HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

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DR. FURTH FORECASTS PPL'S FUSION FUTURE

What's the outlook for fusion research at PPL?

Laboratory Director Dr. Harold P. Furth predicts that frontline research will be carried out in the TFTR site for many more years -- probably with a little help from our friends at other fusion laboratories in the U.S. and abroad.

Despite cuts in the fusion budget and the first layoff in PPL history (see box on page 3), Dr. Furth believes the laboratory's programs have simply been delayed, not derailed. According to the revised TFTR schedule, for example, tritium will be introduced into the device sometime near the end of 1988. However, TFTR must meet the significant challenge of achieving break-even conditions using deuterium before that time. "Among scientists, breakeven in deuterium would be considered the definitive event. Most of the plasma physics would be just the same whether you use hydrogen, deuterium, or tritium. What changes is the amount of nuclear power you release. If we can reach breakeven in deuterium, no one will doubt that everything will work at least as well in a deuterium-tritium mixture, but much more power will be produced."

Dr. Harold P. Furth

Dr. Furth has been pleased with the progress of the TFTR project. "We have been doing pretty well on projecting how TFTR is supposed to come along. We had certain ideas about how long it would take us to bring it up to its full magnetic field strength and current. It actually reached the full magnetic field level about three months early, and also achieved full current early. Now the heating power is coming along. At the moment, all signs point to doing some very interesting things on TFTR this winter, and beginning to reach approximate break-even conditions a year later."

"With TFTR, we've already achieved a large number of those things that were required of us by DOE when TFTR was initially funded. For the rest of the items that were specifically enumerated, nobody has any doubt that we can accomplish them. In addition, we think we can do something which was not specifically laid out -- reaching approximate break-even, and maybe a little bit more."

Despite the delay of the tritium break-even experiment, TFTR is still expected to achieve that milestone a year or two before its nearest competitor, the Joint European Torus (JET). "At the moment, we are neck and neck with JET," Dr. Furth noted. "They are ahead on confinement time, but we are ahead on other important parameters like density and temperature. Together, these two machines are the leading edge of the world magnetic fusion effort at the moment. There are also the Japanese, who turned on a big tokamak called JT-60 in April. They took a little longer to build their machine, but they've done a very good job of it, and it's coming along very rapidly. So I would guess that within a year, they will also

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be in this competition. However, they don't have the capability to put in tritium: they are limited to hydrogen/deuterium plasmas."

Looking toward the future, Dr. Furth pointed out that "we have been thinking about what to do next, ever since 1980. At the moment, there is a very active national effort to design the next machine. In keeping with the times, the cost estimate for a next machine keeps going down. The idea would be to run TFTR through 1989 or 1990, then start cranking it down in the early 90s and crank up the new machine."

The economic realities of the day have called for some redirected thinking about future fusion devices. "The situation is clear -- there will not be any very large amount of money for a large fusion machine in the billion or multibillion dollar class, even in 1988," Dr. Furth explained. "So we came down from thinking about a machine that would cost over $1 billion to one that would cost maybe $300 million at most.

"It's quite a different style of proposal from what was planned in 1980, when it was expected that a real reactor would be built at a new site. By building a new machine of the same general class as TFTR, using the facilities we already have and the new ideas that have come up in the 10 years since TFTR was designed, we should be able to build a much more capable machine, one that could reach ignition. It's a much tougher scientific goal, but we would hope to achieve it with no more money than was spent for TFTR operation, simply because we know how to do it a little better now.

"At the moment, no decision has been made to go ahead with such a machine, or to locate it at PPL, but we have started to think seriously about it. We need to study designs for such a device now, so we would be ready to begin building it in 1988 if a construction project is approved. At that rate, if we are fortunate, it might be running by 1992."

"The idea is to utilize the available resources as much as possible and make a science-oriented fusion machine the next step. We would invite people at other tokamak laboratories to join in the design and construction, and also to enjoy the benefits when the machine is running."

That spirit of cooperation is expected to extend into the international arena. "The Versailles Process is aimed at bringing about constructive collaboration in many fields of science," Dr. Furth explained, "and fusion is one that has been singled out. The Process is based on the idea that it's too expensive to operate in a duplicative way. That was why the heads of state were interested in establishing a cooperative arrangement."

A plan offering such joint participation is already in the works. "There is a feeling in the fusion community that collaboration makes a lot of sense. The U.S. has informally suggested an approach which I think has a good chance of being adopted. The idea is that the United States will build a science ignition machine as quickly as possible. We will consult the Europeans and the Japanese on how it's to be designed, and we will invite them to come work on it when it's ready. Its purpose will be to make sure the physics of ignition is well understood."

"We wouldn't expect the European and Japanese fusion communities to commit financial support to such a project from the outset," Dr. Furth said, "but it seems probable that as we go ahead, if we go ahead, they will be interested in contributing personnel or technical components. In any case, this project would serve as an important first step in our general international understanding of avoiding duplication."

"The Japanese and the Europeans are still planning to do something quite ambitious, something similar to the kinds of projects the United States used to plan. They do not wish to wait for our project to run its course before they start on theirs, which is very reasonable, because they would have to wait until the mid-90s. So it seems likely that the Europeans or the Japanese would start on a much larger tokamak device around the early 1990s. The U.S. fusion community would hope to be invited to participate in their project by making components for them, and by contributing the knowledge we gain from our ignition experiment. That way, people will be doing overlapping steps which are shifted in time and size, rather than everybody

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wanting to do exactly the same thing."

But Dr. Furth also cautioned against too much United States reliance on foreign projects at the expense of our own fusion program. "If you get bargains by not manufacturing your own automobiles and computers, some day the price of cars and computers is going to go up and you're going to be sorry. Similarly, if you don't do your own energy research, then some day when the price of energy goes up, as it inevitably must, you're going to be sorry again. If you lag behind in research as you enter the phase where it pays off, then the people that have been doing it will benefit far more than the people who've just been reading about it, or visiting to hear about it."

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Ray Camp of Quality Assurance and his wife, Martha, whose son, Edward Scott, was born on May 7;

Sam Cohen of PLT/TFTR and his wife, Sukey, whose son, Benjamin Franklin, was born on June 15;

Sheryll Poris of Personnel and her husband, Carl, whose son, Matthew, was born on July 7;

Sheryl Waslenko of Neutral Beams and her husband, Fred, of the MG Room, whose son, Jason Eugene, was born July 10.

Shrinking Staff Reflects Fusion Budget Reduction

President Reagan's FY86 budget, now before Congress, calls for $390 million for magnetic fusion energy -- a significant drop from the $437 million appropriated this year.

It is this fact that has resulted in the first layoffs in PPL's history, according to laboratory Director Harold P. Furth. The cut would reduce PPL's budget from $115 million in FY85 to $100 million next year.

In a recent interview with the Newark Star Ledger, Dr. Furth stated he saw no governmental change of heart reflected in these budget reductions. "I don't think we are seeing any special persecution of fusion. What we are seeing this year is a 10% across the board cut in energy research. The fusion program is getting a proportionate share of that cut. So there is really no one in the Administration or in Congress saying they've suddenly decided after all these years that fusion is a bad idea that shouldn't be supported anymore."

Although budget constraints have forced PPL into the layoffs, Dr. Furth credits prior planning with lessening the extent of the reduction in force. "In the late 1970s and early 1980s, when we had enough money and work for approximately 1800 people, we kept our permanent staff at about 1300 people. This was done precisely because we didn't know whether that was the start of an ever-growing effort with ever-new machines, or whether, as had happened in the past, the effort would level off. So we stopped far short of increasing our staff levels to where they might have gone."

"That proved to be a good thing," he continued, "because our annual budget is coming down from $135 million in FY84 to about $100 million projected for FY86. As a result, PPL is in the process of eliminating 173 positions, mostly through a voluntary separation plan with retirement incentives and normal attrition.

"Unfortunately, to meet our staffing objective, we have had to lay off a little less than 3% of our full-time permanent employees. Compared to what some laboratories have suffered, that's a very limited forced staff reduction."

Dr. Furth pointed out that the layoffs will have little impact on the laboratory's research program. "The reductions being made by the Department of Energy won't be in the area of experimental research. The reductions are coming by putting off extensions of that research, such as postponement of construction of the next major machine, and a two-year postponement of steps in TFTR that would have carried it forward to burning deuterium-tritium in 1986."

Safety Training

The following Health and Safety training courses are scheduled for August:

Fire Extinguisher Training	S. Larson Ext. 3166	August 13 and 27 2-3:30 p.m.
Basic First Aid	S. Larson Ext. 3166	August 19, 21, and 30 9 a.m.-noon OR 1-4 p.m.
Self-Contained Breathing Apparatus	S. Larson Ext. 3166	August 21 9:30-11:30 a.m.
Cardiopulmonary Resuscitation (CPR)	S. Larson Ext. 3166	August 26, 28, and 30 1-3 p.m.

Employees must obtain permission from their immediate supervisor to attend these classes. Supervisors must call the responsible instructor to enroll their employees.

Trash Tips

Trash disposal crews are refusing to dispose of the refuse that periodically overflows a number of laboratory dumpsters.

The 30 cubic foot dumpsters, located throughout C- and D-Sites, are normally emptied three times a week. However, the disposal contractor will not pick up and empty any dumpster containing trash piled higher than the top of the dumpster itself.

Employees should either bag loose papers, or deposit them in the nearest recycling bin. Cardboard boxes should be crushed and placed inside the dumpsters, not piled next to the units. If you expect a job to generate a large amount of trash, contact Jerry Williams at ext. 3595 to arrange for a dumpster assigned to that specific operation.

For further information, or to obtain trash bags, contact Jerry or the Maintenance Control Center, ext. 3092.

Graffiti Increasing

Graffiti written in rest rooms and elevators has become an increasing problem. The time Janitorial Services must devote to cleaning areas defaced by graffiti reduces the time available to provide regularly scheduled services. So exercise your creativity elsewhere!

FOR SALE -- Vinyl pool cover, 20x40, $24. Call 426-0372 evenings.

Classes Scheduled

A course on "Surface Pumping Systems," taught by J. Sredniawski and A. Mamoun, will be offered August 21 and 22 from 8:30 to 11:30 a.m. in the Training Center, D411.

"Physics," the continuation of a course offered last year, will begin on September 5 at the Training Center. The 30-hour program, taught by Dr. Ernst deHaas, will focus on mechanical waves and sound; optics; and a variety of electricity and magnetism topics. Algebra II is the only prerequisite for students interested in taking the course.

"Surface Pumping" and "Physics" are only two of a number of courses being offered on-site to laboratory employees. Courses scheduled to begin this fall include "Pellet Injection," taught by G. Schmidt; "Non-Tritium Gas Delivery Systems," taught by

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R. Krawchuk; "The National Electric Code," by R. Kelemen; "Elementary Plasma Behaviour," by H. Conrads; "Torus Vacuum Pump Controls," by R. Krawchuk; "Grounding," by M. Viola; and "Cooling Water and Pump Room," by D. Harnsberger. For information on the dates and times for these classes, call Ernst deHaas at ext. 2290.

OSHA Violations

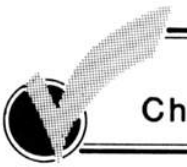
The following safety reminders are drawn from a list of common OSHA (Occupational Safety and Health Administration) violations:

- One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created at point of operation, by ignoring nip points, by rotating parts, or by flying chips and sparks. Examples of guarding methods are barrier guards, two-hand tripping devices, and electronic safety devices.

- The point of operation of any machine whose operation exposes an employee to injury shall be guarded. The guarding device shall be designed and constructed to prevent the operator from having any part of his body in the danger zone during the operating cycle.

- When the periphery of a fan blade is less than seven feet above the floor or working level, a guard with openings no larger than one-half inch shall be installed on the fan.

- Each circular crosscut table saw shall be guarded by a hood which meets all the OSHA requirements for circular ripsaw hoods.



Security Checkpoints

Obscene Call Rules --

If you receive obscene or annoying telephone calls, the Security Department recommends that you follow these rules:

- Try to determine if the caller is male or female. Listen for an accent or a speech impediment. Does the caller's voice seem weak or strong, close or distant? Can you identify any background noises?

- If the call is obscene or suggestive, HANG UP! Don't entice or provoke your caller; your abrupt disconnection may discourage a return call.

- Keep a record of the calls you receive if the caller is persistent. Note especially the time of day, or the day of the week. Your caller may have a specific calling pattern.

- Most importantly, if you receive an obscene or annoying call while at work, contact the Security Department as soon as possible.

For more information about obscene and annoying phone calls, contact Security at ext. 2894.

Patents Awarded

The U.S. Patent and Trademark Office has issued three patents to PPL inventors thus far in FY85. A patent for a "High Voltage RF Feedthrough Bushing" was granted to Glenn Grotz. Randy Knize and Joe Cecchi's "Method of Enhancing Selective Isotope Desorption from Metals" was also granted a patent. The third patent was granted to Steve Jardin and Uffe Christensen for "Stabilizing Windings for Tilting and Shifting Modes." The Department of Energy holds the title to all three inventions.

Applications for patents filed with the U.S. Patent and Trademark Office during FY85 include:

- First Wall for Polarized Fusion Reactors, by H. Greenside, R. Budny, and D. Post

- Rotating Indented Limiter, by S. Cohen, J. Timberlake, and J. Hosea

- Steady-State Inductive Spheromak Operation, vy A. Janos, S. Jardin, and M. Yamada

- Coil to Maintain Equilibrium in Stellarators with Large Transform per Period at High Pressure, by A. Reiman and A. Boozer

- Toroidal Midplane Neutral Beam Armor and Limiter for Indented Bean-Shaped Plasmas, by H. Kugel, S. Hand, and H. Ksayian.

FOR SALE -- One lovebird. $15. If interested, call Ruby Cochran, ext. 2056.

Emergency Planning Helps Circumvent Catastrophes

The dictionary defines an emergency as "an unforeseen combination of circumstances that call for immediate action." The laboratory's Emergency Preparedness Plan has been implemented to combat such crises. The continuing job of foreseeing that PPL can successfully respond to the unforeseen, however, falls to the Emergency Preparedness Plan Review Committee.

Members of the Emergency Preparedness Plan Review Committee include (left to right) Mary Ann McBride, Kathy Dunn, Lori Trani-Gettelfinger, and Molly Tompkins.

Approximately two years ago, the DOE required PPL to establish an Emergency Preparedness Plan, complete with strategies to counterattack any and all emergencies that might occur, in order to continue operation. After the Plan was written, approved, and in place, a "watchdog committee" was deemed necessary to make certain that the reviews and updates called for in the Plan were carried out. The Emergency Planning Committee (EPC) approved the idea, and the Emergency Preparedness Plan Review Committee (EPPRC) was established shortly thereafter.

Lori Trani-Gettelfinger of Security, Mary Ann McBride of Safety, and Molly Tompkins of Telecommunications have served on the Committee since its inception. Kathy Dunn of Information Services joined the group last fall.

One of the Review Committee's first actions was to "boil down" the Plan's 26 supplements into three volumes. Originally, all the information necessary to operate under emergency situations (such as lists of emergency telephone numbers and contacts for each PPL experiment) was contained in those 26 supplements. However, the wealth of such information quickly transformed the Plan into a very unwieldy document.

The Committee found that the total Plan is reviewed annually, and the majority of it remains unchanged. To reflect the changing state of the lab, however, portions of the supplements must be reviewed more frequently. Some of the supplement sections, such as the one dealing with hazardous materials, must be updated on a regular schedule. Other sections could be updated on an as needed basis.

Committee Chairperson Lori Trani-Gettelfinger recalled the decision to try to reduce the Plan to its simplest form. "Our job is to help prepare the laboratory for every eventuality, to provide clear-cut procedures for emergency response techniques. Ideally, anyone should be able to pick up the Plan, or any of its three supplements, and be able to institute emergency procedures in less than one minute."

"We started out by evaluating the content of the Plan," she explained, "deleting what was redundant or would take more than a minute to decipher. Next, we broke down the sections of the supplements that were pertinent to the Plan, making sure we created a reference for everything important in responding to an emergency situation. Standard operating procedures

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were deleted and removed to a reference book; any policy-type items were also eliminated from the Plan."

Mary Ann McBride characterized the condensation of the Plan's supplements as an attempt to "make the Plan manageable. It was put together rather quickly, and information had been pulled from a lot of places. We had to go through it, choose the most appropriate information for forming a quick and efficient emergency organization, and eliminate everything extraneous. The simplification has slowed the committee's constant chasing after details, changes, and corrections, but there still seem to be quite a few revisions made to the Plan every few months."

In the past, the Committee has relied on information garnered by others throughout PPL to aid its updating process. When a Building Emergency Supervisor leaves, for example, the department head is expected to relay that information to the Committee so the Plan can be altered accordingly. Now, however, employees filling specific roles in the Plan will have that fact noted in their computerized Security Department file. Since employees leaving the laboratory payroll must check out through Security, Committee notification and reassignment of the employee's responsibilities within the Plan will occur on a more timely basis.

The committee's primary ongoing duty is to update, assemble, and distribute accurate copies of the Emergency Preparedness Plan. That's not easy, since in addition to changes in laboratory personnel, many buildings on campus undergo both internal and external changes. Each structure has its own evacuation route, and any alterations in those routes must also be reflected in the Plan.

The Committee also helps devise the drills that test PPL's adherence to Plan procedures. The drills, which can simulate a wide range of possible emergencies or disasters, target various groups to see how well they work together during a crisis.

The Committee's focus has changed since the Plan was published. "We're now trying to determine whether it covers every emergency possibility," Lori said. "That's really an ongoing process; as the experiments here change, we're constantly updating our procedures. We're striving to have the most concise document possible, because our future may depend on this Plan. Without continuous updating and feedback, the Plan would become obsolete in a week's time."

"The committee has kept track of the thousands of details the Plan encompasses for the past two and a half years," Emergency Services Unit Director Jack Anderson points out. "I can't say enough about the fine job they do. They're the people that make the Plan work on an operating level."

Helping keep the laboratory safe has sharpened Lori's vision of PPL. "One of the things that I've discovered while working on the Plan is that you become aware of the complexity of our work here, and of the complex involvement people at all levels and in a variety of jobs have for keeping all of us safe. It's given me a keen sense of awareness of how important people at all levels are. Working with the Plan has been a well-rounded educational experience of learning who the key people to contact are, or how a certain machine is shut down, for example."

Lori attributes the Committee's concern with detail to their interest in protecting PPL. "We want to make sure that every inch of the laboratory is covered. All the committee members see our work as actually being a part of our jobs. We're all interested in doing a good job, because it benefits everyone in the long run. Our advance planning may one day end what might have been a bad situation without any major incidents or injuries."

Molly Tompkins feels, "It takes an awful lot of time to whack the Plan into shape, but it's very important that it gets done. People seem to think of emergency preparedness as more work for them to do that they can't be bothered with. It may take some time for them to become familiar with the Plan, but after spending just a bit of time to review the parts of the Plan that are relevant to your area of responsibility can save a lot of time in a real emergency. For doing a little bit of homework, you can accomplish something really worthwhile."

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"We committee members are responsible for looking for areas of the Plan that need revising," Molly concluded. "That takes keeping your eyes open. But I think our input is really necessary, and that's why I've stayed with it."

Invention Update

PPL established a Patent Awareness Program designed to recognize creative inventors and to raise the patent-mindedness of laboratory staff in 1981. A Committee on Inventions, consisting of chairman John Johnson, secretary Nancy Jones, and members Frank Bennett, Peter Bonanos, Schweickhard von Goeler, and Richard Rossi, makes cash awards to inventors for their new or novel ideas. Additional monies are awarded if DOE files a patent application on the discoveries.

Invention disclosures filed since April include:

- Polarization Convertors for Circular Waveguide Modes, by J. Doane
- Disruptionless Tokamak, by J.G. Murray
- Fusion Start-Up and Burn Control with Insulated Limiter Plates, by J.G. Murray
- Fusion Reactor Fueling with Cross Current Assist, by J.G. Murray
- Thermonuclear Inverse Magnetic Pumping Power Cycle, by D. Ho and R. Kulsrud
- Nonmagnetic Lubricationless Air Motor, by R.C. Cutler
- Isotope Separation in a Space Environment, by F.W. Perkins
- Hydromagnetic Electrolytic Cell, by R.G. Mills
- Charge-Exchange Plasma Thruster, by S. Yoshikawa
- DC Break for B through Y Band Circular Waveguide Flanges, by R. Cutler

For further information about invention disclosures or the patent process, contact Meg Harmsen at ext. 2659.

United Way

AT WORK

There are approximately 96 million volunteers donating their time and energy to one activity or another across the United States. Volunteers can offer their services to a wide variety of deserving groups and organizations.

Due to Federal budget cuts, human services organizations are more in need of volunteer help than ever. In turn, these groups can provide volunteers with the chance to apply old skills and develop new ones; the opportunity to help diverse groups of people; and with exposure to new work environments.

To help make the connection between people who want to help and local agencies that need that assistance, the United Way-Princeton Area Communities suggests that prospective volunteers call the Princeton Area Council of Community Services. The Council, a United Way agency, has made available a free Volunteer Opportunities directory which lists over 100 local agencies that need volunteers.

Agencies are listed in the directory by name, address, telephone number, appropriate contact person, descriptions of the agencies' services, and a list of the volunteer work available.

The directory, which focuses on human services organizations, is only a partial listing of the many volunteer opportunities available in local communities. Other opportunities can be found through agency boards of directors, church and school groups, various health and service organizations, and local councils, committees, and associations. For specific groups to contact in these categories, volunteers should consult their telephone directory, call the Council, or contact the United Way.

People interested in any organization should get in touch with the executive director or volunteer director to discuss possible volunteer opportunities. Volunteers should be given clear descriptions of their roles and duties, and should know to whom they are responsible. The Council can be called to discuss any matter related to voluntarism.

To get your own copy of the directory, visit the Council's office at 25 Valley Road in Princeton. Copies are also available from any of the libraries in the 13 communities served by the Council

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and the United Way. These communities include Cranbury, East Windsor, Griggstown, Hightstown, Kingston, Montgomery Twp., Plainsboro, Princeton, Rocky Hill, West Windsor, and adjacent areas of Hopewell, Lawrence, and South Brunswick Townships. The Council can be reached at 609-924-5865 or 609-799-6033.

This volunteer matching service is one of more than 130 services made available by member agencies of the United Way-Princeton Area Communities which are funded by financial contributions made to the United Way.

Correction

In the article on the SEER program published in the last issue of the HOTLINE, Ernie Nieschmidt's name was inadvertently misspelled. The HOTLINE regrets the error.

CPR Knowledge Proves Lifesaver

A little knowledge can be a dangerous thing. Just ask Sue Liesch of the CICADA Control Room. Thanks to the training in cardiopulmonary resuscitation (CPR) she received here, she was able to take over from two people who were administering CPR incorrectly to a stricken man. Her competence kept the victim alive until medical help could arrive.

Emergency Services Unit Members Scott Larson (left) and Frank Bozarth practicing cardiopulmonary resuscitation (CPR) with the laboratory's computerized CPR learning system.

CPR is a lifesaving technique that couples mouth-to-mouth resuscitation with chest compressions. CPR can help revive someone who has had a heart attack, for example, by maintaining oxygen and blood flow throughout the body.

Sue took the CPR course offered monthly by PPL's Emergency Services Unit in November of 1984. "I wanted to learn CPR because you never know when you might need it," she explained, "and having the training couldn't hurt." She successfully completed the course, receiving her Red Cross CPR certification card. "I never thought I'd really have to use it," she recalls.

But she did have to use it this May during a trip to Florida. Sue attended the Sarasota dog races on a night that she remembers as "very humid, with very still air. Maybe that had something to do with what happened."

As she left the race track, she noticed a crowd gathered in the parking lot. A man was lying on the ground, and bystanders were searching for people who knew CPR. With a little prompting from her friends, Sue went over to help.

Reaching the fallen man, Sue found two volunteers attempting to do CPR. "Someone was attempting to pump his chest, but she wasn't doing it correctly. And the woman who was doing the breathing for him hadn't even straightened his head and neck to make sure air was getting into him."

Checking the victim over, Sue found he wasn't breathing and had no pulse. She began breathing for him while a guard from the race track trained in CPR began doing chest compressions. "After a couple of minutes," she remembered, "his heart started, but it stopped again. He also

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took two or three breaths on his own, and then stopped."

Sue and the guard continued administering CPR to the fallen man for approximately half an hour, until an ambulance arrived to transport the victim to the hospital. Although she isn't sure what the final chapter to the story is, Sue is "sure he was alive when the ambulance took him away. I know I did my part, and did the right thing."

Sue believes that everyone should know CPR. "I never thought I'd have to use my training, but when I needed it, it all came back to me. I didn't have to think about it; I just did what I was taught. It's a really valuable skill, especially if you've got little kids who might choke. And it's also important that you learn how to do it right."

For the dates and times of the next scheduled CPR class, see the Safety Training list on page 4. An interactive computerized CPR teaching system, which allows students to take the course on their own schedule, is also available. For more details, or to arrange to take a CPR course, contact Scott Larson, ext. 3166.

Rental Relocation

As of July 1, Larry's Sunoco at Route 1 and Harrison Street no longer represents the Hertz Corporation's Rent a Car Division.

The new Hertz rental car location is at the Hyatt Regency, 102 Carnegie Center, Princeton. The Hertz rental desk telephone number is 452-9548.

Six Steps to Avoid Cancer

According to the National Cancer Institute, there are specific steps people can take that will help lower their risk of developing cancer. The Institute's major recommendations are:

- Don't smoke, or use tobacco in any form. If you drink alcoholic beverages, do so only in moderation.
- Eat foods high in fiber and low in fat. Include fresh fruits, vegetables, and whole grain cereals in your daily diet.
- Keep yourself safe on the job by using protective devices, such as respirators or protective clothing.
- Avoid unnecessary X-rays.
- Avoid too much sunlight by wearing protective clothing and using sunscreens.
- Take estrogens only as long as absolutely necessary.

FREE TO GOOD HOME -- One lop-earred rabbit. One and a half years old, litter trained. NOT an outdoor rabbit. Litter trays, dishes included. If interested, call Linda Fahner, ext. 2090.

Storm Warnings

Thunderstorms are one of nature's most powerful forces, one that can easily turn deadly when accompanied by lightning. A lightning bolt's power can reach 100 million volts, generating quadruple the heat of the surface of the sun in one second. Each year, more people and animals are killed or injured by lightning than by any other weather phenomenon.

To avoid inadvertently lighting up your life, PPL Fire Chief Jack Anderson offers the following tips:

- If you are indoors during a thunderstorm, stay away from doors, windows, and fireplaces. Those openings create a pathway that might attract lightning. Also avoid radiators, stoves, sinks, pipes, and electrical appliances, which can act as conductors if lightning strikes. Remove the plug and antenna wires from your television set, and don't use electrical appliances or telephones.
- A thunderstorm is no time to take a bath! Even a lightning strike on a household water main could transmit current through the water pipes, causing electrocution.
- If you are caught outdoors, don't stand near the highest object in the area, since it will act as a natural light-

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ning rod. Don't become the highest object, either: crouch or lie flat, and avoid touching any metal objects. If you're at the seashore, get out of the water or off small boats, and into a car or a building.

- Don't use metal objects such as golf clubs or tennis rackets. Golfers, with their cleated shoes, become excellent lightning rods on an open golf course.

- If your skin tingles or your hair stands up, drop to the ground immediately. These are signs lightning may be about to strike you.

Persons struck by lightning carry no electrical charge, and can be handled without fear of shock. Persons "killed" by lightning may be revived by immediate cardiopulmonary resuscitation (CPR).

Death Benefits

Effective January 1, 1985, biweekly staff members enrolled in the Princeton Pension Plan who are married and die while still actively employed are assured that the surviving spouse will receive any payments due from the pension plan. It is no longer necessary for the employee to have been 55 years of age and to have had 10 years of service.

In addition, the Benefits Committee has requested that the Personnel Office assure that University employees are aware of recently enacted Federal legislation (the Retirement Act of 1984) which mandates that a surviving spouse be guaranteed a portion of a retired employee's pension. This pension guarantee to a spouse can only be overridden by a waiver signed by the spouse. Employees can obtain further information regarding this law by contacting Nancy Feldman in the Office of Personnel Services, Main Campus, ext. 7-5157

Bowlers Needed

It's time for all laboratory bowlers to get back into the gutter by signing up for the Princeton University Mixed League's 1985-86 season. League play begins at Colonial Lanes in Hamilton on September 4 at 6:15 p.m., and continues each Wednesday for 34 weeks.

Both male and female bowlers are needed, as are keglers willing to substitute throughout the League season. A low average is no problem, since teams bowl for fun, not for blood.

For more information, or to sign up, call League president Debra Simmonds at ext. 3139, or secretary Sarah Thomas, ext. 3711.

Bowlers are also needed for The Princeton University Men's League. The group is seeking another team, as well as individual bowlers to join established teams. The League bowls Mondays at 6:30 p.m. at Colonial Lanes. If you're interested, call Dave Maruso or Paul Kilver at ext. 3067.

Volunteers: People People

The following volunteer opportunities were submitted to the HOTLINE by the Princeton Area Council of Community Services, a member agency of the United Way-Princeton Area Communities. For further information on any volunteer position, contact each agency directly.

- The Fresh Air Fund allows a child from New York City to stay with local families for a two-week summer vacation in the "country." Families that can host these children are needed, as are individuals who could chaperone the children on the train ride from New York City to Princeton and back. To transform your home into a summer resort, call the Fund at 201-359-8786.

- The Family Service Agency of Princeton is a counseling center for people with individual, marital, or family psychosocial problems. The Agency also serves as an educational center for personal growth. Volunteers who can write articles about the agency, or establish contacts with community groups and industries, are sorely needed. Regular secretarial help is also being sought, as are individuals who can assist in arranging group activities. To offer your aid, call the Agency at 609-924-2098.

The next listings were provided by the United Way of Somerset Valley. To learn more about any listing, contact each agency directly.

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- The Management Assistance Program in Westfield needs individuals willing to teach management, technical, and professional skills. Put yourself at the head of the class by calling the Program at 201-233-2888.

- The Mental Health Association in North Plainfield is seeking volunteer companions to mentally handicapped adults in transition. Although they participate in structured programs during the day, these adults need someone to visit them and help them through their adjustment period. To lend a hand, call the Association at 201-754-9078.

The following volunteer posts were supplied by the Voluntary Action Center of Middlesex County. For more details about any position, contact the VAC at 201-249-8910.

- Volunteers are needed to serve as role models and to befriend closed-head injury patients who need help in social rehabilitation. To lend a hand, call the VAC.

- Can you accurately evaluate the quality of a product or repair job? Experts in consumer goods or services are needed to serve as advisors or witnesses in consumer protection cases. Volunteers with extensive knowledge of appliances, auto repairs, home repairs, or the construction industry would be especially welcome. To take the stand, contact the VAC.

Tour Guides

A young man's fancy may turn to love in the spring, but almost 1500 people had thoughts of fusion -- and PPL tours -- instead. April brought not only showers, but a flood of visitors to see the laboratory's experiments. A total of 731 visitors toured PPL in April, escorted on 35 tours by 49 guides. Our sincere thanks to our springtime pathfinders:

APRIL
Jeff Alton
Dale Ashcroft
Hamid Biglari
William Blanchard
Nelson Bowen
Norton Bretz
Robert Budny
Charles Bushnell
Diane Carroll
David Ciotti
Sam Cohen
Fred Dylla
Robert Fleming
Robert Forester
James French
Jeff Gettelfinger
Robert Goldston
James Kamperschroer
David Kaufman
Mark Kijek
Naren Kokatnur
Paul LaMarche
Ed Lawson
Douglas Loesser
Lorand Meray
Donald Monticello
Jack Mount
Mary Ann McBride
Ernest Nieschmidt
David O'Neill
William Osborne
Erik Perry
Gregory Rewoldt
John Robinson
Stan Schweitzer
Al von Halle
Howard Zuvers

MAY
Stefano Bernabei
William Blanchard
Kees Bol
Fred Boody
Nelson Bowen
John Bradish
Graham Brown
Diane Carroll
Alfred Cavallo
David Ciotti
Steve Cowley
Fred Dylla
James French
Donald Grove
Paul LaMarche
Robert Mills
Jack Mount
Ernest Nieschmidt
Michael Pereira
Alan Ramsey
John Robinson
Earle Sheaffer
Mark Smith
Masaaki Yamada
Ken Young

JUNE
Dale Ashcroft
Kees Bol
John Bradish
Norton Bretz
Charles Bushnell
David Ciotti
Anthony DeMeo
Frank Dreher
Robert Fleming
Robert Forster
Donald Grove
Jack Joyce
Naren Kokatnur
Paul LaMarche
Ed Lawson
Lorand Meray
Robert Mills
Alan Ramsey
Gregory Rewoldt
Earle Sheaffer
Edwin Tolnas
Irving Zatz
Howard Zuvers

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HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 2 September 16, 1985

TRITIUM ASSAY LABORATORY

One of the major goals of the Lithium Blanket Module (LBM) experiment is to determine the quantity of tritium bred after the LBM's lithium oxide pellets are irradiated by neutrons produced by TFTR. The task of measuring that tritium has been simplified by the work of Princeton University Chemical Engineering graduate student Pete Bertone. Pete has designed, assembled, and tested equipment in PPL's tritium assay lab that accurately reports how much tritium is bred in an LBM pellet.

The LBM experiment, funded by the Electric Power Research Institute (EPRI), is expected to be installed in TFTR Bay D in late 1986.

The LBM was fabricated by GA Technologies, Inc. (GA) in San Diego. The unit contains over 900 stainless steel tubes filled with cylindrical pellets of lithium oxide. A number of these tubes, located in the center of the array, contain pellets clad with aluminum. It is from these pellets that tritium bred by neutron irradiation will be extracted.

The LBM project first piqued Pete's interest in 1980, when LBM principal investigator Dr. Dan Jassby gave a seminar at the Department of Chemical Engineering concerning the LBM program. At that time, planning was underway to have GA design and construct the equipment needed to conduct LBM tritium assay work. Pete contacted his advisors (Professor Robert Mills, Dr. Jassby, and Dr. Joe File), suggesting that he would be able to develop the required assay equipment at a lower cost. His proposal to use the project as the basis of his thesis was accepted.

For the next three years, Pete investigated the most efficient way to measure the minute amount of tritium produced in the LBM's lithium oxide pellets with an uncertainty of less than 5%. His solution to the problem involves heating irradiated LBM pellets to approximately 500 degrees Centigrade in a small oven, whereupon the pellets release their tritium as tritiated water. This water is collected and assayed using a calibrated liquid scintillation counter. The equipment can process up to three LBM pellets per day, and has an uncertainty level of less than five percent. The assay lab equipment was assembled at a

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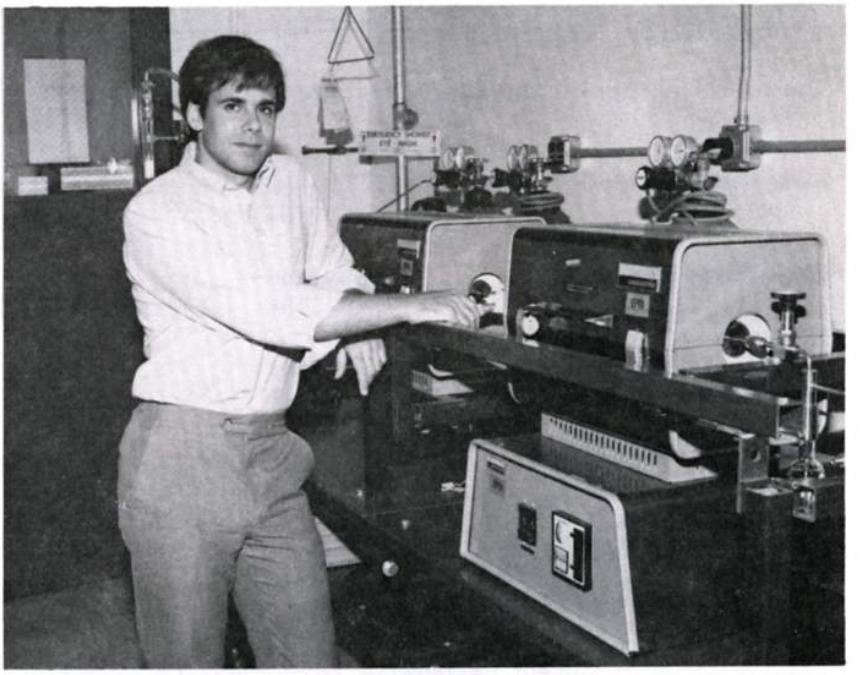


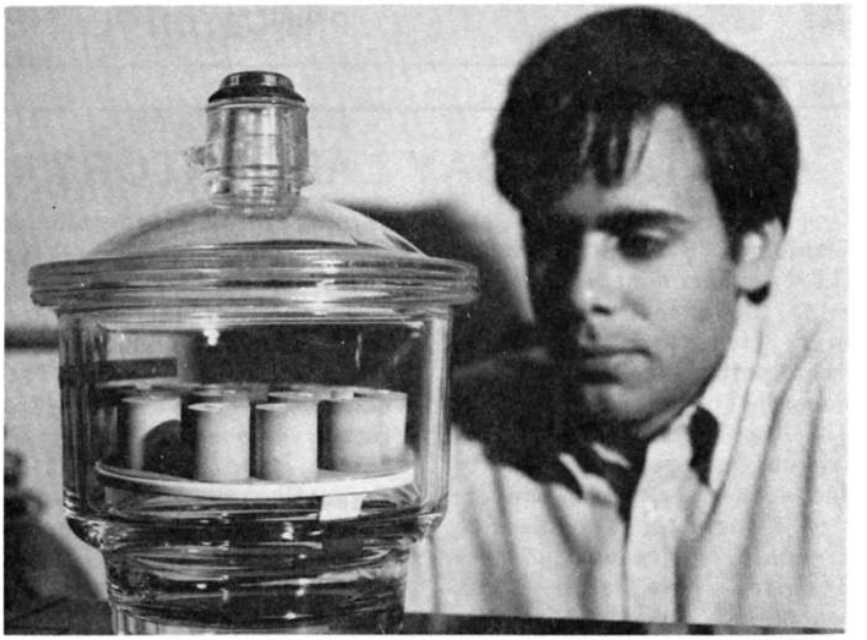
Peter Bertone and the sampling equipment he designed and assembled for PPL's tritium assay lab.

considerable cost savings, compared to initial quotes received from an industrial vendor.

During the past two years, Pete has also been investigating the fundamental kinetics that govern the release of tritium from lithium oxide pellets. Although the assay apparatus was designed to measure the total amount of tritium produced in an LBM pellet, it can also take multiple measurements over a specified time. In this manner, the rate at which tritium is released can also be determined.

The major focus of the tritium assay program remains unchanged, however. Specifically, the tritium measurements will be compared to predictions made by advanced neutronics codes in an effort to test the ability of such codes to model the neutron transport characteristics of complex fusion systems.

The apparatus will also be used to assay tritium in LBM pellets irradiated in the point-neutron source experiment in Lausanne, Switzerland.



These lithium oxide pellets will be removed from the Lithium Blanket Module (LBM) and assayed to determine the amount of tritium each produces.

Safety Training

The following Health and Safety training courses are scheduled for September:

Fire Extinguisher Training	S. Larson Ext. 3166	September 10 and 24 2-3:30 p.m.
Basic First Aid	S. Larson Ext. 3166	September 16, 18, and 20 1-3 p.m.
Self-Contained Breathing Apparatus	S. Larson Ext. 3166	September 18 9:30-11:30 a.m.
Back Injury Prevention	M.A. McBride Ext. 3468	September 19 8 a.m.-noon
Cardiopulmonary Resuscitation (CPR)	S. Larson Ext. 3166	September 23, 25, and 27 9 a.m.-noon OR 1-4 p.m.

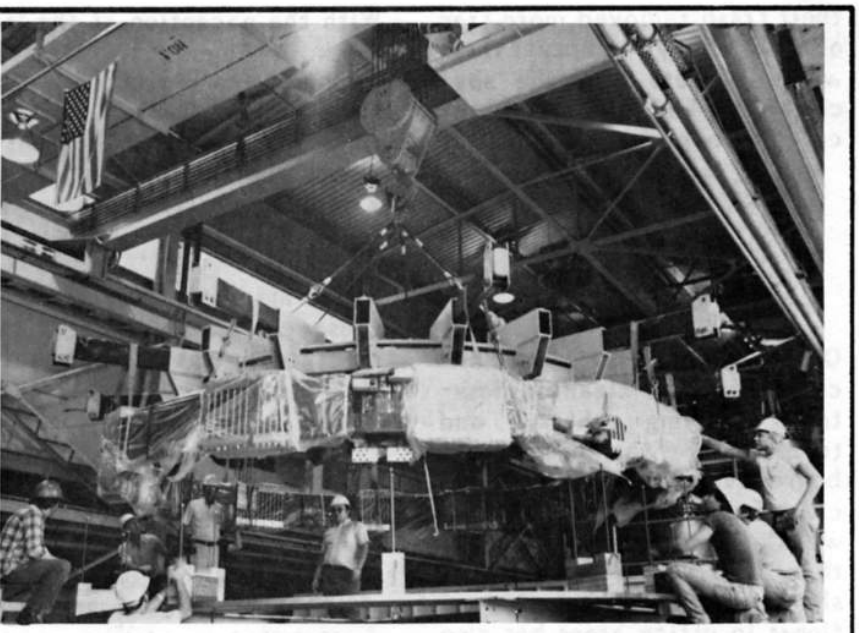
Employees must obtain permission from their immediate supervisor to attend these classes. Supervisors must call the responsible instructor to enroll their employees.

Procurement Program

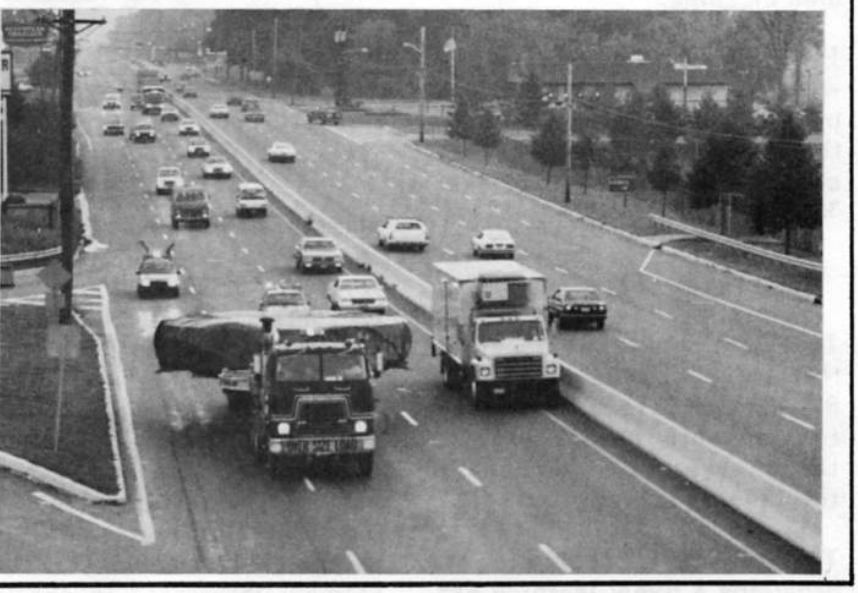
With the approval of the Department of Energy, PPL's Procurement Division is launching a new effort to increase the proportion of the laboratory's contracting business which goes to socioeconomically-disadvantaged firms (commonly called "minority businesses").

Under this initiative, entitled the "Socioeconomic Preference Program," PPL is actively seeking qualified businesses to supply its needs while reducing the traditionally heavy paperwork burden required to comply with government regulations. The PPL program is an outgrowth of successful pilot programs conducted by DOE in cooperation with Argonne National Laboratory and the Solar Energy Research Institute.

As part of this effort, Procurement is requesting any HOTLINE readers who know of qualified firms to contact Tom Browning, the PPL Small/Disadvantaged Business Liaison, at ext. 2962 to have these firms added to the laboratory's bidder lists. If you can help, please do -- your cooperation will make this program work.



The first of the vertical field coils PPL's Coil Shop wound for the Advanced Toroidal Facility (ATF) at Oak Ridge National Laboratory hit the road September 5. Traveling by truck to Oak Ridge were two outer coil assemblies, an inner coil assembly and its support structure, and a lifting fixture, constituting 63,000 pounds of coil and structure. The coils will be stored at Oak Ridge until ATF assembly begins this fall.



Janitorial Schedule Change

As part of the recent labwide reduction in force, the Janitorial Services Section has also been cut back. The janitorial staff now maintains more C- and D-Site space than ever before, with approximately 36% less staff. It has therefore become necessary to perform many cleaning services less often.

Services that affect health and sanitation, such as rest room cleaning, will not be reduced. However, trash removal, general cleaning, and floor maintenance (stripping of floors or shampooing of rugs) will all occur less frequently.

Trash pickup will be reduced from its current daily level to approximately two to three times per week throughout most of the laboratory. Trash in lower use and visibility areas may only be emptied weekly. Employees who must have

(continued)

their trash removed more frequently may empty their waste baskets into the specially marked containers located throughout the lab.

Office cleaning, which includes dusting, cleaning desktops, cleaning ashtrays and telephones, washing blackboards, vacuuming carpet, and cleaning tile, will now be done weekly in all locations, rather than daily. The frequency of shampooing and stripping of floors in office areas has also been reduced to twice per year. Because of this reduction, employees should notify the Maintenance Control Center (ext. 3092) immediately if spills or other problems occur that cannot wait for scheduled cleaning.

Janitorial Services schedules will be posted on bulletin boards. For further information about Janitorial Services, contact Jerry Williams at ext. 3595.

Nursery Openings

The University-NOW Day Nursery, located at 171 Broadmead Street in Princeton, currently has openings in the five-year-old classes for the 1985-86 school year.

The school is dedicated to providing a lively learning experience for its students, in which all aspects of a child's growth are equally important. The Nursery is also committed to providing children with an environment free of sex-role stereotyping, prejudice, and authoritarianism.

With the exception of the last week in August, the Nursery is open from 8 a.m. to 6 p.m. on a yearly basis. Students range in age from 21 months to six years. Classes include a state-certified kindergarten.

Staff members interested in these current openings, or in future openings at the school, should call 924-4214.

Bulletin Boards

All employees who maintain an official laboratory bulletin board should call Meg Gilbert in Personnel, ext. 2036, to verify their position on the official postings mailing list.

Transit Routes

Shortly after its July 1984 takeover of Mercer Metro bus service, NJ TRANSIT reviewed routes operated in Mercer County in an effort to tailor the existing bus system to better meet demand.

Proposals for changes to many existing routes, as well as ideas for new routes, are ongoing. NJ TRANSIT is extremely interested in obtaining local input regarding these recommendations, and has reviewed them extensively with local officials and the general public.

Two NJ TRANSIT proposals specifically affect the greater Princeton area. The only proposal regarding existing service concerns the discontinuance of the Princeton Loop. However, another local carrier (Princeton Area Transport) is expected to expand its current service to include those points no longer served by the Loop. Therefore, no substantive change in service should occur, although service frequency may be decreased.

The second NJ TRANSIT proposal calls for the development of a new route to serve the Route 1 corridor. The service will originate at the White Horse Circle in Hamilton Township, proceed to the Trenton central business district, and then out Route 1, serving Quakerbridge Mall, Carnegie Center, RCA Labs, and the Princeton Forrestal Center. During morning and evening peak travel periods, service frequency will be every 30 minutes, with 60 minute service in the off-peak.

Individuals who wish to comment on either proposal may direct their opinions directly to NJ TRANSIT for their consideration. If your comments are directed at service to the laboratory, advise Bob Smart, who has been working with NJ TRANSIT to establish bus service to this area.

YMCA Child Care

Child care is available through the YMCA Children's Center at Johnson Park School, 285 Rosedale Road. The fall program began on September 3.

The Children's Center includes both a preschool and toddler program, which operate weekdays from 7:30 a.m. to 5:30 p.m. The programs

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have been specifically designed to meet the needs of the children of working parents. Parents are welcome to visit the Center.

For more information, call the Center at 924-9637 or 924-4497.

It's Puzzling.....

We've all heard the slogan "Thanks to you, it works for all of us — the United Way." But did you ever stop to consider just how many programs and services the United Way offers its constituency? See how many you can find in the puzzle below (answers on pg.10). And when you've solved this small puzzle, become part of the solution to a much more vital one: how to provide a wide range of critically needed human services to Princeton area communities. Support the United Way during this year's fall campaign.

SEEK-A-WORD

Alcohol Abuse
Blood Programs
Cancer Care
Counseling
Day-care
Girl Scouts
Help
Hospitals
Information
Red Cross
Referral
Seniors
Therapy
United Way
Visiting Nurses
YMCA
Youth

V	U	Z	A	S	R	N	E	T	R	A	P	Y	E	T
I	N	O	R	T	H	E	R	A	P	Y	L	C	N	O
S	I	B	L	O	O	D	P	R	O	G	R	A	M	S
I	Z	O	A	E	S	I	P	U	G	O	A	N	L	E
T	R	C	L	L	P	K	T	D	X	C	R	C	I	N
I	E	O	Z	D	I	H	E	R	A	P	E	E	X	I
N	F	U	N	I	T	E	D	W	A	Y	D	R	V	O
G	E	N	C	R	A	L	V	E	M	D	C	C	U	R
N	R	S	I	D	L	P	I	C	T	U	R	A	C	S
U	R	E	T	R	S	F	A	X	O	P	O	R	R	D
R	A	L	C	O	H	O	L	A	B	U	S	E	Y	E
S	L	I	V	K	I	C	Y	N	H	M	S	A	L	P
E	I	N	F	O	R	M	A	T	I	O	N	R	C	I
S	D	G	I	R	L	S	C	O	U	T	S	C	U	Y
O	R	E	F	U	N	R	A	R	Z	A	T	H	E	R

WORDS ARE PRINTED HORIZONTALLY, VERTICALLY, AND DIAGONALLY.

Road Construction

In response to many inquiries, the Greater Princeton Transportation Management Association (TMA) recently contacted the state Department of Transportation and obtained the following list of active Route 1 construction projects:

Route 1 and Quakerbridge Road: Work on a grade separated interchange will begin in late 1985 and be completed in the fall of 1987.

North East Corridor (NEC) Rail Bridge over Route 1: Bridge reconstruction will begin in the spring of 1989.

Route 1 from the Route 130 Circle to the NEC Bridge: Work to create three lanes in both directions will begin in the summer of 1988.

Route 1 from Quakerbridge Road to Alexander Road: Work to create three lanes in both directions will begin in the spring of 1989.

The TMA was established earlier this year by the Middlesex-Somerset-Mercer Regional Study Council. The group, whose members include PPL's Associate Head of the Administration Department Robert Smart, is a voluntary organization formed by the private sector. The TMA's aim is to reduce traffic congestion in the greater Princeton area by improving local transportation services.

United Way

AT WORK

While all people have needs and problems, there is a growing recognition that women often have special needs. To meet them, the United Way-Princeton Area Communities currently funds seven agencies that are designed entirely or largely for women.

Some of these agencies, such as the Princeton YWCA, the Delaware-Raritan Girl Scouts, and the Rolling Hills Girl Scouts, might be familiar to many people. Although the names of some of the other agencies are less well known, they also offer crucial services to women. They include:

Crawford House: A temporary residential halfway house for women being treated for alcoholism. Crawford House provides personal and family counseling, as well as other

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supportive services. The Crawford House can be reached by calling 201-874-5153.

Florence Crittenton Home: A maternity home for unwed mothers, the Home offers both prenatal and postnatal care. Residential care and supportive assistance, tutoring, recreational programs, and parenting classes are also provided. Contact the Crittenton Home by calling 609-695-8579.

Mercer County Women's Center of Womanspace: Womanspace operates a 24-hour emergency shelter for female victims of domestic violence and their dependent children. In addition to the shelter, the Center provides a broad range of services, such as counseling, information and referral, community outreach (via telephone crisis line), and assistance in finding housing and jobs. The Womanspace telephone number is 609-394-9000.

Another agency, Big Brothers/Big Sisters Association of Mercer County, operates a program in which volunteer adults are matched with youngsters who need stability and adult companionship.

Of course, all the United Way agencies serve women. If a woman needs agency services, she should contact the agency directly. If you're uncertain where to get help to meet a particular need, the First Call for Help of the Princeton Area Council of Community Services can be reached by calling 609-924-5865 or 609-799-6033. This United Way service will direct a caller to the appropriate agency for services or information.

Security Checkpoints

The C-Site Security booth recently went into operation. However, some construction work at the booth remains to be completed. As a result of the unfinished work, some employees have experienced confusion concerning which traffic lane to use when entering C-Site, and where to register visitors.

The purpose of the Security booth is to provide controlled access to C- and D-Sites. In addition to being an employee entrance, the Security booth also serves as a visitor check-in point. Visitors are no longer required to report to the LOB receptionist's desk for visitor's badges. Therefore, all visitors must stop at the Security booth to obtain the required badges before proceeding. Employees bringing guests into the campus (including spouses, friends, etc.) must also stop at the booth to obtain the required badges. Visitors found on site without a visitor's badge will be told to obtain one from the Security booth officer.

Until construction work at the Security booth is completed, conditions in the booth area will continue to change. Employee compliance with the following procedures will help to expedite safe and convenient access into C-Site.

- Employees should use the right hand entrance lane when entering C-Site. The left hand lane is reserved for visitors and vendors. Employees bringing visitors onto the campus should also use the left hand lane. Visitor badges may be obtained at the Security booth.
- Please reduce your speed when traveling towards the Security booth entrance. The curve in the roadway makes for dangerous driving conditions when speed limits are exceeded. The recommended speed limit for this area is 15 miles per hour.
- Use extreme caution after passing the Security booth. Since the roadway lanes have not yet been clearly defined, there is a great potential for motor vehicle accidents.

Questions concerning these procedures or other Security matters should be directed to the Department of Public Safety, ext. 2894.

FOR SALE -- 1973 Vega, 85,000 miles. Automatic transmission, new tires. Good commuter car. $300. If interested, call 609-426-0372 evenings.

FOR SALE -- Four P215, 75R tires, $25. If you're interested, call 609-426-0372 evenings.

Medical Dictionary Quiz

Any medication works best when it's taken according to directions. One way to ensure that you're getting the proper dosage is to double-check any prescriptions your doctor writes for you. Being able to understand your prescription slip allows you to compare it to the verbal instructions your physician provides. You will also be able to ask any questions you might have about taking the medication while you're still in the doctor's office.

Here's a matching quiz designed to test your medical vocabulary. Match the abbreviations, which are commonly used on prescriptions, with their meanings from the list below. When you've paired up the proper answers, post this page in an accessible spot (such as your medicine cabinet) for quick reference.

1. a.c. ___
2. ad. part. dolent ___
3. alternis horis ___
4. aq. ferv. ___
5. cap. ___
6. collyr. ___
7. dtd# ___
8. ext. ___
9. gtt. ___
10. HOH ___
11. HS ___
12. in loco frig ___
13. m.bene ___
14. O.D. ___
15. O.L. (or O.S.) ___
16. p.c. ___
17. p.o. ___
18. p.r.n. ___
19. q.d. ___
20. q.h. ___
21. q.i.d. ___
22. sig. ___
23. stat ___
24. t.i.d. ___
25. ung. ___
26. ut dict. ___

a. capsule
b. for external use
c. bedtime
d. eye lotion
e. give this number
f. to the painful parts
g. four times a day
h. by mouth
i. as directed
j. every hour
k. right eye
l. a drop
m. every other hour
n. water
o. before meals
p. once a day
q. an ointment
r. left eye
s. label
t. warm water
u. three times a day
v. as needed
w. at once
x. in a cold place
y. after meals
z. mix well

Answers

1. o
2. f
3. m
4. t
5. a
6. d
7. e
8. b
9. l
10. u
11. c
12. x
13. z
14. k
15. r
16. y
17. h
18. v
19. q
20. j
21. g
22. s
23. w
24. n
25. b
26. i

Seatbelt Reminder

Despite the mandatory seat belt law that went into effect in New Jersey in March, a recent survey showed that only 50 to 60% of Garden State motorists are wearing their seat belts. The remaining scofflaws are taking a very serious gamble, both with their own lives and the lives of their passengers.

Surveys show that a fatal car accident occurs every 10 minutes throughout this nation, resulting in over 22,000 deaths annually. That number could be cut in half if more drivers and passengers took a moment to buckle up.

The major argument against using seat belts centers around the possibility of being trapped in a burning or sinking car by seat belts.

However, statistics compiled by the National Safety Council reveal that less than one-half of one percent of traffic accidents involve fire or submersion. And even in those extreme cases, safety belts can keep both drivers and passengers unhurt, alert, and able to escape quickly.

Wearing a seat belt will also keep you in your car in the event of an accident. According to statistics, you are 25 times more likely to be killed if you are thrown from your car in a crash. And making a quick trip to the market is no excuse for skipping seat belts, either. Approximately 75% of all accidents occur within 25 miles of home.

Even low speeds are no guarantee of safety. Eighty percent of all accidents happen at speeds of less than 25 miles

(continued)

per hour. During a collision at just 10 miles per hour, the stress exerted on your arms is equivalent to catching a 200 pound bag of cement dropped from a second story window.

No excuse is good enough for not protecting yourself, your family, and your friends. Buckle up!

- All portions of the radial arm saw blade shall be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table. An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operation.

- Radial arm saws shall be installed so that the front end of the unit will be slightly higher than the rear, causing the cutting head to return gently to the starting position when released by the operator.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Connie Cummings of Accounting and her husband, Dale, whose son, Matthew James, was born August 8.

OSHA Violations

The following safety reminders are drawn from a list of common OSHA (Occupational Safety and Health Administration) violations:

- Each radial arm saw shall be provided with a hood that will completely enclose the upper half of the saw, the arbor end, and the point of operation at all positions of the saw. Its hood shall be so designed that it will automatically cover the lower portion of the blade, so that when the saw is returned to the back of the table, the hood will rise on top of the fence, and when the saw is moved forward, the hood will drop on top of and remain in contact with the table or material being cut.

Volunteers: People People

The following volunteer opportunities were submitted to the HOTLINE by the Princeton Area Council of Community Services, a member agency of the United Way-Princeton Area Communities. For further information on any volunteer position, contact each agency directly.

- F.I.S.H. of Hopewell Valley provides a wide range of assistance to area residents. F.I.S.H. also runs the Hopewell Valley Meals on Wheels program, which brings food to needy area residents. Volunteers who could drive clients to doctor's appointments, do housework for temporarily ill individuals, or visit shut-ins would be welcomed. To lend a hand, call 609-466-1234.

- The Hightstown-East Windsor Community Action Service Center is a nonprofit community organization providing services to the poor and disadvantaged living in the Hightstown-East Windsor area. Volunteers willing to be chaperones on field trips or lecturers on career development are needed. To help, call the Center at 609-443-4951.

- Jewish Family Service of the Delaware Valley offers confidential professional counseling service on family relationship and personal adjustment problems. The agency also provides group programs, family life education, refugee resettlement, contracted homemaker service, and psychiatric consultations. Volunteers are being sought for administrative and office duties, public relations, public speaking, typing and filing, collating, stuffing envelopes, and coordinating mailings. To help, interested volunteers may call the Trenton office (609-882-9317), the Hightstown office (609-443-6260), or the Newtown, PA office (215-968-6665).

The next listings were provided by the United Way of Somerset Valley. To learn more about any listing, contact each agency directly.

- The Management Assistance Program in West-

(continued)

field needs individuals willing to teach management, technical, and professional skills. Put yourself at the head of the class by calling the Program at 201-233-2888.

- The Mental Health Association in North Plainfield is seeking volunteer companions to mentally handicapped adults in transition. Although they participate in structured programs during the day, these adults need someone to visit them and help them through their adjustment period. To lend a hand, call the Association at 201-754-9078.

- The Raritan Valley Workshop in North Brunswick needs volunteer assistance with prevocational testing and job placement. To find out more, call 201-828-8080.

The next volunteer opportunities were supplied by the Voluntary Action Center (VAC) of Morris County. Additional information on any listing is available by calling the VAC at 201-538-7200.

- A male patient in a care center would like to play chess on a regular basis. Playing time can be arranged at your convenience. Call the VAC to get into the game.

- A beautiful county park needs the tender loving care of garden enthusiasts. Transplant flowers, cultivate, weed, and mulch as the season goes on. A call to the VAC can help your volunteer interest bloom.

- A young man working his way out of depression needs a companion to share his interest in photography. To get into the picture, call the VAC.

The following volunteer posts were supplied by the Voluntary Action Center of Middlesex County. For more details about any position, contact the VAC at 201-249-8910.

- Volunteers are needed to serve as mentors to a group of teenagers. Each mentor would work with the youngsters for a few hours each month over a two- to three-month period. People skilled in medicine, the law, computers, and communications who'd like to share their smarts should call the VAC.

Researchers Aiming Bismuth at Cancer Cell Bull's-eyes

Like a team of sharpshooters on a rifle range, scientists at the Department of Energy's Argonne National Laboratory, the National Cancer Institute (NCI), and Johns Hopkins University are seeking to put "therapeutic bullets" squarely in "medical bull's-eyes."

The bullets of this analogy are powerful new radiopharmaceuticals that deliver radioactive bismuth-212 selectively to the bull's-eyes -- deep-seated cancer cells -- with little harm to healthy tissues.

Dr. Arnold Freidman, director of Argonne's Nuclear Medicine Program, explained that the collaborative research effort is seeking to "attach atoms of bismuth-212 to antibodies that go directly to the site of a malignant tumor and bind to the cancerous cell. Bismuth-212 -- which is highly radioactive -- literally "hitches a ride" on the antibody. Then, when it arrives at its destination, it delivers a killing dose of radiation to the malignant cell."

The dose that kills the cancer cell is 20 times more powerful than other radiopharmaceuticals now in use (such as radioactive iodine).

"With radioactive iodine, you get only one-twentieth of the dose," Friedman said. "But with our combination, you direct the lethal dosage to just a few cells at a time without harming surrounding healthy tissue."

Investigators from Argonne, NCI, and Johns Hopkins have been working with mouse cancer cells up to now. Parallel immunological studies are being conducted by Argonne and the University of Chicago.

The investigators first took cancerous cells from the spleens of mice that had tumors such as lymphomas. They then incubated these cells with antibodies tagged with bismuth-212. These antibodies were specific to the proteins on those malignant tumor cells.

"This is painstaking research," Friedman says. "The Johns Hopkins scientists have had to sort through 5,000 mouse cells to obtain antibodies that can be combined with bismuth-212 and go directly to the tumor site."

Argonne has set up a special facility to make radioactive

(continued)

generators of bismuth-212 for this cancer research. The generators are shipped in protective containers to NCI and Johns Hopkins for further testing.

NCI is working on the chemistry of attaching the radioisotopes to the antibodies and also engages in parallel efforts with Johns Hopkins to produce the antibodies.

If the investigators receive approval from the appropriate human studies committees, they will proceed to clinical tests in a limited number of human patients. Further approval by the Food and Drug Administration will be required before they can go to full-scale clinical testing.

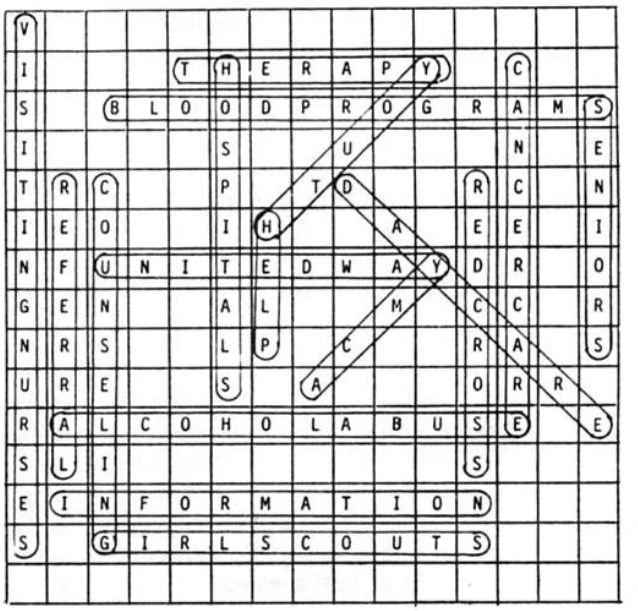
This project is another example of how Energy Department scientists are collaborating with others from government, private foundations, and educational institutions on medical research that can help all Americans.

Obituary

PPL Motor Pool technician Michael E. Burgess, 38, died August 3. Born in New Brunswick, he had worked at the laboratory since 1979. He is survived by his wife, Carolyn, and his son, Allen.

Pat Zeedyk of Transportation Services thanked all those who have donated money to the Burgess family. Anyone wishing to contribute to the fund should contact Pat at ext. 3736.

SOLUTION TO UNITED WAY SEEK-A-WORD



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

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PPL HOTLINE
PRINCETON PLASMA PHYSICS LABORATORY

October 30, 1985 Vol. 7, No. 3

PPL WINS NATIONAL SAFETY AWARD OF HONOR

The National Safety Council (NSC) confirmed that PPL has become a safer place to work by selecting the laboratory to receive its Award of Honor for most improvement in its category in 1984. The award, the highest occupational safety award the NSC can bestow, was given to PPL during the October 16 management safety meeting.

In presenting the award to laboratory Director Dr. Harold Furth, New Jersey Safety Council President C. Edwin Max told his audience that "it's always a pleasure to recognize an effort that's paid off." He congratulated laboratory employees for "contributing to making this achievement possible. I hope the performance continues, because you're doing a very good job."

Laboratory Director Dr. Harold Furth (left) accepts the National Safety Council's Award of Honor from New Jersey Safety Council President C. Edwin Max.

The Award of Honor is presented to a variety of commercial and noncommercial companies, plants, and laboratories for demonstrating outstanding safety performance. Award applicants are required to show significant reductions in accidents and workdays lost due to injury. PPL, employing a combined University and contractor workforce of 1700 people, achieved the highest rating for improved performance among research laboratories in 1984.

Dr. Furth noted that "this laboratory has received a lot of recognition in the area of research, but I believe this is the first time we have received such a distinction in the field of safety." He called excellence in research and safety "mutually reinforcing. A place which can work safely should be a place where one can do good research, and I expect we'll be seeing plenty more of both here."

The NSC computes an accident incidence rate for each

(continued)

Award applicant by examining the number of disabling accidents occurring for each 200,000 hours worked. The severity of each accident is also weighted by the number of days lost from work per 200,000 hours.

PPL is part of an NSC grouping designated as non-commercial research laboratories, which includes other DOE-sponsored projects as well as all university-oriented research laboratories. In 1984, PPL reduced its disabling accidents by 69% and reduced the severity of accidents by 89%. Both figures were calculated by comparing the laboratory's current performance to its performance from 1981 through 1983. The only other DOE-related activity to win the Award of Honor is the Oak Ridge National Laboratory in Oak Ridge, Tennessee.

The NSC Award of Honor reflects PPL's steadily improving safety performance. In December 1984, PPL reached one million man-hours of work without a lost time accident, and was rewarded with an NSC banner.

Deputy Director of Technical Operations J.R. Thompson pointed out that all employees "can take a lot of pride in the achievements of the laboratory today and over the years." He said he could "sense a very real attitude of change toward our safety program. We have achieved excellence in our physics program, and we should expect excellence in our safety program as well."

Although Thompson cited the work of Ray Pressburger and Joe Stencel as being "fundamental to the lab's safety improvement," he maintained that the Area Safety Coordinators and Managers "are the heart and soul of this program, and it's you we'll be looking to in the future. We're off to a good start; we have quite an impressive record, and we've received recognition from the outside world. But it's very important to the future of the lab that we sustain what we've started, and we'll be counting on all of you to continue with the good job you've done so far. I hope this isn't just a one-time award, but the beginning of an annual event."

Dr. John Tobin, head of PPL's Occupational Medicine and Safety Division (OM&S), acknowledged the parts increased emphasis on safety training, periodic safety meetings, and the lab-wide Area Safety Coordinator program have played in reducing PPL's accident rate. He attributed the lab's improved accident record to an increased commitment and participation in safety programs by senior laboratory management; organizational and staffing changes in the Safety Division; and increased employee safety awareness, as well as the organization of the Area Safety Coordinator Program. Safety Branch Manager Les Thompson agreed that the Area Safety Coordinator program "had a lot to do with the award."

Of the more than 12,000 industrial, educational, research, and governmental organizations which were members of the National Safety Council in 1984, only 500 Awards of Honor were made. However, Dr. Tobin estimated that well over 100 of the awards presented went to operational units of large companies, such as General Motors and DuPont, for example.

DOE Cites Laboratory for Improved Safety

A National Safety Council Award of Honor wasn't the only prize PPL received for its improved safety performance. In recognition of PPL's reduced accident rate over a three year period, the laboratory was presented with the Award of Excellence from the Department of Energy (DOE) during the October 16 management safety meeting. PPL is the only DOE Chicago Operations Office facility to receive a Phase I Award of Excellence, which recognizes dramatic improvement in a facility's safety record, this year.

Don Carden, head of the DOE's Princeton Area Office, gave the award to Dr. Harold Furth, and added "the Depart-

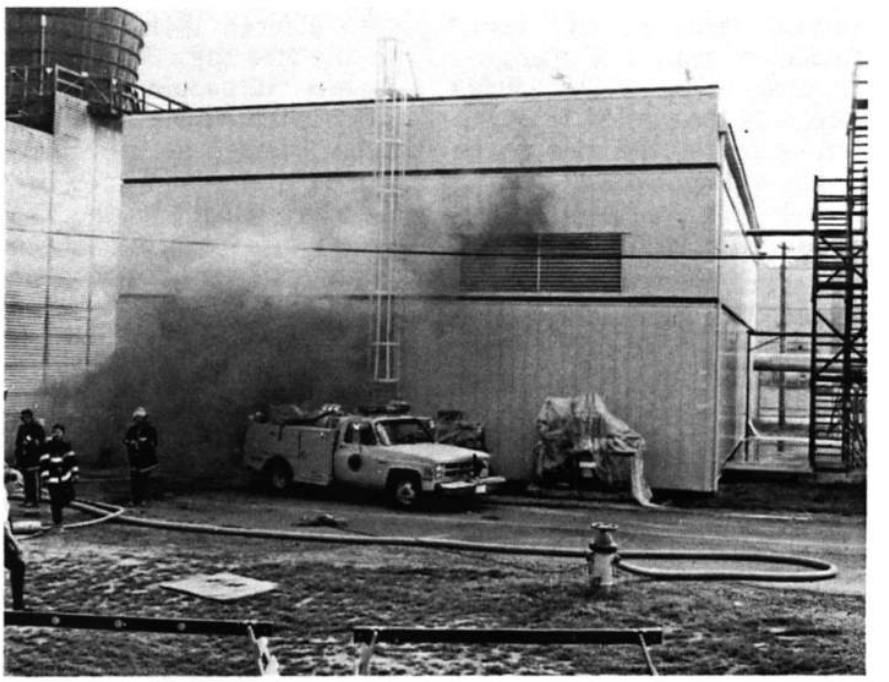
Don Carden (right) of the DOE's Princeton Area Office presents Dr. Furth with the DOE's safety Award of Excellence.

ment's congratulations on your improvement, and for your important contribution to DOE's outstanding safety record."

DOE Princeton Area Office safety officer Juris Balodis submitted the lab's safety record for Award consideration. Juris feels the commitment to safety is evident at all laboratory levels. "In the summer of 1981, Dr. (Harold) Furth made a command decision to improve safety," he recalled. "Dick Rossi then took the hard initiatives that were needed to make sure safety procedures were in place throughout the lab. The improved safety record here is the proof that those programs work."

Juris feels much of the groundwork for the lab's safety program was accomplished through the hard work of Ray Pressburger. "Ray's work with the Area Safety Coordinator (ASC) program has been outstanding," he said. "If he hadn't put as much effort as he has into it, the program wouldn't be as big a success as it is today. However, J.R. Thompson's personal interest and involvement in the ASC program and other operational safety areas has made the big difference in raising the safety consciousness at PPL."

Juris emphasized that although the lab has done well in improving safety thus far, "we shouldn't be content to rest on our laurels. The awards are meaningful, but they don't recognize the total scope of the lab's safety program. Now the challenge will be to keep everyone's safety interest high. We have to keep looking ahead, keeping an ever-improving safety record as our goal."



PPL firefighters fought a smoky blaze that occurred in the pump house in August. To extinguish the fire, three firemen climbed down to the bottom of a sludge tank (next page; arrow indicates ground level) to close valves on the vessel.

Fire Wrap-Up

Emergencies often bring out the best in people, and the August pump house fire was no exception. In addition to validating PPL's faith in its Emergency Preparedness Plan, it also showcased the dedication of three volunteer firemen.

The fire broke out in the pump house next to the water cooling tower shortly before 9 a.m. August 15. It was apparently caused when workmen, using an acetylene torch to remove the metal liner from a sludge tank, inadvertently ignited the tank's styrene inner liner. The smouldering fire spewed smoke and fumes throughout the pump house area.

Emergency Response Coordinator Jack Anderson recalled trying "to cool the tank, but it reignited from the intense heat. So we decided to fill the tank with water to cool it off. To do that meant sending three firefighters, dressed in full turnout gear and wearing self-contained breathing apparatus, into a pit approximately 20 feet below grade level to close two gate valves at the bottom of the tank. The smoke in the pump house reduced visibility to almost zero, and the firemen had to climb down a ladder into almost two and a half feet of water that had been pumped into the area while fighting the fire."

(continued)

The trio who entered the smoky pit were Tom Furman, Mike Yea, and Frank Bozarth. They located the valves "mainly by feel," Anderson said, and managed to close them. The sludge tank was then filled with water, allowing the fire to be finally extinguished.

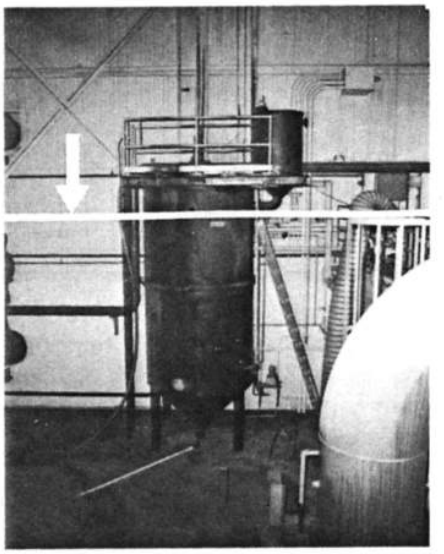
"The entire ESU team did a fantastic job," Anderson asserted, "but those three guys performed above and beyond the call of duty. They were really outstanding."

Anderson said the August fire "proves that all the work that's been done on the Emergency Preparedness Plan, along with the mutual aid and assistance agreements we've worked out with the first aid and fire departments in surrounding towns, has paid off. The proof was that the fire was dealt with quickly and efficiently."

He admitted that the number of employees milling around the fire scene was the "only drawback to the operation. The spectators became too curious; they wanted a look at the fire. They could easily have been in harm's way if there had been a toxic chemical in the fire and smoke."

In the future, Anderson has asked that all employees stay away from an emergency site. However, employees who can assist the emergency control teams by providing information about the site (the layout of the interior of a building, for example) should report to the Command Vehicle at the emergency site and await instructions from emergency personnel.

Anderson offered his thanks to the ESU, all responding municipal fire and first aid squads, and all PPL employees who offered their assistance at the fire site. "Without the caliber of people we had to work with, there could have been damage to surrounding pumps that would have had a negative impact on the TFTR program. We often take our emergency services people for granted, but they're always there to do a good job when they're needed."



Emergency Evacuation System

The Emergency Evacuation System for C-Site became operational last month. The system provides zoned and site-wide interior and exterior emergency voice broadcast, "whooper" evacuation signals, and flashing lights in high-noise areas.

The system will only be used for emergency notices such as fire, and toxic spills. Critical announcements, such as lab closings due to bad weather or power failure, will also be carried on the system. As far as possible, such announcements will be broadcast to affected zones only.

This emergency system is independent of the existing personnel paging system, which will remain in service.

The voice broadcast and flashing lights modes of the system will be tested very briefly with other emergency systems each Wednesday at 12 noon. Any employee who identifies a problem with the system, such as inoperative speakers, should notify Plant Maintenance, ext. 3092.

Some features of the new emergency system, such as the evacuation signals, would be disruptive to normal PPL operations. These features will be tested periodically during off hours; announcements will be issued prior to these tests.

Energy Week

Several years ago, the Department of Energy established "American Energy Awareness Week" in an effort to stimulate the development of Ameria's resources, technologies, and energy conservation habits to provide a more secure and stable future for our nation.

Energy Awareness Week was observed at PPL from October 20 through October 27. However, energy awareness is a year-round concern throughout the laboratory.

According to Bob Gulay of Plant Project Engineering, PPL has pared down its usage of all types of energy. As an example, he pointed out that

(continued)

Steve Ragolia (left) of Plant Project Engineering and Don Green of the Department of Energy's Princeton Area Office admire the DOE Energy Awareness Week posters they distributed throughout PPL.

PPL has reduced its energy consumption from the DOE's FY75 baseline of 64.9 kWh per square foot to 45.3 kWh per square foot in FY85. The difference results in a reduction of slightly more than 30% over that period, and translates into a savings of hundreds of thousands of dollars for the laboratory.

The electrical reduction was the result of a variety of projects, including demand limiting, conservation procedures, recent lighting retrofit projects in buildings and grounds, and the Energy Management Control System (EMCS).

"Thanks to cooperation in conserving energy, the lab has scored quite an accomplishment so far," said Robert Smart, Head of Facilities and Support Office. "In the face of tight lab budgets, we need to realize savings wherever possible. The important factor now is to keep our momentum going."

Heating Policy

In an effort to combat increasing energy costs and deal with budgetary restrictions, PPL is continuing the winter heating policy it has followed for the past several years. The policy has resulted in significant savings through conservation efforts by the laboratory community.

The policy requires thermostats to be set to maintain a minimum temperature of 65 degrees Fahrenheit. Heat will also be turned off or cut back on weekends, weather permitting. Exceptions will be made for designated experimental areas, but unannounced inspections will be held throughout the heating season to ensure compliance with temperature restrictions.

Space heaters, which can only be purchased with the approval of Plant Engineering, or individual room controls should be set to maintain a maximum temperature of 68 degrees Fahrenheit. Unneeded lights should be turned off.

If you have an office or space you feel requires supplemental heat, or if you know of any energy wasting situations, call Plant Maintenance at ext. 3092.

Environmental Concerns

The laboratory is very sensitive to environmental issues and takes extraordinary measures to ensure that all PPL operations have minimal impact on the environment. In addition, sampling is conducted on air, water, soil, and vegetation to test for potential toxic pollutants. PPL's environmental status is summarized in a yearly report, which is distributed as a public document.

It is important that all employees not dump anything into the environment or into the laboratory's sanitary sewer system without prior approval. Dumpsters are provided for normal garbage, which is disposed of at an approved dump site.

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In addition, the Materiel Control Division provides pickup and disposal of toxic or potentially toxic substances. Call Spence Holcombe at ext. 2328 to arrange for pickups. If in doubt about any substance, call Safety for a determination.

Help keep the environment clean!

File Clean Up

Maybe the organizers of the APS, IEEE, and AVS conferences deliberately chose the months of October and November for their major meetings -- not just because it's the beginning of the academic year, or the government's fiscal year, but to allow secretaries some quiet time (with the bosses gone) to clean out files, reorganize for the new year, get the RIDS done, and inventory/catalog what needs to be stored.

In other words, don't order new filing cabinets -- clean out the old ones!

D U M P!

D ESTROY
U SELESS
M ATERIAL
P ROMPTLY!

SOSS Elections

Chris Ritter was reelected to a second term as chairperson of the Secretarial and Office Support Staff (SOSS) organization after the group's September 30 election.

Other SOSS officers elected in September include vice chairperson/treasurer Dolores Bergmann, recording secretary Terry Greenberg, and publicity secretary Mary Ann Brown. Serving on the SOSS program committee will be Betty Carey, Jean Hurley, Ann McGee, Marie Steer, and Jo Barbour.

Polymer Lab Opens

Dedication ceremonies for the Polymer Laboratory, a new research facility located in Building 1-A at A-Site, were conducted last month in conjunction with the first annual meeting of the Polymer Laboratory Advisory Committee. In attendance at the ceremony was Dr. Edward Cohen, Executive Director of the New Jersey Commission on Science and Technology, the group responsible for a $30,000 state grant in support of this activity.

(continued)

Safety Training

The following Health and Safety training courses are scheduled for November:

Basic First Aid	S. Larson Ext. 3166	November 11, 13, and 15 1-3 p.m.
Fire Extinguisher Training	S. Larson Ext. 3166	November 12 and 26 2-3:30 p.m.
Self-Contained Breathing Apparatus	S. Larson Ext. 3166	November 13 9:30-11:30 a.m.
Back Injury Prevention	M.A. McBride Ext. 3468	November 14 8:30 a.m.-noon
Cardiopulmonary Resuscitation (CPR)	S. Larson Ext. 3166	November 18, 20, and 22 9 a.m.-noon OR 1-4 p.m.

Employees must obtain permission from their immediate supervisor to attend these classes. Supervisors must call the responsible instructor to enroll their employees.

In the Polymer Lab, graduate students will study the effects of radiation on polymers, an important topic for coil design. The Lab is the second research facility to be established on the Forrestal Campus through a cooperative effort between the Plasma Physics Laboratory and Princeton's School of Engineering and Applied Science (SEAS). The first, a Chemical Engineering Laboratory, has been in operation for approximately two years.

Students working in the two laboratories are members of the new Interdepartmental Program in Plasma Science and Fusion Technology, which is directed by Dr. Robert G. Mills.

Graduate student Peter Pang watches as Professor John K. Gillham of the Department of Chemical Engineering cuts the orange and black ribbons during dedication ceremonies for the Polymer Laboratory at A-Site. Professor Gillham is in charge of the new research facility.

Don't Run in Heavy Traffic

If your daily run takes you near heavy traffic, you may be doing yourself more harm than good.

Running in heavy traffic for 35 minutes raises the level of carbon monoxide in your blood to that of someone who smokes about a pack of cigarettes a day, according to an article in "Women's Sports and Fitness" magazine. Carbon monoxide displaces oxygen in the blood, reducing the amount of oxygen delivered to your body and possibly causing long-term damage to blood vessels.

Although some experts advise huge doses of dietary supplements to combat exposure to environmental pollutants, it may be easiest just to reroute your run to avoid heavy traffic.

United Way

AT WORK

First Call for Help

You've got a problem. You need to find a good child care agency, help for your aging parents, or a way out of the dead-end job you're in. You need information and assistance, but you don't know who to ask, or where to turn. How will you find the answers you seek? By contacting First Call for Help, a service funded by the United Way - Princeton Area Communities.

First Call for Help is directed by the Princeton Area Council of Community Services, a United Way member agency. First Call does not deal solely with United Way organizations, however. Its purpose is simply to point people in the right direction for help with their problems or questions. If someone needs services available outside the United Way's 13-community service area, First Call will link the individual with the appropriate agency.

The Council began offering information and referral assistance to individuals and agencies in 1976. Callers have been matched with community resources offering aid

(continued)

for problems as varied as job counseling, transportation, divorce, schizophrenia, housing, and care for the aged. In addition, callers have received valuable help in handling state and local regulations affecting them.

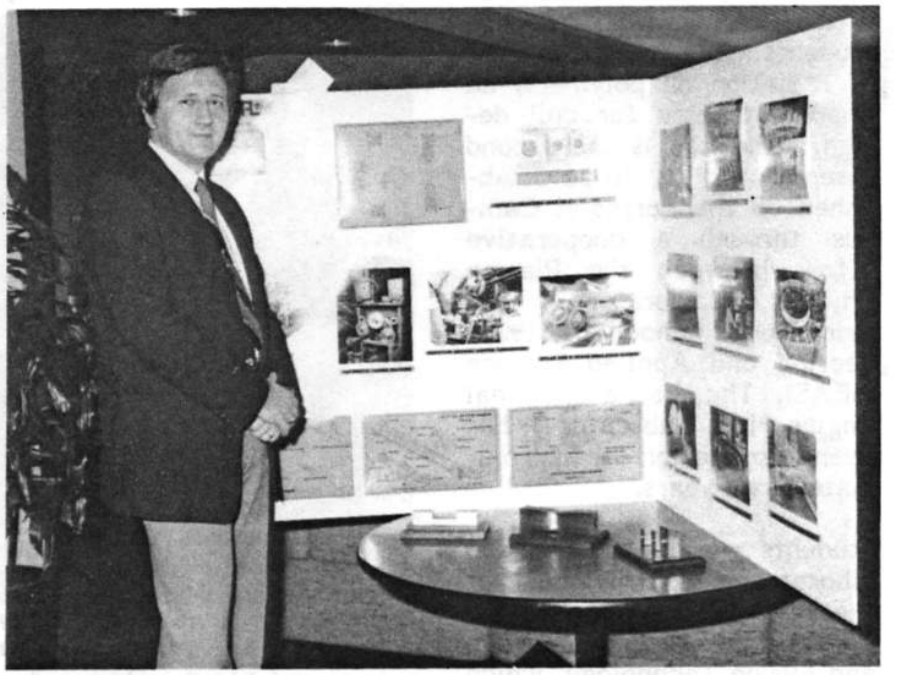
First Call for Help can be reached by dialing 609-924-5865 or 609-799-6033.

TRANSITIONS

The HOTLINE staff offers its congratulations to Bruce Hollendonner of Receiving #3, who married Grace Allen on September 14.

For Sale

A 14-foot, Flying Tern-type sailboat with trailer and extras. $700. If interested, call Frank Homan at 201-359-5043.



Jim Chrzanowski poses beside his poster, detailing ATF coil winding, during a "dry run" of a poster session slated for the 11th Symposium on Fusion Engineering sponsored by the IEEE next month. Jim's poster is one of 18 prepared by the Graphic Services group that will represent the laboratory at the Austin, Texas meeting.

Tour Thank-Yous

The torrid pace set this spring by the laboratory's tour program cooled a bit as the weather heated up during the summer months. A total of 729 visitors viewed PPL's progress between July and September, with over half of them arriving in July. We'd like to thank the following guides, who kept those tourists in tow:

JULY

Halsey Allen
Dale Ashcroft
Charlie Bushnell
Sal Cavalluzzo
Dave Ciotti
Sam Cohen
Ernst de Haas
Fred Dylla
Robert Fleming
Robert Forester
George Gammel
Don Grove
John Johnson
Naren Kokatnur
Dan Kungl
Milt Machalek
George Martin
Loran Meray
Ernst Nieschmidt
Stan Schweitzer
Al von Halle
Howard Zuvers

August

Dale Ashcroft
Byron Benson
John Bradish
Charlie Bushnell
Diane Carroll
Sal Cavalluzzo
Dave Ciotti
Fred Kloiber
Naren Kokatnur
Paul LaMarche
Ed Lawson
Holt Murray

September

Charlie Ancher
John Bradish
Robert Fleming
Robert Forester
John Johnson
Naren Kokatnur
George Martin
Dale Meade
Ernst Nieschmidt
Ben Prichard
Earle Sheaffer

Personnel Division Head Steve Iverson, Assistant to the Personnel Director Bobbie Cruser, and laboratory Director Harold Furth (left to right) congratulated more than 44 laboratory retirees at a dinner held in their honor in September. Each retiree was presented with a gift from the laboratory in recognition of their years of service.

P.U. League

All women from overseas are invited to come to the University League each Tuesday morning from 10-11:30 a.m. Conversation in small groups and a program on American customs and holidays, etc. follows coffee and tea at 10:00. You may bring small children. Native English speakers are always welcome. For more information or transportation, contact Barbara Suppe at 609-924-6519.

Visiting scholars and foreign students on campus are interested in being helped with English and meeting "host families." If you are interested in meeting our International Community, please call the International Center in Murray-Dodge Hall, 609-452-5006.

Art Exhibit

From October 6 through November 1, Hopewell artist Donald Localio will be exhibiting his abstract oil paintings in the Dorothy Brown Room at the Princeton University League, 171 Broadmead.

Born in Princeton, Localio has exhibited extensively and has had several solo exhibitions. His paintings reflect the influence of his mentor, Willem de Kooning.

Questions Answered

"How do I tell my two year old that there's going to be a new baby?" "What's the best kind of day care program for my child?" "My son's grades keep getting lower and lower every year. What can we do?"

Sometimes parents and guardians have concerns about their children that they would like to discuss with a professional. However, they may not need or want counseling.

Parents or guardians may take advantage of the Whitney Center's Parent Consultation Program. The program provides a forum for discussing a child's social, emotional, or intellectual development. Discussions may center on any and all facets of a child's life: from eating and sleeping, to changes that may occur due to divorce, illness, the birth of siblings, and so on.

Parents interested in participating in the Parent Consultation Program may call 609-924-2896 to ask for an appointment. The Whitney Center is located at 253 Nassau Street in Princeton.

The Community Guidance Center of Mercer County is an out-patient mental health counseling center. In addition to the Parent Consultation Program, the Center offers counseling and psychotherapy for individuals, groups, and families; psychiatric and psychological evaluations; alcoholism and substance abuse prevention and treatment; consultation and education to individuals, groups, and organizations; and custom designed Employee Assistance Programs for corporations, organizations, and the troubled employee.

OSHA Violations

The following safety reminders are drawn from a list of common Occupational Safety and Health Administration (OSHA) violations:

- Compressed gas cylinders shall be stored in secured, well-ventilated, dry locations, at least 20 feet from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons.

- Valve protection caps where the cylinder is designed to accept a cap shall always be in place and hand tight, except where cylinders are in use or connected for use.

- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease) by a minimum distance of 20 feet, or by a noncombustible barrier of at least five feet high having a fire-resistance rating of at least one-half hour.

- Cylinder valves shall be closed when work is finished.

Art on Display

A selection of drawings, paintings, and sculpture by internationally recognized artists -- all on loan from local private collections -- is on exhibit at the Squibb Gallery now through November 3.

"Fifty Years of Contemporary Art" features art styles ranging from 1930's abstraction through surrealism, abstract impressionism, pop, minimalism, photo realism, representational and figurative work, to the most recent East Village expressionism. Some of the painters represented in the collection include Marc Chagall, Red Grooms, Rene Magritte, John Marin, Henry Moore, Louise Nevelson, David Smith, and Frank Stella.

The Squibb Gallery is located in the world headquarters of the Squibb Corporation, three miles south of Princeton on Route 206. The gallery is open daily from 9 a.m. to 5 p.m., with hours extended to 9 p.m. on Thursdays. Weekend hours are from 1 to 5 p.m. on Saturday and Sunday.

Retirement Thanks

Since it is difficult to individually thank all the people who participated in their retirement, Jean Henderson and Harold Barbour have submitted the following statement to the HOTLINE:

"We thank everyone who helped to make our lunch such a memorable event. Both of us are happy we were persuaded to "give in." We truly enjoyed it!"

"Our gifts were fantastic, and unique for each of us. Thank you all whose generosity made it possible for us to receive such memorable mementoes of PPL -- and of all of you."

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

PPL HOTLINE
PRINCETON PLASMA PHYSICS LABORATORY
Vol. 7, No. 4 November 8, 1985

"I GAVE AT THE OFFICE"

We're all familiar with that old cliche. Making it a reality for more lab employees is the goal of this year's United Way fundraising campaign at PPL.

At the campaign kickoff meeting October 23, laboratory Director Dr. Harold P. Furth told volunteers participating in the annual fund drive that PPL was to have been a United Way Pacesetter this year. Pacesetter corporations run their campaigns in the early fall. Pacesetters achieve high rates of employee giving, providing a bench mark for the companies staging their campaigns in October and November.

Results of past campaigns show about half the employees in major Route 1 corporations contribute to the United Way. Main Campus giving reached the 20 to 25% mark last year, while only 11% of PPL employees contributed to the United Way in 1985.

Based on these figures, Dr. Furth deemed PPL's possible role as a United Way Pacesetter to be "a high-pressure situation that we didn't really need. We should try instead to improve our record by not neglecting (the United Way campaign) as we have in the past."

The results Dr. Furth expects this year? "Something more than we've done in the past. We don't want to force people to contribute beyond their means, but we think it would be good for the laboratory to have a little more sign of interest, at least in the numbers of people participating. We think if attention is drawn to the United Way, it will make laboratory employees feel good to have made a contribution, and to be a part of an organization that cares a little more than it has in the past."

"We have set the objective of reaching the 50% participation level," he continued. "I

(continued)

Administrative Operations Deputy Director James Clark, PPL's United Way campaign chairman, welcomes volunteers to the kickoff meeting which began this year's fund drive.

think we should do at least as well as Main Campus, or perhaps a little better."

Leslie Vivian, Director of Community and Regional Affairs for Princeton University, congratulated the lab on "reaching out to the community. You're telling them you know they're there through PPL's Community Outreach Program, that you care about them. (Giving to the United Way) is an American form of outreach to the community around us, to the needs that should be met not by government, but by all of us as American citizens."

Measured against the United Way's per capita giving figures, "examining what the Plasma Physics Lab people who do participate contribute is impressive," Vivian pointed out. "It's very generous. It exceeds the per capita rates of several organizations that have employee groups of comparable size to the laboratory."

Gilbert Phillips, Associate Executive Director of the United Way-Princeton Area Communities, warned volunteers that "you will run into people who don't live in the communities we serve, and who would rather help out in their own towns. We emphasize two factors to those people: one, that they can use the services not only of the United Way in their home town, but also of this United Way. As employees of Princeton Plasma Physics, they can use the services of the agencies that the Princeton United Way funds. We have found over the years that thousands of people preferred to avail themselves of our agencies rather than those their hometown offers. Our agencies may be more convenient to them, provide more confidentiality, or reduce their embarassment in getting help. But many people do take these opportunities to use the agencies outside of the home community."

"There's another, more fundamental reason for giving to the United Way at the office," Phillips maintains. "The United Ways do not deal with door-to-door solicitation, nor do most United Ways do any type of residential mailing. So people who don't take advantage of using the payroll deduction plan, or giving a check through the office, lose the opportunity to help others when they need that helping hand."

"Giving where you work is the most rational way of doing the most good," he concluded. "It allow us to do the most good with your hard-earned contributors' dollars."

Volunteers from various PPL "neighborhoods" have distributed pledge cards to employees in their work areas. Anyone who needs additional pledge cards can contact Bobbie Cruser in Personnel, ext. 2101.

United Way: A Sound Investment

The United Way-Princeton Area Communities serves over 38,000 people who live or work in Cranbury, East Windsor, Griggstown, Hightstown, Kingston, Montgomery Township, Plainsboro, Princeton, Rocky Hill, West Windsor, and adjacent areas of Hopewell, Lawrence, and South Brunswick Townships. Its 28 member agencies provide more than 130 services ranging from day care and family counseling to disaster relief, drug abuse treatment, and help for the physically and mentally handicapped. There's something for everyone under the United Way umbrella.

Two major factors set the United Way-Princeton Area Communities apart from many other worthy charities:

1. Anyone who lives or works in the United Way service area is eligible for services. No one is denied service because of an inability to pay, and the variety of services available through the 28 member United Way agencies are services that most people will need at one time or another.

2. To operate the local United Way takes only about 11 cents out of every contributed dollar. Administrative costs can be kept low thanks to extensive volunteer involvement in all phases of the United Way, including the campaign itself, budgeting, planning, and agency allocations. The organization employs only five paid staff members.

And the savings don't stop there. United Way member agencies conserve public funds by lessening dependence on costly public programs, and by providing services that help reduce welfare and medical costs.

Vital services provided with minimal administrative costs -- doesn't that sound like a great investment?

Member Agencies

Your contribution to the United Way-Princeton Area Communities will allow the following 28 member agencies to continue providing their invaluable aid:

Princeton Area Chapter of the American Red Cross

Mercer Chapter of the Association for the Advancement of Mental Health

Better Beginnings Child Development Center

Big Brothers/Big Sisters of Mercer County

George Washington Council, Boy Scouts of America

Camp Fire, Latch Key Program

Catholic Welfare Bureau (Child Abuse Program)

Children's Home Society of New Jersey

Community Guidance Center of Mercer County

Contact for the Deaf

Crawford House

Delaware Raritan Girl Scout Council

Eden Institute

Family Counseling Service of Somerset County

Family Service Agency of Princeton

Florence Crittenton Home

Hightstown/East Windsor YMCA

Jewish Community Center of Delaware Valley, Inc.

Jewish Family Service of Delaware Valley, Inc.

Mercer County Unit of the New Jersey Association for Retarded Citizens

Princeton Area Council of Community Services

Princeton Community Homemaker -- Home Health Aide Services

Princeton Nursery School

Princeton YMCA

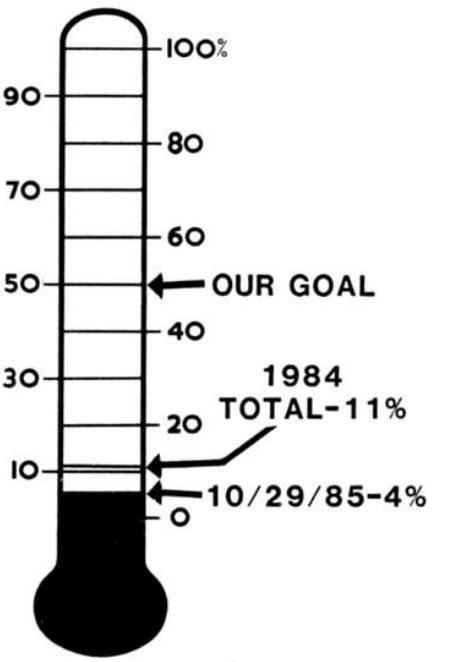
Princeton YWCA

Rolling Hills Girl Scout Council

University NOW Day Nursery

Womanspace, Inc./Mercer County Women's Center

United Way



Campaign Update

If the early results of this year's United Way campaign are any indication, laboratory employees are extending a helping hand in record numbers. In the first four days of the drive, PPL achieved a 4% United Way participation rate. However, if contributions continue to come in at this pace, the laboratory's 50% participation goal will not be achieved when the campaign ends November 30.

Although we're off to a good start, everyone's help is needed if we are to reach our goal. Be sure and return your pledge card in the self-addressed envelope provided. If you've misplaced your pledge card, you can get another from Bobbie Cruser in Personnel.

What Your Dollar Buys

$1 per week buys:

- Housing for one week for an elderly, indigent person
- Four aquatherapy sessions for an arthritic client
- Three resting mats for children in a day nursery

$2.50 per week buys:

- Two weeks of day care for one child
- Five home visits by physical or speech therapists for a stroke victim
- Clothing and shoes for an individual who has lost possessions in a disaster

$5 a week buys:

- Safe shelter for a battered woman for four weeks
- Counseling sessions for six alcoholics and their families
- Nine hours of training for a blind person learning braille

$7 a week buys:

- Preparation and delivery of a hot meal to a homebound senior citizen for 50 weeks
- Supplies for seven months for a retarded adult in a vocational training center
- Ten weeks of sheltered employment for a handicapped person

$10 per week buys:

- Residence and support to a recovering alcoholic woman at a halfway house for three weeks
- A year of telephone reassurance service for two homebound people
- Participation in a sign language class for 20 hearing impaired adults.

United Way Q&A

OBJECTION:

WHY SHOULD I GIVE?

ANSWER: One reason involves our moral obligation to help others who need our aid. Giving is also a form of self-protection; we never know when we, or someone we love, may need the helping hand United Way agencies offer. Your "policy" of giving to the United Way serves as the "premium" that helps "insure" vital services will be available in times of need.

OBJECTION: THE UNITED WAY HAS ALL THE MONEY IT NEEDS -- BIG BUSINESS SUPPORTS IT.

ANSWER: Over 130 services are provided through United Way dollars. Raising the money needed to fund that wide range of human services would be a financial impossibility without individual contributions. In fact, in 1982 (the last year for which figures are available), one-half of all contributions to United Ways nationwide came from company employees. Total individual contributions totaled 63%; total business contributions came to 28%.

OBJECTION: THERE'S NO NEED FOR ME TO CONTRIBUTE TO THE UNITED WAY; THE GOVERNMENT TAKES CARE OF EVERYBODY.

ANSWER: In some countries, that's true. But here in America, voluntary support, including your gifts, has traditionally played a very large role in helping people help themselves. Actually, most of us complain about our taxes now, but if the government were forced to provide all our services, we could really expect our taxes to soar.

Since the job of helping is so massive, it takes the government's tax-supported programs coupled with the contribution-supported programs of the United Way to meet the total community need. We all realize that the government is cutting back on its role in providing human services, but that doesn't mean the need for services will disappear. It just means that services will have to be provided by other sources -- such as the United Way agencies.

OBJECTION: I DON'T LIVE IN THE AREA, SO I'M NOT GOING TO GIVE.

ANSWER: Since you work in the area serviced by the United Way-Princeton Area Communities, you and your family are eligible for services from all United Way member agencies.

If everyone contributes to the United Way where they work, all communities will be assured of the availability of necessary services. Giving where you work also allows you to use payroll deduction, which is a "painless" way of contributing.

OBJECTION: I'M NOT GOING TO CONTRIBUTE BECAUSE UNITED WAY AGENCIES CHARGE FOR THEIR SERVICES.

ANSWER: Of course they do, because the United Way cannot support all the financial needs and expenses of its member agencies. The agencies need far more money than what the United Way can possibly raise, and to get this additional money, they charge fees to people who can afford them, which is only fair and logical. The fees charged by agencies are determined by an individual's income; thus, the lower the income, the lower the fee. United Way dollars ensure that no one will be refused services simply because they cannot afford to pay the full cost.

OBJECTION: WHY DIDN'T SOMEONE I KNOW RECEIVE HELP FROM A UNITED WAY AGENCY?

ANSWER: The United Way agencies never turn down anyone who needs help. So get all the facts -- names, dates, all the relevant information -- then call the United Way. It will thoroughly check out all complaints. In the past, United Way investigations have proved such complaints unfounded.

Case Histories

If you've ever wondered what impact your United Way contributions have, consider these case histories:

- Billy, 11, lives with his mother, a professional woman who works full time. His father lives in San Francisco and sees Billy only twice a year. Billy has become a problem in school by daydreaming, talking during class, and not completing his assignments. He does not get along with children in school or in his neighborhood.

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About two months after his mother brought him to the Big Brothers/Big Sisters Association of Mercer County, Billy was matched with a Big Brother named Steve. Steve has spent time helping Billy deal with people better by engaging in various activities. Steve intends to stick with Billy and help him adjust to life.

- Since both Carol's parents must work full-time, she comes home to an empty house after school every day. Worried that Carol might face an emergency while at home alone, her parents enrolled her in Camp Fire's "I Can Do It" self-reliance course.

  This program gave Carol instructions on walking home alone, being at home alone, using the telephone in emergencies, and basic first aid. The course also reassured Carol by teaching her to deal with the fears of being alone.

  Carol still comes home to an empty house, but now she is much better prepared to face some of its potential problems.

- John came to Family Counseling Service of Somerset County hoping to make contact with his wife and child, who had been hidden from him in a battered women's shelter. He accepted counseling, admitting to alcoholism and occasional wife beating. Although she was determined to get a divorce and avoid further contact with him, John's wife allowed a counselor to arrange visits between her husband and their child.

  The Family Services counselor worked closely with the outreach worker at the agency sheltering John's wife. His wife was persuaded to join John in counseling sessions, and they eventually reconciled. John is now an active member of Alcoholics Anonymous. His family has been reunited for a year without a recurrence of violence.

- Martha's world seemed about to collapse. After 26 years of marriage, her husband had announced that he wanted a divorce and was moving into an apartment. At age 46, Martha found it difficult to pick up the pieces of her broken life.

  Through its "On Your Own" program, as well as its "Women's Services Institute" programs and workshops, the Princeton YWCA helped Martha express and deal with the feelings her divorce caused. The "Y" also assisted her in locating resources and developing job skills. Today Martha is active in her community and holds a full-time job.

Volunteer Review and Allocations Committee

The volunteer Review and Allocation Committee is the United Way's best kept secret. Yet it's the group that underlines the organization's financial accountability in spending contributor dollars.

Ninety men and women volunteer annually to help decide how the United Way should spend its campaign contributions. Their input ensures that local citizens will determine the amount of funding member agencies in the greater Princeton area receive.

The process begins in April, when volunteers are divided into panels. Each panel makes on-site visits to selected agencies, discussing the issues and problems facing each agency with its staff and volunteers . Panel members examine the agencies' requests for funding, management and financial accountability, other sources of funds, and service quality and delivery. Panel members can then make informed choices on how United Way dollars can best be spent on human services.

Each panel sets tentative allocations for the agencies they visit. The United Way's full Budget Committee votes on the recommendations and establishes suggested funding allocations. In June, the Budget Committee's suggestions are presented to the United Way's volunteer Board of Trustees for a final vote.

Two major benefits the Volunteer Review and Allocations Committee provides for the United Way are the flexibility to adapt to changing social and economic conditions affecting human services, and the ability to shift funds as community needs change.

United Way allocations depend on fund-raising results. Although contributions have been climbing annually, funding does not automatically

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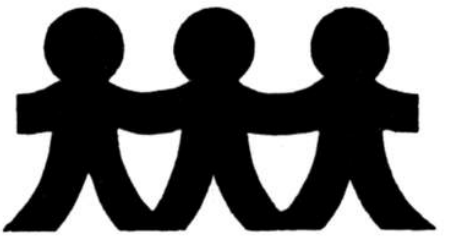
increase, nor is the same increase granted to all agencies. Funding increases to United Way agencies vary, and some agencies do not receive increases in certain years.

The review period involves a lot of evening work, painful choices, and hard decision-making. It is also a secret the United Way doesn't mind telling -- or sharing. If you'd like to be a part of next year's Review and Allocations Committee, call the United Way for more details.



People Helping People

This United Way symbol, three people with joined hands, carries a simple message: people helping people.

It's true that more detailed reasons for giving to the United Way can be found. Yet at its most basic level, the United Way stands for a simple human response: people reaching out to one another in times of need. People helping people.

So reach out, and give to the United Way!

UNITED WAY EDITORIAL

So far, 1985 seems to be the year for celebrating the family of man. Nothing has highlighted our common connection more strongly than the plight of those enduring the Ethiopian famine. Rather than turning a deaf ear to people so far away, an outpouring of help for the suffering came from a variety of sources, most notably the Live Aid concert.

Live Aid proved that huge contributions by vast organizations or governments aren't always what's needed to make a real difference in the world. The concert and its attendant fundraising spotlighted the impact caring individuals can have. A flood of small contributions from a lot of people helped Live Aid raise millions for famine relief. And all that help began with one man's conviction that he could make a difference.

Think of the difference your United Way dollars can make in the lives of so many who live and work here in the Princeton area. Some of the more than 130 services provided by United Way agencies do make headline news -- food and emergency shelter programs for the homeless, or aid to flood victims. But many more services remain behind the scenes -- adoption or foster care, job training and guidance, counseling to overcome drug or alcohol abuse, meals and centers for the elderly. Your contribution can help transform a bleak today into a hopeful tomorrow when you give to the United Way.

It doesn't take much to make a change for the better, especially if you take advantage of the payroll deduction plan. Tomorrow is in your hands -- give today to the United Way.

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

The Symbol Says It All.

You've seen this symbol around—at health agencies, day care facilities, neighborhood centers and, of course, on all United Way posters and publications.

But did you know the symbol's very simple, yet universal, message?

At the bottom is a helping hand. The hand symbolizes the services and programs supported by the United Way that in turn support the people in our community.

The image in the center, based on the universal symbol of mankind, is cradled by the helping hand. It shows that all people are supported and uplifted by United Way efforts.

And a rainbow springs from the helping hand, representing the hope of a better life possible through the United Way.

In these simple figures is the sum total of the United Way philosophy—to promote voluntarism and to support voluntary organizations in their efforts to provide a better life for us all.

Developed by United Way of Greater Rochester (N.Y.)

HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 5 December 20, 1985

DR. SUCKEWER WINS INNOVATOR AWARD

Webster's Dictionary defines innovation as "the introduction of something new." According to Dr. Szymon Suckewer, who has been selected as one of Science Digest's Top 100 Innovators, the introduction of a new point of view is vital to allowing innovation to flourish.

Science Digest asked a wide range of corporations, colleges, scientific and engineering associations, and governmental agencies to suggest significant innovations. Editors narrowed down the nominations from more than 500 to the final 100 featured in the December issue of the magazine.

Dr. Suckewer was suprised to find himself in that select company. "I didn't know anything about it until I got a call from Science Digest telling me I had been chosen as one of their 100 top innovators. They offered their congratulations, and asked for a photograph to be printed in the magazine."

Dr. Suckewer's innovation involves the development of an X-ray laser (see sidebar on page 3). While obviously pleased by the honor, Dr. Suckewer emphasized that "I'm accepting this award as a representative of a group of people. Charles Skinner, Dave Voorhees, and graduate students Howard Milchberg (who received his Ph.D. earlier this year) and Chris Keane have been with the project for a number of years. Without their help, the experiment would probably never have existed. (Laboratory Director Dr.) Harold Furth has also been very, very supportive of this work. Without his personal encouragement at critical moments, I don't think I would have continued to pursue this idea." Dr. Suckewer also offered his thanks to Dr. R. Gajewski of the Department of Energy's Basic Energy Sciences group, who "has also believed in this experiment from the start."

Dr. Suckewer defines innovation as "creative

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Secretary of Energy John S. Herrington visited PPL on December 6. The Secretary toured TFTR and was briefed by PPL Director Harold Furth. Above, TFTR Project Manager Don Grove (left) explains operations in the TFTR control room to Secretary Herrington (center) and University Provost Neil J. Rudenstine (right).

curiosity. Innovation begins when you start thinking about an idea that would be

interesting to investigate, or about how to solve some problem you encounter in an experiment. With the X-ray laser, for example, we're trying now to reach shorter wavelengths.

Dr. Suckewer finds that intense study of a problem is absolutely necessary, although it can initially stifle innovation. "As you continue to gather knowledge about a problem, that knowledge accumulates in the brain. Often you'll have the answer to your problem, but you don't recognize it as such. By searching out still more detailed information on the subject, you only narrow your approach even further."

That's where perspective and patience come into play. "Stepping back from the problem provides a new perspective. It allows you to see a different correlation between the parts of the problem. It's the difference between driving down a road, wondering where you're going, and seeing that same road from the air. When you're airborne, you can suddenly discover where the road leading, and how it connects to other roads up ahead."

"You have to be patient to understand something, to really see it differently. You often carry problems that bother you around in your head; suddenly, the inspiration for the solution seems to come from nowhere. What's actually happened is that you've discovered the bridge between the problem and its solution."

"I often compare new ideas to cultivating plants. When the plant starts growing, you may not know whether you've planted weeds or wheat. If you rip the plant out by the roots to discover which it is, you'll destroy it, and you'll never have a wheat harvest. The plant needs time to develop; you have to give ideas a chance to grow."

Laser Update

In addition to working on improvements to the present system and attempting to reach shorter and shorter wavelengths, Dr. Suckewer's group is investigating possible applications for the X-ray laser. "We're looking for proposals from industry covering not only what we can do with the present system, but also involving what we can do with the laser when we progress to shorter wavelengths. It will become expecially exciting if we can get below 100 Angstroms, because more opportunities open up as the wavelength shortens."

A second laser group goal is improving the practicality of the X-ray lasing process. One major area of investigation centers on substituting gas targets for the solid targets in use at present. Dr. Suckewer predicts that "the gas target should give us a much higher repetition rate, which means that we can have more laser pulses per day. We also won't have to be continually changing targets; instead, we will inject a puff of gas for each shot."

Compared to conventional lasers, vast outlays of power are required to produce X-ray lasing action. The high power requirements can be met, however, if the laser delivering energy to the plasma in order to create the X-ray lasing action (the pumping laser) is fired for only a very small fraction of a second. This portion of a second is known as a picosecond. A picosecond is so short that light can travel only one-eightieth of an inch during that time.

Dr. Suckewer's group is therefore constructing a very powerful picosecond laser, which, when combined with a new CO_2 laser and a new magnet, is expected to provide conditions appropriate for lasing action at wavelengths significantly below 100 Angstroms. The picosecond laser, although relatively not very large, will provide very high pumping power (on the order of millions of megawatts).

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Joining Dr. Suckewer, Charles Skinner, Dave Voorhees, and Chris Keane in working on the X-ray laser are Lou Meixler, Ernie Valeo, Allain Wouters, Bill Tighe, John Robinson, Larry Guttadora, and graduate students Dong Eon Kim and Chung Hee Nam. Also assisting in the project is Dr. Pascal LeMaire, who is visiting PPL for a year from the French X-ray laser laboratory. The group cooperates closely with Professors R. Miles and M. Littman of the University's Engineering Department on the utilization of the picosecond laser for X-ray laser development experiments.

(For a more complete accounting of progress in the X-ray laser program, read "Amplification of Stimulated Soft X-Ray Emission in a Confined Plasma Column," in the October 21, 1985 issue of Physics Review of Letters.)

PPL Seeks X-Ray Laser Technology Transfer

"Help us build a bridge" was what J.R. Thompson asked representatives of industry to do at a PPL preproposal conference held Tuesday November 12. The "bridge" the Deputy Director for Technical Operations was referring to would transfer PPL's soft x-ray laser to industrial applications. The impetus behind PPL's search for commercial uses for the laser stems from PPL Director Harold Furth's strong interest and support for the project.

Exciting technological developments are envisaged employing x-ray lasers in a host of fields including physics, biology, medicine and electronics. While PPL has the physics research capability, industry is being asked to provide guidance in identifying near-term (1-5 years) and long-term applications for PPL's soft x-ray laser. Specifically, proposals are being requested for an X-ray Laser Technology Transfer Study, PPL's first formal RFQ relating directly to technology transfer.

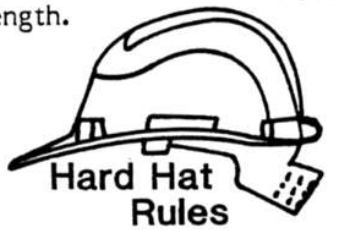
Under the terms of the RFQ, an industrial subcontractor will be selected on the basis of proposals to perform an approximately 6-month study of industrial (non-military) applications of PPL's soft x-ray laser. Bidders were asked to concentrate on immediate spinoffs with recommendations for downstream uses.

The ultimate number of commercial and scientific applications of x-ray lasers may very well surpass that of existing visible, infrared and ultraviolet devices. Most potential applications require lasers below 100Å, with the majority below about 50Å. In medicine, the finely focused x-ray laser would allow better localization in the use of CAT scanners and similar instruments. This, coupled with the fact that the diagnostic x-ray laser would operate in very short bursts, could mean far less radiation exposure for the patient.

In principle the emergence of x-ray holograms would provide physicians with detailed 3-dimensional pictures of the brain and other organs. Biologists would also benefit by being able to take 3-dimensional pictures of DNA in the process of self-replication. X-ray microscopes would have greater resolution than can be currently achieved with electron beam systems.

In the electronics industry, the use of an x-ray laser would allow even more integrated circuitry to be squeezed onto tiny silicon chips. In the area of solid state physics, x-ray lasers would allow a substantial improvement in physicists' ability to analyze the structure of crystalline solids.

PPL'S x-ray laser team is headed by Dr. Szymon Suckewer. They currently utilize a fast recombing carbon plasma to produce soft (long-wavelength) x-ray laser radiation of 182Å wavelength.



Hard Hat Rules

After last month's review of hard hat requirements at the TFTR complex, rules governing mandatory wearing of hard hats have been relaxed in some areas.

Hard hats must be worn at all times in the TFTR Test Cell, the Test Cell basement, and the contractor's area of the Hot Cell.

The wearing of hard hats is not required in any other area of TFTR EXCEPT under special circumstances, when local construction activities are in progress, as specified in installation and lift procedures, or when directed by the Project and Operational Safety Office.

Dr. Robert Mills

Dr. Mills Receives IEEE Award

Dr. Robert G. Mills, Director of Princeton University's Interdepartmental Program in Plasma Science and Fusion Technology, has been presented with the Annual Merit Award for 1985 by the Nuclear and Plasma Sciences Society (NPSS) of the Institute of Electrical and Electronics Engineers (IEEE).

As a recipient of this award, Dr. Mills received $2,500, a certificate, and a plaque engraved with this award citation: "For 30 years of pioneering leadership in fusion engineering, and his lasting contributions of inspiring excellence in his colleagues and teaching the basics of this new field to leaders of the future."

Dr. Mills, who also leads a cooperative effort between the School of Engineering and Applied Science and the Plasma Physics Laboratory, has been active in the IEEE since its inception in 1963. He was selected as an IEEE Fellow in 1979. A past president of the NPSS, he has served on the IEEE Energy Committee for the past 10 years, and heads its Subcommittee on Fusion.

The presentation was made in October during the 1985 IEEE Symposium on Nuclear Power Systems in San Francisco.

Obituary

PPL chemical engineer Carl W. Pierce, 56, died December 3 in the Medical Center at Princeton.

Born in Pittsburgh, Mr. Pierce had lived in Lawrenceville since 1976. He had been a laboratory employee for 10 years.

Mr. Pierce graduated from the University of Pittsburg School of Engineering in 1951 with a B.S. in chemical engineering. He belonged to the American Association for the Advancement of Science, the American Nuclear Society, the American Institute of Chemical Engineers, and the American Vacuum Society.

A Navy veteran of the Korean War, he was a member of Milnor Lodge F&AM in Pittsburgh.

Surviving are his wife, Grace C. Yeschke Pierce; a son, Carl H. Pierce, at home; and a daughter, Lesley A. Pierce, also at home.

Memorial contributions may be made to the University of Pittsburgh School of Engineering, Pittsburgh, PA, 15260.

Bus Routes

Lab employees who'd like to stop struggling with stop-and-go traffic can now leave the driving to a New Jersey Transit bus driver.

NJ TRANSIT-Mercer has established an "E" bus route connecting the Princeton Forrestal Center with the Whitehorse Circle in Hamilton. On weekdays, buses leave Hamilton hourly from 7 a.m. to 8 p.m., beginning the return trip from Forrestal Center hourly from 7:50 a.m. to 8:50 p.m. Stops are made in Trenton at South Broad and Lalor Streets, Lalor and Center Streets, Broad and Market Streets, and State and Warren Streets. The bus also stops at Quakerbridge Mall in Lawrence, and Carnegie Center in West Windsor.

Several transfer points on the "E" line allow travelers to switch to the "H" bus. The

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"H" bus extends service to Pennington, Ewing, and Trenton State College.

Schedules for both the "E" and "H" bus routes are available for review or copying at the reception desk in the LOB lobby at C-Site.

Exact change, a bus ticket, or a NJ TRANSIT bus pass are required for all bus riders. Bus tickets are available from NJ TRANSIT-Mercer, Eddie's Donuts, and Fuji's Market in Trenton. Tickets can also be purchased at the Princeton Health Food Co., 126 Nassau Street, Princeton.

Employees interested in using either bus route should contact Robert Smart, Associate Head of the Administration Department, who will be monitoring PPL usage of the system. If substantial laboratory ridership develops, NJ TRANSIT may provide a stop within Forrestal Campus.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Frank DiBella of the RF Section and his wife, Lynn, whose daughter, Ashley Anne, was born August 30;

Rod Templon of Procurement and his wife, Michelle, whose son, Matthew David, was born September 28;

Tom Egebow of the Administrative Department and his wife, Renee, whose son, Nicholas, was born October 11;

Kurt Jaehnig of TFTR and his wife, Karen, whose son, Gregory, was born October 16;

Harry Stephens of the Computer Center and his wife, Sandra, whose son, Eric, was born October 21;

Doug LeBon of TFTR Neutral Beams and his wife, Carla, whose daughter, Amanda Kate, was born November 12.

QM&S Questionnaire

Occupational Health and Safety (OM&S) was pleased and encouraged by the response of PPL personnel to our lecture on "Drinking and Driving," presented by the State Police. In order to continue with these general interest safety programs, please fill out this form and return it to OM&S, Building 1-O, A-Site. Thank you!

1. Did you enjoy the lecture? Please comment: _____

2. Would you like to see other safety lectures offered? _____

3. Was the scheduled time convenient? If not, what time would you prefer? _____

4. What subjects would you like to see covered in the future? (Include work, home, or recreational health and safety topics) _____

United Way Wrapup

(Deputy Director for Administrative Operations James Clark, PPL's United Way campaign chairman, submitted the following open letter to the HOTLINE:)

Thank you for giving generously to the United Way this year. As a result of your support, PPL's United Way campaign was a great success. As of early December, the total employee participation for 1985 was 29 percent, which is more than double last year's figure. Some pledges are still coming in, and with these additional contributions we may yet exceed 30 percent. In any case, the achievement is significant, and you have reason to be proud.

We all know the United Way agencies help a great number of people in our community who are in need of health and human care services. By giving to the United Way, you have helped to make our community a better place to live and work and have establish our laboratory as a caring place to work.

On behalf of the United Way and its agencies, as well as the people who turn to the agencies for help, I extend my personal thanks for your support. "Thanks to you, it works for ALL of us -- the United Way." For those of you who have been on travel or have not gotten around to pledging, your contribution can still make a difference.

Emergency Closings

On those occasions when the laboratory will be closed for the day, or normal starting time will be delayed (late opening), special announcements will be made over the following radio stations:

Princeton	WHWH	1350 kHz
Trenton	WTTM	920 kHz
Trenton	WPST (fm)	97.5 MHz
Levittown	WBCB	1490 kHz
New Brunswick	WCTC	1450 kHz

PLEASE REMEMBER: WHEN PRINCETON UNIVERSITY IS MENTIONED, THE ANNOUNCEMENT ALSO INCLUDES THE PLASMA PHYSICS LABORATORY

The University begins monitoring weather conditions as early as 4 a.m, and arrives at the decision to open, close, or have a delayed opening as early as practical. PPL DOES NOT independently arrive at its own decision to open or close.

The laboratory has arranged with the Princeton Answering Service to provide an emergency telephone number to call to determine whether PPL will be closed. When calling the answering service at 609-924-1760, individuals should identify themselves as Plasma Physics Laboratory employees. Please call this number ONLY if you are unable to receive radio broadcast announcements, and ONLY to learn if the laboratory will be opened or closed. No other information will be given by the answering service.

In the event that PPL remains open, employees who find it impossible to report to work because of hazardous conditions should notify their supervisors AS SOON AS POSSIBLE that they are unable to report to work.

Invention Update

In 1981, PPL established a Patent Awareness Program designed to recognize creative inventors and to raise the patent-mindedness of laboratory staff. A Committee on Inventions makes cash awards to inventors for their new or novel ideas. Additional monies are awarded if a patent application on the discoveries is filed.

Patent applications filed since August include:

- High Power Factor Magnet Power Supply, by D. Ashcroft
- Periscope-Camera System for Visible and Infrared Imaging Diagnostics on TFTR, by S. Medley, D. Dimock, S. Hayes, D. Long, J. Lowrance, V. Mastrocola, G. Renda, M. Ulrickson, and K. Young
- A Symmetric, Portable Plasma Magnetron, by S. Yoshikawa
- High Speed Block Mode Transient Digitizer Controller, by S. Hayes
- D^+ Detector, by D. Buchenauer, W. Heidbrink, and K. McGuire
- Magnetically Confined Plasma Discharges and Plasma Jets for Chemical Waste Destruction, by W. Hooke, D. Jassby, M. Machalek, and A. Nagy
- Tokamak Radial Insulators, by J. Murray, F. Lawn, and G. Bronner
- Biased Grids, by J.G. Murray and G. Bronner
- Biased Limiter (Diverter), by J.G. Murray, J. Frankenberg, and G. Bronner
- Radial Potential Control, by J.G. Murray and G. Bronner
- Bias Toroidal Electrodes, by J.G. Murray and G. Bronner
- Rotating Shield Roof for High-Field Ignition Experiment (HFIX) Test Cell, by J. Commander
- Multiphoton Excitation of Ions for X-Ray Lasing, by C. Skinner, S. Suckewer, C. Clark, M. Littman, T. McIlrath, R. Miles, E. Valeo
- Heated Cover/Deflector for Directed Deposition of Materials by Evaporation, J. Timberlake and T. Bennett
- Covered Crucible with Perforated Bottom for Downward Evaporation, by T. Bennett, J. Timberlake, and S. Cohen

- Improved "OSM Connector" Assembly Tool for Semi-Rigid Coax Cable, H. Dymowski
- Generating Current by Inverting the Energy Distribution of Alpha Particles, by N. Fisch
- Alfvén Wave Heating in Toroidal Plasmas by the Low-n Toroidicity-Induced Shear Alfven Eigenmodes, by C. Cheng and R. Stockdale
- Feedback Control of Sawtooth Mode in Tokamaks, by R. White
- Relativistic Electron Beam Driven X-ray Laser, by E. Valeo, H. Furth, and S. Suckewer
- Energetic Particle Stabilization of m=1 Kink Modes in Tokamaks, by L. Chen and R. Hastie

For further information about invention disclosures or the patent process, contact Meg Harmsen at ext. 2659.

Route 1 Construction

The Greater Princeton Transportation Management Association (TMA) has obtained an updated list of active Route 1 construction projects from the state Department of Transportation.

The major project in the near future involves the creation of a grade separation at the Route 1-Quakerbridge Road intersection. The contract for the project should be awarded this month, and preliminary work may begin before year's end. Since actual construction will occur north of the existing intersection, the entire project should have minimal impact on area traffic.

Other projects slated for the Route 1 corridor include:

January 1987: Improvements to Adams Lane, Cozzens Lane, and Jersey Avenue intersections in North Brunswick.

February 1987: Addition of a third lane and shoulder on Route 1 from Quakerbridge Road to Alexander Road.

April 1987: Addition of a shoulder from Franklin Corner Road in Lawrence to Quakerbridge Road.

January 1988: Creation of an overpass or underpass at Plainsboro/Scudders Mill RD, Plainsboro; reconstruction of the bridge over the Amtrak railroad tracks in North Brunswick.

October 1988: Creation of an overpass or underpass at Route 1 and the Route 130 junction in North Brunswick.

April 1989: Creation of an overpass or underpass at Alexander Road, West Windsor; elimination of the jughandle at the Motor Vehicle Inspection Station and addition of a service road in Lawrence.

October 1989: Addition of a third lane and shoulder from the Amtrak railroad tracks to Route 130 in North Brunswick.

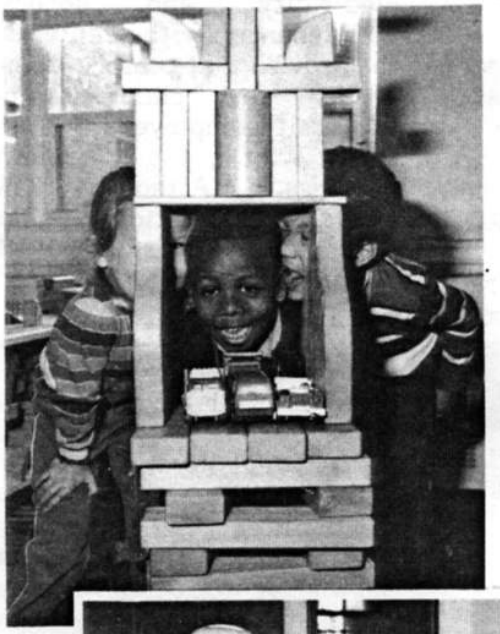
U-NOW Daycare

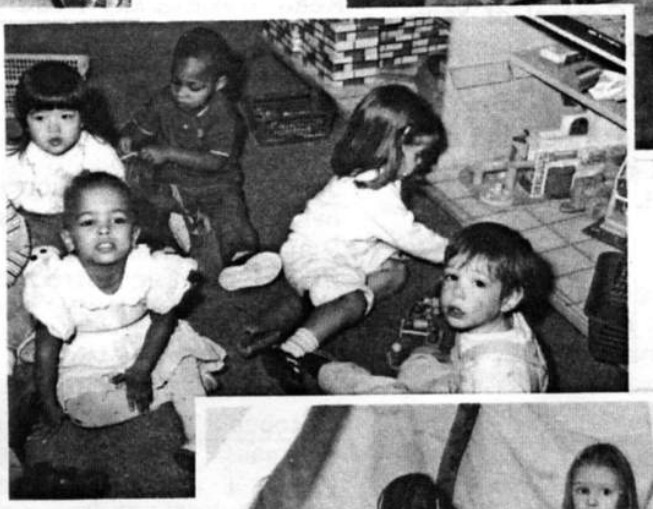
It might seem that the University NOW (U-NOW) Day Nursery at 171 Broadmead Street on Main Campus has nothing to do with a construction company. But both firms are committed to providing a solid foundation that their "customers" can build on.

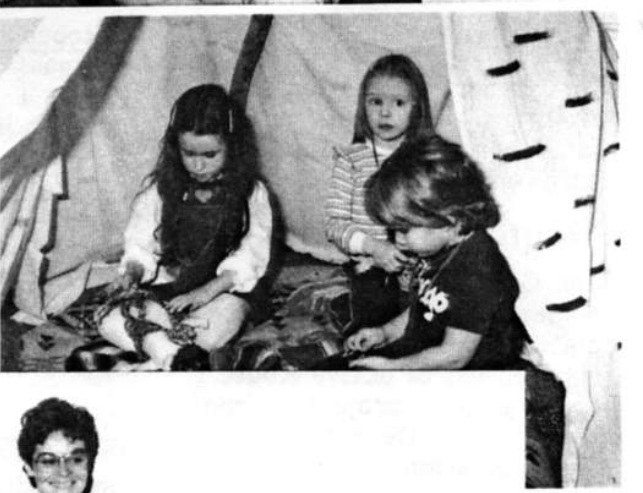
This is the 15th year U-NOW has been in existence. It was founded by the National Organization of Women (NOW) when the group discovered a need for child care in the Princeton area. NOW approached the University during its search for a site for a child care center. The University agreed to provide U-NOW with a building, heat, electricity, and general maintenance for the center on the proviso that preference be given to children of University employees in two-thirds of the center's openings. Although NOW ended its association with the program 12 years ago, U-NOW continues to thrive.

The center has classes for two-, three-, and four-year-olds, as well as a certified kindergarten for five year olds. To qualify for the two-year-old class, a child must be 22 months old by September. The school year runs from September to June, with an optional summer program. The center is open from 8 a.m. to 6 p.m., and provides a hot lunch and two snacks.

The center doesn't function merely as a babysitter. Instead, it provides a non-sexist, non-violent environment for its young charges; there are no Barbies or G.I. Joes in evidence anywhere. Program are aimed at allowing children to develop their own talents and social skills during the most formative years of their lives. The staff's attitude is that each child is an







individual, and should be exposed to a wide range of opportunities So all youngsters in each class are encouraged to try their hand at everything from carpentry to cooking.

Director Connie Danser feels U-NOW places more emphasis on the social and emotional development of each child than other similar centers do. "We concentrate more on acquiring socialization skills, rather than placing a too-early emphasis on academics." Connie, a former public school teacher, pointed out that "at U-NOW, we allow children to experience as much success as possible, which reinforces a positive self-image and raises self-expectations."

Most classes follow the same general format. The center's broad goal is self-reliance, but the teachers are free to design their own curriculum within that framework. Classes capitalize on a teacher's specialty, such as ability to play a musical instrument or teach a craft. The teaching staff is composed of certified instructors and classroom assistants. Most U-NOW teachers have been with the center for a number of years.

Youngsters exercise their budding social skills during the one-on-one interaction that occurs between children in the open play areas. A choice of activities allows students to have some control over their own lives. Because the children are treated as people who have something to say, there is a more comfortable and responsive relationship between the children and the staff at U-NOW than might be found in a public school classroom.

Enrolling a child in U-NOW is very much a family affair. At least eight parents are members of the school's board of directors, which sets policy for the school. Parents also pitch in during the school's cleanups, held each fall and spring.

Parents interested in enrolling their children in U-NOW should call the center to schedule an appointment to observe some of the classes. A $15 non-refundable registration fee is charged when an application is submitted.

For more information about U-NOW, call the U-NOW office at (609) 924-4214.

Patent Changes

A dramatic change concerning rights to inventions made with Federal assistance occurred November 9, 1984, when Public Law 98-620 was signed by President Reagan. The key change for laboratory inventors is that for the first time, if a patent is issued, the inventor and the University will share in royalties obtained from licensing the patent to commercial interests.

However, the DOE will have a nonexclusive, nontransferable, irrevocable, paid-up license to practice any subject invention throughout the world on behalf of the U.S. government.

Any procedural changes in the laboratory's invention program required to conform to this new law will be clarified when PPL's contract with the DOE is amended. Meanwhile, the lab's report processing, invention disclosure, and Patent Awareness Program procedures will remain the same.

However, if you have an invention or an idea that you think may be attractive for use in the private sector, please emphasize its commercial viability in your invention disclosure. A clear message to Princeton University will speed the receipt of a waiver from the DOE, the patent search, and the patent application process to your benefit.

In the pursuit of health and well-being, you should see your dentist twice a year, get periodic medical checkups, and eat right. The Skin Cancer Foundation hopes you'll add one more item to that list: Examine Your Birthday Suit on Your Birthday.

Giving your "birthday suit" an annual checkup greatly enhances your chances of avoiding the conversion of a mole into a malignant melanoma. Keeping an eye on any moles you have will alert you to any changes in the way they look or feel. Such changes should prompt an immediate visit to your dermatologist.

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The Skin Cancer Foundation suggests you stand before a full length mirror, study your body objectively, and catalog your moles on a drawing of the front and back view of the body. Note each mole's size in millimeters, color (tan, brown, dark brown, gray, black, blue, pink, rose, white, or flesh-colored), and shape (round, oval, irregular, or indented).

Because of the importance of early diagnosis and treatment, you should examine your skin once a month if you are in the high risk group. High risk indicators include:

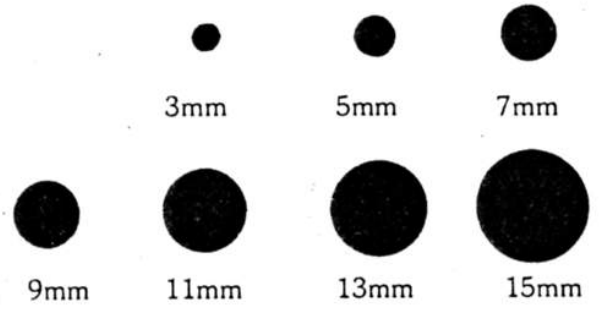
- Moles that are multi-colored; generally a mixture of tan, brown, black, or reddish pink within a single mole. Low risk moles are usually either tan or brown.
- Individual moles that look very different from one another. Low risk moles resemble each other.
- Moles with irregular borders that may fade off into surrounding skin. Low risk moles have clear cut borders between the mole and the surrounding skin.
- Moles with diameters larger than five millimeters. Low risk moles are usually less than five millimeters in diameter. (Use the measurement guide at the end of this column to estimate the size of moles.)
- High risk moles generally occur in large quantities (more than 100), and are usually found on the back, although they may occur below the waist or on the scalp, breasts, and buttocks. Low risk moles are less numerous (20-50), and are scattered over the body, most often on sun-exposed skin above the waist. Low risk moles rarely involve the scalp, breasts, or buttocks.

See your doctor right away if you experience pain, itching, discharge, or bleeding from a mole. Other danger signals include changes in the mole's size, color, shape, texture, or sensitivity.

If you would like an outline of the body to record your moles on, contact Mary Ann McBride at ext. 3468.

MEASUREMENT GUIDE

Use this sizing chart to determine approximate diameter of moles in millimeters.



Check Cashing

The only C-Site location for the cashing of personal checks, made payable to PPPL for $15 or less, is the Receptionist's desk in the LOB lobby. Postage stamps are also available from the receptionist.

Chimney Cautions

As the heating season arrives each year, several families' homes are always destroyed by wood stove or chimney fires. These fires could have been prevented if homeowners took a few moments to perform a preseason stove and flue check.

Before and after each heating season, the chimney should be cleaned and checked for crumbling brick, loose mortar, obstructions, or creosote buildup. Creosote, an oily, combustible residue which coats chimney walls no matter what kind of wood is burned, accumulates faster when green wood is used. To minimize creosote accumulation, only dry, well-seasoned hardwoods such as maple, elm, oak, or birch should be burned in a home wood stove. These woods provide the most efficient burn and the most heat.

The safest fuel to use in a wood-burning stove is hardwood that has been seasoned for 12 months, with larger pieces split to promote drying. Trash should never be used as fuel, nor should charcoal be used in an indoor stove.

Stopping fire hazards before they start can be as simple as good wood stove housekeeping. Stoves should be kept

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free of excess ash, which prevents the circulation of air vital for combustion. Follow your manufacturer's instructions on stove maintenance.

When disposing of ashes, never place the ash container on a combustible floor. Move hot or even warm ashes outside, keeping them well away from other combustible materials. Don't dump ashes into other containers until coals are completely extinguished. Many fires have been started when supposedly "cold" ashes rekindled.

If your oil heating system has recently been converted to natural or liquid petroleum gas, it is VERY important to have the chimney checked for obstructions. People have suffered from carbon monoxide poisoning when clogged chimneys or malfunctioning furnaces prevented the deadly gas from being exhausted.

Be sure to check your municipal fire code carefully when installing any home heating system or device. If you have any doubts about your heating system, have the system safety checked by a professional.

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

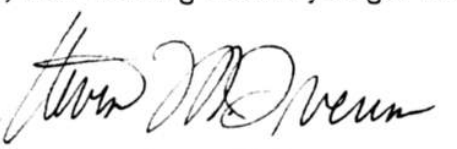
Spotlight On Drinking and Driving

Thanks to the efforts of all of us, PPL received two awards in recognition of our decreased accident record. That record is a source of pride to the laboratory, because it demonstrates our ability to do good science in a safe environment.

During the holiday season, the temptation to relax our safety awareness increases. Instead, we should sharpen our attention to safety, especially when driving. Holiday receptions and office parties increase the likelihood of sharing the road with drivers who are under the influence of alcohol or other drugs. That is one reason why the National Safety Council has designated December 15 to 21 as National Drunk and Drugged Driving Awareness Week.

Drinking and driving can be a costly combination. Conviction on even a first offense for driving while intoxicated carries a high fine and a mandatory suspension of your driver's license. These costs dwindle, however, beside the cost drunk driving extracts in human misery. Each year, approximately 23,000 people are killed in alcohol-related accidents. Thousands more, many of whom were innocent victims of drunk drivers, are seriously injured.

Driving is not a right; it's a privilege. Along with each privilege comes responsibility. Enjoy the holidays responsibly by drinking in moderation, and thinking before you get behind the wheel.



Steven M. Iverson

Designated Driver

Hanukkah, Christmas, and New Year's are holidays rich with tradition. Yet if another tradition is upheld, 2,000 people will die in alcohol-related motor vehicle accidents by the end of this month.

To focus attention on this potential devastation, the National Safety Council (NSC) has designated December 15 to 21 as the fourth annual National Drunk and Drugged Driver Awareness Week.

Hosts can support this NSC effort by encouraging the "Designated Driver" concept at all gatherings where alcohol will be served. At the beginning of the party, several guests "volunteer" to drink nonalcoholic beverages. These "designated drivers" can then drive other celebrants home safely.

If no one volunteers to act as "designated driver," you can still ensure your guests' safety by arranging for cabs, buses, or other transportation alternatives.

The best gift you can give this season may be the gift of life. Serve your friends a safe ride home along with a drink.

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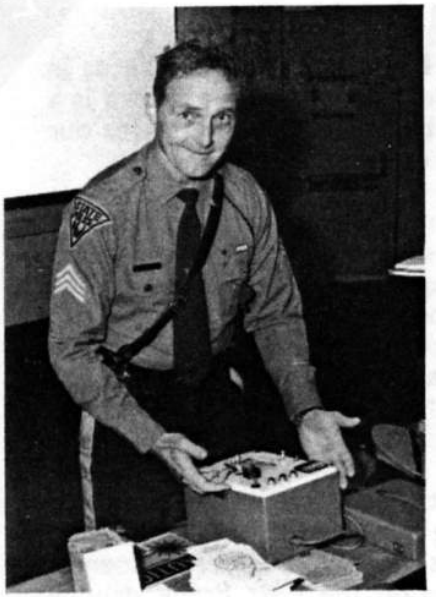

Sergeant John Murphy of the New Jersey State Police explains the operation of the breathalyzer during his lecture on "Drinking and Driving" December 3 in the Gottlieb auditorium. The presentation was sponsored by the Occupational Health and Safety Division.

Drinking & Drugs

The numbers of people killed and maimed in motor vehicle accidents involving intoxicated drivers is well documented. However, the frequency of motor vehicle injuries and deaths caused by drugged drivers is less well known.

According to statistics provided by the National Safety Council, one arrest for driving under the influence of an additional drug occurs in every 11 alcohol-involved driving arrest.

Prescription drugs, such as barbiturates and narcotics, aren't the only medications to avoid if you drink. Over-the-counter drugs can also intensify alcohol's effect. Since medications for pain relief, motion sickness, head colds, and allergy symptoms act on the same brain areas as alcohol does, the "double whammy" effect of the combination can seriously impair the senses and alter perceptions.

Ask your physician or pharmacist if it is safe to drive after taking any medication, and what the effects of drinking alcoholic beverages while taking the medication would be. With over-the-counter drugs, be sure to read and follow label instructions carefully.

Liquor Liability

Liquor liability has been a problem for alcohol suppliers since the 19th Century, when the courts held that intoxicated persons no longer bore sole responsibility for their actions.

Municipalities instituted "dram shop" laws to protect the families of "habitual drunkards." Tavernkeepers became financially liable if they continued to serve a patron after being notified of that person's intemperance. In later years, such laws were extended to prevent injuries to strangers, and to prevent persons from selling, furnishing, or giving alcoholic beverages to minors.

Tavern owners and liquor store proprietors are responsible businessmen, licensed by a municipality to provide a service for its residents and guests. Preventing alcohol overservice to customers is a responsibility monitored by government agencies, grassroots organizations, and community groups. Alcohol servers must realize the responsibility they have to both their patrons and the community. In accordance with increasing national concern with drinking drivers, responsible beverage retailers are now concerned with ways to keep customers from going onto a highway while alcohol-impaired.

The legislatures in 18 states have recognized these public policy considerations and have adopted "dram shop" laws to guide judges ruling on cases against liquor licensees. Seventeen other states use "case law" as a basis for determining a verdict against a "dram shop" violator.

Some state courts have continued to broaden the definition of a liquor "supplier." A California court held that an employer who served liquor at an office Christmas party must pay damages to an employee who was involved in a highway accident on the trip home. A Texas court ruled that a company which sent a worker home because he was too intoxicated to work is liable for damages from the ensuing accident.

A 1984 New Jersey Supreme Court decision further extended the liability to private citizens who "directly serve" liquor to a guest, then allow the person to drive away in an impaired condition. This provision holds the host or hostess liable for the injury to others if the guest becomes involved in a motor vehicle accident.

Alcohol suppliers can minimize their potential liability through an educational program for both the servers and patrons, so both fully understand the effects of alcohol and its responsible service and consumption.

Anatomy of a Drink

(This article, written by free-lance health writer Nancy Friedman, first appeared in the August/September 1985 issue of Campus Voice. It is reprinted in HOTLINE by permission.)

Ever wondered why you catch a buzz after downing a couple of beers? Here's an in-depth look at the physiology of intoxication.

The first sip brings a cold tingle to your mouth, then a warm glow as it glides down your throat and into your fingers and toes. Unconsciously your shoulders and jaw unknot. Relaxation--a hell of a concept, you think, refilling your glass. And you *deserve* to be relaxed. You take a long pull and feel a beatific grin spread across your face. Awash with good will, you make your way to the keg and hoist another refill. "To the antistress diet!" you cry, drawing cheers and laughter.

An hour and three drinks later, you're still laughing, but off-key. You're beyond relaxed now, and well on your way to disjointed. Your smile has dissolved into a sneer. You've just made an insinuating remark about your supervisor's sexual preference, and nobody seems much interested in either your stand-up comedy routine or your break-dancing recital. And where *did* you put those car keys? Oh, well. How about one for the road?

What's going on?

Alcohol is entering every cell of your body. Whether your drink is beer, Bordeaux, or banana daiquiris, the results are eventually the same. Thanks to ethyl alcohol, the extraordinarily versatile and potent drug found in all booze, virtually every body organ will be touched in some way. And the larger the dose, the heavier and longer-lasting the impact will be.

A sobering thought, perhaps, but a little hard to grasp. To really understand how alcohol takes us from here to there, let's follow a few drinks as they travel through the body.

THE ROUTE TO INEBRIATION

The effects start in the mouth, and they don't stop with taste. Almost immediately, tiny capillaries there absorb alcohol into the blood stream. Yet strangely, "the more you drink, the drier your mouth," explains James Beard, Ph.D., director of the Alcohol Research Center at the University of Tennessee College of Medicine at Memphis. "As your blood alcohol level (BAL) rises, your saliva flow is reduced. If you're popping salted peanuts or pretzels, you're even thirstier. And if you're like most people, you perpetuate the cycle by reaching for another drink," says Beard.

Maybe you reach for a cigarette as well. Not so smart, claim some scientists. "Alcohol is a very good solvent for a lot of toxins, especially the toxins in tobacco," says Jeremy J. Berge, M.D., medical director of the drug alcohol unit at Marshall Hale Memorial Hospital in San Francisco.

"Alcohol makes it easier for toxins to invade cells, which explains why people who both smoke *and* drink run a much higher risk of getting cancer of the mouth and throat than those who abstain or do one or the other."

As it travels to your stomach, alcohol acts as an irritant, increasing the flow of hydrochloric acid, a digestive juice. That's what causes the warmth you feel when you drink. In small amounts, such as one glass of wine, alcohol may actually "prime" the stomach for digestion. But drink more than that and the stomach is just plain irritated; digestion may even stop. If you're prone to ulcers, drinking can cause them to flare up. And if you're ulcer-free now, chronic heavy drinking may promote their development.

On an empty stomach, as much as 20 percent of the alcohol you drink can be absorbed into the blood stream directly from the stomach. Normally the rest of the alcohol, along with the remainder of the stomach's contents, heads for the small intestine by way of the pyloric valve. But large concentrations of alcohol cause the valve to get stuck in the closed position. Your digestive system is thrown into reverse and you dash for the bathroom.

INVASION OF THE BODY CELLS

So far your drink has simply moved through your body more or less unchanged (no more than five percent has left through perspiration, urine, or exhaled breath). Digestion has no effect on alcohol, because alcohol isn't really a food. "Alcohol has no vi-

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tamins or minerals, only calories," says Berge. In other words, on a diet of nothing but alcohol, you could literally starve to death without losing weight.

That means that alcohol is still alcohol when dumped into the blood stream from the small intestine. Once there, alcohol causes the blood vessels near the skin to expand, flushing the skin and creating a warm sensation. That feeling can be a dangerous illusion, because body heat is actually being *lost* through the skin. And contrary to popular belief, if you're stranded outside in subzero temperatures, a swig from a brandy bottle is nothing more than an invitation to hypothermia.

Alcohol may also affect the heart itself. In fact, long-term alcoholics tend to develop congestive heart failure. One recent study proves that even social drinkers don't escape alcohol's bad effects. Research conducted at the University of Chicago shows that after a few drinks, the hearts of healthy young people become weaker and less capable of pumping blood out to the body.

Because alcohol is water-soluble, it crosses the watery membranes of all body cells. Within two minutes of a swallow, the alcohol content of brain tissue has already reached 75 percent of the BAL. (BAL is expressed in milligrams percent. A BAL of .10 percent--the legal standard of intoxication in most states--means one part ethyl alcohol to 1,000 parts blood. The smaller the person, the less blood in the body and the higher the BAL reached with a single drink.)

BRAIN DRAIN

It's in the brain that alcohol earns its claim to fame. Technically, alcohol is a depressant. But when it depresses its first target--the frontal lobe, center of such "higher" functions as judgment, conscience, guilt, and the sense of ethics--the effect can be paradoxically stimulating because many of your inhibitions are relaxed.

One drink (12 ounces of beer, five ounces of wine, or a cocktail) is enough to cause the BAL to rise to .02 in a 150-pound man (higher in a smaller person, especially a female) and to bring about an equivalent decline in judgment levels. One result is relaxation. But some of the other consequences are less pleasant.

"At that BAL, there's a 20 percent decrement in visual tracking--the ability to move straight and keep track of things," notes Frederick L. McGuire, Ph.D., an expert on drinking drivers and a professor of medical psychology at the University of California at Irvine's College of Medicine. At .04 BAL (the result of two drinks in an hour) nonprofessional pilots participating in a drinking study made serious procedural errors, such as taking off without their lights on. And at .08 (which is still under the legal limit of intoxication) the chance of a driving accident is 80 percent greater than that for an abstainer, according to McGuire.

As the BAL rises, more primitive brain functions are knocked out. At .10 (five drinks in an hour), motor coordination suffers; at .20, it barely exists. When a person reaches this level, his memory is impaired and his emotions become erratic, swinging from misery to rage to happiness.

After drinking a pint of whiskey in one hour (which raises the BAL to .40), the average person is in a stupor. The senses are still functioning, but only minimally. It's just a swig from there to a BAL of .65, at which point alcohol shuts down the most basic brain function--breathing. "You literally can drink yourself to death," says Berge.

Exactly how alcohol achieves these effects is only beginning to be understood. Although it's often said that alcohol "kills brain cells," that's not quite accurate, say researchers at UCLA's Alcohol Research Center. Instead, it appears that relatively low levels of alcohol seem to disrupt the channels through which brain cells transmit their messages. The neurons still fire their signals, but the signals become garbled en route.

Alcohol may also interfere with the cell's ability to manufacture the proteins responsible for short-term memory--a possible explanation for alcoholic blackouts. A significant *loss* of brain cells, however, happens only after years of chronic alcohol abuse.

Alcohol has one more notorious effect on the brain: it tells the pituitary gland in the posterior lobe to suppress a hormone that regulates the a-

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mount of urine produced in the kidneys. As a result the kidneys pour it on, way out of proportion to the actual quantity of liquid you've downed.

The effect occurs only when the BAL is rising, and it has absolutely nothing to do with the kidneys themselves. In fact, the kidneys are among the very few organs that are *not* affected by alcohol (except in cases of severe alcoholism).

DETAILING DETOXIFICATION

What if you try to sleep off alcohol's nastier effects? That's easier said than done. "Alcohol, like all drugs, disrupts normal sleep patterns by preventing rapid eye movement (REM, the sleep phase during which dreaming occurs)," explains Berge. "The body may be unconscious, but the mind isn't repairing itself. The next day, even if you're not 'hung over,' you may be irritable and shaky."

The duration of these effects depends on how fast your body can metabolize the alcohol and remove it from the body. And *that* depends on the liver.

Where alcohol is concerned, the liver is similar to a bank at which only one teller window stays open, no matter how long the line. Regardless of how much you drink, the liver steadily metabolizes 100 milligrams of alcohol per kilogram of your body weight per hour. For example, if you weigh 154 pounds (70 kilograms) your liver is capable of metabolizing 7,000 milligrams, or 7 grams, in an hour; if you weigh 100 pounds (45.45 kg), you can metabolize just 4.5 grams.

If you remain within those limits, acknowledges Beard, you'll never get high. But if you're like most people, you'll probably drink quite a bit more. "Four ounces of wine with a 12 percent alcohol content contains 11.4 grams of pure alcohol," he points out. "A 12-ounce bottle of beer has 10.3 grams. And a 1-1/2-ounce shot of 80-proof whiskey has 14.3 grams of alcohol. With any of these drinks, your liver is saturated *immediately*."

Excess alcohol makes it harder for the liver to accomplish other important jobs. Fatty acids, for instance, are metabolized more slowly when you've been drinking. After as little as six days of heavy drinking, a condition known as "fatty liver" develops.

This ailment causes your liver to become enlarged, shiny, and "greasy." It occurs when at least 30 percent of caloric intake within a two-week period comes from alcohol, and it disappears when alcohol intake stops. Fatty liver is believed to be a precursor of cirrhosis (severe and sometimes fatal scarring of the liver), and until recently it was usually seen only in hospitalized alcoholics.

"We're now seeing a lot of college students with acute fatty liver," claims Beard. "By the time they're in their late twenties or thirties, some of them are experiencing liver conditions, such as hepatitis, that we used to see only in 40- and 50-year-olds."

Alcohol also prevents the liver from detoxifying other drugs--whether they're over-the-counter, prescription, or illicit ones. Unmetabolized drugs exert a more powerful effect, and when alcohol (a depressant to the central nervous system) is added to another depressant, such as a barbiturate or an antihistamine, the sum may be more than the parts can handle. That's why many alcohol-related deaths are really drug-and-alcohol-related deaths.

Finally, the liver is where hormones (including sex hormones) are metabolized. Consuming too much liquor (and there's no agreement about how much is too much) can wreak havoc in that area. "Men normally produce small amounts of estrogen, a female hormone," explains Berge. "Usually the liver gets rid of it. But in men who drink heavily, the testicles shrink and breast tissue starts developing because their bodies aren't disposing of the estrogen."

Women, on the other hand, may experience irregular menstrual cycles or miscarriages. And it's been known for centuries that although a small amount of alcohol may make you feel sexier, a bit more will mar your performance. "Alcohol depresses libido," says Berge. It also affects coordination and communication, which makes you a less pleasant sexual partner."

AVOIDING THE DARK SIDE OF DRINKING

You don't have to be a teetotaler to escape alcohol's sinister effects. These tips

(continued)

can help you maximize your enjoyment while minimizing the side effects:

- **Eat before you drink and nibble while you drink.** A full stomach protects against alcohol's irritating effects and slows the rate at which it is absorbed into the blood. Snacking while imbibing will prevent a rapid rise in the BAL. Food dilutes the alcohol and decreases the rate at which it is absorbed.

- **Drink slowly.** Chugging causes a steep rise in the BAL and overloads the liver, which can safely handle about half a glass of wine (or half a bottle of beer, or half a cocktail) per hour.

- **Mix your drinks with fruit juice instead of carbonated beverages.** The carbon dioxide in sodas causes alcohol to be absorbed faster.

- **Don't smoke.** Alcohol makes it easier for tobacco's toxins to enter the body.

- **Drink when you're already relaxed.** People who drink to relieve stress are likely to turn to alcohol whenever they can't cope.

- **Plan not to drive.** Even one drink can affect a person's judgment levels dangerously. Appoint one person in your group as official driver-and official abstainer.

HANGOVERS: MYTH VS. FACT

- **MYTH #1: IF YOU DON'T MIX YOUR BOOZE, YOU'LL NEVER GET A HANGOVER.** "There's probably a psychological factor to this one," explains Dr. James Beard of the University of Tennessee's Alcohol Research Center. "If you got deathly ill the first time you tried to mix your liquors, you may have the same reaction on every occasion. Basically, though, booze is booze is booze."

- **MYTH #2: IT'S THE OTHER STUFF THEY ADD TO LIQUOR THAT GIVES YOU THE HANGOVER.** The "other stuff" refers to congeners, and they include everything (besides ethyl alcohol) that gives liquor its characteristic flavor. Vodka has the fewest congeners; bourbon has the most. And although some congeners can be toxic, says Beard, "you can get a perfectly awful hangover from straight vodka."

- **MYTH #3: IF YOU TAKE TWO ASPIRIN BEFORE YOU GO TO SLEEP, YOU'LL WAKE UP FEELING FINE.** "Booze irritates the mucous lining of the stomach," says Beard. "So does aspirin. If you take aspirin on top of alcohol, you could end up with gastric bleeding." Buffered aspirin is safer, but no medication will speed up the rate at which alcohol is metabolized. It's only when the alcohol completely leaves your body that you'll lose your headache.

- **MYTH #4: IF YOU'RE HUNG OVER, YOU'RE DEHYDRATED — DRINK A LOT OF WATER.** A hangover is actually a water *excess* problem. The proof: that throbbing in your head. "It's actually cerebral edema --"water on the brain," says Beard. The alcohol causes your body to retain salt, which forces fluid retention. Drinking more water won't do a thing; only time corrects the imbalance.

- **MYTH #5: A RAW EGG, BLACK COFFEE, OR A BLOODY MARY ARE THE BEST CURES FOR A HANGOVER.** Eggs are nutritious, but they don't negate alcohol's effects. Drinking coffee (a stimulant) or "walking it off" is the opposite of what your body needs, which is rest. And more alcohol just delays the inevitable. Not drinking is the only way to prevent a hangover, and only time will cure one.

Volunteers: People People

The following volunteer opportunities were submitted to the HOTLINE by the Princeton Area Council of Community Services, a member agency of the United Way-Princeton Area Communities. For further information on any volunteer position, contact each agency directly.

- The Historical Society of Princeton runs a small museum, which includes a children's museum, library, photo archives, and book and gift shop, all of which

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focus on local Princeton history. The Society also sponsors activities such as trips to historical places and evening lectures. Volunteers are needed as guides for Bainbridge House, to serve as teaching docents for the children's museum, to do library research, and to mount exhibits. To offer your aid, call 609-921-6748.

- The Montgomery Township Recreation Department/ Montgomery Community School in Belle Mead is seeking volunteers to assist supervisors with various programs during the fall, winter, and summer seasons. Unique recreation ideas for adults, children, and the handicapped are also being sought. To lend a hand, call 201-359-8211.

The next listings were provided by the United Way of Somerset Valley. To learn more about any listing, contact each agency directly.

- The Planned Parenthood Association of Northwest New Jersey needs pregnancy counselors, doctor's assistants, interviewers, receptionists, and orientation leaders. The Association has offices in Morristown and Flemington. Call 201-539-9580 to get involved.

- Therapeutic Recreation Services of North Branch offers a recreation/leisure program for post-stroke and physically disabled adults. Volunteers are needed for arts and crafts activities and to assist clients in socialization. To offer your assistance, call 201-526-5650.

- Vision of Peace, Inc., located in Bound Brook, is seeking volunteers to do research, to speak before school groups, and to perform a variety of office tasks. Get involved by calling 201-271-1506.

The following volunteer posts were supplied by the Voluntary Action Center of Middlesex County. For more details about any position, contact the VAC at 201-249-8910.

- A rehabilitation engineering volunteer network is seeking individuals interested in engineering, drafting, computer technology, design, and physical therapy. Volunteer commitments are made on a project by project basis. Training is provided, and work is accomplished under the direction of a senior engineer. Share your skills by calling the VAC.

- Lunch on the House of God has a critical shortage of volunteers to serve meals to the poor Monday through Saturday. To lend a hand, call the VAC.

- Middlesex County Phone Friends needs volunteers for a new hotline. The service will provide reassurance to children at home alone who are lonely, frightened, or simply in need of someone to talk to. To become a child's "special someone," call the VAC.

The next volunteer opportunities were supplied by the Voluntary Action Center (VAC) of Morris County. Additional information on any listing is available by calling the VAC at 201-538-7200.

- The editor of a quarterly newsletter covering events for the handicapped needs an assistant to help interview and write articles. Lend a hand in spreading the news by calling the VAC.

- A retired handyman who'd like to spend one day a month making small repairs would come in handy at an alcohol counseling center. The center needs someone with electrical, plumbing, and carpentry knowledge. Lend a hand by calling the VAC.

- Receptionists, interviewers, and doctor's assistants are needed to staff a health center. Evening, weekend, or daytime shifts are available after a training period. Call the VAC for more details.

- Men are needed to help other men in a counselling setting. Group discussions and one-on-one chats are held one evening a week for men with a history of abusive behavior. Counsellors will provide on-the-job training. Arrange for an interview by calling the VAC.

Clean Room Creator

The creators of "Trivial Pursuit" missed the opportunity to include Willis J. Whitfield's name in their game. Perhaps even they didn't know the name of the man who invented what is formally known as the "Laminar Airflow Clean Room." Since its invention in the late 1950's, Whitfield's device has generated sales of more than $200 million annually in the United States alone.

Whitfield, who will retire December 31 after 30 years of service at the U.S. Department of Energy's Sandia National Laboratories, originally invented the clean room for the nation's nuclear weapons program.

In 1959, dust particles were causing problems in the clean rooms Sandia used to produce nuclear weapons components. So Whitfield began work on an improved approach. Instead of simply trying to keep dirt out, which was the way conventional clean rooms worked, he perfected a way to make the room continuously clean itself.

By covering the room's ceiling and floor with gratings, Whitfield made it possible to bring a continuous flow of clean air through the entire ceiling, pushing it out through the floor. As the air travels in relatively straight lines from ceiling to floor, dust is constantly being drawn downward and out of the room. There are no eddies or dead air spots where dust can collect.

The air flows through the room at one mile an hour, creating a slight breeze that carries lint from workers' clothing and other contamination out of the room and into a filter below the grated floor. Air pressure in the room is deliberately kept slightly higher than it is outside, preventing dirt from being blown in when the door is opened. In some cases, a grated wall is used as an air intake instead of the ceiling, while the opposite wall replaces the floor as an exit duct.

"The conventional clean room was like washing in a tub of water," Whitfield said. "After a while, you're washing in dirty water. The laminar air flow clean room is like washing in a stream of clean water. Since the dirt is always being carried away, you're always washing in clean water."

Whitfield lost no time making the benefits of his clean room available to whomever could use them. He worked without charge to help set up clean rooms for NASA, Zenith, Motorola, Western Electric, RCA, Bell Laboratories, an Texas Instruments. He ha also assisted in establishing clean rooms for a large number of hospitals, which use his invention in operating rooms and in treatment rooms for vulnerable patients, such as burn victims or those suffering from leukemia.

While the patent for his clean room is in Whitfield's name, licensing rights are assigned to the government. By the mid-1970's, more than 50 U.S. companies were manufacturing laminar flow equipment and marketing it throughout the world. Western Electric uses its laminar airflow facilities to assemble pushbutton phones, while RCA workers use theirs to assemble color television picture tubes NASA uses laminar airflow equipment when assembling space vehicles, and drug firms utilize the equipment to ensure the purity of their pharmaceuticals.

While Whitfield's clean room is one of the most outstanding examples of the transfer of technology to the private sector, it typifies the efforts of all Department of Energy laboratories to make the benefits of their research available to all.

HOTLINE
PRINCETON PLASMA PHYSICS LABORATORY
Vol. 7, No. 6 January 27, 1986

PPL NOTIFIED OF GRAMM-RUDMAN-HOLLINGS FUNDING REDUCTION IN FY 86

The U.S. Department of Energy has notified PPL that the Laboratory's FY86 budget will be reduced by $3.8 million dollars (about 4%) effective March 1. The cut is a result of the Balanced Budget and Emergency Reduction Law of 1985, better known as the Gramm-Rudman-Hollings Act, passed by Congress and signed by President Reagan in December. PPL managers must now determine how the reduction will be applied to the laboratory's FY86 program, already underway. Budget revisions for specific PPL programs and activities will be completed and announced within the next several weeks.

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This article will discuss the Gramm-Rudman-Hollings Act, focusing on the FY86 and FY87 appropriations for fusion energy. The new law has been called the most significant single change in the Federal budget process, since the beginning of the Republic, certainly since the Budget and Accounting Act of 1920. As with any change of such magnitude, there are more questions than answers, both in Congress and the Executive Branch, as to exactly how the law will work in practice and its impact on any specific area of Federal spending.

Gramm-Rudman-Hollings requires that the Federal budget deficit be completely eliminated by 1991. The law provides a specific ceiling on the deficit for each of the intervening years, given below:

FY 1986	$180 Billion
FY 1987	$144 Billion
FY 1988	$108 Billion
FY 1989	$72 Billion
FY 1990	$36 Billion
FY 1991	$0

The President is required to order an automatic spending cut if, after legislative and executive action in the appropriation process in each year, the projected deficit still exceeds the limit by more than $10 billion. Under the Act, these targets can be waived only in the event that war has been declared or Congress and the President declare in a Joint Resolution that the U.S. economy is in recession.

In FY86, the automatic cut is limited to a maximum of $11.7 billion, regardless of the projected deficit for this year. The law requires that half of the $11.7 billion be taken from funding for defense programs and half from the funding for non-defense programs. A number of entitlement programs such as Social Security and certain benefit programs for low-income families (for example, food stamps program) are exempt.

Under the law's procedures for FY86, the Office of Management and Budget (OMB) and the Congressional Budget Office (CBO) reported FY86 deficit projections to the General Accounting Office (GAO) on January 15. Based on these, President Reagan ordered agencies to take the full $11.7 billion reduction, 4.9% for defense and 4.3% for non-military programs, by March 1 1986. For non-military spending, the law calls for uniform cuts in every "program, project and activity." The FY86 cuts are automatic and can take place without further action by the Congress.

The FY87 federal budget will be the first formulated and enacted under the Gramm-Rudman-Hollings bill. The first information on the FY87 magnetic fusion budget will

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be contained in the President's budget message to be issued on February 5, 1986. Both the Senate and the House would pass budget resolutions during their spring sessions and complete Conference Committee actions on appropriations according to an accelerated schedule before the July 4 recess begins. Thus, the amount actually appropriated to support the National magnetic fusion energy program in FY87 will not be known until mid-summer. Any subsequent automatic budget cuts in this amount under Gramm-Rudman-Hollings can be avoided in FY87 if the President and Congress agree to Government-wide appropriations which keep the Federal deficit within the specified limit of $144 billion.

The special automatic features of the Gramm-Rudman-Hollings law for FY87 (and each of the following four years) begin in August when OMB and CBO report their revised FY87 deficit projections to GAO, based on Congress's appropriations actions and on economic conditions as of August 15 1986. If, for example, the projected FY87 deficit exceeds the ceiling of $144 billion by more than $10 billion, President Reagan will be required to issue an initial spending reduction order on September 1 to reach the ceiling. The cut must bring the deficit below the $144-billion FY87 limit.

During October, the first month of FY87, OMB and CBO present revised deficit projections to GAO, which reflect the President's orders and any legislation enacted since their report in August. Based on this report and upon instructions about any additional reductions which may be required, the President must issue a final FY87 spending order by October 15. The additional automatic cuts, if they are necessary, are then applied.

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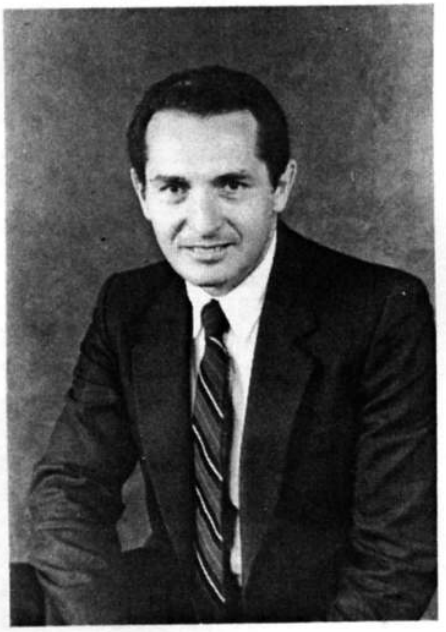
Twelve members of Congress are challenging the constitutionality of the Gramm-Rudman-Hollings Law. The plaintiffs argue that the law violates the principle of separation of powers by delegating legislative functions to non-elected officials who are not responsible to the voters. A final court decision is not expected until summer, long after the $11.7 billion FY86 cut takes effect. However, even if this part of the law is stricken down in court, automatic features of the Law may continue with the instructions conveyed through Joint Resolutions of the Congress which have been signed by the President.



Allan R. Guyet

Safety Director Named

Former Essex County Sherrif's Department deputy chief Allan R. Guyet has been named managing director of public safety at Princeton University's Forrestal Campus. Guyet, who assumed his new duties January 20, succeeds Jim Kopliner in the position. Kopliner retired last year.

"Mr. Guyet will direct and supervise all elements of the Department of Public Safety on the James Forrestal Campus," said Princeton Director of Public Safety J.L. Witsil, "which includes a staff of 50 full-time and over 30 volunteer personnel. They provide law enforcement, emergency medical response, and fire fighting services."

Guyet, 46, has been director of safety and security and chief of police at Brookdale Community College in Lincroft for two and a half years. During his 13 year stint with the Essex County Sherrif's Department, he served as the commanding officer of the special investigations unit, of the bureaus of narcotics and criminal identification, and of the department's administrative division. He is also a former member of the Newark and Dover Township police forces.

Guyet has served as an adjunct faculty member at both Monmouth College and Brook-

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dale Community College over the past 14 years. He taught courses on criminal justice, has lectured on the laws of arrest and search and seizure at the Monmouth and Essex County Police Academies, and was consultant/lecturer for the N.J. Corrections Officers Training Academy in Trenton.

Guyet earned his associate's degree in police science from the John Jay College of Criminal Justice in New York. He received a B.A. magna cum laude in criminal justice from the same college in 1974, earning his M.A. in criminal justice there in 1978. A Marine veteran, he graduated from the F.B.I. National Academy in 1977 and served as New Jersey treasurer of the F.B.I. National Academy Associates last year. He belongs to both the American Society for Industrial Security, and the International Association of Campus Law Enforcement Administrators.

Guyet and his wife Carol are the parents of four children.

EVES Operation Begins

Beginning February 5, the laboratory's new Emergency Voice Evacuation System (EVES) will be tested each Wednesday at noon. The test of the new system will occur in addition to the regular weekly test of the fire alarm.

The EVES system, which has been installed throughout C- and D-Sites, links specific emergency tones with a public address announcement to notify employees of emergency situations. The steady, siren tone will be followed by an announcement of emergency alert information, such as an early snow closing, or an accident creating traffic tie-ups. The alternating tone (the repeating "whoop") precedes the announcement of a laboratory evacuation or other critical emergency information. In cases where environmental noise might obscure the tones (the C-Site MG Room, for example), emergency announcements will follow alert strobe lights.

Area Safety Coordinators (ASCs) will be monitoring the EVES system to ensure audibility and clarity of test messages. Any ASC who discovers an operating problem with the system should notify the C-Site Public Safety Desk at ext. 2536 and report the problem to the officer on duty.

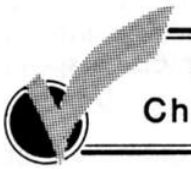
Trivia Winner

Barbara Sobel won the first session of the Word Processing trivia game. She received her first place prize of a new coffee mug earlier this month.

The game, patterned after Trivial Pursuit, requires players to fill a pie-shaped game card with six colored "slices" by answering trivia. It was devised by Marilyn Hondorp, Head of NBI Network Operations, as a way of ensuring that operators read the "daily news" on the NBI system. The news alerts operators to alterations in the system, or to upcoming maintenance shutdowns.

In addition to system information, the "daily news" has contained a daily trivia question since July. Operators send their answers to the Word Processing Center on C-Site, where a record of their correct answers is kept. At the end of each month, the correct answers are totalled, and the top three operators receive a "slice" of the "pie".

Second place in the first session of the game was shared by Sandy Phillips and Kathy Dunn. Third place finishers included Don Bumgardner, Steve Duritt, and Dinah Larsen.



Security Checkpoints

The Public Safety Department has a responsibility to all Plasma Physics employees with regard to security and traffic safety. But laboratory employees also are responsible for observing the rules and regulations pertaining to security and traffic safety.

Traffic signs were recently installed along Stellarator Road to remind personnel of several very important security and traffic related points:

- All visitors must be registered at the C-Site security booth. If you are traveling on campus in your personal or government vehicle, please be sure to obtain a visitor pass for your passengers.
- Employees with visitors entering the C-Site area by shuttle should make arrangements to stop at the security booth for the required visitor pass.

The Public Safety Department will be conducting sporadic checks of vehicles and shuttles entering the campus to determine whether visitor badges are required for travelling passengers. Anyone ob-

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served without the required identification will be required to obtain a badge/pass immediately.

Traffic Safety -- Motorists are again reminded to observe posted driving speeds on the campus, particularly around the bend towards the C-Site guard booth. The sharp bend in the roadway creates a hazard in itself, which is intensified when a vehicle is speeding through it.

Public Safety will be conducting speed checks on a sporadic basis. Violators will be dealt with accordingly. Please obey the traffic speeds and avoid unnecessary inconveniences later on.

TFTR Shirts

Shirts featuring a new multicolor TFTR logo designed by Don Weissenburger and Matt Edgar will be available in a variety of styles in February.

The logo is a variation of a design created by both men in 1982, which incorporated a sunburst being powered by four neutral-beam-breathing dragons. The new design features two dragons injecting deuterium particles into the sunburst. The particles are fused in the center of the sunburst, with both the year deuterium-deuterium fusion should be achieved and the possible products of that reaction also depicted.

The new shirts will be available in both sweatshirt and teeshirt versions in sizes ranging from childrens' to double extra large. Samples of the shirts will be displayed at local distribution points throughout the laboratory, where shirts can be ordered and finished shirts picked up. Local distributors include Mary Lou Lauricella in the 1-K Building on A-Site, and Anne Golden and Marilee Thompson in LOB on C-Site.

The prices for the new shirts vary with the type and style of shirt chosen. The price covers the cost of producing the shirts; any profits realized from the sale will be donated to charity.

Further information about the shirts will be posted on bulletin boards throughout the laboratory in February.

The primary causes of winter driving accidents are controlled by the motorist, not Mother Nature. Making minor changes in your driving style can help you avoid these common mistakes and travel safely in snowy weather:

- Driving too fast for conditions: When the road is slippery, you can't stop as quickly or as safely as you can on a dry road surface. Reduce your speed when the roads turn treacherous.
- Abrupt turns, lane changes, or sudden speed changes: Any one of these can cause bad skids on ice and snow. Anticipate turns or speed changes, and make them slowly and gradually. Use smaller steering corrections more often.
- Limited visibility: A driver who scrapes only a small peephole in his ice-covered windshield is asking for an accident. Completely clear your windshield completely of ice and snow, and scrape your outside mirrors clean. Be sure your defroster is in good shape.
- Poor traction: Losing your grip on the road has caused many a crackup. Traction improves markedly with tire chains. Chains will also allow you to to stop in a much shorter distance on ice and loosely packed snow. If you do not use chains, be sure your snow tires are in good condition. Then get them out of the garage, and onto your car!

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

George Fleming of CICADA and his wife, Mary Ann, whose daughter, Kelly Lea, was born December 31.

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

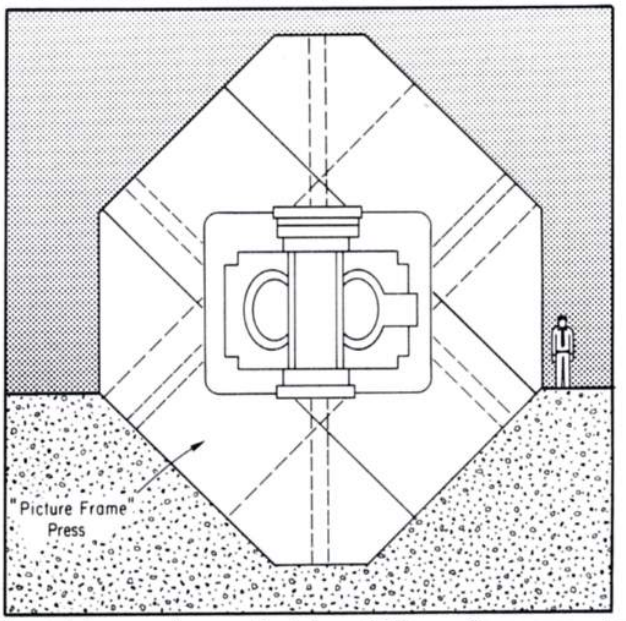
HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 7 April 14, 1986

PPL LEADS CIT PROPOSAL EFFORT

PPL has been asked by the US DOE Office of Fusion Energy (OFE) to lead a National Design Team in the development of a proposal for the construction of a Compact Ignition Tokamak (CIT), the next machine beyond TFTR. A Conceptual Design Report and an R&D plan will be formally submitted to DOE on May 23.



Elevation view of the CIT reference design showing the "picture-frame" press

A consensus has emerged within the national fusion community regarding the physics goals and general design characteristics for the CIT. While TFTR's primary mission is the attainment of scientific breakeven, where the fusion power produced in the plasma equals the auxiliary heating power required to maintain the plasma temperature at 100 million °C, CIT will go a step further. It will be capable of producing a "burning" or ignited plasma, where enough fusion power is produced to sustain the plasma temperature at 100 million °C, without the aid of auxiliary heating. While scientific breakeven occurs at Q = 1 (where Q is the ratio of fusion power output to auxiliary heating power input), ignition occurs when Q = ∞, i.e., net fusion power is produced with no auxiliary power input.

In D-T reactions, 20% of the fusion energy produced is in the form of alpha particle kinetic energy. Since they are charged, the alphas remain trapped in the magnetic field and through collisions transfer their energy to the plasma, heating it. At ignition, alpha particle heating is sufficient to sustain the 100 million °C plasma temperature without auxiliary heating. CIT will provide physicists with an opportunity to study alpha particle heating in a burning plasma, and enable them to study plasma confinement properties in the range required for fusion power plants.

An ignited plasma is analogous to a conventional fire. Initially, some energy must be input to the fuel to start the fire. However, once ignition occurs, the fire is self-sustaining as long as fuel is available. The initial energy input to a CIT plasma "fire" will come from ohmic heating, indigenous to a tokamak, and to a much larger extent from auxiliary heating in the form of radio frequency waves.

If funded according to the proposed schedule, CIT would begin operation in late 1992. It will be capable of a 3-4 second plasma burn, a sufficient duration for essential plasma physics experiments, while keeping construction costs to an upper limit of $300 million. CIT will serve as a cost-effective intermediate step between TFTR and

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the operation of an Engineering Test Reactor (ETR), about 10 years later. ETR would take advantage of physics knowledge gained on CIT coupled with advanced engineering and materials development, allowing sustained ignition and a demonstration of the actual conversion of fusion energy to heat and then to electricity.

Design and Construction

The CIT proposal will call for design and construction in the 1988-92 time frame. A site for CIT will be selected before detailed design begins. Location at PPL would minimize cost due to savings from the use of existing TFTR support facilities. Parsons, Brinckershoff, Quade, and Douglas have been retained by US DOE as architect-engineer to perform a facilities study in support of the CIT conceptual design. Currently, a cylindrical test cell configuration is preferred with a rotatable shield ceiling, above which a polar crane would operate through a radial access slot.

At a January meeting of the Ignition Technical Oversight Committee (ITOC), chaired by PPL Director Harold Furth, agreement was reached as to basic design guidelines intended to channel the near-term activities of the CIT National Design Team toward the preparation of an effective proposal.

The compactness of CIT, with a major radius of about R = 1.22 meters compared to 2.45 meters for TFTR, results in the need for a high magnetic field to achieve the plasma confinement quality required for ignition. The magnetic field strength in CIT will be of the order of 10 tesla, twice that of TFTR. Since magnetic pressure increases as the square of the field strength, the CIT coil and machine structure must be designed to withstand pressures up to a factor of four greater than those experienced on TFTR. One of the most interesting CIT design characteristics is the proposed use of an innovative "picture-frame" press to counteract toroidal field (TF) coil vertical separating forces. When energized, each of CIT's D-shaped TF coils will experience a vertical force which tends to push it apart at the top and bottom of the "D". To counteract these forces, the entire CIT machine will be fitted within the large central cut-out of a "picture frame" press, comprised of two giant, parallel, welded steel plates (see sketch). Arrays of hydraulic cylinders above the tokamak will press CIT inside the frame. As the TF coils are energized, the hydraulic cylinders are programmed to react and apply forces of up to 50 million pounds (equivalent to the displacement of a large battle ship) to counteract the vertical separating forces within the TF coils. Although it appears to be rather large, the frame press actually allows better machine access compared to other design approaches.

Engineering studies have led to the conclusion that CIT's PF coils should be placed outside the bore of the TF coils, as in TFTR. Toroidal field (TF) conductors are to be made of bonded copper-Inconel sandwiches, cooled by liquid nitrogen. TF centering forces will be taken up entirely by wedging action between adjacent TF coils. CIT will not have a center column to serve as a secondary support against centering forces. Thus, the CIT conceptual design will proceed with self-supporting TF and OH coil systems having the simplest structural features of all the options considered.

CIT Physics

CIT will be designed to produce both limiter and divertor plasmas with OH currents up to 10 MA. The machine will accommodate 20 MW of auxiliary heating, most likely ion cyclotron radio frequency heating (ICRF). Several key physics questions need to be addressed before machine operation, such as how well ICRF works in high pressure, diverted plasmas. CIT program participants have called for an expansion of the US RF heating program in the near-term to provide an enlarged data base in preparation for the new machine. U.S. participation in RF heating work on foreign tokamaks such as JET and JT-60 has also been recommended.

The Lawson factor, or confinement quality $n\tau$, required for ignition is 2×10^{20} m^{-3} sec, a factor of five greater than that needed for scientific breakeven. CIT will be designed to attain in densities, $n \geq 6 \times 10^{20}$ m^{-3} in combination with global energy confinement times, $\tau \geq 0.4$ second at temperatures exceeding 100 million °C, thereby reaching ignition.

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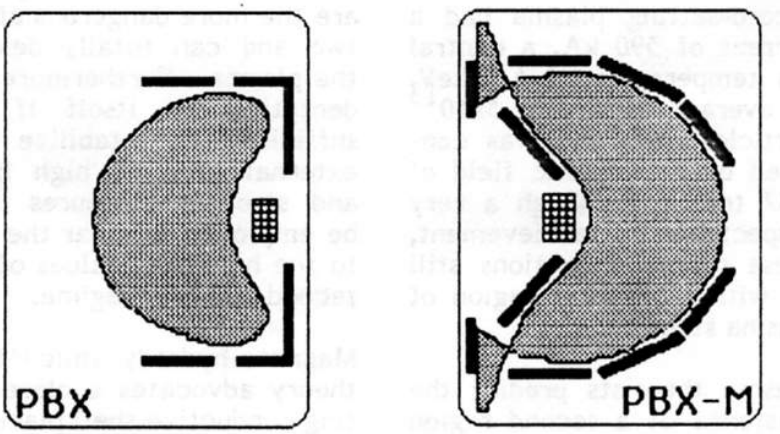
CIT Project Team

In addition to PPL participants, members of the CIT National Design Team are being drawn from MIT, the Fusion Engineering Design Center, Oak Ridge National Laboratory, GA Technologies, Inc., Idaho National Engineering Laboratory, and Lawrence Livermore National Laboratory. PPL's John Schmidt is Project Manager and Bruce Montgomery of MIT is Deputy Project Manager.



"Old" and "new" PBX plasma configurations

MODIFICATION OF PBX APPROVED

The $10 million improvement of PBX has been formally approved by the USDOE Office of Fusion Energy. The modified device, which will be called PBX-M (for "Princeton Beta Experiment-Modification"), will be completed in April 1987, and is expected to reach beta values well beyond those attained in PBX, already a record high for a large tokamak.

Although PBX will not be completely torn apart as envisioned in the most ambitious of the plans developed a year ago, the hardware inside the vacuum vessel will barely be recognizable when the modifications are complete. Not only will the existing magnetic field coils inside the vacuum vessel be shifted to new locations, but five new coils will be wound in place. That includes a replacement for the present "pusher" coil, which gives the PBX plasma its indented shape. Furthermore, the system of electrically conducting "passive stabilizer" plates that are essential to the operation of PBX will be greatly extended in PBX-M.

Some four tons of inch-thick, stainless-steel-clad aluminum will hug the plasma with a clearance of only a few inches over most of its surface. A gap of about 16-inches on the outboard side will allow human access to the plasma volume for installation and repair work, and will also provide a way for the neutral beams to fire into the plasma to heat it up.

A less visible but no less important part of the overall project will be six new power supplies to drive the magnetic fields that will accurately maintain the shape and position of the plasma within its enveloping shell. These will be installed in the ESAT building to the east of the C-Site MG area. Finally, the old (and obsolete) IBM 1800 process controller -- which has already served FM-1, ACT, PDX, and PBX -- will be replaced by modern and much more flexible PLC's (Programmable Logic Controllers).

The primary physics goal of the modification is the attainment of beta values in the so-called second region of plasma stability. Beta is the ratio of the plasma pressure to the pressure of the magnetic field that traps the plasma. The plasma pressure is the product of temperature and density, two quantities which directly determine the fusion power output. The higher these values are above the minimum needed for fusion to occur, the more fusion power is produced. A higher beta means that greater plasma pressure, thus more fusion output, is achieved in a given magnetic field; or conversely, that the same output can be achieved in a weaker field.

Since the cost of a reactor is strongly influenced by the strength of the magnetic field that must be provided, beta values are directly related to the economics of fusion power production. Beta is usually expressed as a percentage, with 5% generally believed to be the minimum value required for a economical fusion reactor.

In May of last year, PBX achieved a beta above 5% with a neutral beam heating

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power of 5.5 MW. This record-setting plasma had a current of 590 kA, a central ion temperature of 4.5 keV, an average density of 5×10^{13} particles/cm^3, and was confined by a magnetic field of 0.87 tesla. Although a very respectable achievement, these plasma conditions still lie within the first region of plasma stability.

Plasma theorists predict the existence of a second region of plasma stability provided beta can be made high enough -- typically above 10%. The challenge is to get to this regime experimentally without driving fatal plasma instabilities. Physicists believe that there are two major instabilities to surmount on the way to the second region, historically identified by the type of distortion they produce in the plasma as "kinks" and "ballooning modes." The former generally appear at lower beta than the latter, but since the most dangerous kinks can in principle be stabilized by a conducting wall close by the plasma, attention has focused on bypassing the ballooning modes. As has been noted in earlier HOTLINE editions, the indented plasma of PBX is meant to do just that.

Kink instabilities come in two varieties: "internal" and "external." The internal kink is a helical distortion of the plasma core which may cause a severe loss of energetic particles injected into the plasma from the neutral beams. Theory predicts that indentation is an effective defense against the internal kink, and results of recent PBX experiments support these predictions. External kinks, which give the plasma the appearance of a twisted candy bar, are the more dangerous of the two and can totally destroy the plasma. Furthermore, indentation by itself if not sufficient to stabilize the external kink at high beta, and stronger measures must be employed to clear the way to the high beta values of the second stability regime.

Magneto-hydrodynamic (MHD) theory advocates a close fitting conductive shell placed in the outboard region of the plasma as an effective means of suppressing the external kink mode. Physicists hope to realize this stabilization on PBX-M by encasing the plasma within appropriately placed conducting plates, while still accomodating the logistical limitations posed by the presence of internal field coils, diagnostics, divertor hardware, and neutral beamlines. The plasma-shell separation will be about five centimeters.

While the primary objective of the shell will be to stabilize external kink modes, it should have the further advantage of allowing a more highly indented plasma and thus strengthening the stability against both internal kinks and ballooning modes.

Another important feature of PBX-M is an improved, high recycling divertor configuration. Not only is the new divertor expected to greatly enhance the power and energy handling capacity of PBX, it will also generate a strong H-mode (high confinement mode). During an H-mode, a sharp boundary appears at the plasma edge, indicating that no large scale turbulence takes place and that the improved thermal insulation at the edge can produce higher beta with given heating power.

The combination of the conductive shell and the improved divertor configuration should allow exploration of the second stable region with betas of 10-15%.

First Trilateral Agreement Signed

On January 15, the United States, the European community, and Japan signed a formal agreement calling for an exchange of information and scientists between TFTR, JET, and JT-60 -- the three operating large tokamak devices. The pact, negotiated through the Paris-based International Energy Agency (IEA), established the first joint project involving all three large tokamak facilities.

Through a series of topical workshops, scientists will exchange data and operational experience. Details regarding the exchange of a small number of scientists are to be worked out by an executive committee comprised of representatives of the three devices. The future implementation of a computer data link will also be discussed. The Japan Atomic Energy Research Institute (JAERI), which operates the JT-60, will act as coordinator for information exchanges and program planning.

JAERI Executive Director Dr. Shiregu Mori signed the agreement for Japan. Dr. Alvin W. Trivelpiece, Director of the DOE's Office of Energy Research, signed the pact for

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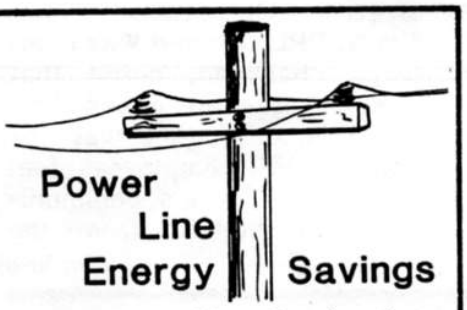
the United States. Professor Paolo Fasella, Director-General for Science, Research, and Development at the European Communities Commission, signed the agreement on behalf of both the European community and the JET joint undertaking. PPL Director Dr. Harold P. Furth represented the TFTR project at the signing ceremony, held at the Max Planck Institute for Plasma Physics in Garching, Germany.

The TFTR was the first of the three tokamak devices to become operational, followed by the European community's JET in June 1983, and Japan's JT-60 in April 1985. During the past five years, the three partners in the agreement have spent about $4 billion in fusion research.



Power Line Energy Savings

The Power Line Carrier System is an energy management system controlling the on/off time of water fountains, water heaters, and hall lights throughout C-Site. Under normal circumstances, the heaters, fountains, and lights are turned on at 7 a.m. and off at 6 p.m. Monday through Friday.

Anyone wishing to alter this schedule, or who temporarily needs to have hall lights turned on longer than scheduled, should call ext. 3092 between 8 a.m. and 4:30 p.m. weekdays or ext. 3101 after hours.

Award Winner

TFTR Project Manager Donald J. Grove has received the United States Department of Energy's Distinguished Associate Award. The honor is given by the Federal agency to recognize outstanding individual efforts or achievements on the part of contractor employees. The recipient receives a citation and a bronze medal upon which his name is inscribed.

Dr. Donald J. Grove

The award was conferred on Dr. Grove for his leadership in the design, development, construction and operation of TFTR, recognizing his contribution to the project's significant scientific results. Dr. Grove previously received a Distinguished Associate Award in 1976 from the US DOE's predecessor agency, the Energy Research and Development Administration, for his work on PLT. He served as PLT Project Manager, responsible for the design, fabrication, installation, and operation of the device.

Dr. Grove, who received his Ph.D in physics from Carnegie-Mellon University, came to PPPL "on loan" from the Westinghouse Electric Corporation in 1954. Working with Dr. Lyman Spitzer, he was one of four scientist-engineers who made the first studies on the practical aspects of power production from magnetic fusion. He also planned, constructed and put into operation the first ultra-high vacuum laboratory for large fusion systems.

As physicist-in-charge of PPL's Model C Stellarator operations in the 1960's, Dr. Grove managed the entire facility and generated more than 50 papers on plasma physics and controlled thermonulcear research. From 1970 to 1972, he managed a crash conversion of the Model C Stellarator to the more advanced Symmetric Tokamak device, managing operations for that project as well.

Dr. Grove received the Westinghouse Electric Corporation Order of Merit in 1976. He joined the Princeton University staff in November 1982, after retiring from Westinghouse.

Lost

LOST -- A small black and white Zenith television with a cream-colored exterior casing. The TV belonged to Carl Pierce. If you have the set, or know where it is, please call Ann McKee at ext. 2198.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who have become proud parents:

Joe Bartolick of the Spectroscopy Group and his wife, Michelle, whose son, Joe Jr., was born January 27;

Jules Nemeth of Maintenance and his wife, Sharon, whose daughter, Hope Christine, was born February 9;

Karen Tuttle of DAS Applications Programming and Al Frank, whose son, Bryan, was born February 14;

Tom Goodwin of the AC Power Section and his wife, Donna, whose daughter, Amanda Lynn, was born February 24;

Wayne Riersen of Engineering Analysis and his wife, Jeannine, whose daughter, Dana, was born March 4;

Jerry Williams of Maintenance and his wife, Cheryl, whose daughter, Brandi Renee, was born March 4;

George Walton of TFTR and his wife, Kathleen, whose daughter, Meghann, was born March 13;

Henry Stevens of TFTR and his wife, Dana, whose daughter, Jessica Michelle, was born March 17;

Dr. Alicia Ehrhardt of Engineering Analysis and her husband, William, whose son, Jeremy Michael, was born March 17.

PPL Wins United Way Award

By more than doubling their contribution rate this year, PPL employees helped the United Way complete another successful fund drive. The United Way showed its thanks by giving the laboratory its first United Way Gold Award, which now hangs in the lobby near the information desk.

The citation on the award plaque commends the PPL staff "for outstanding services to people of our community -- the United Way."

The laboratory's giving rate in this year's United Way fund drive was 32%, with a total of $15,202 contributed. This compared with a 12% giving rate last year. A number of units in the laboratory registered impressive increases above the laboratory average. One of the largest units, the Mechanical Engineering Division under Dave Mullaney and Don Knutson, attained 67% participation. Two smaller units in Administrative Operations -- IRM and Personnel -- had 100% "perfect" participation rates.

Deputy Director for Administrative Operations James Clark, PPL's United Way campaign chairman, noted that the increase in giving "reflects in a tangible way the concern PPL employees feel for people in this community. We benefit from the

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The American Cancer Society has offered to assist PPL in presenting a free course on smoking cessation. If there is sufficient interest, the class will run for four weeks from noon to 1 p.m. in the Sayre Hall auditorium. Class participants would bring a "brown bag" lunch to each class session.

If you are interested in attending such a program, please fill in the attached coupon and return it to the PPL Health and Safety Building, C-Site.

Want to Quit ?

Yes, I want to attend the course and stop smoking.

Name _____

Phone _____

SEND TO:

HEALTH & SAFETY BUILDING, C-Site

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support of the community, and this is a way we can give something back. We are pleased that the United Way has recognized our improvement, and we hope to do even better next year."

PPL recorded another "first" with the United Way when Jack Joyce was appointed a member of the group's Board of Trustees with a three-year term.

United Way

AT WORK

Although senior citizens have certain needs and interests, many do not know where to go or who to contact to meet them.

The Princeton Area Council of Community Services, a member agency of the United Way-Princeton Area Communities, has made finding out who's who and what's what easier for area senior citizens. The Council has produced a free Senior Directory, which lists services available for older people in the Council's and the United Way's service area. Communities covered by the Directory are Cranbury, East Windsor, Griggstown, Hightstown, Kingston, Montgomery Township, Plainsboro, Princeton, Rocky Hill, West Windsor, and adjacent areas of Hopewell, Lawrence, and South Brunswick Township.

Groups and organizations are listed by name, address, telephone number, and the types of senior citizen services each provides. Adult day care centers, clubs, consumer protection, counseling and guidance, education, employment, financial advice and aid, health services, nursing homes, nutrition, support and self-help groups, and transportation are just some of the topics discussed in the directory.

Copies of the directory are available at the Council's office at 25 Valley Road in Princeton. Directories are also available from any of the libraries in the 13 communities listed above.

The Council can be reached at 609-924-5865 or 609-799-6033.

PPL Wins Second DOE Safety Award

For the second consecutive year, the Department of Energy has presented PPL with the Award of Excellence. The award, which recognizes dramatic improvement in a facility's safety record, was given to only one other DOE Chicago Operations Office facility for its 1985 safety performance

In a memo to Associate Director for Administration Richard Rossi, Milton Johnson of DOE's Princeton Area Office (PAO) said the "PAO is proud of this accomplishment, especially since it is the second year in a row that such recognition has been given to PPL. We trust that with continued management support of safety and continued safety awareness by all employees, PPL will maintain its outstanding safety performance in the future."

Caution: Prolonged Sitting May Be Hazardous to Your Health!

You can harm yourself more by sitting in your comfy chair than by falling out of it. Studies show that people who spend a good part of their lives sitting run a greater risk of developing herniated discs, varicose veins, phlebitis, and colon cancer.

Sitting actually puts a lot of strain on the whole body. When you "take a load off your feet," you simply shift the load elsewhere, usually to your back and your legs. Sitting puts 40% more pressure on your spinal discs than standing does, and sitting cross-legged nearly doubles the stress on your spine.

The best advice for people with back problems and varicose veins is to avoid sitting for more than an hour at a time. Get up and get a drink of water, or stand and pace while on the telephone.

One simple, painless exercise is to put your hands in the small of your back and arch backward. Some other exercises to get your back back in shape include:

- Push away from your desk, curl to the floor to touch your toes, then uncurl one vertebra at a time.

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- Press your belly to your spine. The movement becomes a kind of isometric situp you can do while sitting up.

- Drop a pencil to the floor and bend from the waist sideways to pick it up.

- Circle your ankles, wrists, and head periodically. Flexpoint your feet.

- While seated, rest your hands on a desk or the seat of your chair and lift one leg off the floor. Put it down slowly, and lift the other leg in the same way. This exercise will strengthen the muscles of your stomach and lower back.

Antenna Survey

In 1981, two antennas were installed outside the LOB as part of PPL's satellite data link. The antennae were state-of-the-art technological devices which have not only functioned up to expectations, but have also reduced transmission costs for relaying computer information to the West Coast. However, employees have periodically expressed concerns regarding the safety of these antenna dishes, which transmit data via microwaves.

On May 4, 1981, the HOTLINE published information on the first survey of these devices. A follow-up survey on February 3, 1986 obtained identical results, indicating that the microwave levels emitted from the dishes remain very low -- below detection limits in most cases.

At the plane of the dish (see dashed line on diagram), measured microwave power densities were below the detection levels of the measurement instrument (less than 0.05 mW/cm^2). The maximum predicted power density in this near-field region is 0.02 mW/cm^2, with much lower power levels (0.002 mW/cm^2) predicted near the edge of the dishes. Health physicists in the Project and Operational Safety Office are confident that microwave levels in any area accessible to PPL employees are far below the U.S. standard of 5 mW/cm^2 at the operating frequencies of these antennae.

A noteworthy feature of these devices is that they can transmit data up to a satellite (22,300 miles up) at one watt. By comparison, a standard walkie-talkie used by the Public Safety Department operates at approximately 5 watts.

Employees who would like a further explanation of antennae operation from a safety standpoint should call Joe Stencel or Jack Couch of the Project and Operational Safety Office, ext. 2600.

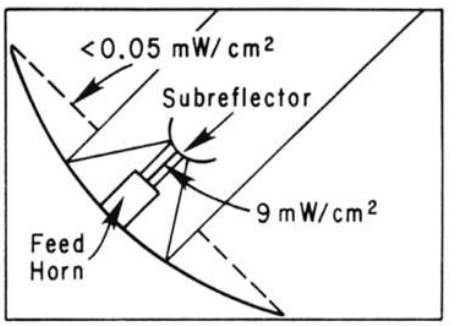

Diagram of microwave power densities measured at the LOB satellite antennas

Bowling League News

The Pony Express team once again proved they can deliver by winning the first half of the 1985/1986 Princeton Mixed League bowling season.

Team members Ken and Nancy Strine, Debra Simmonds, Keith Sapp, and Al Martin won 81 games and lost 45, edging out the Low Rollers (Spence Holcombe, Terry Tempkin, Noreen Cruser, Matt Lawson, and John Luckie) for first place halfway through the 34-week season.

Each of the eight teams in the league is composed of five PPL or University employees. The league competes each Wednesday at Colonial Lanes, Route 1, Lawrenceville. If you're interested in substituting for the league, or in joining a team for next season, contact league secretary Sarah Thomas at ext. 3711.

Great Adventure

You'll find something for everyone in the family when you visit Six Flags Great Adventure this year. And if you use your free Funseeker card, now available in Personnel, you'll also find a little more money in your wallet at the end of your visit.

The Funseeker card will save you four dollars on a combination admission to the theme amusement park and the drive-through safari park now through May 25. After that time, you can save two dollars on a combination admission, or on admission to the theme park or safari only, until the 1986 season ends September 28.

You can get your free Funseeker card from Meg Gilbert in Personnel, Sayre Hall, B-Site.

Science Seminars

Supercomputers, lasers, and recombinant DNA are among the topics enticing over 180 high school students to attend the Science on Saturday seminar program sponsored by PPL. The eight-week program features a lineup of distinguished academic, research, and industrial scientists offering local teenagers, teachers, and parents a look at some of the leading areas of scientific endeavor.

"We have tried to present a wide cross-section of scientific research," said program developer Diane Carroll. "PPL, the University, and area industries provide an enormous pool of scientific talent. The laboratory's goal in this program is to use this resource to stimulate an interest in science among area students, and to provide an opportunity to enrich their science education. Exposure to working scientists is another plus."

"Many of the laboratory staff are eager to offer their talents to enhance science education, and this program provides one such outlet," Deputy Director for Administrative Operations James Clark pointed out. "We feel that programs like this provide an important link between the laboratory and the community."

The seminars meet weekly for two to three hours at PPL. Lecture titles for this session include "An Introduction to Fusion Energy Research;" "Molecular Biology, Gene Cloning, and Playing God;" "Satellites and Space Technology;" "New Drug Development;" "Supercomputers -- Past, Present, and Future;" "Horizons in Laser Technology;" and "Comets and Mass Extinctions." One session covers robotics, light guide engineering, and computer-aided manufacturing, and offers a tour of the AT&T Engineering Research Center in Hopewell.

There are no tests and no fees. The Greater New York Chapter of the American Vacuum Society provides refreshments at each meeting. "The sessions are very informal. I think this helps people to respond to the topic, and ask questions they might not bring up in a more formal setting," Diane said.

"The students have been very enthusiastic about the program," she continued. "You can't get 180 teenagers out on a Saturday morning unless there is a great deal of interest. I know it has been rewarding for laboratory participants, too. We would like very much to do this again next year."

Security Checkpoints

Following a few simple rules can help maintain office security and avoid thefts of personal and laboratory property:

- Lock all doors, windows, desks, or cabinets when you are not in your office. If you don't have keys available, ask your supervisor to obtain them for you. Be sure to keep all keys out of plain sight.
- Record all identifying information (including government property numbers, serial numbers, makes, and model numbers) for all valuable items, and keep the records in a safe place.
- Engrave valuables that have no specific identifying information (such as electric pencil sharpeners, staplers, small desk clocks, etc.). Employees who wish to borrow engravers, or who would like to make an appointment to have their property engraved, should contact the Public Safety Department at the Chemical Sciences Building.
- Keep personal valuables, such as handbags, brief cases, or clothing, secured. Secure all small valuables in locked cabinets or drawers.

Questions concerning theft and crime prevention should be directed to the Public Safety Department at the Chemical Sciences Building, ext. 2894.

Thank You

The HOTLINE received the following thank-you note from former laboratory employee Portia Edwards:

"My utmost respect and sincere thanks go to all who attended my farewell luncheon. Thanks for being there, and thanks for your kind words for future success.

To Pete Haney, for pulling it all together and keeping it a suprise -- thank you, Pete! I also extend my thanks to all who contributed to my gift, as

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well as to those of you who were unable to attend the luncheon, but who encouraged me to move onward and upward. You all will always have a special place in my thoughts.

I have enjoyed my experiences at PPL, and appreciate the opportunity I had to provide support for laboratory projects. Special thanks go to C. Neumeyer, M. Awad, D. Harnsberger, the ECS engineers and technicians, and the members of the TFTR Facilities Operation group. I wish you and the project much success in the future!"

Science Camp

Does your child prefer "Mr. Wizard" to "Miami Vice?" Do you have to make an appointment with her to use your home computer? Is Madame Curie his pin-up of the month?

If you answered yes to any of these questions, then your gifted and talented child is ready for the Science Camp at Trenton State College, to be held July 7 to August 1. Now in its ninth year, the Science Camp is designed to give children the opportunity to explore aspects of science and computer programming which they do not ordinarily get in high school.

The camp is divided into three sections: Division I for current seventh and eighth graders; Division II for current ninth and tenth graders; and Division III for current eleventh graders. Campers in Divisions I and II are challenged by both hands-on experiments and mini-lectures in biology, chemistry, astronomy, technology, and physics. Division III campers are teamed one-on-one with a faculty member to assist with an ongoing research project. All campers participate in a computer lab to help them improve their programming skills. Courses are taught by a highly qualified professional staff, and class size is small.

Dr. Fred Pregger, TSC professor of physics and co-director of the Science Camp, has planned several field trips, including a visit to Longwood Gardens in Pennsylvania. Two overnight, four-day weekends will be held at TSC's Camp Mohican, located near the Delaware Water Gap. The weekends include swimming, canoeing, and geology and ecology hikes.

Children may attend the camp for one two-week session, or for the full four weeks. They have the option of living on the TSC campus in a residence hall under the supervision of an adult counselor, or of commuting daily. Scholarship aid is available.

For more information or for application forms, write to the Division of Continuing Studies, Trenton State College, Hillwood Lakes CN550, Trenton, NJ, 08625-0550. You may also call the college at 609-771-2255.

Tatoo Warning

Many children have been caught up in the sticker craze, collecting and trading multi-colored stickers and paper-backed "tatoos." But unless parents become more cautious, their children might be caught up in something much more serious -- drugs.

According to national police reports, some youngsters have inadvertently been exposed to LSD by handling a form of tatoo called "Blue Star." The tatoos, which are about the size of a pencil eraser, are sold on a white sheet of paper. Each star is impregnated with LSD, which can be absorbed through the skin by handling the tatoos, or by removing a star from the paper backing and placing it in the mouth.

Police have also found stickers that have been treated with LSD. These stickers, which are about the size of a postage stamp, feature Superman, Mickey Mouse, and other Disney characters. They are packed in a red cardboard box, which is wrapped in foil and enclosed in a clear, lock-type plastic bag.

Symptoms of exposure to LSD include hallucinations, mood changes, and severe vomiting. If your children display these symptoms, get them to a hospital immediately. If you or your children find "Blue Star" tatoos or the suspect stickers, DON'T HANDLE THEM; notify your police department instead.

OSHA Violations

The following safety reminders are drawn from a list of common Occupational Safety and Health Administration (OSHA) violations:

- The walls and faces of all excavations in which employees are exposed to danger from moving ground shall be guarded by a shoring system, sloping of the

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ground, or some other equivalent means of protection.

- If employees may be required to enter an excavation, excavated or other material shall be effectively stored and retained at least two feet or more from the edge of the excavation.

- Sides, slopes, and faces of all excavations shall meet accepted engineering requirements by scaling, benching, or other equally effective means. Special attention shall be given to slopes which may be adversely affected by weather or moisture content.

Tour Guides

October, November, and December certainly didn't constitute a holiday season for the PPL tour program. Almost 1,000 visitors viewed our facilities, with 545 tourists arriving in October alone. Our appreciation is offered to the following tour guides, who shepherded our sightseers during the recent holiday season:

OCTOBER

William Blanchard
Nelson Bowen
John Bradish
James Chrzanowski
Ernst deHaas
John Doane
Robert Forester
James French
Charles Gentile
Phil Heitzenroeder
Hans Hendel
John Johnson
Robert Kaita
James Kamperschroer
Dan Kungl
Paul LaMarche
Benoit LeBlanc
George Levitsky
George Martin
Ernest Nieschmidt
William Osborne
Stan Schweitzer
Joseph Stencel
Al von Halle
Irving Zatz

NOVEMBER

Nelson Bowen
Graham Brown
Alfred Cavallo
David Ciotti
Robert Forester
George Gammel
Naren Kokatnur
George Martin
Thomas Meighan
Ernest Nieschmidt
Earle Sheaffer
Wolfgang Stodiek
Al von Halle

DECEMBER

Dale Ashcroft
William Blanchard
Diane Carroll
Fred Dahlgren
Robert Ellis
George Gammel
Dan Huttar
James Kamperschroer
Naren Kokatnur
Paul LaMarche
Dale Meade
Dave O'Neill
Greg Rewoldt
Stan Schweitzer
Fred Wood
Masaaki Yamada

Volunteers: People People

The following volunteer opportunities were submitted to the HOTLINE by the Princeton Area Council of Community Services, a member agency of the United Way-Princeton Area Communities. For further information on any volunteer position, contact each agency directly.

- The Mercer County Unit of the New Jersey Association for Retarded Citizens offers a variety of recreational opportunities to mentally retarded individuals and their families. Volunteers can lend a hand at parties held on the first and third Fridays of each month from 7:30 to 9:30 p.m. Or you may prefer to help out at the Association's coffeehouse, held monthly on the second and fourth Wednesday from 7:30 to 9:30 p.m. Scorekeeping and coaching assistance during Saturday morning bowling sessions would also be appreciated. For further information, call the Unit at 609-393-2483.

- Princeton University's International Center provides service to the more than 700 foreign students and visiting scholars on the Princeton campus. Volunteers willing to host first-year foreign undergraduates, graduate students, and visiting fellows are always welcome, as are tutors in conversational English and hosts for the weekly International Center luncheons. For more information, call the Center at 609-452-5600.

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- If you'd like to "make" history, offer your aid to the Princeton History Project, which collects local history and publishes "The Princeton Recollector" 10 times a year. The project needs volunteers to conduct local research, interview senior citizens, transcribe tapes, type oral history interviews, write articles, address envelopes, and do fundraising. If you're interested, call 609-921-8330.

The next listings were provided by the United Way of Somerset Valley. To learn more about any listing, contact each agency directly.

- The New Jersey Commission for the Blind and Visually Impaired needs volunteers who can record printed material onto audio cassettes, or transcribe printed material into braille. Many of the Commission's clients also need help with errands, correspondence, reading, making and keeping appointments, and using transportation. Call 201-648-3330 to lend a hand.

- The Resource Center for Women and Their Families needs a variety of clerical support, as well as volunteers willing to assist with a telephone hotline, provide transportation, or offer evening child care. To find out more, call 201-685-1122.

- SWIM, Inc. needs volunteers to provide transportation, to assist swimmers in the dressing rooms and while entering and leaving the pool, and to supply or serve refreshments. Call 201-766-6436 or 201-439-2356 to offer your aid

The following volunteer posts were supplied by the Voluntary Action Center of Middlesex County. For more details about any position, contact the VAC at 201-249-8910.

- The Voluntary Action Center of Middlesex County is seeking individuals with fundraising and public relations skills to help with a fundraising project. Volunteers would personally follow up on area restaurants previously contacted for recipes, contributions, and coupons.

- The Rahway Forum is a program of the Rahway State Prison offering various types of assistance to inmates. Counselors are needed, as are tutors in basic skills, resume writing, and job hunting. The Forum also conducts a pen pal program. To get involved, call the VAC.

The next volunteer opportunities were supplied by the Voluntary Action Center (VAC) of Morris County. Additional information on any listing is available by calling the VAC at 201-538-7200.

- Develop a guide to services and programs available in Morris County to assist children and families. The guide will become an invaluable tool for those in this state organization for preventing child abuse. Office, desk, phone, and clerical assistance are available.

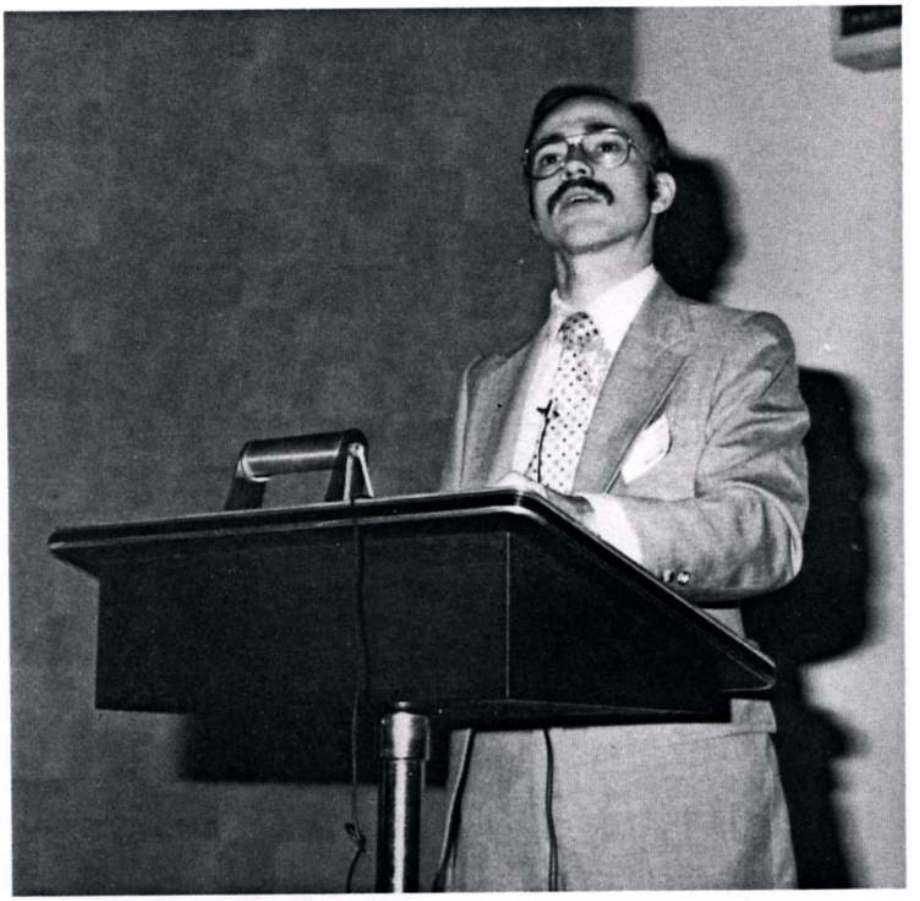
- The nominating committee for a national girl's organization is seeking a finance whiz to handle the accounts, statements, and reports. The organization holds monthly board meetings, and staff assistance is available.

- Got a nose for news? Prepare news releases, write feature articles, arrange distribution to the media, and assist with a newsletter for a new group dedicated to research on the environment of the Morris County area. Work at their office, or from your own home.

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

PPL HOTLINE
PRINCETON PLASMA PHYSICS LABORATORY
Vol. 7, No. 8 May 14, 1986

PPL PREPARING FOR ATTITUDE SURVEY



Dr. William A. Schiemann of the Opinion Research Corporation explained the schedule for the upcoming PPL employee attitude survey to laboratory supervisors April 21. The survey will be taken in late May or early June.

Confidentiality is a crucial component of the employee attitude survey to be conducted at the laboratory this month. To ensure that survey responses will remain confidential, PPL has selected the Opinion Research Corporation (ORC) to conduct the survey.

An outside consultant was chosen to guarantee that survey results will be uninfluenced by previous experience with the laboratory. ORC's objectivity will ensure an honest, balanced profile of PPL and an accurate reflection of employee opinions will be submitted to lab management.

ORC, co-founded in 1938 by George Gallup, conducts a wide variety of market and opinion surveys. Employee attitude surveys are the corporation's forte, however. An extensive data base composed of employee survey results since 1950 enables the firm to accurately track changing employee attitudes over the years.

During the preliminary portion of the survey process, completed last month, ORC staff held in-depth interviews with selected managers and approximately 100 employees in nine "focus groups." Participants in the focus groups were randomly selected to represent various demographic categories within the laboratory. Employees discussed their thoughts about working at PPL, allowing the ORC to learn about the lab and identify topics of concern to employees.

Since that time, the ORC has been designing a customized survey for PPL. Although the survey will cover topics specifically relevant to PPL, it will also include questions relevant to any organization. These questions will assist the ORC in comparing PPL survey

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results to those of similar organizations in its data base.

The survey will contain specific questions designed to provide demographic information, permitting breakdown of results by major organizational groups. Summary results will be issued only for groups of 10 or more so that no individual's response can be identified. A space will be provided on the questionaire to allow employees the opportunity to add any comments or concerns they may have that they feel the survey did not address.

PPL management will review the questionaire prior to its use to ensure clarity of the language and terms used, and to help ensure that all employee groups are represented.

All laboratory employees are encouraged to take part in the survey, conducted by ORC personnel and planned for late May or early June. Completed surveys will be collected by ORC and taken back to their offices, where they remain ORC's property. Information on the questionaires will be entered into the data base, and the questionaires will then be destroyed.

ORC will submit a report of the survey results for laboratory management review, and will assist in the preparation of a summary report for all employees this fall.

Patent Dinner

Approximately 100 PPL inventors and their guests were honored April 22 at the FY85 Recognition Dinner held at Prospect House. The annual dinner, as well as the monetary awards presented earlier this year, are part of the DOE-funded Patent Awareness Program. The purpose of the program, which is overseen by the PPL Committee on Inventions, is to foster the disclosure of inventions, raise the patent-mindedness of the staff, and to provide appropriate recognition to creative inventors.

Inventions committee members include chairman John Johnson, secretary Meg Harmsen, Peter Bonanos, John Lowrance, Schweickard von Goeler, and ex officio member Richard Rossi. Questions about the patent program should be directed to any committee member.

Arlene White, Dorothy Quinn, and Skip Schoen (left to right) of the Purchasing Division display their "Helping Hand" awards.

Award Winners

Skip Schoen, Arlene White, and Dorothy Quinn of the PPL Procurement Division were honored for lending minority businesses a "Helping Hand" by the New York/New Jersey Minority Purchasing Council. The trio received "Helping Hand" award certificates at a dinner held at the Meadowlands Hilton and hosted by the Council.

The Council bestows the "Helping Hand" awards in recognition of outstanding support of the minority business community. Nominations for the award are made by vendors.

In addition to the "Helping Hand" awards, PPL received the Small/Disadvantaged Business Award from the Chicago Operations Office of the Department of Energy. The award cites the outstanding performance of the entire Purchasing Division, commending its "exceptional program support" for fiscal year 1985.

Working with small or disadvantaged vendors isn't anything new to the Procurement Division. As a DOE-funded

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contractor, PPL has participated in the Socioeconomic Preference Program for small or disadvantaged businesses since 1981. The program encompasses active recruitment of small and disadvantaged businesses as sources of materials and services required by the laboratory. A percentage-of-procurement-dollar goal for use of such vendors is set annually. PPL has exceeded that goal for the last two years.

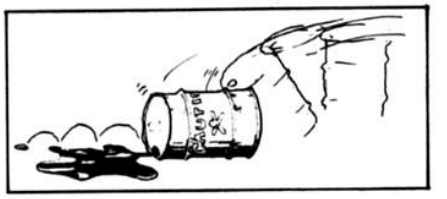
According to Public Law 95-527, small or disadvantaged businesses are typically companies run by blacks, Hispanics, or other disadvantaged groups that have traditionally had difficulty obtaining business capital. In most cases, such difficulties handicap these firms when competing for clients in the open market.

Procurement Division Head Roger Gould emphasized that the laboratory doesn't run "a giveaway program" for these vendors. "They have to be competitive," he said. "We ran an open house for small and disadvantaged vendors. Our technical representatives familiarized them with our operation and our procurement standards. From that meeting alone, we added 125 suppliers to our vendor list."

Exchanging small and disadvantaged vendor lists with other laboratories doing comparable work developed more sources. In addition, upcoming major PPL procurements are announced in minority business and trade association publications twice a year.

"We normally try to include small and disadvantaged vendors in our bidding procedure as a matter of course," Gould said. "If their price is fair and reasonable, they have as much chance of getting the procurement as any other business."

Anyone wishing to suggest a small or disadvantaged company be added to the laboratory's vendor list should contact Tom Browning, PPL's Small Business liaison officer, at ext. 2691.



Spill Procedures

The following procedures should be observed in case of spills of chemicals or hazardous materials:

- Get out of the spill area IMMEDIATELY.
- Call the emergency spill team at ext. 3333. Please provide the operator with the location, type, and size of the spill.
- Notify your immediate supervisor and the Area Safety Coordinator.

Invention Update

In 1981, PPL established a Patent Awareness Program designed to recognize creative inventors and to raise the patent-mindedness of laboratory staff. A Committee on Inventions makes cash awards to inventors for their new or novel ideas. Additional monies are awarded if a patent application on the discoveries is filed.

Patent applications filed since December include:

- Interdigital Fast Wave Antenna, by P. Colestock
- Beam-Ion Profile Diagnostic Using Pellets and Neutron Flux Measurements, by W. Heidbrink
- Zero to 360° Phase Detector, by L. Meixler
- Apprentice System for Plasma Physics Theory, by H. Mynick
- MHD Current Drive in a Tokamak by Oscillating Loop Voltage and the Horizontal or Vertical Field, by A. Boozer
- Hydrogen Isotope Separation Utilizing Bulk Getters, by R. Knize and J. Cecchi
- A Novel Modification of Toroidal Plasma Device to Produce Low Energy Neutral Beams, by W. Langer, S. Cohen, D. Manos, and R. Motley
- Neutral Beam Facility, by R. Motley, S. Cohen, W. Langer, and D. Manos
- Gyro-Electron Ghost Images Due to Microchannel Plate Operation in Transverse Magnetic Fields, by A. Roquemore and S. Medley
- Collisional Plasma Phase Conjugator, by J. Federici and D. Mansfield
- Neutral Beam Interlock System on TFTR Using Infrared Pyrometry, by S. Medley, H. Kugel, T. Kozub, J. Lowrance, V. Mastrocola, G. Renda, and K. Young.

For further information about invention disclosures or the patent process, contact Meg Harmsen at ext. 2659.

Electric Line Safety

The Project and Operational Safety Office (P&OS) wants to remind all employees of the potential hazards of outside overhead electric power and telephone lines. If you encounter a fallen overhead wire, follow the following rules:

- **RULE 1 — PRESUME THE WIRE IS BARE AND ENERGIZED.** Some power cables are only jacketed and are not fully insulated for their operating voltage.

- **RULE 2 — STAY AS FAR AWAY AS POSSIBLE FROM ANY FALLEN LINE ANYWHERE ON THE SITE.** Telephone lines seem innocent enough, but they may be in contact with fallen power lines at some point beyond your field of vision -- so go back to Rule 1.

- **RULE 3 — NOTIFY THE ESU OF THE OCCURRENCE ON EXT. 3333.** If at all possible, send someone else to do this -- we need you on the scene for Rules 4 and 5.

- **RULE 4 — WARN APPROACHING VEHICLES OR PERSONNEL.** Once you have positioned yourself a safe distance away from the fallen line, try to keep others away using any convenient warning devices at hand.

- **RULE 5 — KEEP OTHERS AWAY UNTIL SPECIFICALLY TRAINED HELP ARRIVES.** As a precaution, keep others away from any metal objects or fences in the vicinity of the fallen line.

- **RULE 6 — STAY PUT OR JUMP —DON'T STEP OUT!** If you are in a vehicle that has accidentally contacted an energized line, remember Rule 1 and stay in your vehicle. You want to avoid completing the electrical circuit consisting of the wire, your vehicle, you, and the ground. Instead, sound your horn to attract attention. When you are noticed, immediately warn anyone coming to your aid that your vehicle may be energized. DO NOT allow them to touch the vehicle or you: send them for help. If you must get out of the vehicle, open the door and jump out and away from the vehicle. If you merely step out onto the ground, you will have completed the circuit from the line to the ground -- through you.

  Do not attempt to free the wire from the vehicle. Only specifically trained electrical personnel using linemens' gloves and insulated poles can safely perform this work. Some wires retain a "reel curl," and may take off in unpredictable directions when they are cut or otherwise relieved of tension.

If you have any questions about these procedures, call Frank Beane at the Project and Operational Safety Office, ext. 2530.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Larry Lagin of the Computer Division and his wife, Ronna, whose son, Noah Philip, was born March 23;

Sue Hill of Procurement and her husband, Ed of Mechanical Engineering, whose son, Edward, was born April 16;

Sandy Phillips of PM&O and her husband, Don, whose daughter, Melinda, was born May 2;

Diane Carroll of Information Services and her husband, Tom, of the Computer Division, whose son, Peter James, was born May 3.

Correction -- The "Power Line Energy Savings" article in the last issue of HOTLINE listed an incorrect after hours telephone extension. The correct extention is 3103.

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

Security Checkpoints

As most of us know, the Security Department has merged with the Emergency Services Unit to form the Department of Public Safety. A feature article on the merger will be published in an upcoming edition of the HOTLINE.

Al Guyet manages the Department of Public Safety, and Jack Anderson, Associate Director of Public Safety, is specifically responsible for Emergency Services. The former Associate Director for Security, Al Terry, resigned in early April to accept a position with the University of Hartford. His duties are now being performed by Al Guyet.

For assistance in all cases involving immediate or life-threatening emergencies, dial the Forrestal Campus emergency number (ext. 3333). To report security problems, such as a theft or other routine security matter, employees should call the C-Site Public Safety Communications Desk on ext. 2536.

Help with administrative, special security matters, or information concerning automobile decals, ID cards, etc., is available by dialing ext. 2893.

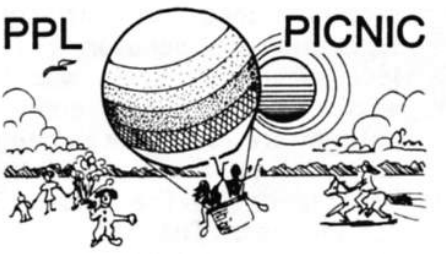
New Location

The Occupational Medicine and Safety Office has moved from the 1-O Building on A-Site into the Health and Safety Building next to the firehouse on C-Site. Telephone extensions for office personnel remain the same.

Garden Plots

Laboratory employees can gratify their green thumbs by signing up for a PPL garden plot. Plots are still available, especially at the B-Site garden patch located adjacent to the air strip.

Prospective gardeners should fill out a garden plot form and send it to Meg Gilbert in Personnel. Forms can be obtained by calling Meg at ext. 2036.



Be sure to mark June 21 on your calendar. That's the day of the annual PPL Picnic, come rain or come shine.

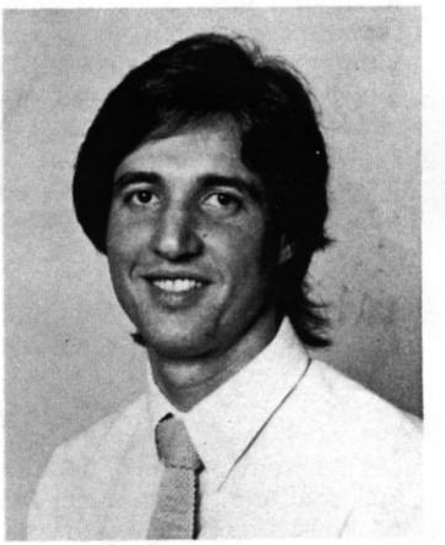
Ticket request forms for the picnic will be distributed soon. For more information, contact Bobbie Cruser at ext. 2101.

Congressional Pace Hectic For PPL Senate Staffer

Viewed from afar, the life of a Congressional staffer might seem to be a glamorous occupation. But PPL's Dr. Ralph Izzo, who spent a year on Capitol Hill for New Jersey Senator Bill Bradley, knows better. Underlying the surface glamor are long hours and lots of hard work.

Ralph's stint in Washington began following his selection as an American Physical Society (APS) Congressional Scientist Fellow for 1985. Fellows are assigned to a senator, congressman, or congressional committee to lend their scientific expertise to public policy issues. He took a one-year leave of absence from PPL to serve his Fellowship appointment to Senator Bradley's staff.

When he began working on the senator's staff, Ralph quickly became acquainted with the massive information glut every senator faces. An estimated 2,000 bills are introduced in the Senate per



Dr. Ralph Izzo

year, along with 300 resolutions and almost 1,500 amendments. Digesting this wealth of information for Senator Bradley is the task of his legislative staff, which consists of four permanent staffers and two full-time positions filled by appointed Fellows.

As a legislative assistant, Ralph spent about half his time tracking legislation and

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supplying ideas for initiating legislation to Senator Bradley. While Congress was in session, he had to be continually aware of what was being discussed on the floor of the Senate, or in the senator's committees. That's why each morning began with a call to the Democratic cloakroom, which monitors everything happening on the Senate floor.

Rather than being "saved by the bell," a unprepared staffer could be sunk by the bell summoning senators to the floor for a vote. From the moment the bell tolls, senators have approximately 15 minutes to decide how they'll vote. In that time, the staff must brief each senator on the topic under discussion, making recommendations and providing supporting arguments. While the briefing was expected to be comprehensive, it was also expected to be brief. "You quickly learn how to summarize!" Ralph emphasized.

The only way to do a competent job, he discovered, required everyone on the staff to work as a team and share the workload. "We needed to be constantly ready, because you don't control the schedule of what's coming up on the floor of the Senate. You're always reacting, so the staffers come to depend on each other. You must know your information sources, and be able to access them and your senator as efficiently as possible. You're forced to know a little about everything, and if you know a little more about a specific area, you quickly become the resident expert -- and a source yourself. It certainly keeps the staff on its toes!" Ralph laughed.

That perpetual readiness makes for a long day for the legislative staff. Ralph was typically at the office from 8 a.m. to 8 p.m., and worked 60 hour weeks during Congressional sessions.

Staffers also compile information for a senator called to testify before a Senate committee, or to question a witness appearing before a committee. Among Bradley's committes are Energy, Finance, Aging, and Intelligence. Ralph's responsibilities included energy, environment, agriculture, transportation, the Strategic Defense Initiative (SDI), science policy, and others.

A daily portion of Ralph's time was devoted to dealing with individuals and groups stopping by Bradley's office, anxious to share their views with the senator. Since many more people want to see the senator than his schedule allows for, the legislative staff meets with the wide range of people who visit the office, passing on their concerns to the senator in capsule form. "The senator only has so many hours available," Ralph explained, "so he relies on his legislative staff to brief him on the concerns of the day."

During his year as a staffer, Ralph found out that "lobbyist is not a bad word." Rather than approaching the senate staff as some constituents do, "expecting to put their feet up on the desk and have a long conversation with the senator," a lobbyist understands that the senator's time is limited. "Lobbyists can be extremely helpful. They will give you not only their side of the story, but often the other side as well. They can be a great help in an emergency, and a very good lobbyist will get called for information by the legislative staff."

Although Ralph found the lifestyle of a Congressional staffer to be "pretty anonymous" rather than glamorous, he felt continually challenged to do his best work. "You have to always remember that you're not reflective of Ralph Izzo, you're reflective of Bill Bradley, so there's a lot at stake. When the screwups are not your own, it makes a difference."

Rather than becoming discouraged about the state of the democratic system of government, Ralph returned from his year on Capitol Hill "charged up and optimistic. I spent a year learning how our political system works, and I found that people can influence how our country is governed. You just have to use the process, and explain why your piece of legislation will be useful to other people. If you have an idea you'd like to get action on, you have to take responsibility for formulating legislation, bringing it to the proper authorities, and working it through the process."

"It's a different emphasis in Washington," Ralph concluded. "It's not as focused as it is here at the lab, but it's just as intense. It was a wonderful place to work."

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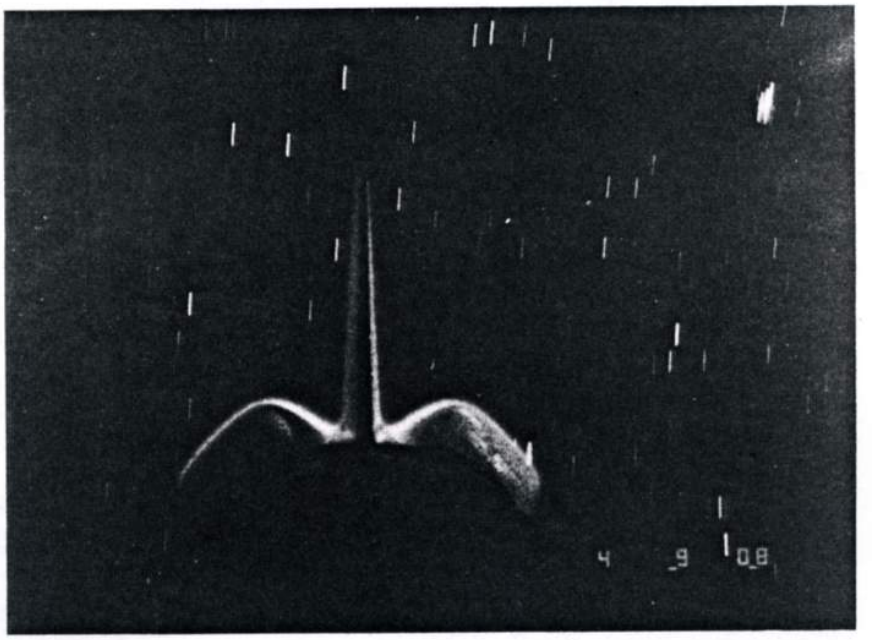
SHUTTLE GLOW EXPERIMENT



The glow visible on the surface of the tail fin and engine pods of the orbiting space shuttle is under investigation by a group of PPL physicists. (Photo courtesy of NASA)

A group of PPL scientists bring outer space into the laboratory daily through their investigation of the phenomenon of spacecraft glow. Discovering why the glow appears may shed new light on which materials are best suited for fabrication of space-bound astronomical telescopes and vehicles.

Spacecraft glow is a luminescence that occurs only on the side of the craft facing the direction of travel while in orbit. It has been observed in the past on other orbiting spacecraft, such as the Atmospheric Explorer Satellite, and was most recently observed and photographed during space shuttle flights.

The goal of the spacecraft glow experiment is to understand what causes the luminescence. One theory contends that the glow may re-

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Survey Schedule

The Employee Attitude Survey is scheduled for Thursday, June 12, and Tuesday, June 17. Opinion Research Corporation (ORC) will conduct four survey sessions on each of the two days to make participation convenient for all PPL employees.

Schedules established for each division will provide at least two sessions for employee participation. Supervisors will be asked to divide their staffs between sessions to avoid overcrowding and for privacy during the survey.

According to ORC, a high employee participation rate in the survey is important to most accurately assess staff attitudes and concerns. In a memo to all PPL employees, Dr. Harold Furth has encouraged members of all laboratory staffs to take part in the survey.

Most people will complete the survey in 30 to 45 minutes. An ORC staff member will conduct each session and will collect and secure all completed survey forms. No information will be released by ORC that will permit identification of any PPL employee.

sult from the excitation of atoms and molecules contained in the earth's thin outer atmosphere (which has a density of 10^9 to 10^{10} cm^{-3}) as they strike the spacecraft's skin. Since the shuttle travels at approximately 8 km/sec, the energy transferred to these particles through collision is 5 to 10 electron volts (eV). That energy may be sufficient to excite atmospheric nitrogen or oxygen, causing them to emit photons and creating the glow.

An alternate theory suggests that the glow stems from chemical reactions between atmospheric particles and the spacecraft's surface. The chemical changes as particles hit and react with the surface, forming new molecules and creating chemiluminescence.

While the glow is harmless to the spacecraft, the light it generates poses problems for astronomical observations made from space. The glow causes a fog-like effect in observations made by orbiting space telescopes, reducing their effectiveness for very sensitive measurements.

In addition to the glow, the impact of oxygen causes erosion of spacecraft surfaces. Understanding the mechanics of material erosion in space would be useful in designing future spacecraft or orbiting space stations. Selection of construction or insulating materials prone to significant erosion during prolonged periods orbiting in space could then be avoided.

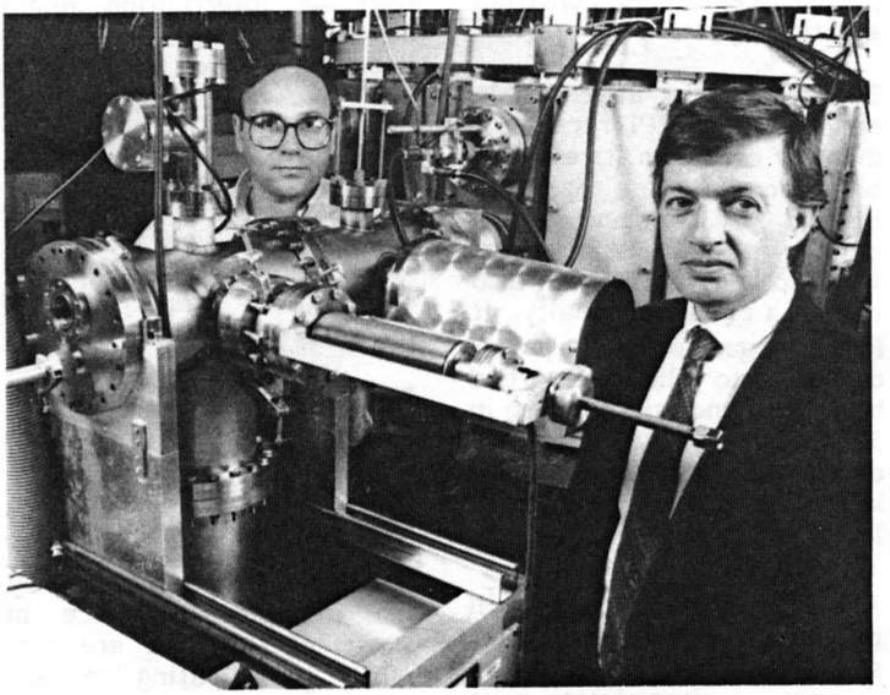
In space, experiments designed to analyze the glow are detailed and costly. Therefore, several groups are attempting to simulate orbital conditions in the laboratory to investigate the phenomena further.

To reproduce the environment orbiting spacecraft encounter, a beam of neutral particles that will strike a surface at 8 km/sec must be created. Investigators estimate that the glow effect requires particles with energies of between 5 and 10 eV and a flux of approximately 10^{14} atoms/cm^2/sec striking an orbiting spacecraft's surface. Several research groups are attempting to produce the neutral particles through traditional methods, such as charge exchange or photodetachment of ions. However, these methods are inefficient for producing large quantities of low energy neutrals. "They're taking old technologies and pushing them to their limit," said Bill Langer, PPL's principal investigator on the spacecraft glow experiment. "We developed a novel technique to produce an intense source of neutrals."

Langer became aware of the research into spacecraft glow in the summer of 1984. By January 1985, he and several colleagues were actively pursuing funding for their new approach to the problem. He credits PPL Deputy Director for Technology J.R. Thompson for being "instrumental in getting NASA to look at our approach to this problem." Through NASA's Space Telescope project, approximately $200,000 of "seed money" was given to PPL for its development of a beam and initial examination of the glow phenomenon. By April 1985, the first funding arrived.

Although the project is separate from PPL's fusion work, Langer regards it as an outgrowth of the laboratory's program. He maintains that this approach to the problem would have been unworkable without either PPL's facilities or the expertise in plasma surface interactions and impurity studies available here.

The PPL proposal involves creating a plasma and allowing some of it to strike a wedge-shaped limiter. The experiment makes use of the Current-Drive Experiment (CDX), which was formerly the ACT-I machine. As ions drift outward from the central plasma, they hit the limiter, which is energized at a



Dennis Manos (left) and Bill Langer (right) stand beside the spacecraft glow experiment. The apparatus is installed in a port on the Current-Drive Experiment (CDX).

specific bias voltage. The plasma particles are neutralized on impact and richochet off the limiter into a drift tube to create a low-energy neutral beam. Solid or gas targets are inserted into the opposite end of the drift tube, and any resulting luminescence is measured with filters and phototubes. The filters will eventually be replaced by spectrometers.

The PPL team working on the spacecraft glow experiment includes Langer, Sam Cohen, Dennis Manos, Bob Motley, Masayuki Ono, Steve Paul, and graduate student Don Roberts. The group completed initial experiments in October of last year after having produced neutral beams of the correct flux and with controllable energies. "Proving we could make the beam was the hard part," Langer said.

In the initial experiments, neutral beams of nitrogen were used to bombard solid and gas targets. With solid targets such as Chemglaze (an optical paint used on spacecraft), a glow too faint to be observed with the naked eye was produced. The glow was most intense on the surface of the solids, growing fainter farther out from the surface. Both of these observations provided ground-based replication of effects similar to those observed in space. There are suggestions that some part of the shuttle glow is caused by beam collisions with gases in front of the vehicle surface. To test these theories, chemiluminescense experiments were conducted with carbon and nitrogen oxide gas targets, each gas was found to emit a different glow under test conditions. Langer said, "While the glow observed in our tests may be produced by a mechanism similar to that responsible for spacecraft glow, the relevant experiments require using oxygen beams. Work on these beams is underway right now."

While most erosion studies are conducted using energies much lower than 1 eV, there remains a whole regime of unexplored erosion and chemiluminescent reactions occurring with 1 to 10 eV beams. PPL investigators are continuing to explore this area with the capability provided by CDX. Preliminary experiments have shown that various gases cause different erosion rates: while nitrogen caused very little erosion of a carbon target in three hours, for example, oxygen almost completely eroded the target in less than two hours.

Langer said, "In our initial experiments, we've demonstrated our ability to develop a good low-energy neutral beam source, and use it to produce chemiluminescence on solid and gas targets.

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We're now conducting more detailed experiments, varying the properties of the beam and targets, and taking higher resolution spectra to identify the molecules producing the chemiluminescence. In this way, we hope to understand the physical and chemical mechanisms causing the glow and erosion. In addition, our results will help in the design of spaceborne telescopes, satellites, and perhaps the future space station."

Interruptible Load

PPL's participation in the Public Service Electric and Gas (PSE&G) Company's interruptible service program will save the laboratory over a million dollars in utility charges.

PPL is among 33 PSE&G customers who contracted for interruptible electric service this year. The contract stipulates that if PPL receives an interruptible load request from the utility, the laboratory will reduce its electrical requirements to a contractually agreed-upon level in half an hour. Power interruptions may occur at any time during the year; however, they are most likely during summer periods of hot, humid weather with heavy air conditioning loads. Power reductions are expected to last a number of hours, probably for the balance of any work day in which they are ordered.

The contract is mutually beneficial, providing PSE&G with the ability to handle heavy power demands without expending capital to construct additional power plants.

By choosing the interruptible service option, PPL receives a monthly credit on its electric bill, amounting to a total savings of just over one million dollars annually. However, interruptible service also carries a potential penalty. If PPL is requested to cut power demands to the pre-agreed base level and fails to do so in 30 minutes, very heavy charges are assessed for every kilowatt used above that base level.

At PPL, load reductions will be met primarily through shutdown of all experimental devices. Procedures have been established with all personnel who will be involved in shutting down the necessary devices and supporting equipment.

For information purposes, employees will be notified of any power reduction through the Emergency Voice Evacuation System (EVES) and the TFTR public address system. This announcement is intended to alert staff involved directly in the shutdown. Other employees can assist reduction efforts by turning off non-work-related electrical equipment, such as lighting in unoccupied areas. However, unless specifically directed by lab management, normal office and support work should not be interrupted by shutting down electrical equipment. Other than the scheduled shutdown of experimental devices, work will not be interrupted to reduce the electrical load.

If you have any questions concerning the possible impact an interruption might have on your work, please call Bob Gulay at ext. 3255.

Personnel Outreach

Since PPL's reduction in force in July of last year, the laboratory has kept a helping hand extended to employees affected by layoffs.

With the assistance offered through the Personnel Division, 95% of those who were laid off in July have succeeded in getting equivalent or better positions with other employers. Those affected by the reduction in force in March of this year are currently participating in laboratory-supported efforts to help them identify new employment opportunities.

Due to funding cutbacks and program redirection, a total of 31 exempt and non-exempt employees were separated from the laboratory in June 1985. Additional funding reductions resulting from the passage of the Gramm-Rudman-Hollings Act necessitated a further involuntary reduction of 29 employees this March.

Along with supplying severance pay and benefit coverage, the laboratory constructed, equipped, and staffed "outplacement centers" to help these employees obtain jobs with other firms. The Personnel Division works closely with Right Associates, a professional outplacement group, to provide assistance in resume preparation, interview training, and other job-search related activities.

Both group workshops and individual counseling sessions

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help separated employees develop their personal reemployment campaign. Although most employees affected last July have found new positions, a followup seminar was conducted in September for individuals who were still unemployed.

PPL Manager of Employment Barry Cohen remains actively involved in providing job search support to individuals directly affected by the reductions in force.

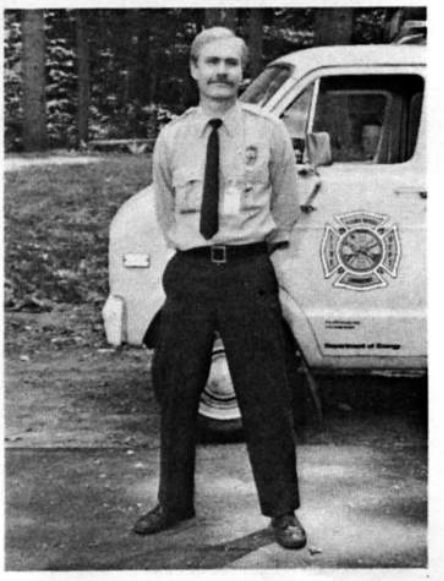
Security Merger

The merger of the Security Department with the Emergency Services Unit (ESU) has not left the laboratory unprotected. The new organization, the Department of Public Safety, continues to keep the laboratory secure -- at a savings of more than $200,000.

The new department was created when the merger took effect last July. The new name better defines the full scope of the department's responsibilities, which include security, fire suppression, rescue, hazardous materials containment, and emergency medical treatment on the Forrestal Campus.

Much of the restructuring was suggested by Associate Head of Public Safety Jack Anderson, who drew on his experience with the Port Authority police. "Back in 1937," he recalled, "the Port Authority started training their people in police procedures, structural firefighting, and first aid. They're now a very diversified unit -- they have Emergency Medical Technicians (EMTs) and paramedics, as well as personnel trained to respond to crashes, rescue, hostage situations, and all the other facets of emergency service."

Tom Maple demonstrates the versatility of Emergency Services Officers, security officers who respond to emergencies as either firefighters or emergency medical technicians.



Anderson pointed out that "I presented a plan for providing similar training for our Security and ESU people several years ago. In the long run, the training is cost-effective; in fact, the escalating costs of police and fire fighting protection was what finally changed people's minds. We were also working with people who have the intelligence and drive to make this merger work. It's a common-sense approach to safeguarding the laboratory, and the dedication of the people involved has made it successful."

The merger resulted in the creation of the Emergency Services Officer (ESO) position. Four Security officers -- Tom Maple, Al Hoagland, Ed Murfit and Wes Foraker -- became Emergency Services Officers. An additional five officers -- Tom Furman, Steve Kidd, Jack Jones, Dick Weisel and George Warshany -- were drawn from the existing ESU program. These 9 ESO's now provide PPL with year-round, round-the-clock coverage for security, emergency services, and fire protection.

The ESO's function as security officers at all times during their shift. If an emergency occurs, however, they respond as either firefighters or emergency medical technicians (EMT's) as needed. To allow the ESO's to "change hats" as neecessary, they receive training in security, first aid, and fire fighting. They hold N.J. State Fire College firefighting certification (or its equivalent), and are taking the state EMT courses. Training is ongoing to ensure compliance with all state and federal standards.

The ESO's are part of a highly skilled team, drawing on the expertise of other PPL volunteers as needed. The laboratory's 30-member volunteer

(continued)

ESU force encompasses captains, driver-operators, firefighters, and EMT's. In emergencies involving hazardous materials or requiring rescue, personnel can be drawn from all four categories.

The merger's benefits extend beyond cost reductions, however. As a result of recent training, Forrestal Public Safety Director Al Guyet has seen a marked increase in morale. "When you're in a position that has some risk and requires a lot of teamwork, morale develops very quickly," Guyet explained. "Firefighting is just such an activity, and I've seen that happening with the Emergency Services Officers."

Opportunities and options for career advancement also accompanied the merger. But perhaps most importantly, Guyet thinks the cross-training has resulted in an increase in mutual respect between emergency services officers and security officers. Anderson agrees, adding that the carryover of respect extends throughout the entire department. "Everyone now knows what everyone else has to do in an emergency, and they've learned to respect each other's specialties."

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

Teri Hamilton

Print Shop Supervisor Becomes Published Poet

Teri Hamilton now has something in common with Robert Frost and Elizabeth Barrett Browning. For Teri, PPL's Duplicating Center supervisor, has become a published poet.

Her poem, "You and I," has been published in the "American Poetry Anthology." The volume, which is intended for use as a school textbook and as a reference for editors and publishers, was edited by John Frost and published by the American Poetry Association of Santa Cruz, California.

Although "You and I" is Teri's first published work, three more poems are awaiting publication. Her poetry will soon be featured in "Inspirational Writings - Volume 2," the "National Poetry Society's Anthology," and "Hearts on Fire - Volume 3."

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Teri began writing poetry seven years ago. She wanted to speak frankly about herself; not being inclined to verbalize her feelings, she turned to writing as an avenue for "literal sharing."

"All communication is sharing," Teri contends, "All people are related through the similarities of our life experiences, and everyone can relate to something about another person. Human beings grow by sharing, and my creative way of sharing is writing poetry." She regards her poems as mirrors, illuminating feelings her readers can identify in their own lives.

Teri clearly recalls the first time she wrote a poem. "I was sitting in the Print Shop, looking at a particularly beautiful poster of a mountain. Suddenly, feelings began stirring up inside me. I remember someone telling me that you should write down your feelings, so I did. When I read them over after I'd finished, I couldn't believe that they made sense, much less that the words flowed together well. I finally showed the poem to someone else, who told me he could understand what I was trying to say. I always knew that I could draw and paint, but that was the first time I knew that I could communicate through poetry. Now writing is something I do all the time, so I keep note paper around to allow me to hold whatever words may surface at whatever time. I find that if I don't write them down immediately, they may not recur in just the same way again."

It might seem that tossing off a few lines is easy compared to writing a novel. But Teri doesn't see it that way. The poem "You and I" went through 25 revisions before she was satisfied with it. "I'm always revising," she confides. "I spend hours doing it. Sometimes when I'm working on a poem, an idea will remind me of a poem I've already written. So I go back and look it over again, and usually wind up reconstructing those words for thought. Each revision helps me create alignment between my experiences and the words of the poem. I try to be absolutely accurate about the feelings, while still allowing the words to flow freely."

You and I

Brother,
I came into this world
and you were there,
You and I
were such a pair.
At the usual times
we would escape
to a place, we hoped
was cause to be late.
Slow down, I'd say
often your shadow,
and over again
you'd just say, follow.
To one another
I had "thought" we belong
but my pretense
that was, has gone.
Left remaining
as it had been
is the love I hold
forever within.

Before "You and I" was finally accepted, Teri had submitted her poems to publishers before and received only rejection slips. Rather than quitting, those criticisms helped keep her creativity high -- and reinforced her persistance.

"I wrote a poem about rejections called 'Empowering Words'," she explained. "Rejection is very energizing for me, because I treat it as a challenge. I think 'oh, you didn't like this one, huh? Well, I'm going to write one that's so good you'll have to accept it!' I've gotten 10 rejections, and they've all made me more determined to keep writing. I also don't take rejection notices personally because I know that the editor simply might not have liked the way the words worked together. After all, he's a professional."

However, Teri admits that face to face critiques of her poems are a different matter. "When I'm face to face with someone who's criticizing my work, I can get pretty touchy! But I keep asking people to read my work, because I have to know how someone else perceives my poems. That's really the only way I can find out if the poem is saying exactly what I want it to say."

Once she discovered poetry, Teri shifted her artistic concentration from painting to poetry. However, she admits to drawing occasionally, "basically to see if I can still do it." She may do some illustrations to accompany "Tears of Illumination," a compilation of 50 of her poems. "The book will cover a transformational period in my life," she explained. "The title is based on the idea that along with the tears shed during the trying times in one's life, valuable insights can show up!"

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Getting a poem published produces a different satisfaction from getting her poems "right." "There is an excitement, a feeling of total inner alignment, when a poem is finished. But getting a poem published -- that's really exciting!"

All There Is

Where are the moats
surrounding castles
in the air
and dragons breathing fire,
the righteous knight
in shining armor
taking a stand
saving everyone?

All there is
is me.

I am the moat
the hell and fire
a righteous knight
in shining armor,
I touch the sky
the castles there
and slay hungry dragons;
No applause.

All there is
is me.

"When I was notified that my poem had been accepted for the "American Poetry Anthology," I expected the book to be out right away. But it actually took nine to 10 months after I was notified before the book was published. When I opened it, and found out that I was on Page 26 of more than 300 pages, I started yelling and screaming -- even though I was the only one home at the time!"

That excitement stems from a writer's validation by a publisher, according to Teri. "You can have confidence in yourself, and the intuition that you're good. But getting published is like the publisher agreeing with your idea of your ability!"

Intramural Softball

Heavy hitters are still in demand for PPL's co-ed intramural softball league. Teams will compete every Wednesday night during the 10-week season, scheduled to begin this week.

The intramural league offers an alternative to the travel involved in industrial league play. Games are held on the ball field adjacent to the Forrestal landing strip.

Four teams of 12 players each are needed to get the season underway. Teams members need not be from the same division or department. Interested individuals can call Frank Wasiowicz at ext. 3568 or Ed Bush at ext. 3309 to be placed on a team.

Employee Safety Reports

Disastrous accidents, such as the Challenger explosion or the Chernobyl nuclear plant fire, graphically focus public attention on safety. Yet safety professionals agree that for every accident that is reported, hundreds of "near-misses" remain undiscovered. The Employee Safety Report (ESR) can prevent these near misses from becoming tragic realities.

Because it comes directly from employees, the information included in an ESR provides candid, detailed information concerning workplace hazards. Workers should use the ESR to describe unsafe conditions or practices that may exist but are not being addressed through normal line organizations. Since safety personnel cannot be everywhere at all times, each ESR plays a vital part in PPL's safety program by collecting and channeling information for safety action followup.

If you have a safety concern that cannot be resolved by your line organization or through your area safety coordinator, fill out a safety report (instructions are printed on the report form). Forms are available in the racks adjacent to the safety bulletin boards throughout the lab. For more information about the ESR, or to get additional forms, contact Peter Del Gandio in the Project and Operational Safety Office (ext. 2806) or Richard Carlese in the Occupational Medicine and Safety Office (ext. 2533).

Get Ready For Barbeques

It's time to get out the grill for the backyard barbeque season. Here are a few safety tips to remember:

- Line the bottom of the clean grill with an inch of

(continued)

ash, gravel, or commercial charcoal base to absorb dripping grease and reduce flare-ups.

- Set the grill on a level surface away from low branches, dry brush, or other combustibles -- including the house or garage.
- Follow package directions when using charcoal lighter fluid. Never substitute gasoline or other combustible liquids.
- Never use the grill indoors. Burning charcoal produces carbon monoxide, an odorless, tasteless, lethal gas. Don't bring the grill in after using it, even if the fire appears to be out. Coals that are dry and cold to the touch can still be smoldering inside, giving off deadly carbon monoxide.

Picnic Ticket Change
ADMIT ONE

Contrary to the information on the flyer distributed to all lab personnel, Dinah Larsen WILL NOT be selling tickets for the PPL Picnic during June. Anyone interested in purchasing tickets for the picnic, which will be held June 26, should contact Bobbie Cruser at ext. 2101.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Kellianne Glasson of the Construction Branch of the Administrative Division, whose daughter, Erin Marie, was born May 2;

Doug Bucknum of TFTR and his wife, Chris, whose daughter, Amanda, was born May 3;

Debbie Shuster of the Computer Division and her husband, Tom, whose son, Eric Thomas, was born May 7;

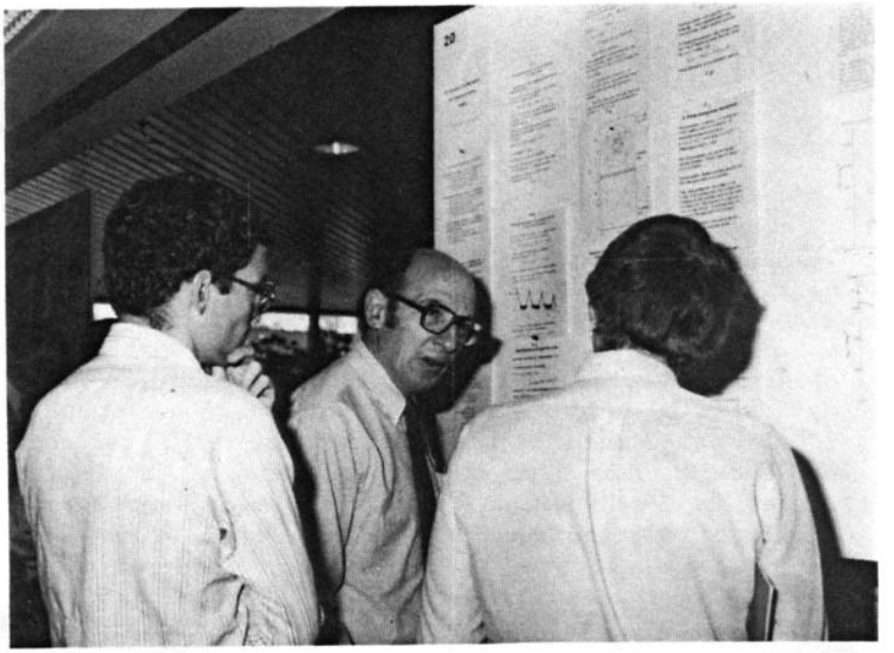
Steven Jurczynski of the Vacuum Section and his wife, Susan, whose daughter, Kristen Lee, was born May 9;

Erik Perry of the Engineering Division and his wife, Isabelle, whose daughter, Rebecca, was born May 19;

Manny Waldman of TFTR and his wife, Janice Marie, whose son, Justin Ross, was born May 19.

The Fusion Energy Division (FED) of the American Nuclear Society (ANS) presented TFTR Project Manager Dr. Donald J. Grove, left, with its "FED Outstanding Achievement Award" during the May 29 information meeting hosted by PPL. The award honors "exemplary individual achievement requiring professional excellence and leadership of high caliber in the areas of fusion science and engineering." The FED Honors and Awards Committee congratulated Dr. Grove on his "long and distinguished record of providing leadership in design, development, construction, and operation of nearly all US magnetic fusion program "flagship" experiments. Your enthusiasm and boundless energy are, and will continue to be, an inspiration to all of us."

Approximately 105 people representing private industry, government, and other fusion research laboratories attended the information meeting hosted by PPL May 29. In conjunction with sessions covering recent research results, 79 posters describing all laboratory experiments to meeting attendees were on display during the one-day event.



Energy Department Research Helps in Early Detection of Huntingtons' Disease

"This land is your land...this land is my land...this land was made for you and me..."

Those are the most famous lyrics of folk singer Woody Guthrie, who wrote more than 1,000 songs before his death from Huntington's Disease in 1967. Guthrie may be the best known victim of this inherited disorder of the central nervous system -- but he was not the only one.

Studies suggest that one in every 10,000 persons may have Huntington's Disease, although a lack of reliable information may mask an even greater incidence. It affects men and women alike, occurs most often in middle life, and is fatal -- usually within five to 15 years of onset. Chances are high that if the defective gene occurs in one child, it will also occur in other children born to those parents.

Researchers at Massachusetts General Hospital recently located where this gene occurs in each human cell. Now research is being conducted in a further effort to combat Huntington's and other incurable genetic diseases passed from one generation to another. Work at Los Alamos National Laboratory in New Mexico and Lawrence Livermore National Laboratory in California brings hope that potential carriers of such diseases may be identified early and advised of the risk to their offspring.

Research efforts at Los Alamos and Livermore pro-

(continued)

vide the basis for isolating and identifying pieces of human genetic material, which may be "specific" for such genetic disorders.

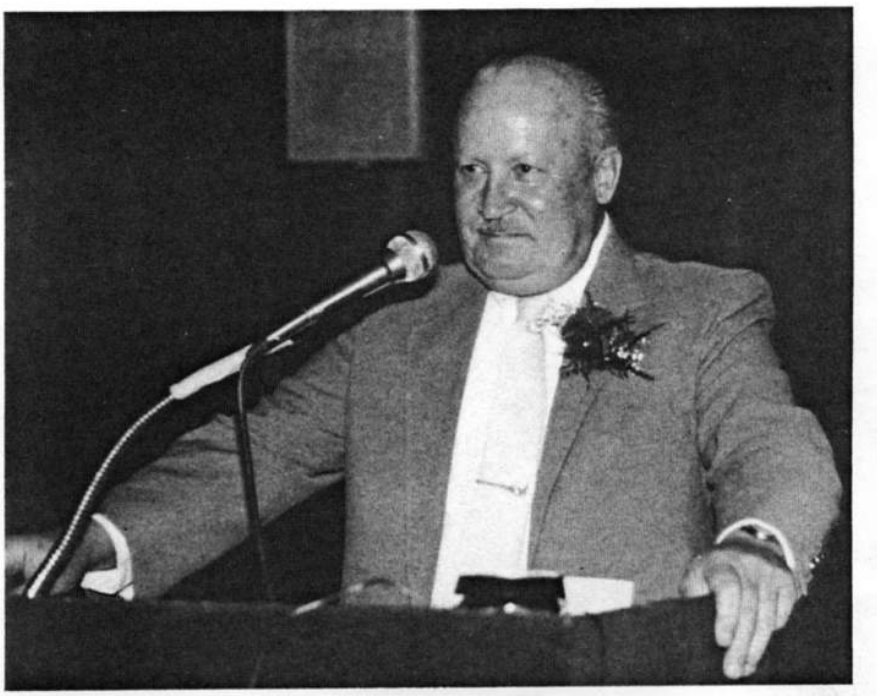
The idea, explains the co-principal investigator Dr. Larry Deaven of Los Alamos, is to build "gene libraries" from each human chromosome. A "library" is actually small pieces of human DNA isolated from a specific chromosome, held in a fluid medium and encased in tiny plastic tubes. The libraries will then be made available to researchers throughout the world who will search through the pieces of DNA and attempt to identify specific pieces which are associated with human genetic disease.

"Many genetic diseases cannot be recognized by looking at chromosomes through a microscope," Dr. Deaven explained. "It is necessary to analyze the genetic material itself -- the material known as DNA."

Once a piece of DNA associated with a disease such as Huntington's Disease is identified, says Dr. Deaven, it becomes possible for doctors to determine whether their patients carry the defective gene by comparing genes from each patient with pieces of DNA obtained from the library. If the defective gene is present, a couple could then be advised that their children would have a high probability of developing the genetic disease. If not, the couple could be freed of worry.

This "gene library" project is another example of how U.S. Energy Department research can benefit us all.

Mary Ann Brown and Ernie Nieschmidt (right rear) hosted the eight PPL Corporate Award winners from the National Energy Foundation's Student Exposition on Energy Resources (SEER) science fair when they visited the lab April 30. The winners received a tour of the laboratory, a TFTR medallion, and lunch.



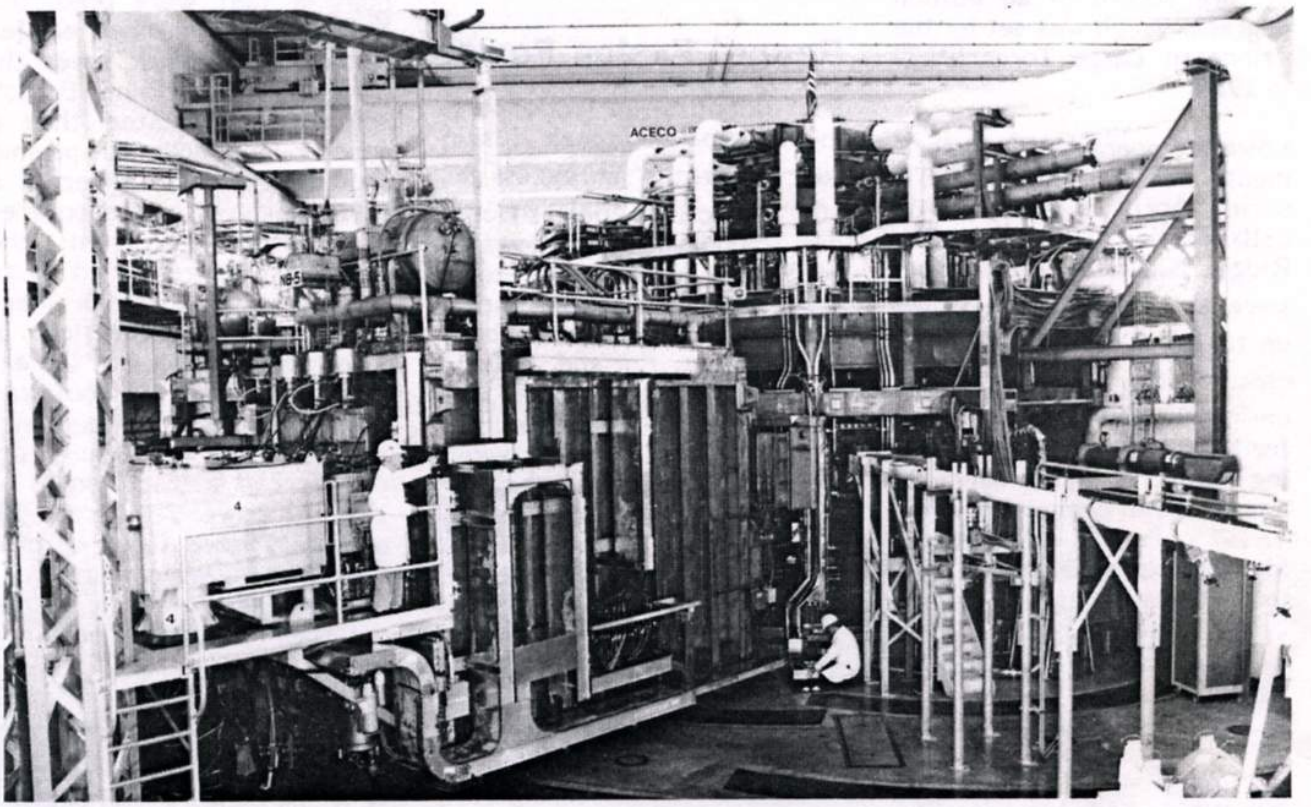
PPL's Superintendent of Maintenance Ray Pressburger accepted the gifts and congratulations of almost 100 of his co-workers during a retirement party held in his honor at Cedar Gardens April 25. Ray retired after 22 years with the laboratory.

HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 10 August 7, 1986

TFTR HITS 200 MILLION °C



Exceeds Original Objectives

During July, PPL physicists succeeded in producing plasma temperatures of 200 million degrees Celsius on TFTR. This is the highest temperature ever produced in a laboratory -- more than ten times the temperature at the center of the sun.

The US DOE made the announcement Thursday, August 7. Secretary of Energy John S. Herrington commented that "This marks a major milestone in progress toward the development of fusion energy. The temperature achieved is in the range required for a fusion reactor. These promising results bring us closer to the goal of fusion energy."

The levels of plasma temperature and heat confinement achieved in TFTR experiments during July exceeded the objectives specified for TFTR when the project was authorized in March 1976. The recent experiments required the use of only about one-half the neutral-beam heating-power (30 million watts) that will ultimately become available.

Progress Towards Break-Even

The objectives of the TFTR project include the demonstration of "scientific break-even," where the power produced by fusion reactions equals the power required to keep the fuel hot. In order to reach break-even, two separate conditions must be met: both the plasma temperature and the quality of heat insulation must exceed threshold values. The quality of heat insulation is measured by the Lawson parameter $n\tau$ -- the product of plasma particle

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density, n per cubic centimeter, and the heat-confinement time, τ in seconds. The 200 million degree temperature level was achieved in TFTR along with a Lawson parameter $n\tau$ equalling 10^{13} cm^{-3} sec -- more than ten times the $n\tau$-value associated with the previous high-temperature record of 80 million degrees, which was set by the Princeton Large Torus (PLT) in 1980.

Lower-temperature experiments carried out in TFTR during April of this year, in collaboration with the Oak Ridge National Laboratory, were able to reach $n\tau$-values up to 1.5×10^{14} cm^{-3} sec -- close to the goal of 3×10^{14} cm^{-3} sec that will be desired for a practical power-producing reactor. Performance of a break-even demonstration in TFTR calls for the present high-temperature plasma regime to be extended to $n\tau$-values of 2-3 times 10^{13} cm^{-3} sec, which is believed to be a realistic near-term goal. Plans now call for an initial demonstration of the feasibility of break-even during 1987 using plasmas of deuterium ions. Preparations are underway to introduce tritium into TFTR and carry out a fully realistic break-even demonstration in 1989.

Record Fusion Power

Last month's TFTR experiments produced peak fusion reaction rates in excess of 10^{16} reactions per second, corresponding to 10 kilowatts of fusion power. The total fusion energy released during a half-second pulse was about 3 kilojoules. For the existing TFTR plasma parameters, introduction of a deuterium-tritium fuel mixture would produce a fusion yield in excess of one-million joules, satisfying the minimum TFTR project objective specified in 1976: "production of one to ten megajoules of thermonuclear energy (per pulse) in a deuterium-tritium tokamak."

"Bootstrap" Current

The combination of ultra-high temperature and high plasma pressure that characterizes the new TFTR regime has permitted experimental study of some important new phenomena that were predicted theoretically during earlier phases of tokamak research. In 1971, Soviet and British scientists calculated that a reactor-level tokamak plasma should be able to generate a sufficiently strong spontaneous electrical current, the "bootstrap current", so as to maintain the tokamak magnetic-field configuration in steady state. Proof of the existence of such a bootstrap current would be of major significance in enhancing the commercial attractiveness of tokamak power reactors. PPL scientists have reported preliminary measurements supporting the existence of the predicted bootstrap phenomenon.

Edward A. Frieman Heading SIO

Former PPL Deputy Director Edward A. Frieman has been selected as the new director of the Scripps Institution of Oceanography (SIO), located in La Jolla, California. The appointment took effect July 1.

SIO is the oceanographic graduate school and research center for the University of California-San Diego (UC-SD). It is recognized as one of the world's foremost centers for providing marine science graduate training in research and public service.

Frieman was hired as a PPL research associate in January 1952. He was promoted to

head of the Theory Division in 1953, and concurrently served as a professor of astrophysical sciences at Princeton University. He was appointed Associate Director in 1964, and Deputy Director in 1978.

Frieman left PPL in 1979 to take over as Director of the Office of Energy Research for the Department of Energy in Washington, D.C.

Frieman joined Science Applications International Corporation, a high-tech research and development firm, as vice president in 1981. During the same year, he served as adjunct professor of physics at UC-SD. He held both positions through June of this year.

Coil Shop Firsts

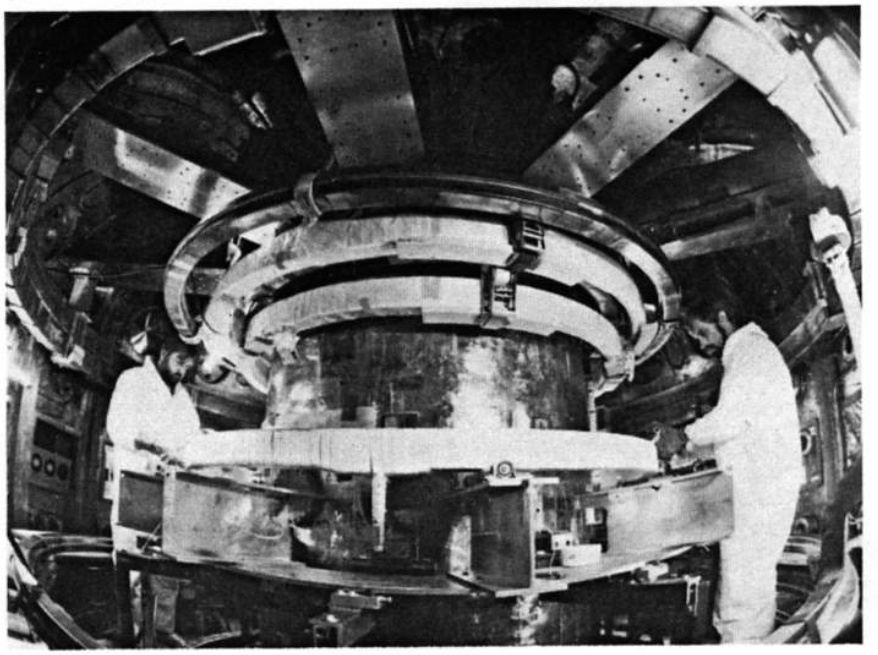
Designing and fabricating coils for various PPL machines doesn't qualify as unusual work for the Coil Shop. But the unique method the group employed in winding new coils within the PBX-M vacuum vessel has opened new avenues for revitalizing existing experimental devices.

This is the first time continuous coil winding has been performed in place within a closed, confined area. The success of the procedure provides a cost-effective alternative to dismantling an experimental device to modify its characteristics. The capability now exists to make alterations from within the vacuum vessel, drastically reducing the cost of such changes. In some cases, the savings might be significant enough to extend the life of an older machine.

PPL's Coil Shop staff wound five of the PBX-M coils in place within the machine's vacuum vessel. These coils include four eight-turn divertor field (DF) windings and one 16-turn winding used as the device's "pusher coil." The pusher coil creates the indentation in PBX-M's kidney-bean-shaped plasma.

Normally, the copper conductor used for winding coils is held under tension as it feeds onto the winding mandrel. The coil is then removed from the mandrel, baked in the Coil Shop's large oven, leak checked, and installed in its coil case. However, winding coils in place on PBX required a different procedure, since no additional load whatsoever could be placed on the vacuum vessel. In addition, all winding apparatus had to enter and leave the vacuum vessel through a 14"x14" port.

Coil Branch engineers met this challenge by devising a method of "pushing" unworked copper conductor onto a mandrel attached to a coil-winding table within the machine. The winding table rotated as the malleable copper was press-formed onto the mandrel via a hydraulic clamping system. The mandrel and coil were then insulation wrapped as one unit, permanently incorporating the mandrel into the coil bundle for added coil support.



Once completed, each of the five coil bundles were hand-wrapped with fiberglass insulation within the PBX-M vacuum vessel.

Engineer Jim Chrzanowski pointed out that "everything was a series of firsts for us. Normally, we have more reliance on tension when we're winding a coil. With this project, everything was a challenge, but it was those challenges that made it interesting."

In order to provide as much room within the vacuum vessel as possible, the new coils were wound within the vessel before other new hardware was installed. Additional space on the machine platform was obtained by removing a neutral beam ion source, which was located on the platform near the winding station. Much of that precious workspace was quickly absorbed by a wooden platform built to allow personnel to safely walk around inside the vessel. Using only one 14"x14" port to admit people and another for machinery and materials required for the alteration created further difficulties. A steady stream of incoming conductor quickly restricted workspace at the machine's diameter. In comparison to the spaciousness of the 1-K Building, the Coil Shop staff found working within PBX-M a tight fit.

Each mandrel was designed and fabricated at the 1-K Coil

(continued)

Shop to fit a specific PBX-M coil. The mandrel frames were wrapped with B-stage fiberglass insulation (a semi-cured, polyester-filled glass tape), and heat cured. Each mandrel was then precisely cut into segments and transported to PBX-M.

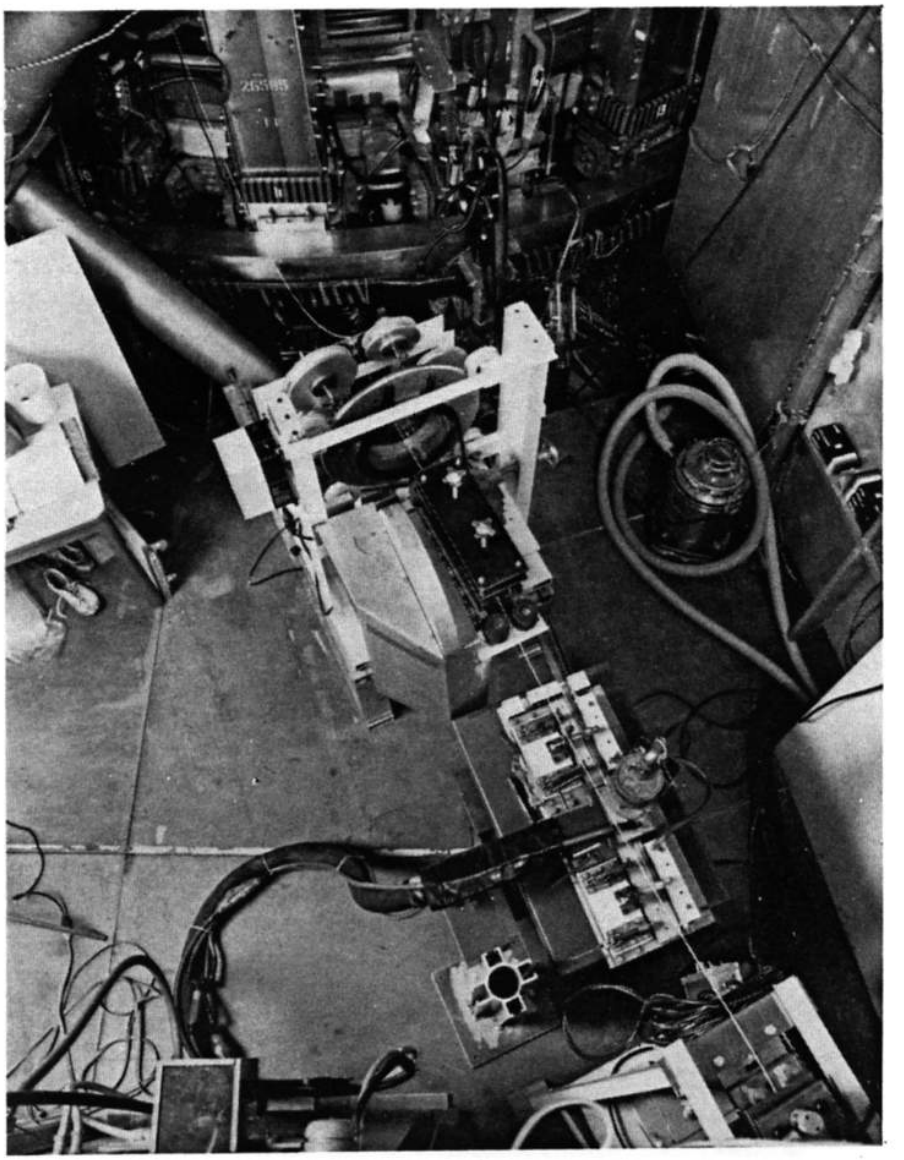
The segments were passed into the vacuum vessel to be spliced and epoxied back together. Grooves and feed-through holes were cut into each mandrel to allow epoxy to flow through them. G-10 plates and screws at the splice joints provided further support. Treating the mandrel assembly with air-cured epoxy and attaching it to the winding table completed the reassembly operation.

The actual winding procedure began with several four-foot diameter spools, each holding 65 feet of 3/4" square copper conductor with a 1/4" cooling channel. All coolant holes were flushed with a degreasing agent and continuity checked. Lengths of conductor were joined together using a portable induction brazing unit. Each joint thus created was helium leak checked, and subjected to a hydraulic stretch test of 11,000 pounds.

An automatic feed system, which straightened and continuously fed the conductor through the vacuum vessel port to the winding table, was located on the PBX-M machine platform. Approximately 16 feet of conductor separated the winding table from the feed system.

The conductor was wrapped by an automatic taping machine. This unit applied five layers of insulation simulataneously. The insulation consisted of three layers of Mylar tape, and two layers of dry glass for added mechanical and electrical strength. Once completed, each coil bundle was hand-wrapped with fiberglass insulation within the vacuum vessel. Staff from PPL's Vacuum Shop then installed the stainless steel "cans" surrounding each coil, welding them into place within PBX-M. In the fall, the coils will be impregnated with air-cured epoxy to give each coil its mechanical and added electrical strength to complete the assembly process.

The winding process began in early March, and was completed in late April. Jim Chrzanowski commended the entire Coil Shop staff working on the project for their dedication during the two-shift operation. Speaking on behalf of the PBX-M project, Dan Kungl added his praise for "a job well done from both a quality and schedule viewpoint."



Copper conductor is seen being automatically straightened, wrapped with insulation, and fed through a PBX-M port to be wound into coils within the machine's vacuum vessel.

Industrial Hygienist

Rebecca Mitchell

The Occupational Medicine and Safety Office staff increased in June when Rebecca Mitchell became the laboratory's new industrial hygienist.

Rebecca, who also holds a bachelor's degree in nursing, earned her master's degree in environmental and industrial health from the University of Michigan in 1982. During five years in the nuclear industry, she has had a lot of experience in program development. Prior to joining the laboratory staff on June 23, she was respiration protection supervisor at the General Public Utility's Oyster Creek nuclear plant. At Pennsylvania Power and Light's Susquehanna nuclear plant, she developed and ran both the internal dosimetry and respiratory protection programs at the facility.

She was attracted to PPL by "the general academic and research atmosphere," as well as by the "broader base of responsibilities" handled by the laboratory's industrial hygienist. "Industrial hygiene's focus is to protect the employee from workplace hazards," Rebecca explained. "When they hear that description, most people think first of chemical hazards. I have responsiblities for managing chemical hazards, and I'm the person to call when people need Material Safety Data Sheets. But I'll also be doing air sampling, and analyses of the ventilation, noise and vibration levels, illumination levels, and ergonomic problems of work areas."

Rebecca expects to be surveying many areas of the laboratory, gathering data from employees as well as from the physical environment. But she also sees herself as a consultant, providing advice on the selection of protective clothing to attain a specific level of protection, for example.

Employees can contact Rebecca at the Occupational Medicine and Safety Office on C-Site, ext. 3584.

Harrison Street Bridge

According to a report in the Greater Princeton Transportation Management Association's spring newsletter, the Harrison Street bridge reconstruction is proceeding on schedule. However, design delays still threaten to derail the project.

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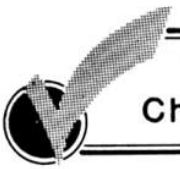
State officials said detailed studies of the bridge foundations found that potential environmental problems and other impediments are not as serious as expected. They concluded that the entire structure, including the bridge piers, can be rebuilt without major increases in cost or construction time.

County and local governments, Princeton University officials, and area residents have submitted suggestions concerning the structure and aesthetics of the new bridge. These comments are being processed by state and federal highway officials, who are attempting to incorporate some of those suggestions in the bridge's conceptual plan. If local and state officials fail to reach a consensus on the plan, however, bridge construction could be delayed.

If an agreement is reached soon, final design work on the bridge could begin this summer, and the new bridge could be open to traffic by late fall 1988.



Security Checkpoints

The purpose of the C-Site Security booth is to provide controlled access to C- and D-Sites. In addition to being an employee entrance, the Security booth also serves as a visitor check-in point.

Since visitors are no longer required to report to the LOB receptionist's desk for visitor's badges, ALL visitors MUST stop at the Security booth to obtain the required badges before proceeding. Employees bringing guests into the campus (including spouses, friends, and so on) MUST ALSO STOP at the booth to obtain the required badges. Visitors found on site without a visitor's badge will be told to obtain one from the Security booth officer.

All employees should use the right-hand entrance lane at the Security booth when entering C-Site. The left-hand lane is reserved for visitors and vendors. However, employees bringing visitors onto the campus should use the left-hand lane and be sure to obtain visitor badges for their guests.

Motorists approaching the Security booth entrance should be sure to reduce their speed. The curve in the road makes for dangerous driving conditions when speed limits are exceeded. The recommended speed limit for this area is 15 miles per hour.

Questions concerning these procedures or other Security matters should be directed to the Department of Public Safety, ext. 2894.

HazMat Disposal

The following procedures are to be used for disposing of hazardous materials lab-wide:

- Departments using hazardous materials must have Material Safety Data Sheets (MSDS) on hand for all hazardous material stored or used in a PPL work area.

- All hazardous materials requestors will complete a three-part Hazardous Waste ID Card, available at the C- or B-Site stockrooms. After filling in all the necessary information on the Hazardous Waste ID Card, the top copy should be sent to Materiel Control with all applicable MSDS sheets. The second copy should be sent to Occupational Medicine and Safety (OM&S); the third (card) copy should be attached to the material to be disposed of.

- Upon receipt of any Hazardous Waste ID Cards with MSDS information, Materiel Control will pick up the material as promptly as possible -- usually within 10 working days. OM&S industrial hygienist Rebecca Mitchell (ext. 3584) should be advised of any materials requiring immediate action due to imminent danger. She will arrange for prompt removal of the material.

- If the requestor does not have the MSDS sheets, or does not know the identity of the material, he should contact the industrial hygienist. She, in turn, will obtain the needed information -- either by checking OM&S files, by contacting the manufacturer, or by arranging for an analysis. Once this information is available, Materiel Control will promptly pick up the material.

- If requestors find it necessary to remove the material from a work site prior to scheduled pickup by Materiel Control or prior to the availability of MSDS data, they will be allowed to move the material themselves to a "quarantine" area set up by Materiel Control. Each

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requestor must make prior arrangements with the Hazardous Materials Section of Materiel Control (Scott Larson, ext. 3387) for receipt and storage of the material.

- In all cases, the requestor is responsible for having the material in a container suitable for transportation to Materiel Control and to ensure that items in the work area are stored properly prior to removal for disposal.

In order to assure expeditious handling and follow-up of disposal actions, Materiel Control will present a status report of pending actions at the laboratory's monthly safety meetings.

Any questions or problems relating to the disposal of hazardous materials should be referred to Scott Larson in the Hazardous Materials Section of Materiel Control, ext. 3387.

Bowling Wrapup

The Princeton University Mixed League's May 14 roll-off between the Gutter Dusters and the Pony Express was a contest of champions. Each team won half of the league's bowling season, but the Gutter Dusters grabbed the final victory by defeating the Pony Express in the roll-off.

Ending their season on a winning note were Gutter Dusters Dotty Kerr, Sarah Thomas, Barbara VanNostrand, Brian VanLiew, Mike Quigley, and Dick Yager. Bowling for the Pony Express were Debby Simmonds, Nancy Strine, Ken Strine, Keith Sapp, and Al Martin.

Anyone interested in signing up for the League's 1986-87 season should contact Sarah Thomas at ext. 3711 or Elmer Fredd at ext. 2120.

Safety Training

The following Occupational Medicine and Safety training courses are scheduled for August:

Course	Responsible Instructor	Date
Respirator Protection	Rebecca Mitchell Ext. 3584	August 19 9 a.m.

Employees must obtain permission from their immediate supervisor to attend these classes. Supervisors must call the responsible instructor to enroll their employees.

CONGRATULATIONS -- to former PPL employees Mary Dyson and Gary Estepp, who were married in Las Vegas on June 14. Both left the laboratory and moved to Albuquerque, New Mexico in 1985.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Geter Hicks of Procurement and his wife, Leslie, whose daughter, Allana, was born May 9;

Doug Loesser of the Mechanical Engineering Branch and his wife, Lisa, whose son, Scott, was born June 11.

Petty Cash ID's

Effective immediately, employees picking up reimbursements from the Petty Cash office must present a valid PPL ID badge to receive their money. The Petty Cash office is open daily from 9 to 10 a.m., and from 2 to 3 p.m.

For any questions about this requirement, please contact Flo Short at ext. 3503.

Commuter Exchange

If you're looking for a ride, why not try the classifieds?

The Greater Princeton Transportation Management Association (TMA) launched "Commuter Exchange," a want-ad program designed to link potential car or vanpoolers, this month. Commuters traveling to and from the greater Princeton area who are interested in ridesharing can now call the TMA at 609-452-1491 to place a free advertisement. The ads are published under the "Commuter Exchange" heading in the classified section of US 1, a monthly Princeton-based publication delivered to most area employers.

Each ad lists pick-up and drop-off points, work hours,

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and the phone number of a contact person. Optional information, such as how many days a week you wish to rideshare, whether you're a rider or a driver, and preferences for smokers or non-smokers, may also be included.

TMA is a member-supported service organization whose goal is to reduce traffic congestion and improve mobility in the central New Jersey region. For more information about TMA or its activities, please call 609-452-1419.

Obituary

William G. Kirkham, 63, a technician with the Electronic and Electrical Engineering Department, died on June 9. He had been a laboratory employee since 1962.

Mr. Kirkham is survived by his wife Marion, his son William, and two daughters, Kathleen and Maureen.

United Way

AT WORK

"There's Nothing to DO!"

How many times have you heard that comment from your teenage children once school lets out for the summer. With *their* time on *your* hands, it helps to have some ideas for activities. Big Brothers/Big Sisters of America, a United Way-supported agency, offers these suggestions for entertaining children or the entire family:

- Take advantage of athletic or family education classes or activities. Now is the perfect time to take up water sports, or to tour your area by bicycle.
- Do shop projects, such as carpentry. Build a birdhouse, for example, place it in your yard, and take photos of your feathered visitors.
- Find neighborhood money-earning projects, such as mowing lawns or babysitting. Better yet, get involved in a project that will beautify your neighborhood, such as collecting discarded bottles and cans for recycling.
- Visit the library and do some reading.
- Wash and/or repair the car.
- Hit the road! Visit a historical site, or an amusement park.
- Get involved in volunteer work. Lend a hand to the homebound elderly, become a candy striper at your local hospital, or read to the blind.

Tour Guides

The chill winds of the New Year blew almost 1,000 tourists through PPL's doors during the first three months of 1986. March roared in with 20 tours and 474 visitors to pace the period. We'd like to thank the tour guides who shepherded our sightseers through the facility:

January

Charlie Ancher
Norton Bretz
Diane Carroll
Sam Cohen
Ernst deHaas
Robert Fleming
George Gammel
Alan Janos
George Martin
Ernst Nieschmidt
Dave O'Neill
Greg Rewoldt
Stan Schweitzer
Hal Wexler
Irving Zatz

February

John Bradish
Norton Bretz
Dave Ciotti
George Gammel
James Kamperschroer
Mark Kijek
Don Monticello
George Martin
Ernst Nieschmidt
Irving Zatz

March

Halsey Allen
Robert Budny
Glenn Bateman
Dave Ciotti
George Cutsogeorge
Ernst deHaas
Joseph Fennimore
George Gammel
Charles Gentile
Jerry Gilbert
Ralph Izzo
Bob Kaita
Randy Knize
Don Knutson
Naren Kokatnur
Mark Kijek
Ed Lawson
George Levitsky
David Meyerhofer
George Martin
Bob McCann
Ernst Nieschmidt
Robert Pinsker
Greg Rewoldt
Joseph Stencel
Stan Schweitzer
Marilee Thompson
Russel Winje
Irving Zatz

Keep Your Digestion Working

The digestive system performs the amazing job of breaking down food into the nutrients your body needs. As you grow older, however, this system may not work as well. The National Institute on Aging offers these suggestions for keeping your digestive system working at its best:

- Eat a well-balanced diet that includes a variety of fresh fruits and vegetables, whole grain breads, cereals, and other grain products such as pasta.
- Eat slowly and, if possible, try to relax for 30 minutes after each meal.
- Exercise regularly.
- If you drink alcohol, do so in moderation.
- Avoid large amounts of caffeine.
- Use caution when taking over-the-counter drugs, and always follow your doctor's orders exactly when taking prescription medicines.

Your digestive system is bound to get upset now and then. Most of the time the problem will take care of itself, but these symptoms warrant a trip to the doctor:

- Stomach pains that are severe, last a long time, recur often, or come with shaking, chills, and cold, clammy skin.
- Recurrent vomiting, or blood in the vomit.
- A sudden change in bowel habits, recurring diarrhea, or sudden constipation.
- Bloody or coal-black stools.
- Jaundice or dark, tea-colored urine.
- Pain or difficulty swallowing food.
- Unexplained weight loss.

OSHA Reminders

The following safety reminders are drawn from a list of common Occupational Safety and Health Administration (OSHA) violations:

- Flammable or combustible liquids shall be stored in tanks or closed containers. Such liquids shall be drawn from or transferred into vessels, containers, or portable tanks within a building ONLY through a closed piping system; from safety cans; by means of a device drawing liquid through its top; or from a container or portable tank by gravity feed through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited.
- The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tankcars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965. For further information regarding storage and handling of compressed gas, contact PPL's Occupational Medicine and Safety Office.

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

Since moving to the 1-O Building, the Personnel Office meets with a few "neighbors" each Wednesday for a weekly cookout. Pictured enjoying the fruits of their labors are (left to right) Sally Young, Madeline McMullen, Steve Iverson, Barry Cohen, Bill Johnson, Noreen Cruser, Sheryll Poris, and Bobbie Cruser.

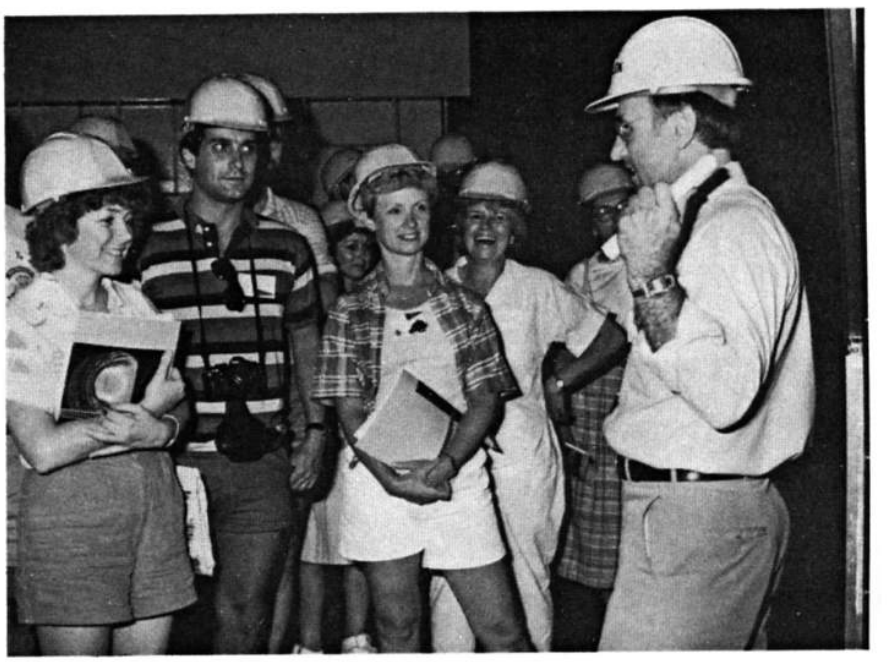
Art Exhibit

"William King: Sculpture" is the current exhibit on display at the Squibb Gallery.

Several of King's humorous sculptures have been included in the exhibit. The pieces are done in a variety of sizes, textures, and materials.

The Squibb Gallery is located in the world headquarters of the Squibb Corporation on Route 206, three miles south of Princeton. Gallery hours are 9 a.m.to 5 p.m. Monday through Friday, and from 1 to 5 p.m. on weekends. Thursday gallery hours are extended to 9 p.m.

Milton Machalek explains the finer points of the TFTR program to 70 Woodrow Wilson Master Teachers who toured PPL July 29. Sponsored by the Woodrow Wilson National Fellowship Foundation, 100 high school math and science teachers were selected for the honor after a national competition. Master Teachers spend four weeks in residence at Princeton University, where they participate in classes taught by faculty from across the country.



HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 11 September 8, 1986

MESSAGE FROM THE DIRECTOR

This summer's TFTR experiments have brightened the promise of magnetic fusion power. TFTR has now reached the temperature level that will be needed for a practical fusion reactor. Several significant improvements of the tokamak "magnetic bottle" were discovered in the process.

The announcement of the TFTR results on August 7 received favorable world-wide news coverage. Both Princeton University and the Department of Energy have expressed particular pride in the recent PPL achievements.

Successful accomplishment of the TFTR mission now seems assured. By the end of 1987, we expect further advances in TFTR performance, including a demonstration of "equivalent break-even" in deuterium plasmas. The actual break-even demonstration using deuterium-tritium is scheduled for 1989.

A national study group, led by PPL, has prepared a proposal for the next major step beyond TFTR: The Compact Ignition Tokamak (CIT) has the goal of achieving burning-plasma conditions just like those in the plasma core of a net-power-producing reactor. The new project is estimated to cost about 300 million dollars, assuming that the TFTR facilities are reused for CIT. The proposed schedule calls for project authorization in 1988, with completion of construction in 1993. The CIT proposal is supported by the DOE and has received favorable mention by Congressional committees.

The University has offered to give the DOE a 40-year lease on C- and D-Sites to facilitate the siting of the CIT at PPL. The DOE is considering authorization of new office and shop space on C- and D-Sites, so that the Laboratory can consolidate its activities, while the University will be able to develop A- and B-Sites for other uses. The new DOE-University contract, which goes into effect on October 1, 1986, will formalize these real-estate arrangements. The University has stated its intention to continue as the manager of PPL during the 40-year period of the C- and

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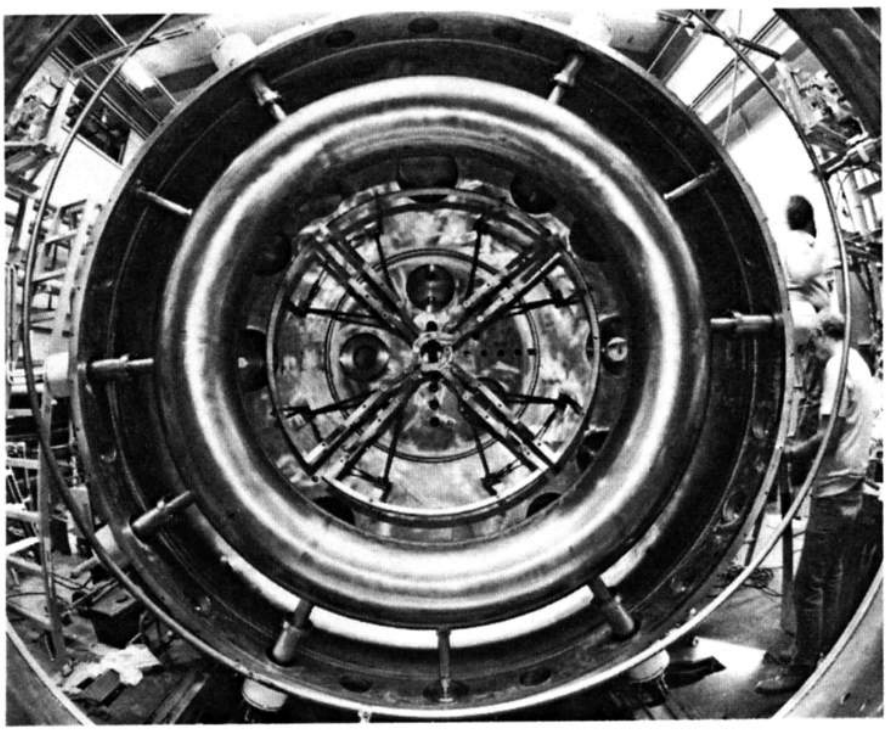
Reporters for both print and broadcast media filled the Gottlieb Auditorium August 7 during a press conference held to announce achievement of 200 million °C temperatures in TFTR. The event received extensive worldwide news coverage, and was featured in newscasts by NBC, WOR, and the New Jersey Network.

D-Site lease, with Laboratory staff maintaining their status as regular University employees. There are plans to strengthen direct ties between PPL and the Main Campus, especially in regard to joint research and academic initiatives.

Looking back to fiscal years 83-86, the PPL budget declined by about 30% following completion of TFTR construction. Our budget for FY87 will be about the same as the budget for FY86. Future budgets, both for PPL and for the US magnetic fusion program as a whole, are expected to rise again -- thanks to the TFTR results, the probable authorization of the CIT project, and the prospects for major international collaboration in magnetic fusion research. The Laboratory's staff, particularly in the engineering disciplines, will be needed to play a central role in the CIT project. As during the years of TFTR construction, the Laboratory policy will be to stabilize the level of permanent staffing by relying on subcontractors and participation by the other fusion laboratories to share peak work loads.

In summary, the work of the Laboratory has been going extremely well and is earning widespread recognition and support. During periods of rising opportunity, the immediate impact on the staff is often to increase near-term problems and demands -- such as the extra effort that will be required to consolidate the Laboratory on C- and D-Sites. The main implication of recent events is that PPL's long-term future looks very promising.

S-1 UPGRADE



The passive figure-8 coil stabilization system is visible through the newly installed S-1 flux core

An improved flux core and liner helped the S-1 Upgrade successfully pass its preliminary high-power tests August 6. The machine, which had been shut down for alterations for almost a year, is expected to reach new spheromak plasma parameters this fall.

After a successful run period in early 1985, S-1 developed problems with its flux core power feedthrough, adversely affecting the amount of coil current that could be fed through the core. Leaks also developed in the machine's flux core liner, requiring replacement of the entire liner. The liner is a 0.02-inch thick shell of Inconel, with fiberglass applied to its interior surfaces. The liner surrounds the flux core, and serves to maintain vacuum purity by encapsulating the flux core windings.

The new liner was made by Explosive Fabricators, Inc. of Colorado. Explosion forming is an expensive process, and cost and schedule constraints precluded using the process on the first S-1 flux core liner. However, explosion forming results in a more precise and regular liner surface than could be obtained by spin forming, the method used to fabricate the original liner.

The first step in the explosion forming process involves preparing a mold of the liner from a block of tool steel. A sheet of Inconel was clamped over the top of the mold, and the entire assembly was lowered into a water-filled tank. Explosive charges were detonated in the water, and the resultant shock waves forced the Inconel into the mold. This process, which was repeated several times,

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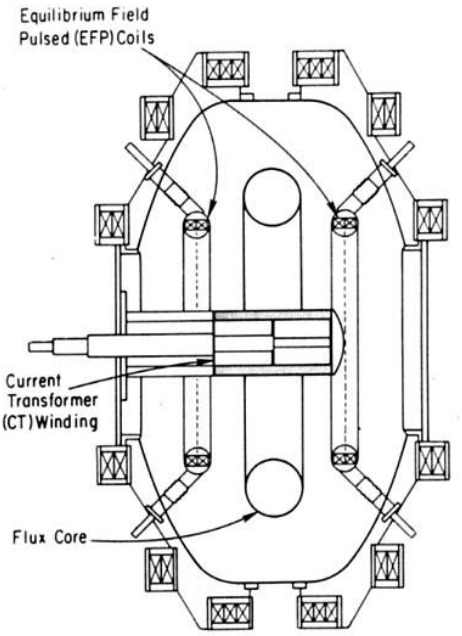
allowed the liner to be shaped without the ridges or high and low spots spin forming can leave. The new liner is expected to have a longer life expectancy and greater reliability.

When the liner was removed last year, the flux core windings were also examined and redesigned. The copper conductors in the original flux core windings consisted of insulation-covered stranded cable. The new windings were made using conductors with solid copper cross-sections. The change provides the potential of operating the flux core at higher current levels. PPL's Coil Shop completed the second flux core last March.

The S-1 program was hindered when problems surfaced during the testing of the new flux core. Although the insulation sleeve that had previously covered the copper conductor was deleted in the new design, impregnation of the core with epoxy resin was expected to provide sufficient insulation. Testing, however, revealed an insulation breakdown, proving that the insulation scheme was inadequate for the high voltages the core must withstand.

In March, the Coil Shop began winding a third S-1 flux core. The copper conductor was now wrapped with Mylar tape prior to being impregnated with epoxy resin. The work was completed in May, and the flux core was successfully tested to its design rating of 41,000 volts. It was installed in the S-1 machine, checked in place with its supporting buswork, and successfully passed full power tests held in early August.

On August 6, both the TF and the PF coils were operated at 20 kV, the full design rating for each system. With the new core, S-1 should be able to produce plasma currents of over 500 kA. The maximum current range with the old core was 350 kA.



Schematic of how a poloidal-flux transformer installed in S-1 will look

Engineering Department Head Jack Joyce offered his thanks to the engineers and technicians in the Coil and Vacuum Shops for their outstanding performance with the S-1 project. He singled out specifically Jeff Alton, who followed the project personally on the machine floor. Masaaki Yamada, co-head of the S-1 program, agreed, adding that "Jeff devoted 120% of his time to the core, and it paid off."

The near-term goal for the S-1 Upgrade is to return to reliable operation with all diagnostics. A multipoint Thomson scattering unit, fabricated by Dr. Fred Levinton, is being added to the device's diagnostic array. The experimental program will then pursue high-current operations in an attempt to have improved machine parameters in September and October. Dr. Yamada expects that the S-1 Upgrade will achieve higher temperatures (hopefully over 150 eV) as well as increased confinement time (reaching nt of over 1×10^{10}) in the near future.

In the coming year, the S-1 Upgrade experimental program will begin investigating the details of spheromak confinement utilizing the Taylor relaxation mode. A significant S-1 finding was that spheromak plasmas always adjust their configurations by means of flux conversion toward the Taylor minimum energy state. The discovery of the flux-conversion mechanism has created the opportunity to push the parameters of the S-1 machine towards the 1-MA, 300-eV level by means of a relatively small modification: introduction of a poloidal-field transformer coil. When the present experimental run period concludes next spring, the transformer coil will be installed on S-1. S-1 should also be able to improve its parameters into the reactor regime by adiabatic plasma compression.

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

Obituary

Thomas R. Hurley, 43, died August 5 at the 1T2 Building on A-Site. Many of Tom's co-workers and friends wanted to remember him. HOTLINE lets them speak for themselves:

"Tom had been the lead technician for Plant Maintenance and Operations at A-Site since 1980. During this period, he also conducted training classes for approximately 10 PM&O technicians at a time. He assisted Ray Pressburger in developing a safety program for PM&O, and conducted the safety meetings and safety inspections for that group for years. It was basically this program that was adopted as a model for the lab-wide Area Safety Coordinator (ASC) program. Tom served as the ASC for PM&O since the inception of that program. Tom was loved and respected by all who knew him, and he will certainly be missed in PM&O." (Connie Stout)

"His perserverance, interspersed with appropriate moments of humor, assured the success of our safety program." (Bob Smart)

"Tom has worked closely with me for many years. I will truly miss him as a friend and a professional associate. He has been my right hand man when we established the safety program for Maintenance, then the Administrative Department, and then the whole lab. His work in keeping Administrative safety a leading group at the lab will be missed very much by everyone." (Ray Pressburger)

"The sudden death of Tom Hurley has left me, as I know it has many of us, in a state of shock and disbelief. Having known Tom as a friend and co-worker for a good many years and knowing his warm, outgoing personality; his ability and willingness to help others; the enthusiasm he had for his work; and his general apparent love of life makes it harder to understand and accept this tragic occurrence. Tom touched many people during his career at PPL, and he will be sorely missed. Tom, if there really is a heaven, I am sure you are there and I can only say "go with God." (Henry Miller)

Tom Hurley

"I remember talking to Tom after our classes were over at 1T2 Building. He was very idealistic; he believed that the world could be a better place if only we'd all work at it. His ever-present pipe announced to everyone "Tom's here!" He always had a smile and a joke for everyone; Irish jokes were his favorites. He was fiercely proud of his Irish heritage, and we discovered that green foil shamrocks had sprouted in various spots around the lab after he had passed by. He was a friend. I'll miss him." (Pat Zeedyk)

"Tom was one of the nicest people I have ever met. He would help anyone in any way. I will truly miss him. My nickname for him was "Mr. Safety." Admin. Safety will never be the same." (Sandy Phillips)

"Tom was one of the finest gentlemen I have ever met. He always had a sympathetic ear and a kind word towards everyone. He always smiled and joked with everyone. He will be missed by all his friends." (George Kalescky)

"He was very safety conscious, and kept up on safety for the shop as far as films and lectures. He assured that the proper masks were used for safety-related jobs on site. He kept up on the days lost time accident sign. He ran the school in 1T2 for job education. He couldn't win the Pick-6 lottery on a bet." (Mitch Dorun)

"I liked Tom because he was a real person. He had a quick sense of humor, and he was nice. I also miss very much the smell of his pipe tobacco." (Terry Greenberg)

"Tom will be missed as a contributor to the PPL Energy Conservation Program. I found Tom to be a conscientious employee who addressed job tasks in a consistently professional manner, was flexible to new ideas, and was cooperative. His efforts were the difference that made the difference at A-Site." (Bob Gulay)

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"Tom Hurley was one of Maintenance's most popular employees. He was well-liked by his co-workers, with a keen sense of humor and always a friendly jibe at his co-workers. He was definitely good for morale at PPL. His friendly disposition, helpful attitude, will be missed by all who knew him as the "big guy" he was." (Anonymous)

Tom is survived by his wife, Jean Brown Hurley; a daughter, Barbara Nini of Hamilton Square; his parents, Lois and Wilbur Hurley of Cream Ridge; a sister, Carol Tilton of Hopewell; a nephew; and two nieces.

Memorial contributions may be made to the Muscular Dystrophy Association.

Safety Awards

PPL's greatly reduced 1984 accident rate earned the laboratory the DOE Award of Excellence and the National Safety Council's Award of Honor. By maintaining its winning accident rate in 1985, PPL has now received the National Safety Council's Award of Merit, the New Jersey Industry Recognition Safety Award, and a second DOE Award of Excellence.

To win the National Safety Council award, the lab competed against other comparable national laboratories, including several other DOE facilities. The Council examines each contestant's accident experience over the last three years. Laboratories with significant reductions in lost time injuries and lost work days become Council award winners.

The DOE's Phase I Award of Excellence recognizes PPL's continued satisfactory progress in improving its safety record. PPL and the Ames Laboratory in Ames, Iowa are the only DOE Chicago Operations Office facilities to receive Phase I awards.

Celebrating PPL's achievement of working for one million man-hours without a lost-time accident are (left to right) Deputy Departmental Safety Officer Paul McCann, Occupational Medicine and Safety Office Manager Les Thompson, PPL Director Dr. Harold Furth, Project and Operational Safety Office Manager Joe Stencel, and Deputy Departmental Safety Officer Halsey Allen.

In 1985, PPL continued to reduce both its disabling accidents and the severity of each accident. The laboratory is presently well on the way to another safe year, having recently attained one million man-hours worked without a lost-time accident.

The Occupational Medicine and Safety (OM&S) Office credits the laboratory's outstanding safety performance to the employees. Although the Area Safety Coordinator (ASC) program keeps safety alive in the workplace, and both safety groups (OM&S and Project and Operational Safety) complement each other, each PPL employee is responsible for the laboratory's safety record by working safely.

According to OM&S Safety Branch Manager Les Thompson, "When I joined the lab two years ago, the overall safety program needed direction. Since then, OM&S has instituted frequent meetings, safety audits, thorough accident investigations, and we've added more training courses. Now people understand what's required of them, and things are getting done."

Les also noted the positive attitude toward safety throughout the lab. "There's an awareness of safety by the

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employees, and a commitment by management to provide the resources and training to help people get the job done safely. I think people have finally recognized that our safety program isn't a one-time thing: our concern for employees' safety is here to stay, and we must conduct research without accidents."

Les commended outgoing Deputy Director J.R. Thompson's efforts to revitalize the PPL safety program. "J.R.'s commitment to safety, which also has the backing of Dr. Furth, is a major reason we've accomplished so much. They've both encouraged management commitment, and that's been the foundation for the success of the program."

Bill Dorn, Industrial Safety Engineer, pointed out that achieving one million manhours of safe operation demonstrates that "accidents don't have to happen; they can be avoided." He added that it is important not to permit our eagerness to reach technical goals to encourage taking shortcuts on safety. It could take years to recover from a serious accident, but by continuing to work safely, we will save time and money in the long run."

Both men agreed that significantly more interest in safety exists throughout the lab now. "The ASC program increased safety awareness," Bill continued, "and safety awareness is half the battle. The other half is getting something done about the safety problems you find before an injury occurs."

To report safety concerns, employees should contact their supervisor or their Area Safety Coordinator.

Safety Training

The Occupational Medicine and Safety Office has scheduled the following training courses for September:

Hazardous Materials/Right to Know: Sept. 9-11

Respiratory Protection/Confined Space Entry: Sept. 16-17

Back Injury Prevention: Sept. 18

Basic Radiation Training: Sept. 22-26

Powder Actuated Tools: Date to be announced

Employees must obtain permission from their immediate supervisor to attend any course. Supervisors must call Mary Ann McBride at ext. 3468 to enroll their employees. Attendees will be notified of the time and place their class meets one week before each session starts.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Rich Myslinski of Engineering Services and his wife, Dottie, whose daughter, Rochel Lynn, was born August 13;

Joe Pownall of Engineering Services and his wife, Gwenn, whose son, Joseph, was born August 13;

Jim Conover of Materiel Control and his wife, Pattie, whose son, Ryan, was born August 13;

Jeff Gettlefinger of TFTR Operations and his wife, Lori Trani-Gettlefinger of Public Safety, whose son, Andrew, was born August 19.

People who watch a lot of TV are more likely to have headaches, backaches, and joint pain than those who watch little or no TV, according to a survey of 1,254 people by Louis Harris and Associates.

Dr. John Bonica of the University of Washington, a pioneer in the pain research field, said that the findings are related dto a tendency among frequent TV viewers to be lethargic. Watching repeated commercials that focus on head and body pain might also play a role, he said.

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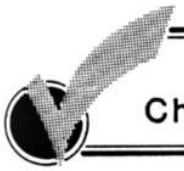
"People who sit around watching television most of the time just aren't getting enough exercise," Bonica said. "Tension headaches are very common for them."

The study, financed by Bristol-Myers Co., found that people who exercise regularly, don't smoke, drink little or no alcohol, and watch little or no television experience less pain than people with the opposite habits. It also found that women experience more pain than men, and that headaches are a malady of the middle class, affecting people mostly in the $15- to $50-thousand annual income range.



Security Checkpoints

To safeguard your personal property at home or at work, the Department of Public Safety suggests having your valuables engraved.

Public Safety has the equipment to engrave any of your personal items, such as calculators, clock radios, computers, etc. By engraving these items with your driver's license number, you will help deter theft. To arrange for engraving, call the Public Safety Department at ext. 2895.

Most police departments also have engraving programs for items in your home. Simply contact your local police department for the necessary information.

For additional tips on methods of preventing crime, call the Department of Public Safety at ext. 2895.

GIVE LIFE

Bloodmobile Wants PPL Plasma

The Bloodmobile will again visit the laboratory September 11 from 10 a.m. to 3 p.m. at the Sayre Hall auditorium. Those wishing to donate blood should contact Meg Gilbert at ext. 2036 to set up an appointment. Donors will be scheduled every 15 minutes, and refreshments will be served.

Although employees are covered for blood needs under a group plan, the University must meet its yearly quota of blood donations to continue to offer this benefit.

Toner Disposal

Waste dry toner from copy machines should not be disposed of in trash receptacles unless it has first been placed in a sealed container, according to the Occupational Medicine and Safety (OM&S) Office.

The toner is composed of fine plastic beads and carbon black, neither of which are particularly toxic or require disposal as hazardous waste. When waste cans containing loose toner are emptied by Building Services personnel, the dry powder is released to the air. The dust thus created is irritating to the eyes and difficult to remove from the skin.

Any questions regarding this procedure should be referred to the OM&S Office.

Computerized CPR

Resusci-Annie is no dummy any more.

The familiar mannequin, who has helped teach cardiopulmonary resuscitation (CPR) to so many people, has finally joined the computer revolution. Now outfitted with a series of sensors, and aided by an Apple computer and a Sony videodisk player, Annie is "teaching" CPR classes to PPL employees.

CPR is a lifesaving technique that couples mouth-to-mouth resuscitation with chest compressions. CPR can help revive someone who has had a heart attack by maintaining oxygen and blood flow.

The interactive learning system, developed and patented by the American Heart Association, allows students to acquire CPR skills at their own pace, with the computer -- and Annie -- acting as course instructors. The system generally cuts training time, provides more standardized and detailed instruction,

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and can be used on a 24-hour basis.

Students meet for an initial one-hour training session, during which an Emergency Services Unit member demonstrates how the system works. Class members then spend time during the week working with the system. A one-hour follow up session is provided during the second week to answer questions or resolve problems. Students usually complete the course in two weeks.

The CPR learning system is a self-contained, stand-alone unit. It interfaces the videodisk player and the microcomputer with two video monitors, a computer controlled audio player, a light pen, and the sensor-equipped mannequin. The system's CPR instruction begins with classroom lectures, viewed on the videodisk monitor. Students are periodically tested on course material through multiple choice or fill-in-the-blank quizzes. Questions are presented on the computer monitor; the student responds by using a light pen to select answers. The results of each test are automatically recorded by the computer.

The second portion of the course involves work on Resusci-Annie. Sensors monitor movement of the mannequin, including depth and placement of chest compressions, and the effectiveness of mouth-to-mouth ventilation. A combination of audiovisual coaching, visual computer displays, audio tones, and a computer graphic summary provides students with immediate feedback on their performance. The course concludes with a complete CPR test, which must be completed to the computer's exacting specifications.

To sign up for CPR training, contact Mary Ann McBride at Occupational Medicine and Safety, ext. 3468.

Tour Thanks

Taking its cue from the season, the laboratory's spring tour program grew with a vengeance. From April through June, 95 guides conducted 60 tours, showing 1,465 visitors just what makes PPL tick. April led the period with 788 visitors, led by 39 guides on 27 tours. To those hardy souls who keep our "tourists" enthralled, we extend our sincere thanks:

April

Jeff Alton
Peter Beiersdorfer
William Blanchard
Charles Bushnell
John Doane
Fred Dylla
Robert Ellis
Robert Fleming
George Gammel
Ralph Izzo
John Johnson
James Kamperschroer
Fred Kloiber
Naren Kokatnur
Paul LaMarche
Benoit Leblanc
George Levitsky
George Martin
Harold Murphy
John Murray
Don Monticello
Ernest Nieschmidt
David O'Neill
Robert Pinsker
Ned Sauthoff
Allen Stevens
Stan Schweitzer
Harry Towner
Michael Ulrickson
Irving Zatz

May

Halsey Allen
Michael Bell
Norton Bretz
David Ciotti
Pat Colestock
Anthony DeMeo
Fred Dylla
Ray Fonck
George Gammel
Charles Gentile
Tom Harley
Harry Howard
David Ignat
Ralph Izzo
John Johnson
James Kamperschroer
Christopher Keane
Naren Kokatnur
William Langer
George Levitsky
George Martin
Sid Medley
Ernest Nieschmidt
S. Ramakrishnan
Greg Rewoldt
Steven Sesnic
Stan Schweitzer
Marilee Thompson
Michael Viola
Irving Zatz

June

Dale Ashcroft
David Ciotti
James French
George Gammel
Charles Gentile
Jerry Gilbert
Benoit Leblanc
Paul LaMarche
Ed Lawson
George Levitsky
George Martin
Ernest Neischmidt
Robert Pinsker
Robert Philbin
Allen Ramsey
Robert Woolley
Irving Zatz

HOTLINE

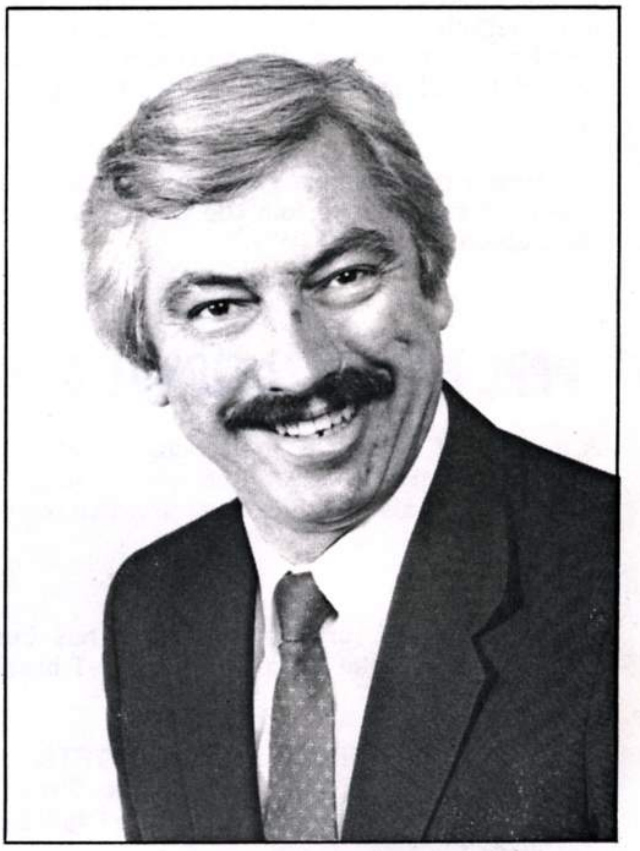
PRINCETON PLASMA PHYSICS LABORATORY

Vol. 7, No. 12 September 19, 1986

DON GROVE APPOINTED DEPUTY DIRECTOR FOR TECHNICAL OPERATIONS

DALE MEADE TO HEAD TFTR PROJECT

Dr. Donald Grove



Dr. Dale Meade

Don Grove has been named Deputy Director for Technical Operations to succeed J.R. Thompson, who has resigned to become Director of NASA's Marshall Space Flight Center: Dale Meade will become TFTR Project Manager. Both appointments were announced by Director Harold Furth on September 11, 1986, and will become effective October 1. Dr. Furth noted, "Don and Dale have long and distinguished records of accomplishment. We wish them well in their demanding new jobs."

Dr. Grove will be responsible for the operation of all of the Laboratory's experimental devices, which include the Tokamak Fusion Test Reactor (TFTR), the Princeton Beta

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Experiment (PBX), the Princeton Large Torus (PLT), and the S-1 Spheromak. He will also oversee engineering support activities and design studies for the Compact Ignition Tokamak (CIT) project. As head of the TFTR Project, Dr. Meade will lead a team of 200 scientists and supporting personnel, and administer an annual operating budget of approximately $70 million.

Dr. Grove has served as TFTR Project Manager for the past four years. Last February he was awarded the United States Department of Energy's Distinguished Associate Award in recognition of his leadership in the design, construction, and operation of TFTR. In 1976, he received the Distinguished Associate Award for his contributions as Project Manager of PLT, which was the principal US fusion device at that time.

Dr. Grove received his Ph.D. in Physics from Carnegie-Mellon University, and came to the Laboratory "on loan" from the Westinghouse Electric Corporation in 1954. He was one of four scientist-engineers who worked with Lyman Spitzer on the first studies on the practical aspects of fusion power. He also planned, constructed, and put into operation the first ultra-high vacuum laboratory for large fusion systems.

Dr. Meade was appointed Deputy Manager of TFTR and Head of the TFTR Research Operations Division in November, 1982. He has also been Head of the Experimental Division of the Laboratory's Research Department since February 1980. During the early 1970's, he did research using the FM-1 device and was named the head of the project in 1973. In 1974, he became interested in the effects of impurities on fusion reactors, played a leading role in the design of the Poloidal Divertor Experiment (PDX), and was then named head of PDX operations.

Dr. Meade received his Ph.D. in Physics from the University of Wisconsin. He joined PPPL in 1966, but returned to join the faculty of the University of Wisconsin in 1967. He returned to the Laboratory in 1972.

PPPL ORGANIZATIONAL CHANGES EFFECTIVE AUGUST 25

A number of organizational changes have been made to formally recognize the CIT project and the central role of the research program within the Laboratory. Several recent promotions at the division level are also reflected in the Laboratory's new organization chart.

TFTR

A revised TFTR project structure has been approved that should strengthen efforts to achieve D-D breakeven in 1987 and D-T breakeven in 1989. Key elements are:

- Jim Sinnis will become Head, TFTR Heating Systems Division. This new division will combine under his direction the three TFTR heating systems -- Neutral Beams, ICRF (transferred from PLT), and the Ohmic Power Supplies.

- Rich Hawryluk will become Head, Tokamak Operations Division. His current branch, Physics Operations, will be combined with the Core Engineering and Systems Engineering Branches of the former Facilities Operations Division. Dave O'Neill will be Deputy Division Head.

- Rob Goldston will become Head, Physics Program Division. He will continue to manage the TFTR Physics Task Forces and will now manage the Data Analysis, ICRF Physics, and TFTR Modeling Branches. Kevin McGuire will be Deputy Division Head.

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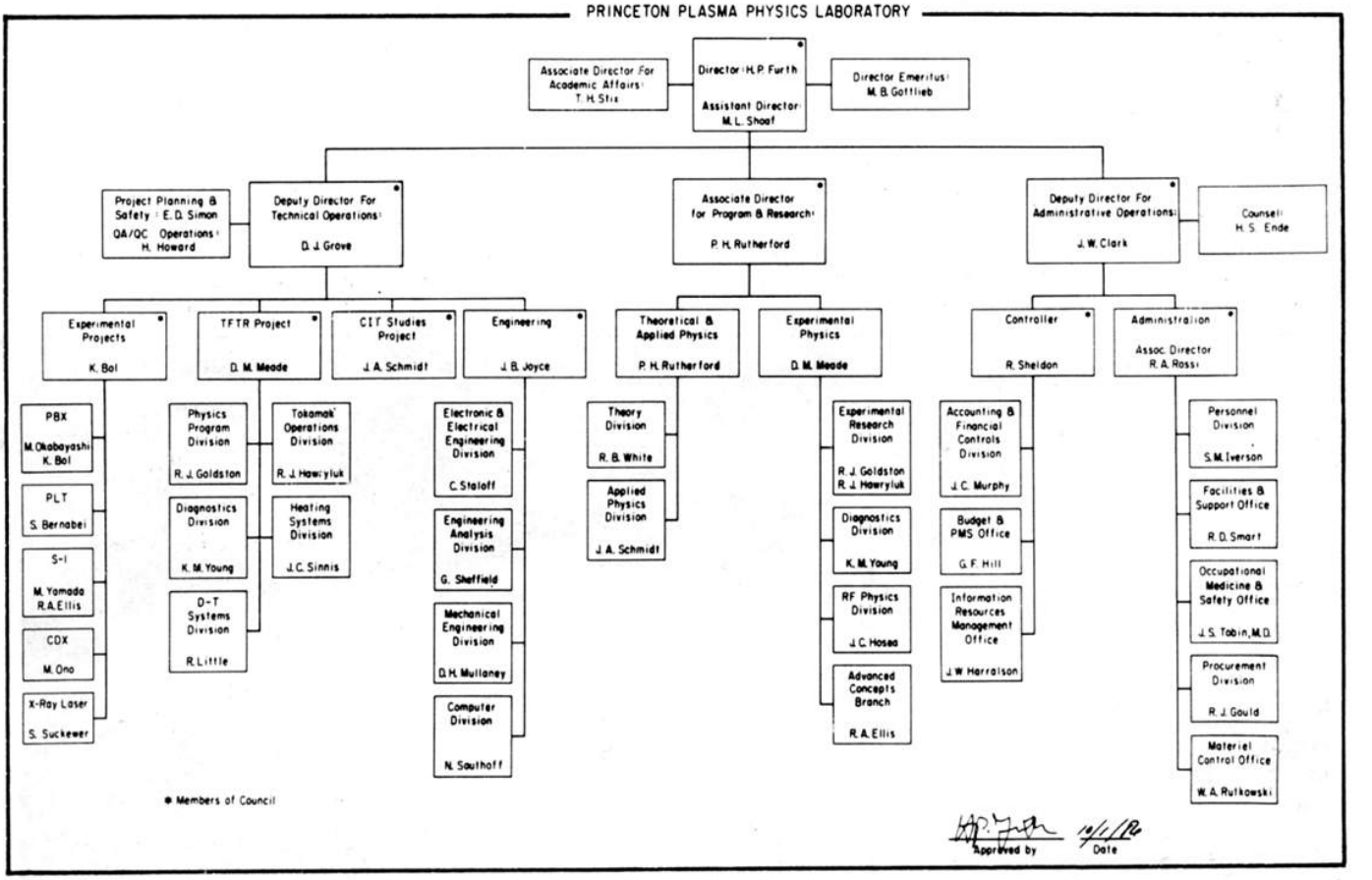
- Ken Young will continue to head the Diagnostics Division; no changes are planned in the current branch structure. Larry Johnson will continue as Deputy Division Head.

- Roy Little will become Head, D-T Systems Division, where he will manage all preparations for tritium operation on TFTR as well as special D-T-phase development projects, including remote manipulators, a D-T pellet injector, and shielding. Dan Kungl will be Deputy Division Head. Joe File becomes Associate Division Head for Special Projects for the Mechanical Engineering Division.

CIT

The CIT design effort has now advanced to a point where it merits explicit recognition in the PPPL organization chart. DOE approval of this project, to be sited at Princeton, is expected. In view of the importance of the proposed CIT project to the future of the Laboratory, John Schmidt has been named a member of the PPPL Council.



Research and Program

Proposed changes in the research and program organization are expected to strengthen the Laboratory's program-planning function and to simplify the home-organization responsibilities for research personnel.

- Paul Rutherford, as Associate Director for Program and Research, chairs the Laboratory's Program Committee, is responsible for the allocation of budgets to directly funded projects, and is the Laboratory's spokesman on programmatic issues. He also

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oversees the recruitment and professional development of all members of the Research Staff. He also has line responsibility for the Theory Division, headed by Roscoe White with Liu Chen as Deputy, and the Applied Physics Division, headed by John Schmidt.

- Dale Meade will act as Head of the Experimental Physics program, with Bob Ellis as his Deputy: Kees Bol will serve as Associate Head, representing Experimental Projects. The primary function of this organizational unit is the allocation of research staff to the Laboratory's projects.
- Rob Goldston and Rich Hawryluk will serve as Co-Heads of the Experimental Research Division.
- Ken Young will head the Diagnostics Division.
- Joel Hosea will head the RF Physics Division.
- Bob Ellis will continue as Head of the Advanced Concepts Branch.

Administrative Operations (Controller)

The new organization chart also reflects actions taken to integrate the performance measurement systems (PMS) with the budget systems of the Laboratory, the PMS staff having been transferred to the Controller's office earlier this year. The Budget and PMS Office will be headed by George Hill. Ron Strykowsky will continue to direct the PMS activities and will also serve as Deputy Head of the office.

Mitch's Patches

Webster's dictionary tells us that a patch is used to cover a hole or weak spot. But patches have become a strong point with Mitch Dorum of Plant Maintenance and Operation. His collection of patches gathered from every municipal police department in the state is being loaned to Hightstown, and is on display in the Hightstown Borough Hall.

Although there are other collections of police patches, Mitch's perserverance has made his grouping the only one known to be exclusively focused on New Jersey's 547 known municipalities.

Mitch began assembling the collection last year to commemorate the 150th anniversary of the Hightstown Fire Department. "I have a lot of

Mitch Dorum of Plant Maintenance and Operations proudly poses with a portion of his patch collection.

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pride in the fire department," Mitch explained. "I wanted to do something special for them, so I decided to present them with a patch collection." Since Mitch was a member of the Hightstown fire department, that patch started the collection. He then sent letters to a variety of state fire and police departments, asking each to donate a patch to the effort.

With only a 20% response rate to his letter campaign, Mitch began personally visiting fire and police departments to request the patches. His quest took him all over the state, from Sussex in the north to Cape May in the south. Within four months, he'd collected over 150 patches.

When Mitch decided to give the Hightstown Fire Department a collection composed solely of fire patches, he was left with 60 to 70 police department patches. Instead of simply selling or discarding them, he decided to attempt to collect a patch from every police department in the state.

Again Mitch wrote letters and visited police stations to obtain patches. Emblems representing one-man departments, which consist of a full-time chief and part-time officers, were tough to get. So were the patches for departments that no longer exist. Many of these departments have been taken over by the state police, making the job of acquiring their patches much more difficult. So Mitch supplemented his burgeoning collection by buying or trading for hard-to-get patches at police patch shows.

Gathering the patches required major personal investments of time and money. So why amass such a collection? "It was a drive I had," Mitch explained. "When I do something, I try to give it 100% effort. Once I started, I wanted to collect all of New Jersey. When I was still missing a lot of patches, getting them was fairly easy. But when I got down to the last dozen or so, that was the real nitty gritty. My wife says I 'patch' her to death. It got tough to stick with it, but I'm glad I did!"

Mitch discovered how hard the collecting bug had bitten him after he completed his New Jersey police patch collection. He's now after all 52 of the badges worn by police in the United Kingdom, police patches from every continent in the world, and police hats and uniforms!

DEPARTMENT OF PUBLIC SAFETY
• Emergency Services Unit

Extension 3333 is the number to call to report a medical emergency. This extension is answered 24 hours a day by the Communications Officer located at the C-Site Security Desk. The call is also simultaneously monitored by the Emergency Services Unit (ESU), the Occupational Medicine and Safety Office, and the Project and Operational Safety Office.

The Communications Officer answering your call is trained to obtain vital information about the emergency, such as the nature of the problem, the exact location of the incident, and the name of the caller. The officer will probably ask you to hold the line while the ESU is dispatched. DO NOT hang up the phone!

After dispatching the ESU, the officer will ask the caller for the telephone number at the emergency site, the name of the injured or ill person, and any other information which may aid the response to the emergency. Let the Communications Officer hang up FIRST: that will be his indication that he has all the information required to handle this emergency.

If possible, and without leaving the victim unattended, the caller should get someone to meet the responding ESU members at the closest entrance to the area to help direct them to the actual emergency site.

The Department of Public Safety appreciates your cooperation in aiding the timely response to all medical emergencies at PPL.

TRANSITIONS

The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Walter Stark of the Computer Division and his wife, Barbara, whose son, Joshua, was born August 8;

Mary Jane German of Accounting and her husband, Paul, whose son, Brenton Thomas, was born September 3.

Roger A. Mayes (left), Director of Operations and Environmental Safety Division of the Department of Energy's Chicago Operations Office presented PPL Director Harold P. Furth with the DOE Award of Excellence September 5. The award recognizes the laboratory's continued progress in improving its safety record. PPL surpassed one million man-hours worked without a lost-time accident last month.

Al Hoagland

If you're waved through the C-Site guard booth with an semi-military salute after your ID check, you've probably already met Public Safety Department Officer Al Hoagland.

Al was born in Trenton and raised in Philadelphia. He spent 22 years in the Air Force, retiring with the rank of Master Sergeant. He and his wife have four children ranging in ages from two to 20.

Al joined the Princeton University Security staff in August 1984. When the Security Department merged with the Emergency Services Unit to become the Department of Public Safety, he became an Emergency Safety Officer (ESO) at the Forrestal Campus.

ESO's function as security officers at all times during their shift. If an emergency occurs, however, they respond as either firefighters or emergency medical technicians as needed. The position gives Al the opportunity to use the skills he acquired during 18 years of firefighting in the Air Force.

Al, who describes himself as "people-oriented," has found his daily contact with lab employees makes his job more enjoyable. "When you're dealing with people, you sometimes have to be very flexible," he says. "On the 4 to 12 shift, things are usually more quiet after most of the employees are gone. Most of the time then is spent checking buildings. But when you're on the day shift and you add people, the people factor can make a day very interesting."

Al said things were initially a little confusing at the C-Site guard booth when mandatory checking of ID badges began this summer. Al recalled making "meaningful contact" with some staff members, explaining that the checks were not designed to delay or harass employees. "It was a relatively new procedure," he said, "and when you're dealing with that human element, you've got to try to ease people into that new situation." Now, he reports, drivers approach the booth with a grin, often waving their badges at the officers. "I'd say the operation runs smoothly about 98 percent of the time," Al maintains.

Fireworks

Charlie Neumeyer, Dave Olsen, and Pete Haney really get a bang out of their second jobs. The trio are part of a company that plans and executes fireworks shows throughout the New York and New Jersey area.

The company is owned and operated by Joe Sredniawski, a Grumman employee now working at the company's Bethpage plant. While he worked in the local Grumman office, Joe met Charlie, Dave, and Pete. Joe discussed his sideline with them. Although they all possess "a healthy fear of power and energy," according to Charlie, all three expressed interest in becoming members of one of Joe's fireworks crews.

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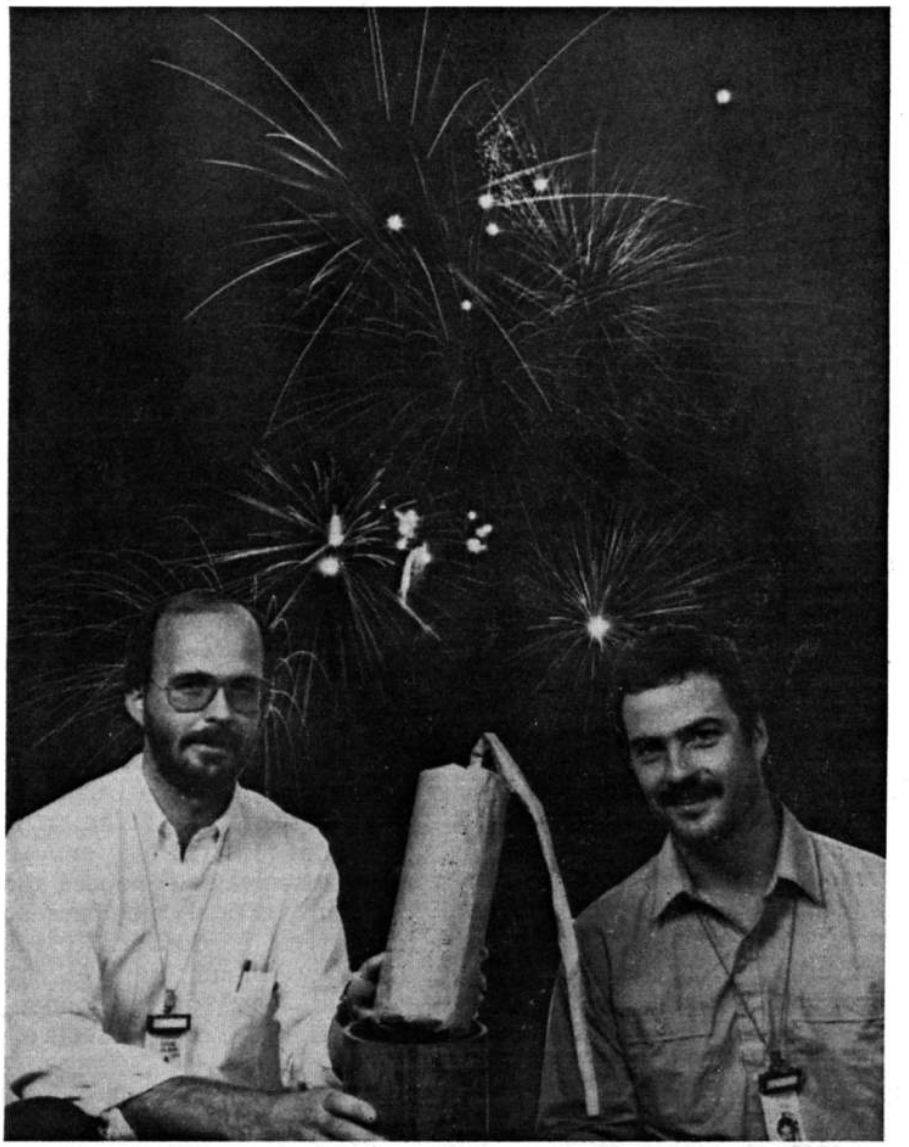
Once the three were hired, they went to Joe's home for training. All Joe's employees are required to watch a video about fireworks, followed by a hands-on dry run of packing and firing the fireworks shells. Each worker then attends two to three shows as an observer before being allowed to participate on a show crew.

Joe translates a customer's requests into reality by planning the shows, designing the firework sequence, and packing the necessary shells into a magazine. A crew of six to nine workers transports the magazine to the show site, loads the three- to eight-inch diameter shells into mortar tubes, and fires the shells in the preset order.

For safety's sake, no one crew member is permitted to both load and light the fireworks. Each team employs loaders, who take the shells out of the magazine and insert them into the mortar, and lighters, who light the fuses with a flare. All lighters and loaders approach the mortar from an angle to minimize the possibility of being being struck by an ascending shell.

Safety concerns abound when dealing with fireworks. There is, for example, a distinct difference between U.S. made and Japanese made fireworks. U.S. made models have fuses which extend for about two inches from the shell. When lit, the fuse burns for two to three seconds -- allowing plenty of time to clear the firing area. But Japanese fireworks use fastburning fuses, leaving little escape time once ignited.



Dave Olsen (left) and Pete Haney

Each shell is propelled skyward by a lifting charge packed within it. Malfunctioning lifting charges (a rare occurrence) can be a real danger. Dave recalled a shell that exploded while it was only one foot above the mortar tube. Crew members were shaken, but no one was hurt.

Coordination is vital if the crew itself is to avoid accidents. The shells are loaded in straight runs, mixing shells that create the patterned lights with those that are simply noise. When the weather is still, the smoke and haze the explosions create hovers at ground level. It makes it difficult for the loader to find the throat of the tube. There's also the stench of gunpowder. Crew members must constantly shout out what they're doing, ensuring that everyone is aware of what's going on all the time.

Even preparing a ground display, which is created by stapling smaller fireworks onto wood and wire frames, isn't

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without risk. Occasionally a misplaced staple will set off a string of firecrackers during assembly.

Although the displays are fired directly over their heads, Charlie, Dave, and Pete rarely get to see the fruits of their labors. There is very little opportunity for crew members to look up during a show. The exception is the finale, which is rigged for continuous firing by itself.

The danger of working with unpredictable fireworks adds a thrilling aspect to this avocation, and keeps all three men coming back. But despite precautions, the thrill can sometimes turn to chill. It did when Pete worked as a lighter in a show done for McCorriston High School. Unaware that a second shell was already loaded in a mortar, Pete bent over the tube as a shell exploded from it. The shell knocked him over, burning his face and embedding cinders in his skin.

The most dangerous situation Charlie ever encountered during a show came during the Feast of Lights in Trenton. Six rockets were set into aluminum mortars mounted on a wooden rack. One malfunctioned, blowing the tube apart. The explosion tipped the rack over, setting off the other shells. No one was hurt in the incident, and the show continued.

Such accidents seldom occur, and can't overshadow the enjoyment all three men get from indulging their childhood fascination with fireworks. So despite the danger, the trio intend to keep lighting up the night skies with their explosive hobby.

OSHA Reminders

The following safety reminders are drawn from a list of common Occupational Safety and Health Administration (OSHA) violations:

- Guardrails and toeboards must be installed on all open sides and ends of platforms more than 10 feet above the ground or floor. Scaffolds four to 10 feet high, with a minimum horizontal dimension of less than 45 inches in either direction, must have standard guardrails installed on all open sides and ends of the platform.

- Vertical portions of a scaffold must be properly secured laterally by use of cross braces, diagonal braces, or both. The cross braces must be long enough to automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections must be made secure.

- The minimum dimension of the scaffold base when ready for rolling must be at least one-half of the height of the scaffold. Outriggers, if used, shall be installed on both sides of the staging.

Space Heaters

Space heaters can certainly turn drafty areas toasty warm. But to be sure it's the air, and not you, that gets toasted, keep the following space heater guidelines in mind:

- Put at least 36 inches of empty space between your portable heater and <u>everything</u> else -- including walls.

- NEVER refuel a liquid fuel heater while the heater is hot. The residual warmth in the heater could cause a flash fire during refueling.

- Use only the fuel recommended by the manufacturer; saving pennies on substitutes or lower grade fuels could cause a costly fire. And NEVER use gasoline as a heating fuel!

- Check electric heaters frequently for frayed or cracked power cords. If you find damage, don't take chances; disconnect the heater and don't use it until the cord has been replaced.

- Never allow children to play alone near a space heater. Make sure an adult is present to prevent painful burns.

Remember that space heaters for use at PPL can only be purchased with the approval of Plant Engineering.

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