



HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

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February 7, 1985

S-1 ACHIEVES INITIAL GOALS

Perhaps from now on the S-1 spheromak should be billed as "the reborn S-1." The device recently reached the initial milestones established when the S-1 project was proposed in 1979. Those early milestones have now been followed by an even more ambitious experimental plan for the coming years.

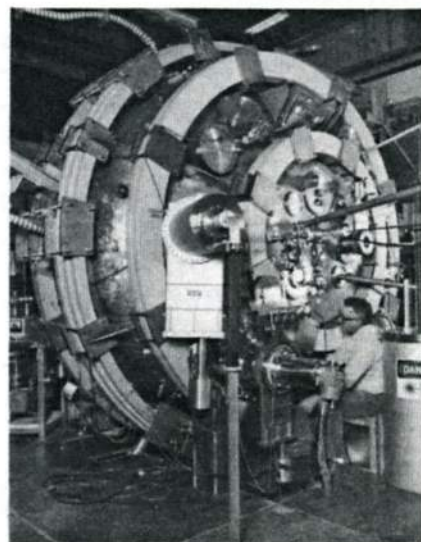
The initial goal of the S-1 program was to obtain hot (100 eV) plasmas with lifetimes of 1 msec or more. With passive stabilizing coils, these spheromak plasmas were also expected to be stable against gross magnetohydrodynamic (MHD) instabilities. S-1 has accomplished all those achievements in the past three to four months.

Dr. Masaaki Yamada, who serves as co-head of the S-1 project with Dr. Robert Ellis, credited the dramatic improvement in machine performance to improvements made during last summer's machine opening, and to the perseverance and enthusiastic performance of the S-1 team. The program had been stalled by problems resulting from cracks in the flux core liner. Experimentation was halted while the original liner was replaced by a 20 mil thick, epoxy-backed Inconel liner. The flux core power feed-through was strengthened during the same period, allowing more coil current to be fed

through the core. Members of the Coil Shop and the Vacuum Shop designed and carried out the flux core modification with enthusiasm and dedication to minimize S-1 down time. After the repairs, the vacuum faults which had plagued the program disappeared, and S-1 began functioning very reliably.

Other hardware refinements continued to improve S-1's performance. The installation of figure eight coils during the fall made a significant improvement in S-1's ability to resist gross MHD plasma instabilities. The coil system had been successfully tested on the Proto-S-1 device, but worked even better when installed on the S-1 machine itself.

Prior to installation of the figure eight coil system, the plasma was subject to constant shifting and tilting instabilities, affecting not only plasma lifetimes but also the diagnostic reproducibility of S-1 results. Once operation resumed with the figure eight system, creation of well-defined spheromak plasmas detached from the flux core which formed them became routine. Instabilities were suppressed, allowing for formation of cleaner, hotter plasmas with lifetimes over 1 msec. S-1 is now reaching toroidal currents of over 300 kA, electron densities in the



The S-1 device

mid to upper 10^{13} range, and measured peak temperatures often exceeding 100 eV.

The most important observation in recent S-1 experiments is that the electron temperature is no longer limited by the impurity radiation loss. After the S-1 vacuum condition and the gross MHD plasma stability were improved, there was strong evidence that the temperature increases with plasma current. This observation is very similar to the scaling observed in RFP (reverse field toroidal pinch) machines. This is a very promising sign, according to Dr. Yamada; if S-1 follows this trend with increased plasma current, as well as with current density increased by adjusting the plasma size, the machine should be able to achieve electron temperatures in the 200-300 eV range "in the foreseeable future."

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Dr. Yamada said that the S-1 spheromak may eventually exceed RFP performance, since spheromak plasma surfaces can be kept away from the first wall, thus reducing impurity contamination. He added that the spheromak has great potential to be the most promising alternate magnetic fusion concept.

Another significant finding is that the S-1 spheromak plasma always adjusts its configuration by means of "flux conversion" toward the minimum energy state predicted by a theory of J.B. Taylor. On February 6, Dr. Alan Janos will present a PPL colloquium covering these results, together with many other plasma physics observations from S-1.

The discovery of the flux-conversion mechanism has created an opportunity to push the parameters of the S-1 machine towards the 1-MA, 500-eV level by means of a relatively small modification: introduction of a poloidal-field transformer coil. This idea will be tried out on Proto S-1C this summer, and work on a S-1 modification could begin next year. In the future, still further parameter advances will be made by adiabatic compression of the spheromak plasma.

According to Dr. Harold Furth, "The spheromak flux conversion mechanism is of first-rate plasma-physics interest, and has also greatly improved the prospects for making high-powered spheromak fusion devices."

Although S-1 has met many of its experimental objectives thus far, the most important goal for the project lies ahead, according to Dr. Yamada. "We hope to discover the physics confinement

features of S-1 which are no longer obscured by impurity radiation. We're into the real physics research on that now; the next several years should be very exciting. We will listen to the machine very carefully, and we hope that S-1 will answer our questions."

The S-1 Team includes physicists Grant Hart, Alan Janos, Fred Levinton, Mikio Mimura, Steve Paul, and Peter Young; technicians John Bilinski, Fred Hoffman, Dick Labaw, Al Malone, Ray Pysher, and Fred Wood; and graduate students Dave Mayerhofer and Fred Wysocki.



Computer Classes

Building on the success of the basic computer courses run last year, the PPL Training Center is offering monthly classes on the use of IBM personal computers.

The classes, taught by Phil Jones, have been structured with the beginner in mind. Instruction begins with turning the computer on, and progresses to topics such as copying and formatting floppy disks, editing files, and the fundamentals of the BASIC computer programming language.

Each of the four class sessions lasts approximately one and a half hours. The January and February classes are filled, but those interested in signing up for the March and April sessions should contact Ernst deHaas at ext. 2290.

Benefits

In accordance with Social Security Act legislation, the rate of tax withheld from salaries is 7.05%, beginning January 1, 1985. The taxable base increased from \$37,800 to \$39,600 at the beginning of the new year.

Those individuals whose taxable salary for 1984 was in excess of \$37,800, and therefore had no Social Security tax deducted during a portion of that year, are reminded that this tax is reimposed at the beginning of the new calendar year.

Retirement Notification

Anyone planning to retire should notify Mary Moore of the Personnel Office, Sayre Hall, IN WRITING three months prior to the effective retirement date. If you have any questions regarding your upcoming retirement, call Mary at ext. 2043.

Aetna Claims

The University's Aetna Health Care Plan will allow you to carry over bills from October, November and December 1984 to help satisfy your deductible for 1985. In addition, once the first deductible has been met under the family plan, other family members' medical bills can be combined to satisfy the second family deductible.

For further details about either procedure, call Eleanor Schmitt in Personnel, ext. 2046.

EMT Training

Beginning and experienced first aiders alike will be coming to PPL to attend two spring classes being offered here by the Princeton EMT (Emergency Medical Technicians) Association.

The Association will begin its basic first aid course January 30 at 7:30 p.m. in the LOB. Classes will meet on Monday and Wednesday evenings at 7:30 p.m. in the LOB. Several Saturday sessions will also be included in the course. The \$15 class fee is payable on the first night of the session.

The Association will also begin its Emergency Medical Technician (EMT) refresher course February 6 at 7:30 p.m. Classes will be held on Wednesday nights only, although the course does include several Saturday sessions. The fee for the refresher course is \$10, payable at the first class.

Both classes will be based on the Brady Third Edition of Emergency Care, which can be purchased on the first night of class. The course textbook costs \$17, and the

companion workbook costs \$8. Both books are required for the basic course; however, refresher class members are not required to purchase the workbook.

Those wishing to take either course should write to the Princeton EMT Association, 59 Andrew Street, Trenton NJ 08610. Prospective participants should list their name, address, telephone number, and whether they will require a textbook, a workbook, or both.

Health and Safety Training

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

<u>Course</u>	<u>Responsible Instructor</u>	<u>Date Scheduled</u>
New Employee Safety Orientation	M.A. McBride Ext. 3468	February 20 9 - 10 a.m.
Back Injury Prevention	M.A. McBride Ext. 3468	February 14 8:30 a.m. - 12:30 p.m.
Fire Extinguisher Training	S. Larson Ext. 3166	February 12, 26 2 - 3:30 p.m.
Cardiopulmonary Resuscitation (CPR)	S. Larson Ext. 3166	February 18, 20, 22 9 a.m. - noon OR 1 - 4 p.m.
Self-Contained Breathing Apparatus	S. Larson Ext. 3166	February 13 9:30 - 11:30 a.m.

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

SPOTLIGHT ON:



John Krzywulak troubleshooting a computer terminal in the Calibration, Repair and Maintenance Lab.

When a vital piece of electronic equipment breaks during an experiment, the time spent waiting for a repairman or a replacement unit can become an expensive proposition. Measured by that criteria, the swift service provided by the Calibration, Maintenance and Repair (CM&R) Lab makes it one of the most cost-effective groups in PPL.

Part of the Diagnostic Services group of the Engineering Division, the Calibration, Maintenance and Repair Lab has provided in-house maintenance for PPL's broad array of electronic equipment since the research effort here began. At that time, most electronics equipment contained vacuum tubes and required regular recalibration. The advent of solid state electronics, which typically need much less recalibration, changed the group's major emphasis from calibration to maintenance and repair. Today only a small percentage of lab work involves strict calibration. The majority of its time is spent repairing malfunctioning equipment.

Calibration Lab

The Calibration Lab constantly aims at providing accurate and efficient service, rapid repair turnaround time, and the assurance that repaired equipment meets manufacturers' specifications when it leaves the work bench. "In many cases," explained lab supervisor John Gennuso, "the need for a repaired piece of equipment is immediate. When such instances arise, the men of CM&R do everything possible to get the equipment up and running."

Calibration Lab staff members include Gennuso, Robert Ericsson, Jakov Gavrusenko, John Krzywulak, Frank Pecht, Sam Pellitteri, and Howard Richter. Most of the equipment they are asked to repair has failed in use. Gennuso emphasized that although PPL purchases quality equipment, "failures are inevitable. (Voltage transients) can damage an instrument, or magnetic fields can disrupt video displays, and so on."

While repairs to test instrumentation and computer peripherals comprise the bulk of the Calibration Lab's work, more than 2,000 items needing repair have passed through the lab during the past year. If on-site repairs are added to that total, the figure rises to approximately 4,000.

Due to the large volume of work processed by the Lab, thorough records are a necessity. Record keeping assistance comes from a computer system, which also tests computer peripherals after repair; keeps track of inventory; and monitors National Bureau of Standards (NBS) recalibration schedules for specialized equipment.

In order to maintain a high level of confidence in readings produced by certain test equipment, this equipment must be traceable to the National Bureau of Standards. Some of these items are shipped to an outside calibration facility traceable to NBS for periodic recalibration. Equipment is collected and shipped to this facility on the second and fourth Tuesday of each month.



Bob Ericsson calibrating a digital multi-meter.

The Lab also works closely with the Warehouse, checking out a variety of electrical equipment as it comes in. When a new piece of electronic equipment arrives at PPL, the Receiving Department delivers much of it to the CM&R Lab for initial testing and proper operation. Gennuso pointed out that this ensures that the equipment is operating properly. "In addition," he said, "it gives us the opportunity to note the warranty dates and collect maintenance documentation on the equipment."

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CM&R staff members include (standing, left to right) Howard Richter, John Krzywulak, Jakov Gavrushenko, Robert Ericsson, John Gennuso, (kneeling, left to right) Frank Pecht, and Sam Pellitteri.

The Calibration Lab also serves as a resource for PPL personnel in need of electronics equipment or technical support. Lab employees can direct individuals to sources for equipment, or loan them equipment the lab has on hand. Approximately 800 to 1,000 items are available for loan to staff members who need them. Information and advice on the application of test equipment is yet another service the CM&R Lab staff does its best to provide.

The lab deals with a broad array of electronics, which is what keeps the job interesting, according to Gennuso. "The guys do a great job," he says. "They're very dedicated and very professional. Lab employees have developed good technical relationships with various service representatives of equipment manufacturers. In addition, the Lab staff has amassed a total of 97 years of electronic experience here at PPL."

In order to efficiently handle

the volume of repairs, the CM&R Lab divides its work into classes. Individual workers have become "specialists" in certain areas. For example, John K. and Jake do the majority of the lab's computer peripheral work. Frank does the majority of oscilloscope and CAMAC module work. Howard does vacuum controller and vacuum pump system repairs, residual gas analyzers, and safety breaks on PLT/PBX. Bob and Sam work on the majority of power supplies, analog and digital meters, and a large cross-section of the smaller jobs the CM&R Lab receives. John handles the administrative work, keeping everyone free to concentrate on the constant flow of repair work.

What keeps the job interesting after all that time? Gennuso, a PPL employee since 1966, says it's the "challenge of trouble-shooting, and the satisfaction that the job we are doing is not only supportive but important to the fusion effort."

Fire Rule Reminder

As the weather gets colder, many of us will begin using supplemental heating systems to combat the chill. But that welcome heat may become a fire unless safety procedures such as these are followed:

- Have fireplaces, wood burning stoves, and chimneys inspected once a year. Use the proper fuel for each fireplace or stove, and avoid overfiring.
- Make sure all combustible materials, such as paper, kindling, or furniture and draperies, are kept away from stoves and fireplaces. Kerosene space heaters should be located well away from any combustible material.

Smoke can be a deadly prelude to any fire. Make sure smoke detectors are properly maintained. Replace batteries as suggested in the detector's operating instructions.

- Keep all exits clear, and plan secondary escape routes in case your primary path becomes impassable during a fire. Hold periodic fire drills to practice these routes.
- In case of fire, keep close to the floor -- where the cleanest air is. A few breaths of the superheated fire gases at head level might be enough to kill you. Drop to all fours and crawl to safety.

Community Services Directory

The 1984-85 edition of the Directory of Community Services is now available from the Princeton Area Council of Community Services.

A resource guide for individuals and professionals seeking services in their communities, the Directory has descriptive listings of over 250 public and private agencies, organizations, and governmental departments. Service agency listings include the agency name, address, telephone number, operating hours, geographical area served, eligibility criteria, sources of financial support, and cost of services. The new format includes both an alphabetical and functional listing of agencies and organizations.

The Directory identifies services in Mercer, Somerset, and Middlesex Counties, and is prepared for people who live or work in Cranbury, East Windsor, Griggstown, Hightstown, Kingston, Montgomery Township, Plainsboro, Princeton Borough, Princeton Township, Rocky Hill, West Windsor, and adjacent parts of Hopewell, Lawrence, and South Brunswick Township.

The Directory costs \$1 plus postage, and may be obtained from the Princeton Area Council of Community Services, 25 Valley Road, Princeton. The Directory may also be ordered by calling the Council office at 609-924-5865 or 609-799-6033.

The Council is supported by the United Way-Princeton Area Communities.

Volunteers: People People

The following volunteer openings were supplied to the HOTLINE by the Voluntary Action Center (VAC) of Morris County. For more information on any of these listings, contact the VAC at 201-538-7200.

- A handicapped young adult, interested in a future career as a journalist, is learning to use the computer. His volunteer mentor is leaving, and the staff at the rehabilitation center where he resides is anxious for him to continue his progress. If you can help him learn to program the computer on weekends or evenings, call the VAC.
- Many departments in local hospitals have slots for volunteers willing to serve as couriers or receptionists. Help is also needed in the transportation department, gift shop, and emergency room. To join the volunteer corps, contact the VAC.
- An organized person with volunteer experience is being sought to head the volunteer personnel program for the local chapter of a national health care agency. If you think you'd fill the bill, call the VAC.

The next three volunteer listings were provided 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 Tri-County Chapter of the Juvenile Diabetes Foundation, Belle Mead, needs volunteers to work as family counselors and fund raisers, as well as to assist in distributing educational materials. To offer your aid, call the Foundation at 201-359-6248.
- The Hub, located at the United Methodist Church on Nassau Street in Princeton, provides a social center for area residents who feel isolated due to mental or emotional disorders. Volunteers work as hosts or hostesses at all Hub gatherings, which are held on Saturday evenings, and on Friday and Sunday afternoons. Volunteers should be prepared to commit themselves to a minimum of one afternoon or evening a month. For more details, call 609-924-0781.
- The Family Resource Infant Center of Princeton is a parent education and support center for families with children from birth to three years of age. The Center offers group discussion courses, parent-child education programs, and an informal atmosphere for parents to share their concerns and interests. Assistance is needed for answering telephones, conducting mailings and fundraisers, and working with youngsters in a child care setting. For more information, call the Center at 609-896-0891 or 609-924-2167.

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The next three volunteer listings were supplied by the United Way of Somerset Valley. Additional information is available by contacting each agency directly.

- The Hunterdon Occupational Training Center in Flemington needs volunteers to perform clerical, carpentry, maintenance, receptionist, bookkeeper, and janitorial tasks. Call the Center at 201-782-1480 to lend a helping hand.

- Lutheran Social Services of New Jersey matches volunteers with refugee clients, offering one-to-one assistance in their resettlement in the United States. If you have a flair for English language training, cultural orientation, or job development, call 609-393-3442.

- The Martin Luther King Youth Center in Bridgewater is seeking tutors for students ages 5 through 13, tutor aides, and van drivers. Call 201-526-3688 for more information.

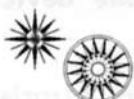
The following volunteer opportunities were provided by the Voluntary Action Center (VAC) of Middlesex County. For further information about any listing, contact the VAC at 201-249-8910.

- Jewish Family Services of Raritan Valley needs crisis listeners for its widows' support group. Training is available; contact the VAC to offer your assistance.

- An agency is seeking an individual to keep track of legislation on child and elderly adult abuse. To peruse the political scene, call the VAC and volunteer.

- Volunteers are required to survey public buildings for accessibility. Hours are flexible, and training is available. Contact the VAC to begin work in your local area.

Winter Storm



Warnings

Winter storms -- blizzards, heavy snow, ice storms, freezing rain, or sleet -- can present serious hazards to people in many parts of the country. Storm-proof yourself by following these suggestions from the United Way-Princeton Area Communities. Your life, or the lives of those you love, may someday depend on it.

- Make sure you could survive for a week or two in your home in case a severe storm makes it impossible for you to leave. This is especially important if you live in a rural area.
- Stock up on supplies such as food, water, fuel, flashlights, candles, and spare batteries. Have a portable radio handy. If a power failure occurs, use a fireplace or a camp stove (with proper ventilation) for heat. If necessary, conserve fuel by keeping the house cooler than usual, or by closing off some rooms temporarily.

- If you must go outside, dress in lightweight, loose-fitting layered clothing. Beware of hidden ice and fallen trees, branches, and wires. Avoid overexertion from walking, pushing cars, or shoveling snow.

- Drive your car only in an emergency. Keep your gas tank full. Use chains or snow tires, and travel only on main roads. Notify someone of your destination and estimated arrival time.

- If your car becomes disabled, stay in the car and wait for help. Run your engine and heater sparingly, and open a window a bit for ventilation. Keep blankets, flares, a first aid kit, and emergency food (non-perishable) in the trunk of your car.

Remember, your first line of protection is to know when a winter storm is approaching. Keep posted on weather conditions in the surrounding area through television, radio, and newspapers. If you know of an approaching storm, you can avoid being caught in it -- or at least be better prepared to deal with it.

Irradiator Improves Transplant Success

A young boy with a defective kidney lies in a hospital while a dialysis machine cleanses his blood. In another wing of the hospital, a girl the same age has just died of a head injury suffered in a car accident.

The girl's parents offer to donate her kidneys, but doc-

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tors decide against a transplant for the boy since the youngsters are not related and their blood types do not match.

While this scene is fictional, scenes like it occur all too frequently. Doctors often decide against kidney transplants from unrelated donors because the body's defense mechanisms will reject the transplant in about 40 percent of such cases. The problem is that white blood cells, known as lymphocytes, fight not only the infection but also any foreign bodies they encounter -- including the "foreign" donor organ.

Currently, chemotherapy and single, massive doses of radiation to flowing blood are the only alternatives available to suppress transplant rejection. Both approaches have drawbacks, however. Chemotherapy damages all cells, not just the immune system, and makes patients very ill. Massive radiation, given days or weeks before the organ transplant, permits new cells to generate. It is these cells that often initiate rejection.

A team of scientists at the Department of Energy's Pacific Northwest Laboratory has developed a portable blood irradiator that shows promise of improving the odds of a successful transplant.

The device -- developed by Dr. Frank P. Hungate, L. Roy Bunnell, and William F. Riemath -- uses radiation from an isotope of the element thulium to suppress the levels of lymphocytes. Treatments would start two weeks before a planned transplant, continuing for four weeks after its completion.

The irradiator is about the same diameter and half the length of a pencil. With its shielding, it becomes a cylinder about $1\frac{1}{4}$ inches in diameter and five inches long, worn on the wrist or ankle. Blood flows from an artery through the irradiator and back into a vein.

"The kidney will resume its functions, including normal clotting of the blood, in about two weeks," Dr. Hungate says. "As clotting is resumed, it shuts off blood flow to the irradiator, and the device is then removed."

The most pleasant surprise in the research, which has been conducted only on animals so far, has been the lack of infections or side effects from bacteria while the animal's lymphocytes are lowered by the radiation.

"We believe there are antibodies that are not directly reliant on lymphocytes, but are the basis for fighting bacterial infection," Dr. Hungate said. "We haven't checked it thoroughly yet, but irradiated goats we turned out to pasture have had no problems with disease or infection."

"If our only achievement is a five percent improvement in the success rate of kidney transplants, the money the taxpayer saves and the improved life for the transplant recipients would be worth it," Dr. Hungate said.

Caregivers Conference

The Princeton Area Council of Community Services is sponsoring a Family Caregivers Conference on March 2 from 9 a.m. to 1 p.m. at the

West Windsor-Plainsboro High School.

Conference workshop sessions, planned by the Council's Health and Aging Committees, have been designed to address the needs and concerns of individuals who care for an impaired and homebound family member. The conference will provide information on community services and resources, physical care techniques, and equipment and products available to help the caregiver. Opportunities to learn coping skills for handling the stress of this physically and psychologically demanding role will be offered, along with sharing of experiences in an atmosphere of mutual support.

Anyone who wishes to attend the conference is asked to pre-register. A buffet lunch will be provided, and both respite care and transportation for the conference can be arranged through the Princeton Area Council of Community Services. Further information about the conference and pre-registration forms may be obtained by calling the Council office at 609-924-5865 or 609-799-6033.

The Princeton Area Council of Community Services is a voluntary non-profit organization of public and private health, welfare, recreation, and education agencies and representatives of the general public concerned with improving the quality of life in their communities. The Council is funded by the United Way-Princeton Area Communities, and serves 13 communities in Mercer, Middlesex, and Somerset Counties.



NO FREE RIDE

People can be injured trying to hitch rides on trucks, cranes, or other vehicles. Others get hurt stepping on or off stationary equipment such as ladders.

Why does this happen so often?

For one thing, people often get in too much of a hurry. They don't take the time to step on the bottom rung of the ladder, or they skip the bottom stair step. They're in such a hurry that they don't watch how or where they're stepping, and they end up becoming an accident statistic.

Another reason these kinds of accidents occur is impatience. Walking to their destination seems to take too long for some people. These individuals are used to driving instead of walking a couple of blocks to run a short errand, and this attitude carries over into the workplace.

The next time you're tempted to grab a free ride, think again. The minutes you lose going the safe way may actually add years to your life.

Employment Verification

Verification of employment is necessary when applying for mortgages, credit cards, and so forth. The Personnel Office will comply with these requests **ONLY** when the request is received in writing and authorization for information release is granted by the employee. Employment **WILL NOT** be verified over the telephone.

Requests for employment verification should be sent to Eleanor Schmitt in care of the Personnel Office.

Transitions

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

Steve Landau of the Vacuum Shop and his wife Paula, whose son, Steven Alexander, was born January 8;

Carol Goldenbaum of Accounting and her husband Gary, whose daughter, Kristy Lynne, arrived on December 28.

Benefits Meetings

Beginning this month, PPL's Benefits Administrator Mary Moore will be conducting small group benefits meetings around the laboratory. The purpose of these meetings will be to explore employees' questions and concerns about the laboratory's benefits programs. Employees with questions or concerns about their personal benefits status should contact Mary at ext. 2043.

Seat Belt Benefits

Although New Jersey's mandatory seat belt law doesn't go into effect until March, it's never too early to develop the habit of buckling up each time you get into your car.

Using your seat belts makes good sense, even when you're only going on a quick local errand. Most accidents that kill or injure occur at speeds of less than 40 miles per hour, and within 25 miles of the motorist's home.



And although many drivers feel they'd rather be thrown clear of their vehicle in case of a collision, statistics show your chances of being killed are five times greater when you're thrown from the car. Seat belts keep you in place and in control during an accident.

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

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

OSHA Violations

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

- Every infrequently used pit or trapdoor floor opening must be guarded by a floor opening cover of standard strength and construction, which should be hinged in place. While the cover is not in place, the pit or trap opening must be protected on all exposed sides by removable standard railings, or monitored by a guard posted at the site.
- If someone could accidentally walk into a floor hole, it must be guarded by a floor hole cover of standard strength and construction.
- Every open-sided floor or platform suspended four feet or more above the adjacent floor or ground level must be guarded by a standard railing on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder. The railing must be provided with a toe-board wherever people can pass, machinery can move, or material can fall beneath the open side.

For Sale

The following items are being offered for sale by Meg Gilbert of Personnel:

Test-Rite 100-DC diffusion enlarger, 135mm lens, with 4x5, 2-1/4 x 2-1/4 carriers. Good condition, crude but sturdy. \$125.

Eico 460K oscilloscope, 5MHz vertical bandwidth, recurrent sweep. Works; \$50.

"Legacy of Blood," 16mm movie, starring John Carradine and Faith Domergue. Color, 90 minutes. Very good condition; \$100.

If you are interested in any of these items, call Meg at ext. 2036.



Tour Guides



October, November, and December certainly didn't constitute a holiday season for the PPL tour program. Almost 900 visitors viewed our facilities, with 323 tourists arriving in December alone. Our appreciation is offered to the following tour guides, who shepherded our sightseers during the recent holiday season:

OCTOBER

Art Brooks
Lee Benson
Kees Bol
Peter Bonanos
Diane Carroll
Dave Ciotti
Larry Dudek
John Doane
Ernst deHaas
Cliff Fortgang
Richard Jensen
Russell Kulsrud
Naren Kokatnur
Roy Little
George Levitsky
George Martin
Don McNeill
Don Monticello

Lorand Meray
Dennis Manos
Carl Pierce
Hank Rozenbroek
John Robinson
Alan Ramsey
Stan Schweitzer
John Tobin
Al von Halle
Shoichi Yoshikawa
Irving Zatz

NOVEMBER

Halsey Allen
Dale Ashcroft
Charlie Ancher
John Bradish
Dave Ciotti

Sam Cohen
Sal Cavalluzzo
Ernst deHaas
Jim French
Robert Fleming
Ralph Izzo
Naren Kokatnur
Russell Kulsrud
Janardhan Manickam
Michael Periera
Eric Perry
Alan Ramsey
Joe Stencel
Randy Wilson
Hal Wexler
Irving Zatz

DECEMBER

Halsey Allen
Robert Budny
Lee Benson
Peter Beiersdorfer
Jim Chrzanowski
John Coonrod
Robert Forester
Ralph Izzo
John Johnson
Naren Kokatnur
Randy Knize
George Levitsky
Benoit Leblanc
Loran Meray
Robert Mills
Michael Periera
Greg Rewoldt
Irving Zatz