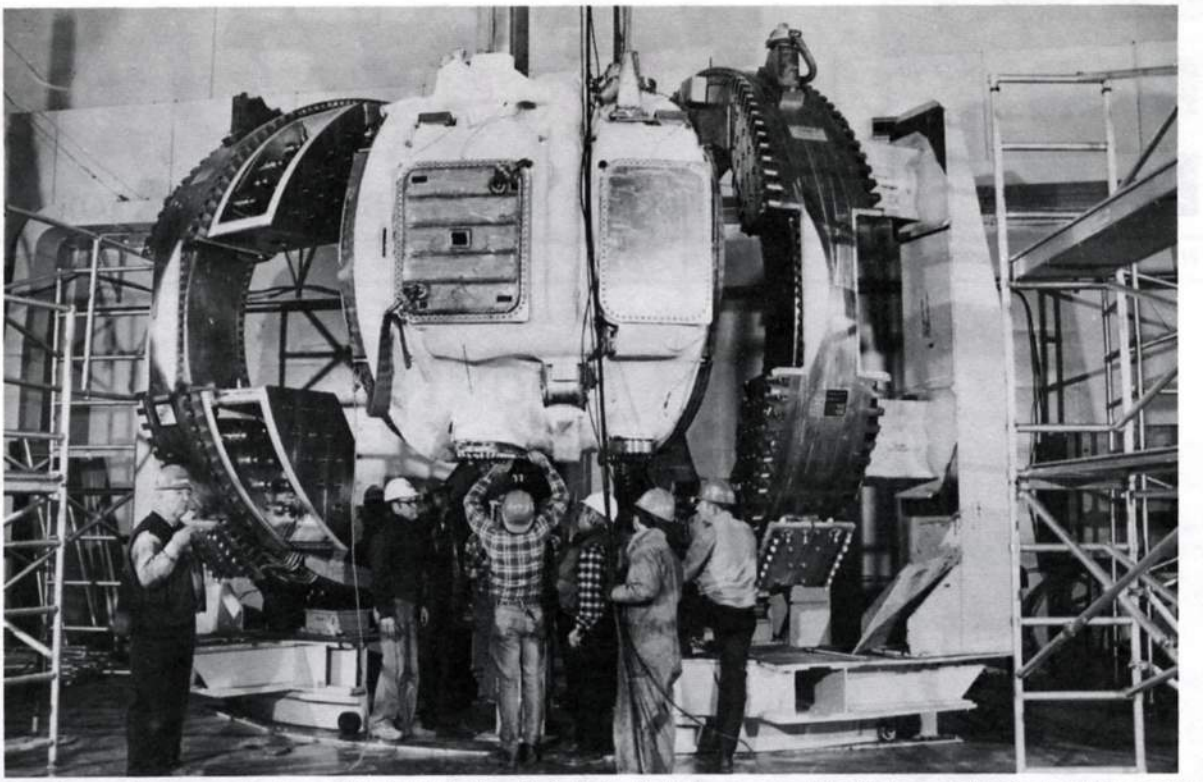
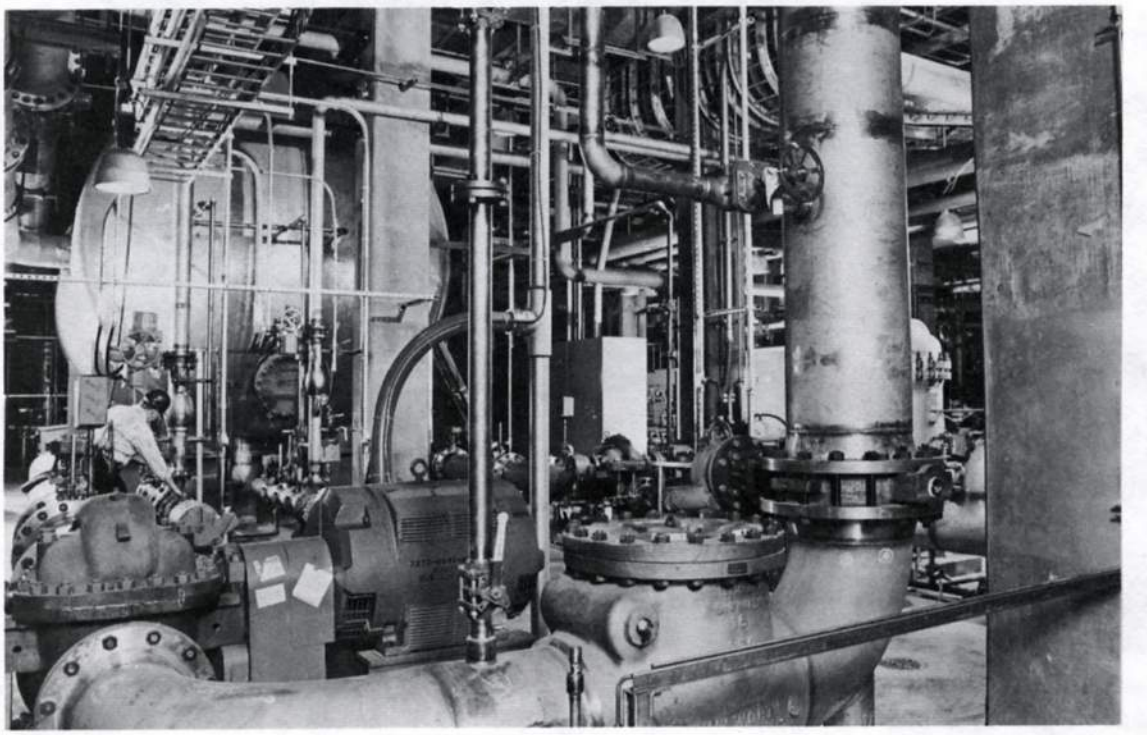
TFTR Update



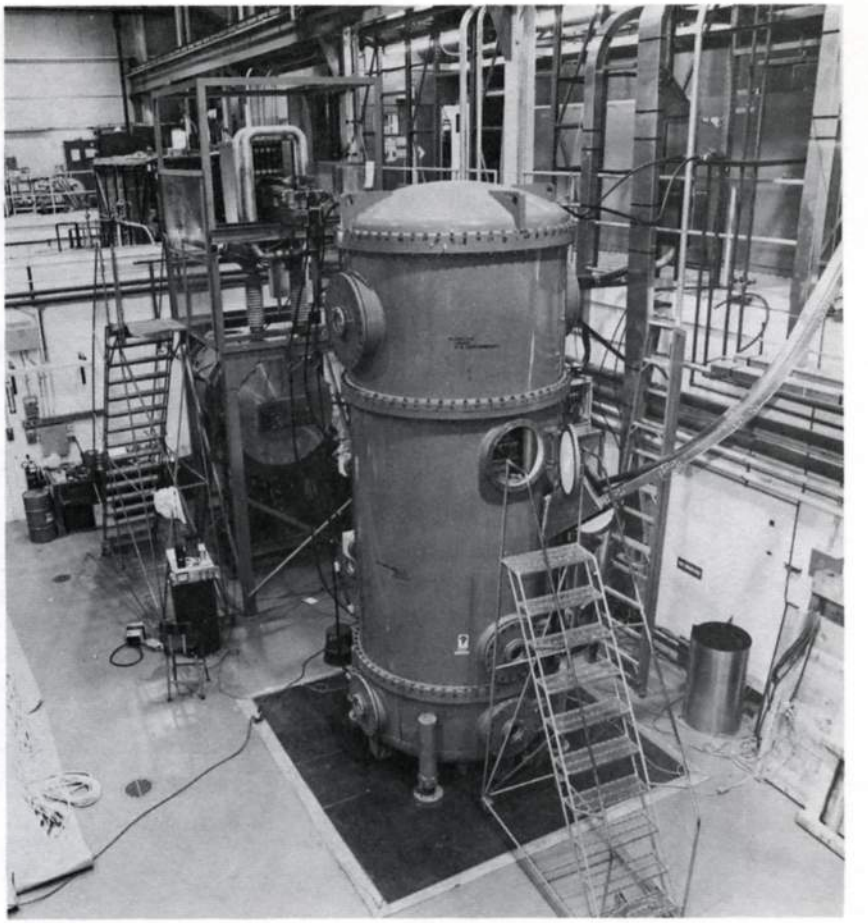
The various components that will eventually comprise TFTR are continuing to come together in the D-Site Test Cell. In this picture, taken in February, the large poloidal field (PF) coils are being connected in place around the machine base. Piled against the wall on the right of the exit are three toroidal field (TF) coils awaiting installation. The inner support structure/PF coil subassembly, which will form the "hole" in TFTR's "doughnut", is visible to the left of the exit near the crane. The upper PF coils began arriving at the test cell March 29.



In the picture above, a pair of toroidal-field (TF) coils is being held in an assembly fixture and mated with a vacuum vessel segment. The TFTR will be constructed from 10 such units. The TF coils will carry 23 kiloamperes and generate up to 52 kilogauss. They will be energized for pulse durations of 2 to 10 seconds, with a repetition rate of 5 minutes. They will be water cooled and are housed in special steel cases connected by shear panels.

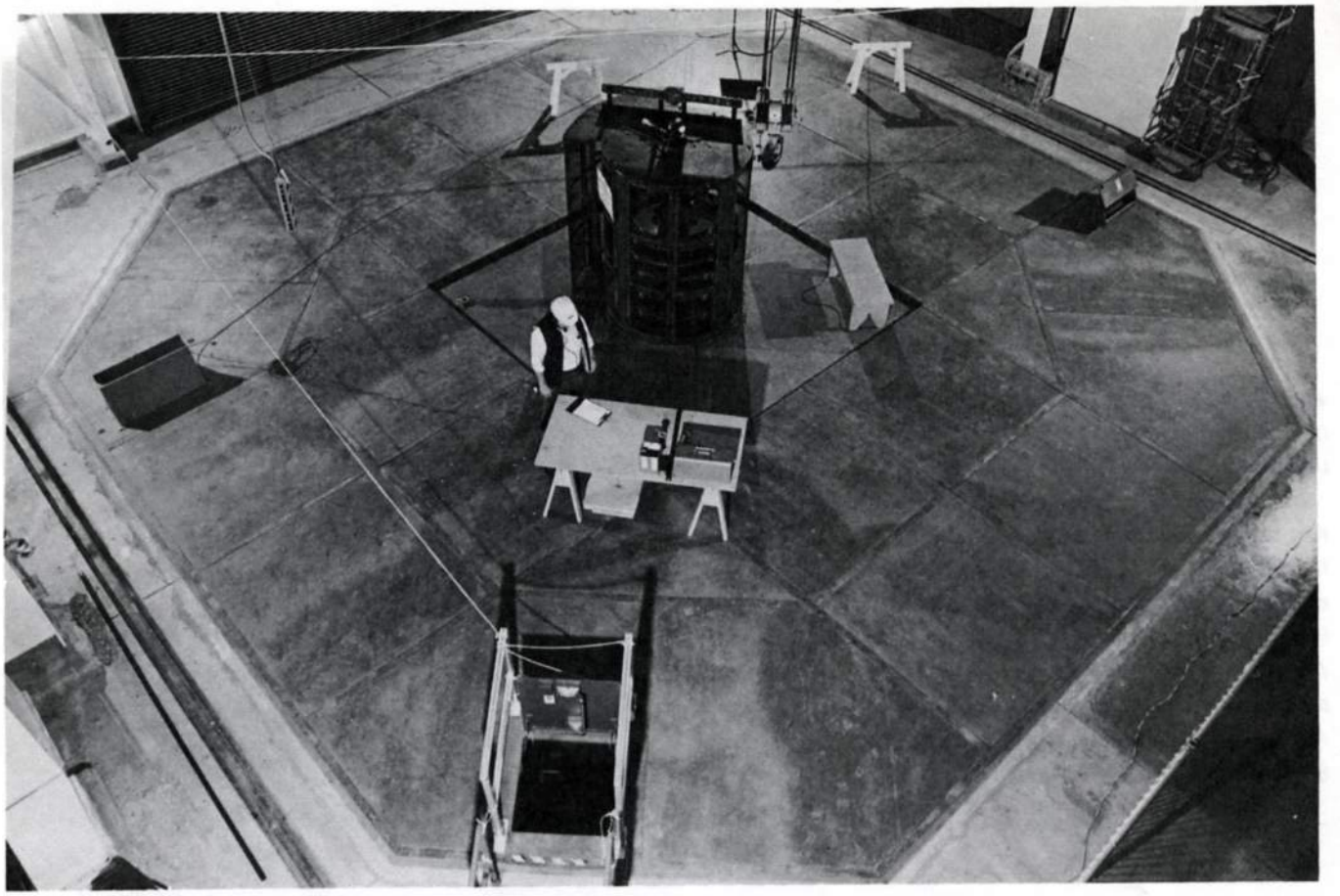


The pump room is part of a 30,000-square-foot basement underlying the TFTR installation. Shown in the foreground are an 18-inch waterline and a 3,300-gallons-per-minute centrifugal water pump for circulating deionized water to cool the TFTR coils. In the background is a 32,000-gallon stainless steel deionized water storage tank.



The 120-kilovolt accelerating supply of the neutral-beam injection system is currently under test. The heart of the accelerating supply is a specially developed tetrode, 3 feet tall and weighing 325 pounds, which is capable of passing about 125 amperes of current and withstanding 250 kilovolts. A large sulfur hexaflourine pressure tank (shown in the foreground) houses the are-power and filament-power supplies of one neutral-beam ion source, floating electrically at 120 kilovolts above ground.

Large racetrack-like openings provide diagnostic access from the underside of the six-foot-thick machine base into the TFTR vacuum vessel. The wide angle shot shown above distorts the machine geometry.



Motor Generator Set No. 1 is currently undergoing acceptance tests, which include balancing. The unit has reached speeds of 330 revolutions per minute during these tests, and has a top speed of 375 rpm. A settlement has been made on MG Set No. 2, damaged during installation in December 1980, allowing for repair and replacement of set components.

MG Settlement

An out-of-court settlement of approximately $8 million has been reached regarding the December 1980 TFTR motor generator set accident at PPL. The settlement will allow repairs and component replacement to proceed at no cost to the University or the government.

Negotiations involving the U.S. Government, Princeton University and Ebasco Services, Inc. have been ongoing with the Belding Corporation, the Reliance Truck Company and their insurers. Under the terms of the settlement, Belding's insurers have paid $3.39 million, while Reliance's insurers paid $4.75 million.

The majority of settlement funds will be provided to General Electric Co. for the removal of damaged components, and the fabrication and installation of a replacement generator. The balance of the recovered funds will offset miscellaneous accident-related expenses incurred by Princeton, Ebasco and the Government.

In December 1980, a crane failure damaged generator components during installation of a second MG set for TFTR. The Chicago-based Belding Corporation, Ebasco's subcontractor, was responsible for the installation of the motor generator. The crane was supplied by the Reliance Truck Company of Phoenix, AZ.

Completion of the replacement generator is scheduled for the fall of 1984. The accident is not expected to delay the TFTR experimental program, since the second generator is only required for experiments in 1984 and beyond.

Alarm Available

As part of a combined crime prevention effort, the University Store has made available at cost the "1st Aid" personal alarm and flashlight. This unit can be comfortably carried as a very functional flashlight, and with a mere flick of the switch gives off an ear-piercing, shrill alarm. Unlike tear gas and mace (which have been virtually ineffective in warding off an attacker), the "1st Aid" alarm will attract attention and, if placed near the ear of an attacker, act as a weapon as well.

The "1st Aid" alarm/flashlight is endorsed by the Security Department, and costs $7.49 including batteries. Departments that have employees who occasionally work late may want to consider the purchase of a "loaner" that can be available for such times and returned by the employee for future use.

The attacks that have been reported in the area in recent months have made personal safety foremost in everyone's mind. The "1st Aid" alarm/flashlight should help return some degree of confidence—and could perhaps save a life.

Holiday Schedule

Three four-day weekends have been incorporated into the 1982-83 edition of the University's holiday calendar.

In addition to Monday holidays on July 5, September 6 and May 30, the laboratory will be closed on November 25 and 26, December 23 and 24, and December 30 and 31.

Current Courses

Two courses, sponsored by the Technology Department's Engineering Program and the Personnel Department, are currently being run on a weekly basis in Sayre Hall. The first, "Physics of Fusion for Engineers", is a series of ten engineering-oriented lèctures highlighting energy and physics. The first lecture, already given by Frank Bennett, will be followed by talks by Dr. Fred Tenney and other noted PPL physicists. Areas of interest to members of the Engineering and Scientific Staff will be discussed.

The second course, "Analog Circuits", is being taught in conjunction with Mercer County Community College. The 12-week course is designed to acquaint monthly support and biweekly staff members with the operating principles of operational amplifiers, power switching circuits, triacs, and transistors.

For further information about either course, contact Human Resources Manager Len Thomas at ext. 2052.

Patent Program

PPL now has a Patent Awareness Program, as well as a Committee on Inventions, to increase the patent awareness of laboratory staff. Five invention disclosures were filed with the committee since December:

- Borated Coatings for Thermal Neutron Shielding, by J.C. McDade and C. Clifford
- Non-Inductive Tokamak Startup Scheme, by R. Horton, M. Ono, T. Stix, K.L. Wong and G. Wurden
- High Transfer Rate Heat Exchanger Cooling Tube, by P. Bonnanos
- Infrared Temperature Monitor, by M. Ulrickson
- Rooftop Resonator, by L.C. Johnson and D.K. Mansfield

For further information about the committee or the program, contact committee secretary Nancy Jones at ext. 2659.

Identification Badges

All employees who have not obtained their new Employee Identification Badge should come to the Security Department in the Gas Dynamics Building at their earliest convenience. If you still have an old badge, it will be deprogrammed and will deny access to the facility after APRIL 15.

Chain Letters

PPL facilities, including Xerox copiers and the mail service, are for official Laboratory business only. Personal chain letters, even though they may be well-intended, are not to be copied or distributed with the use of PPL facilities.

"Dresser" Trip

The Princeton University League is sponsoring an April 21 New York bus trip to see the Broadway play "The Dresser", starring Tom Courtenay and Paul Rogers. The $29 fee covers theatre tickets and transportation. The bus will leave the Princeton Shopping Center at 8:45 a.m., and is expected to return at approximately 5:30 p.m. the same day.

For further information on the trip, call the league office at 452-3650.

Softball Startups

PPL employees will again have the chance to settle intraoffice rivalries on the field of honor, via the PPL intramural softball league.

Organizer Ed Bush said the Warehouse and the Vacuum Shop will be fielding teams this season, and several other offices and departments have expressed interest in the league. Teams must have a minimum of 10 players, and team membership is open to all laboratory employees. Games will be played each Wednesday night at the baseball diamond near the airstrip.

Anyone interested in playing in the league should contact Ed on ext. 3309, Frank Wasiowicz on ext. 3568, or "Bubba" Vinson on ext. 3682 by April 23. The season is expected to start at the beginning of May.

Sports Programs

Len Thomas, Manager of Human Resources, has asked that anyone responsible for sports programming at the laboratory contact him on ext. 2052.

The Secretarial and Office Support Staff (SOSS) will have their annual Secretarial Party April 23 in the cafeteria. The party is open to all secretaries and their supervisors. Refreshments and entertainment will be provided.

Science Fair '82

On March 20, 21 and 22, staff members from PPL's Information Services Branch were "shaking hands" with the masses. The laboratory was participating in Science Fair '82, held at Rutgers University and sponsored by the Research and Development Council of New Jersey.

Thirty-seven exhibits representing several universities, industries and businesses were on display at the fair.

Using models of PDX, PLT and TFTR, Informa-Services staff members explained what fusion is and how our machines work to over 13,000 attendees.

"I was amazed at the public's general knowledge of fusion," said one staff member. " It's good to know that so many people are following fusion research and see our work in such a positive light."

Cafeteria Cautions

Cafeteria trays taken to your office and left there mean no trays in the cafeteria, and inconvenience to lunchtime diners. If you eat in the cafeteria, stop inconveniencing yourself. Return all trays (along with any plates or silverware) to the cafeteria *today*.

Vacation Car Check

While hauling trailers, boats and kids to vacation spots this summer, motorists will find themselves stuck in the middle of the Lincoln Tunnel, halfway up a mountain, or in the middle of the Everglades—all because somebody forgot to have something checked before leaving home.

Most car trouble can be prevented with five basic pre-vacation services:

- Cooling system: Have the radiator flushed and refilled with new coolant if needed.

- Engine: Have a tune-up if your car hasn't been tuned in the last 12 months. Check the engine if it's been tuned more than six months before your trip.

- Brakes: Have your brakes adjusted if necessary. If there's any doubt about the condition of your brake linings, have them checked and replaced if necessary.

- Steering: Be sure there is no excessive play in the linkage. It's also a good idea to have wheel alignment and balance checked.

- Chassis lubrication: This encompasses a lot more than the old fashioned "grease job." It gives your service man a chance to look at the battery, lights, wipers, tires, shock absorbers, belts, exhaust system and the general condition of the car. This is also a good time to change the oil and filter.

Sound like a big job? Not so, because many of these items are routine checks which should be done periodically anyway. And if you find you are about to need a new tire, windshield wiper or radiator hose, where better to have the work done than in your own home town?

Trio Complete Tritium Training

If any group of people at PPL can be said to be well-versed in the state-of-the-art techniques of tritium handling, it would be Mike Candelori, Lloyd Ciebiera and Gene Shropshire. All three men recently returned from the Monsanto Research Corporation's Mound Facility in Miamisburg, Ohio, where they learned the intricacies of the tritium handling system they will be using on TFTR.

Mike, the supervisor of the three-man crew, has been with the University for 23 years. "I was interested in moving into a different type of work, and I got interested in tritium handling," he explained. "Carl Pierce and Halsey Allen took me on board, and sent me out to Mound for six months of training. I spent another year and a half there, working with the equipment we'll be using here."

Most of the work Mike did involved testing plumbing, electrical connections and calibration of components of the tritium storage and delivery system (TSDS). Lloyd and Gene were at Mound for a little over a year, receiving similar training. All three men were taught methods of handling tritium safely, as well as what conditions prevail in a laboratory using radioactive materials and how to deal with them.

"We worked hand in hand with the Monsanto people in their every day duties of handling radioactive materials," Mike said.

Lloyd explained that when TFTR incorporates tritium as part of the fusion process, the radioactive hydrogen isotope will be delivered to the laboratory as a gas in sealed containers. "We'll put it into the tritium receiving glove box and assay it for purity."

TFTR tritium must be 99 plus percent pure upon reaching the torus. Assuring that purity will be part of the crew's responsibility, as will cleanup of all tritium handling areas.

Once the purity of the tritium is established, the isotope is transferred to the tritium storage and delivery glove box, where it is maintained in solid form at specified temperatures and pressures. Small amounts will be bled off as required for experimental use.

Mike explained that the entire tritium system "is designed to protect the employee from the gas." "We checked it out at Mound, and we'll check it again here," Lloyd said, adding that the TSDS performed "extremely well" during testing at Mound.

The system is actually composed of interlocking subsystems, all serving as backups for one another. For example, a primary line carrying tritium is encircled by a second line carrying inert gas. The gas acts to circumvent any tritium escape. Differences in pressure between the two lines also acts to contain the tritium.

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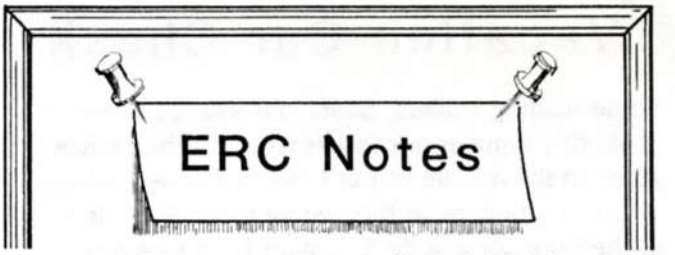
This pressurized protection extends into the various areas where the isotope is used. The pressure in the tritium glove box is lower than that in the vault area, which is lower than that of the room outside it. The variation causes any tritium that may be released to be contained in the release area, rather than leaking into the surrounding areas.

The crew has also been carefully trained in the use of emergency procedures in the unlikely event of a tritium escape. If work in a release area became necessary, crew members would don plastic "bubble suits" to enter the contaminated area. The suits have a supplied air system and are made from 12-mil polyethylene plastic. Crew members would be rotated into and out of the contaminated area, reducing the possibility of tritium exposure.

All three men felt the most important lesson they learned at Mound was thinking an entire operation through before beginning it. "You do have to change your thinking," Mike admitted wryly." "You become very conscious of preplanning everything before you move. It's all part of dealing with a potentially dangerous isotope, but we've found that it doesn't have to be dangerous when you take the proper precautions."

Mary Bersch, formerly Assistant to the Manager of the Information Services Branch, has been promoted to PPL Benefits Administrator in the Personnel Department. Mary is responsible for administering the workmen's compensation, life insurance, salary reduction, retirement and other service programs for the laboratory. She will also assist Human Resources Manager Len Thomas with employee relations and training issues. Mary has been with the University for five and a half years.



Associate Director and Head of the Administration Department Dick Rossi attended the March 10 ERC meeting to discuss employee concerns on management issues. Among the issues discussed were:

- Need for improved communications between management and employees.

- Employee dissatisfaction with current benefits package.

- Employees perceptions of management's concern for staff welfare.

- Employee-Supervisor relations.

- Staff morale and motivation as affected by above issues.

Mr. Rossi explained management's positions and efforts relating to the issues discussed, then requested a continuation of the dialogue. At a special ERC meeting held March 24 for that purpose, the following actions were taken:

- Mr. Rossi suggested that Manager of Human Resources Len Thomas serve as the official communications link between management and the committee, reporting to the ERC at each meeting.

- Mr. Rossi stated the University Benefits Committee has been studying the benefits issues, but he felt there is not much likelihood of changing the laboratory benefits package in the current year—aside from the recently announced change in educational benefits.

- Mr. Rossi met with the PPPL Council and set a May 1 deadline for requesting bids for a public address system, to be used for emergency notification purposes.

- Mr. Rossi also said that mandatory training programs are under consideration for supervisors. Such programs would provide uniformity among managers and their policies.

Pictured here are the PPL employees who have volunteered to be energy monitors for the In-House Energy Awareness Committee. Pictured above are, from left to right, (first row) Ed Costello, Employee Energy Awareness Subcommittee member Pat Zeedyk, John Garbowski, (second row) Abe Simon, Mike Burns, Paul Jones, Ray Pressburger Jr., monitor co-ordinator Steve Ragolia, (third row) Bob Goodwin, Marie Steer, Tom Goedert, Ed Berman, Girard Boyd, (back row) John Hirthler, Floyd Boyd, Bruce Brilliantine, Ben Velivis, Joe Wood, Rich Cargill and Jerry Williams. Pictured below (left to right) are monitors Pat Melsky, Employee Energy Awareness Subcommittee member Mary Ann Brown, Sallie Young, Marie Maruso and Kay Finch. The monitors will remind other employees in their areas of wasteful uses of energy, and will report continual problem areas back to the energy committee for further action.

ppl people

Marathoners Take Training in Stride

Some people think marathoners are crazy. For 25 grueling miles, they force their bodies to perform, to conqueor that last mile, to dredge up that last bit of endurance. They train with a singleminded concentration and determination, running weekly distances that often seem incredible. For few other athletes is the taste of success sweeter than for the marathoner, who arrives totally drained at the finish line.

Bob McCann and Jules Nemeth know that special feeling marathoners share, because they've both competed in several marathons. Both have agreed to share their thoughts on their "crazy" avocation with HOTLINE readers.

Bob McCann

Bob McCann

Bob, a computational physicist on the professional/technical staff, became active in fitness in junior high school. "President Kennedy's youth fitness program gave me the excuse I needed," he recalled.

He took up long distance running in graduate school in the early 1970's. His distance increased when he solved his foot problems. "I have short, wide feet with long toes," he explained, "and when I got shoes that were made for wide feet, it made all the difference in the world. I suddenly found that doing 10 miles wasn't painful anymore."

Bob enjoys running because "you're not really competing against anyone but yourself and your personal standards. Running is something I enjoy. It's my own form of meditation and provides a needed stress relief."

He credits running with relieving tension and reducing the intensity of the migranes he's often plagued with. "Prolonged training reduces the blood pressure, slows the pulse, increases the blood flow, and changes the blood chemistry," he contends. "There are chemicals in the brain (the enkephalins) that are stronger than morphine; they cause relaxation and "runner's high," since they're released when you run." Bob asserts that runner's high is a fact "and you can definitely become addicted to it." He also points out that after four or five minutes of running, the level of the runner's awareness drops, reflexes slow, and thoughts don't flow as quickly. According to Bob, this is probably due to the oxygen debt you build up during a long run; "it's somewhat like getting slightly drunk."

Bob begins training for spring races in mid-February. He'll run unless the wind chill factor drops below 10 degrees F. "In very cold weather," he says, "it's very easy to pull a muscle. But you've

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got to train for several months before you start doing marathons. If your goal is simply to finish, it's not that hard. The training is a long-term thing; weekly distance shouldn't be increased more than 10% per week. Once you're prepared, though, you can usually keep your performance up."

Bob may start training one day a week as long as four to five months before his first long race of the year. When running with others, he paces himself with conversation. "If you can't run and talk at the same time, you're running too fast. I've found that helps to prevent injuries."

When he's training, Bob eats anything he wants—an added bonus to running. "Running provides enough exercise to burn 125 calories per mile. That allows me about one beer per mile or one bowl of ice cream for every five miles." That's a lot of ice cream, considering that Bob puts in 40 to 60 miles per week for several weeks prior to a marathon. He claims that's severely undertraining, and that 65 to 80 miles per week for a month prior to the race would be much better. The week before, though, he rests to allow his body to recover fully from the training.

Bob turned in a 3:45 time in last year's 26 mile, 365 yard Sri Chinmoy marathon in Plainsboro. Two months later, he did a 3:27:39 in the Marine Corps Marathon in Washington, D.C. He's planning to run in the New York Marathon and the Princeton Half Marathon next fall. He's also considering a springtime run through the cherry blossoms in Washington, D.C. as an added challenge.

He reports that when you cross the finish line after 26 tedious, grueling miles, "you just thank the stars that you're still alive!" He's forced to make frequent water stops during runs of 10 miles or more, especially during the summer months. "With high humidity and heat, you can sweat off a puund or more per mile, so dehydration is a constant nemesis in the summer."

That's why Bob advises anyone interested in beginning a running program to get a full physical. "Go to a sports doctor or to a doctor who knows about running," he said. "Then join a running club such as the Mercer-Bucks Running Club. That will help you to steer clear of most of the bad mistakes, and it's more fun to run with other people than it is to run alone. You should also read a magazine like *Runner's World*; it has some very helpful articles in it."

Jules Nemeth

Jules Nemeth

Jules, a preventive maintenance technician, came to PPL in 1975. His interest in running stems from a suggestion made by fellow PPL'er Steve Obst.

"Steve mentioned that running might help me with the mental and physical fatigue I was feeling," Jules recalled. In 1979, he began running short distances, keeping the possibility of running "just one marathon" in the back of his mind. Now he runs a minimum of 10 miles a day, and often stretches that to 20 miles in the hilly areas of East Amwell.

When he started running, Jules ran in basketball sneakers for a week. "I had bad blisters, and I couldn't understand how anyone could run for long distances when it hurt so much," he remembered. Changing to different shoes made a big difference; instead of running less than 20 miles per week, he now usually covers between 50-60 miles. He runs 7½ to 8½ minute miles, and he can go 6½ minute miles "if I really push."

"Running is as much a mental training as anything else," Jules believes. "You can physically keep going at times, but you have to have the mental stamina to want to."

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He admits that "getting motivated is the hardest part of running. When you look outside and it's cold and rainy, it's hard to put on the shoes, get out and get going. But running has helped me cure some negative mental attitudes I've had. It's a very positive high."

When he began running, Jules traveled three miles, "and I thought the world was about to end!" He built up slowly, then ran in the New York Marathon (with a time of 3:30). He followed that with a 3:32 performance in the Philadelphia Marathon a month and a half later. He's currently training for the Trenton Marathon May 1, and will probably run in the New York Marathon October 16, and the Jersey Shore Marathon in December. His first pre-marathon tuneup came March 14, in the 10-kilometer Great Road Race, where he finished in 46 minutes. He also intends to participate in the Princeton Half Marathon in October.

"When you're running for three hours a day or more," Jules explained, "that takes a lot of time. I run twice a day, in the morinig and evening. When I'm training, I eat like a horse: cheese, ice cream, and all kinds of junk food. And I still lose weight!"

Jules begins training for three months before his first marathon, beginning with five miles a day and working up from there. He runs 70 to 90 miles a week prior to a race, and tries to mentally fortify himself on marathon day. He also augments his roadwork with 100 pushups and 100 situps a night.

Jules, who often listens to jazz on his Walkman while doing training runs, finds himself experiencing "runner's high" after about 10 miles. He likens the feeling to yoga: "You find yourself suddenly feeling better, and you can go longer distances."

Approximately 16,800 runners joined Jules for last year's New York marathon. Jules estimated it took him five to eight minutes after the official start of the race to actually cross the starting line, due to the large number of runners. In Philadelphia's marathon, it took five minutes.

He deems concentration the most important thing a runner can have. "When you're concentrating hard, you're always striving to go faster. When you start to hurt, you have to reallly concentrate to keep going." That monent came at the 18 to 19 mile mark in the New York Marathon, according to Jules. He struggled a bit, but managed to complete the race.

Running the marathon wasn't as bad as finishing it for Jules. "Fininshing is the most dangerous time," he believes. "When I finished in New York, I had chills, cramps, nausea and I turned purple!" He's since learned to recognize his body's usual "little hurts" from the pain of a real problem.

He advised anyone interested in becoming a distance runner to "start gradually; don't go out and try to run five miles the first time. Walk and run some half miles. Get yourself into condition first."

Jules also expressed his gratitude to Steve Obst, without whom "I never would have known the joys of running. After my family, running is the most important thing in my life. It really gives me an increased mental awareness, and an overall improved attitude."

The PPL Hotline is issued by the Princeton University Plasma Physics Laboratory, a research facility supported by the U. S. Department of Energy. Correspondence should be directed to PPL Information Services, Module 2, C-Site, James Forrestal Campus, ext. 2754.