



### TFTR Update

After a record-setting spring and a busy summer, TFTR is preparing to power up for a fall experimental run that should be even more exciting, according to Deputy TFTR Project Manager Dale Meade.

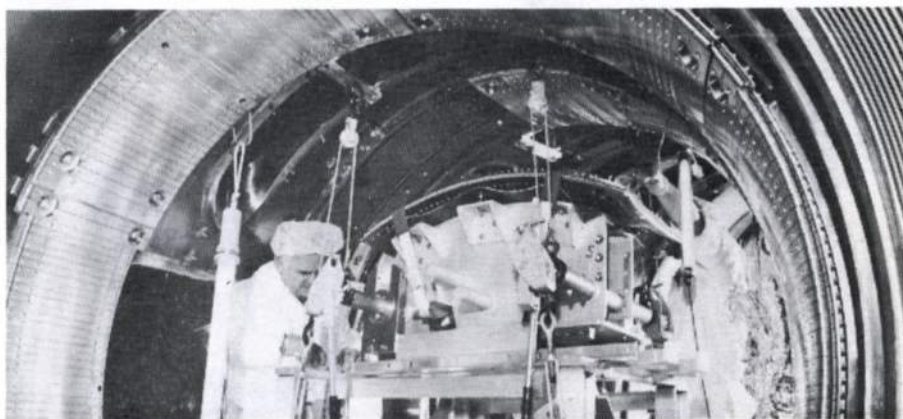
"TFTR had a very successful run from April through the end of June," Dr. Meade reported. "The most exciting results were that the energy confinement time of the plasma was in the range of 150 to 180 ms for cases where the density was  $2 \times 10^{13} \text{ cm}^{-3}$ , and the electron and ion temperatures were in the range of 1.5 keV. This is the longest energy confinement time ever obtained in a tokamak; it's the world's record."

"Especially interesting," he continued, "is the fact that this long confinement time indicates that the confinement time is increasing as the size of the tokamak is increased. In particular, for these ohmically heated plasmas, the results suggest that the confinement increases by size cubed."

Nor was this TFTR's only accomplishment. The machine was brought up to approximately 40% of its power systems rating, while the toroidal field was run at 50% of its main value. The plasma current was increased to 1 MA (40% of its full 2.5 MA rating) six months ahead of the deadline date PPL had given the Department of Energy.

The plasma control systems were also checked during this experimental period, resulting in the routine production of 800 kA plasmas with 1 sec. flat-top. Actual plasma disruption rates were found to be less than the rates assumed in TFTR design studies.

Almost six weeks of operation were used to condition the vacuum vessel and limiter. During this period of time, 25,000 shots with plasma currents of



*Technicians make adjustments before installing another segment of the bellows cover plates inside the TFTR vacuum vessel.*

approximately 150 to 200 kA lasting 100 ms were used to pulse discharge clean the inside of the TFTR vessel.

A wide range of diagnostics were also brought on line. Diagnostics to monitor electron temperature; ion temperature; electron density; and plasma impurities are now operational. In addition, the total power radiated by the plasma is being measured by a bolometer.

Through the majority of the test period hydrogen plasmas were run although several pulses were run with deuterium at the end of June. After approximately 322 documented plasma shots, the TFTR vacuum vessel was baked out at about 100°C. for three days. The vacuum vessel was opened early in July to allow for installation of the bellows cover plate system, the moveable limiter, hardware for the Thomson scattering system, and the prototype surface pumping system. A small bellows leak was also repaired during the summer opening.

Not all the summer TFTR activity took place on the machine itself, however. Power supplies continued to be commissioned and upgraded, and an analysis of MG set performance was made. "We believe (the MG set) will be capable of full performance for the fall run," Dr. Meade asserted.

The first neutral beam line was installed in the Test Cell during the summer, six months ahead of schedule. The second neutral beam line is slated to be moved to the Test Cell in mid-January, and testing of both will begin in April.

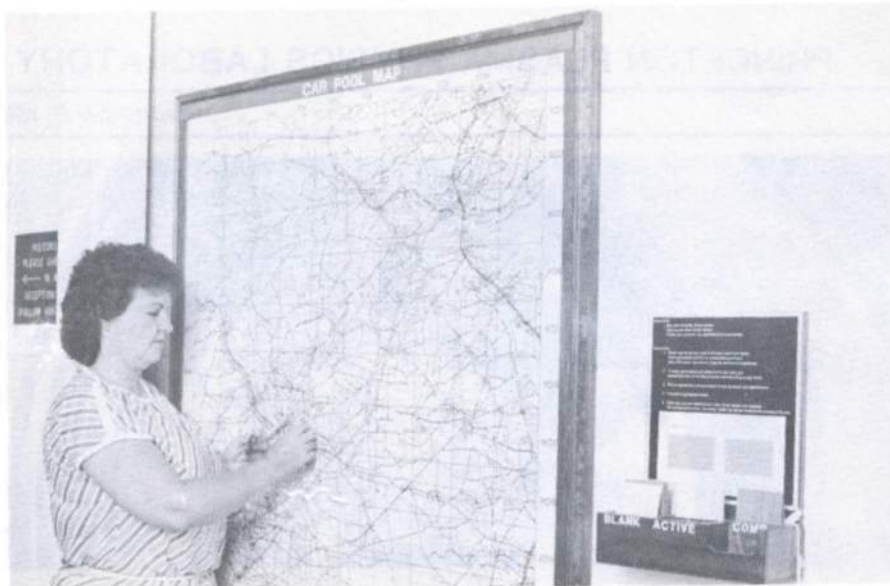
TFTR is scheduled to be put back under vacuum around September 19, with pulse discharge cleaning expected to begin about October 1. The major objective of the fall experimental run will be to continue size scaling studies for major radius plasmas. Dr. Meade said he expects that plasma currents in the range of 1 to 1.5 MA should also be "routinely produced".

The next major milestone in the program is the first test of plasma compression, currently planned to take place in December. Creation of ohmically-heated plasmas would continue through mid-January, when the machine would again be opened for installation of neutral beam injection equipment.

Dr. Meade expressed his thanks to the laboratory community for the hard work, skill and dedication that have made TFTR such a success thus far. "The results of the contributions of everyone in this laboratory are recognized throughout the world as a significant step forward," Dr. Meade concluded. "And we look forward to even more exciting experiments in the fall."



## Carpooling Map



*Debbie Anastasio places her pin in the PPL carpooling map, located near the C-Site guard station.*

Employees interested in sharing their daily commute to work can now take advantage of PPL's carpooling map, located near the C-Site guard station.

A rack next to the map contains colored pins and red, yellow and blue data cards. Blue cards should be filled out by those seeking riders; red cards are for those seeking drivers; and yellow cards are for those willing to share driving chores.

Prospective carpoolers should locate their homes on the map by grid numbers. If a pin is already located in that area, a corresponding data card should be filed in the card rack. Each completed card

lists an employee's home and campus address, PPL extension and working hours. Individuals are responsible for contacting each other to make ride-sharing arrangements. Carpoolers should leave their pins and data cards in position until their desired level of ridership is reached.

Once a carpooling request is filled, the pin should be removed from the map. The data cards should then be placed in the "completed" area of the card rack. Completed cards will help measure the map's effectiveness.

Instructions for using the map are posted above the card rack.

## Respirator Reminder

Respiratory protection is used to safeguard the health of workers from air contaminants. Respirators include, but are not limited to, chemical cartridge filtering masks, dust masks, gas masks and self-contained breathing apparatus. Specific examples used at PPL are MSA Comfo II, MSA Dustfoe 66, Wilson Air Purifying Masks, ScottAir Paks and 3M Model 8710 Dust Masks.

In order for these devices to protect you, they must be used in accordance with a

respiratory protection program. Such a program consists of fit testing the masks to the wearer; choosing the proper respirator for the air contaminant present; ensuring that the respirators are sanitized and stored properly; and training the user in the limitations, care and use of the respirator.

If the use of respirators is not governed by such a program, then health problems may occur. For example, if the proper respirator is not chosen, then that wearer will not be protected from the contaminant present. Another example

is that if the respirators are not sanitized, communicable diseases may spread. The use of respiratory protection is highly regulated by OSHA and DOE for these health reasons.

We are seriously concerned that some PPL employees can be needlessly exposed to health hazards through the misuse of this protection. Everyone should inspect their area of responsibility. If you are using respirators without the programming elements described above, please contact Health and Safety promptly.

Future health and safety walk-through inspections by the Departmental Safety Officers, Area Safety Coordinators and H&S staff will include the evaluation of the use of respirators.

## Obscene Call Rules

Here are a few rules you should follow if you receive obscene or annoying telephone calls:

- Try to determine if the caller is male or female. Try to detect an accent or speech impediment. Does the caller's voice seem weak or strong, close by or distant? Are there background noises?
- If the call is obscene or suggestive, **HANG UP!** Don't entice or provoke your caller. An abrupt "hang up" may discourage your caller from calling back.
- Keep a record of the calls you receive if the caller is persistent. Note the time of day, day of the week, and so on. Your caller may have a calling pattern.
- *Most important*, if you receive an annoying or obscene call while at work, contact the Security Department as soon as possible.

For more information about annoying/obscene phone calls, contact the Security Department on ext. 2894.

## Stress Workshop

September 15 is the registration deadline for a stress management workshop being offered by the Personnel Department. The one-day workshop will be conducted by Dr. Robert Woolfolk, a professor at Rutgers University who co-authored the book "Stress, Sanity and Survival". How to recognize signs of stress, managing your time, and how to relax will all be discussed during the day.

The workshop will be held in the Professors' Lounge at Fine Hall on main campus. To register, contact Meg Gilbert in Personnel at ext. 2036.

## Fume Hood Use

One of the most important elements of a laboratory safety and health program is the fume hood. Although it is an essential piece of equipment for the protection of personnel, it is commonly abused.

In order to achieve maximum protection with the fume hood, the user must understand basic hood functions, expected performance and limitations, and above all, proper hood usage. It is important to remember that a laboratory fume hood is only a box with air flowing through it. Large bulky objects and hood clutter are detrimental to hood performance. Too much equipment or bulky objects (such as towel and glassware racks) are the most common causes of poor performance.

To maximize hood performance employees should:

- "Block-up" necessary bulky objects off the hood work surface. Turbulence is reduced by allowing some air to flow underneath.
- Do not use hood for dead or unnecessary storage.

- Avoid blocking the rear baffle exhaust slot.
- Keep the hood clean. Clean up spills immediately, and periodically clean debris off the baffles. Do not allow wipe tissues to be drawn into the exhaust slots.
- Work with the substance well inside the hood. Pouring and transferring noxious materials are most safely done at arm's length.
- Avoid placing your head into the hood. This obviously defeats the purpose of the hood.
- Maintain the sliding sash at the lowest practicable working level. Use the sash as a protective shield.
- Hoods are not designed to contain explosions, but most hoods can withstand some process excursions and almost any fire long enough for it to be extinguished.

Extremely toxic materials, such as beryllium dust and fumes, can often be handled in a glove box rather than a fume hood. The nature of a chemical and its use, along with the air flow and hood parameters, needs to be evaluated.

The proposed design, installation, and use, or the existing use, of a laboratory fume hood should be worked out with Health and Safety (H&S). This will ensure that the type of hood, the location of the air flow velocity, and the materials used inside it coincide with good ventilation practices.

Health & Safety performs hood air flow surveys on an annual basis. The results of the most recent survey are provided on a tag found on the upper right hand corner of each hood. Additional information on the survey can be found at the H&S Office. A hood that is suspected of not performing properly should be promptly brought to the attention of H&S.

Questions should be directed to K. Semel at ext. 2531.

## Obituaries

Three PPL staff members have died since mid-May. They include:

Kazimier H. ("Mike") Michalowski, 56, who died July 5. A laboratory employee for over 10 years, Mr. Michalowski was a technical assistant in the TFTR Neutral Beam Control and Instrumentation Section. He is survived by his wife Madeline, who works in the PPL Engineering Division; and two daughters, Cindy Michalowski and Mrs. Susan Vancelette.

William H. McBride, 63, who died June 15. Mr. McBride had worked for PPL since 1979, and was the Telecommunications Manager on the Administrative Staff. He is survived by his wife, Catherine; his son, Bruce; and his daughter, Bonnie.

Nicholas F. Csenderi, 54, who died on May 24. Mr. Csenderi joined the laboratory in 1976, and was Assistant General Supervisor, Warehouse in the PPL Material Control Division. He is survived by his brother, Joseph Csenderi.

## Safety Spotlight

Laboratory employees should consider themselves their brother's keepers, at least where safety is concerned. When you forget to consider safety — your own and that of your fellow workers — you may inadvertently be setting the scene for an accident involving another member of the PPL "family".

Such accidents have resulted in an unsatisfactory safety record for the laboratory. In an effort to get at the causes of these accidents, so that injuries may be prevented and our safety record improved, Deputy Director of Technical Operations J.R. Thompson and Associate Laboratory Director R.A. Rossi have adopted a policy of personally meeting with individuals in their organizations



who have lost time from accidents. The first such meeting has taken place, resulting in the identification of both an unsafe work practice (placing equipment where it presents a tripping hazard) and an unsafe condition (the rough working surface in front of ESU Headquarters). The work practice has been changed so equipment is not kept where it can be tripped over. The working surface is also being improved.

While it's good to identify and correct the causes of our accidents, it's much better to prevent the accidents in the first place. None of us enjoys being injured, and most of us would not want to be responsible for serious injury to a fellow worker. If we each do our part to make PPL a safer place, it will benefit all of us.

## TFTR Talk

TFTR Project Manager Dr. Don Grove will discuss "The Status of TFTR" on September 7 in the Gottlieb Auditorium. In order to allow more employees an opportunity to hear Dr. Grove's presentation (which is geared to provide an overview of TFTR status for a non-technical audience), it will be presented from 2 to 3 p.m. and again from 3:30 to 4:30 p.m. Supervisory approval is needed to attend either session.

## G. A. Discounts

All PPL employees can get a free 1983 Great Adventure Funseekers card from the Personnel office in Sayre Hall. The card entitles you and your family to discount admission to Six Flags Great Adventure during the park's 1983 season.

New at Great Adventure this year is Parachuter's Perch, the tallest family thrill ride in the world. Reminiscent of the Parachute Jump at the 1939 World's Fair and successor to the Coney Island Parachute Ride, Parachuter's Perch carries riders 25 stories — 250 feet — above the park.

You can also enjoy Great Adventure's many other rides, including the new

Freefall, which simulates a fall from a 13-story building. Shows, such as the new Water Ski Spectacular and the Wild, Wild West Show, are included in the Funseekers' reduced admission price.

If you haven't received your Funseekers card, contact Meg Gilbert in Personnel, ext. 2036.

## Bloodmobile Wants PPL Plasma

The Bloodmobile will again visit the laboratory September 13 from 10 a.m. to 3 p.m. at Sayre Hall. 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.

## Deadly Drinks

It only takes a small amount of alcohol to poison a small child. Three ounces of hard liquor, for instance, could kill a 25-pound child.

Although most parents probably know better than to serve their children alcohol, they may inadvertently make it available. One way this happens is when parents don't clean up after a party. The children wake up the next day and sample the unfinished drinks while the parents are still asleep.

If you have a party, always empty the drinks before you go to bed. Like any other drug, alcohol should be stored safely out of children's reach.

Keep hidden sources of alcohol — mouth wash, cough preparations, colognes — out of children's reach as well. These all contain enough alcohol to harm a child who drinks them.

## For The Birds



When something is "strictly for the birds", it is considered trivial, even regarded with contempt. That may be true for regular birds, but not for birds in Plainsboro, a town where for many years the working scientists and engineers far outnumbered the inhabitants. Some of that high technology must have rubbed off on the feathers of at least one bird, judging by a nest found recently in PPL's outdoor capacitor yard.

The nest is made from the usual twigs, but those are reinforced with three to four - inch - long metal spirals ("rebar" in the jargon of the civil engineer). The nest builder did not have to go far for the special material. The strips were produced by a power drill during assembly of the aluminum capacitor racks, and there are still many shavings lying on the ground.

The nest was cleverly located about five feet off the ground, at the intersection of two aluminum angles that float at 15000 volts when TFTR is operating. That does not harm the birds when they land on the nest from the air, but it does keep squirrels or other uninvited guests out. Squirrels, for example, would be zapped when trying to cross the insulators that support the capacitor racks.

The nest was only half finished when it was discovered; the birds apparently never lived in it.



*Maintenance apprentice program committeemen (standing, left to right) Ray Pressburger, Tom Carr, Ed Gilsenan, Barry Cohen, Tom Hurley, Roy Whitley and Carl Potensky pose with apprentices (seated, left to right) Kirk Garvin, Larry Berry, Bruce Black and Ed Costello.*

## Apprenticeship Program

Known as the home of innovative physics concepts, PPL may soon become known as an innovator in employee development. A coalition of members from the Personnel Division and the Plant Maintenance and Engineering Division have created an apprenticeship program that is proving to be quite successful.

The idea for this program began in May of 1982 when Personnel Employment Section Manager Barry Cohen, and Superintendent of Plant Maintenance Ramon Pressburger met. Both men decided there was a definite need to develop a certified journeyman program for PPL's general mechanics. They investigated this concept with outside industries to see if such a program did indeed exist. They found that it had been tried, but had developed so many unforeseen problems that it ultimately failed.

Approval for the PPL proposal was obtained from Mercer County Vocational Technical School, as well as from the State and Federal Journeyman Program certifying representatives. A committee composed of chairman Carl A. Potensky (Manager of Maintenance Control) and members Tom Carr, Barry Cohen, Ed Gilsenan, Tom Hurley, Bob Longmuir and Roy Whitley was formed, meeting monthly to formulate guidelines for this program.

The General Mechanics Apprenticeship Training is a five year program presently

limited to Plant Maintenance employees. It consists of formal classroom study and on-the-job training, with task requirements in the various trades pertaining to maintenance work. Participants spend a year working in the carpenters' shop,



*Apprentice Larry Berry follows group leader Doug Gunn's instructions during his training in the PPL Pipe Shop.*

and six months each in the welding, general mechanic, electrical, plumbing, and millwright shops. They also spend three months in Heating Ventilating and Air Conditioning (HVAC), three months in painting, two months in preventive maintenance, and one month each in vehicle maintenance, rigging, toolroom and boiler room work. Eight additional

hours of training each week is provided by Tom Hurley in a classroom environment. This offers individualized instruction in a variety of trades pertaining to maintenance work.

Presently, Larry Berry, Bruce Black, Ed Costello, and Kirk Garvin are enrolled in this program. When they complete their apprenticeship period, which began in October of 1982, they will be certified on both the State and Federal level as Journeyman General Maintenance Mechanics.

## Patent Program

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

- Method of Winding High-Field Double-Pancake Superconducting Coils, by P. Matera
- Gaseous Divertor, by F. Tenney, W. L. Hsu and M. Yamada
- High Rejection-Ratio Differential Amplifier, by S. Yoshikawa
- Hexagon Tap Driver, by R. Silvester
- Neutron Band-Pass Filter for Fusion Diagnostics, by T. Elevant and L. Samuelson
- Current Generation by Phased Injection of Pellets, by N. Fisch
- TFTR Ion Source Protection Equipment, by R.C. Segers
- Calculation Method and Computer Program for Determination of Inductance of Multiconductor Transmission Lines, by A. Nudelman and N. Fromm
- Technique for Coupling Electrical Energy Sources, by F. Lawn and D. Huttar
- Parabolic Tapers in Overmoded Waveguide, by J. Doane
- Bends in Overmoded Waveguide with Hyperbolic Secant Curvature Variation, by J. Doane

- High Voltage DC Break for High Power Overmoded Waveguide, by J. Doane and M. Goldman
- Tokamak Plasma Current Disruption Infrared Control System, by H. Kugel and M. Ulrickson
- High Speed Crowbar, by G. Grotz

- High Speed High Current Spark Gap, by G. Grotz
- Stabilizing Center Cylinder for Sphe-romak, by A. Janos and M. Yamada

For further information about the committee or the program, contact Meg Harmsen at ext. 2659.

## Faces and Places -- Promotions

Job movement continued at PPL this Spring, as 41 employees received promotions during the April to June period

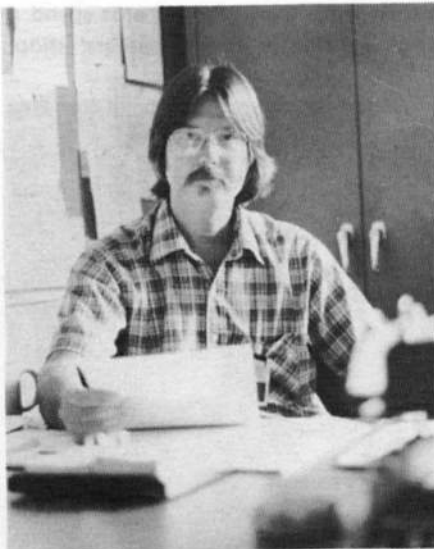


*Jack Joyce*

Among those promoted in June were Jack Joyce, now Head of the Engineering Department; Spence Holcombe, now Excess Property and Hazardous Material Control Supervisor in Material Control; Diego Debonis, now technical associate in AC Power; Robert Diernbach, now technical associate in Neutral Beam Power; Jeffery Fitzwater, now technical assistant in Operations Support; George Kalesky, now technical assistant in Project Engineering; and Mark Krysa, now technical associate in AC Power.

April promotions were given to John Boychuk, technical associate, PLT, & RF; Thomas Carr, technical associate, Plant Maintenance; Peter Haney, technician, TFTR Operations; Kenneth Hobson, technical assistant, Lasers; William

Kineyko, technical assistant, Experimental; Richard LaBaw, technical assistant, S-1; Helen Livernoche, staff assistant, Accounting; Eileen Rabiger, staff assistant, Planning & Construction Office; Leonard Thomas, Manager, Human Resources, Personnel; and Joseph Winston, technical associate, Facility Operations.



*Spence Holcomb*

Promotions in May went to Bruce Berlinger, technician, Facility Operation, TFTR; Wayne Braddock, technician, Engineering Services; Michael Brooks, technician, Engineering; Harvey Evans, technical assistant, Vacuum; Jerry Fat, technician, PLT & RF; Frank Galbraith, technician, Engineering Services; Joseph Ignas, technical associate, Cooling Systems; Charles Keller, Operating System section head, Operating System; Stephen Kemp, technical assistant, Engineering; Robert Kneeshaw, technician, Engineer-

ing; Chester Kucemba, technician, Engineering; Douglas LeBon, technician, Neutral Beams; Ronald Lusen, DAS/USC System Section Head, DAS/USC Applications; Richard McDonough, technician, Mechanical Trades; Thomas Meighan, technical associate, Coil Section; Richard Myslinski, technical assistant, Engineering; Peter Palladino, technician, Computer CICADA; Erik Perry, Fabrication & Design Section head, General Fabrication & Design; Mark Smith, administrator, Experimental; Barbara Sobel, secretary, Research; Joseph Sun, manager, General Accounting, Accounting; Arlene White, buyer, Procurement; and Michael Williams, manager, NB Systems Engineering, Neutral Beams.

## Faces and Places-- New Hires

The laboratory's ranks swelled by 30 employees during the April to June period. New hires in June included administrator Robert Applebaugh, Director's Office; physicist Ronald Bell, Laser Diagnostics; technician Irwin Bennis, Engineering Services; engineer Haim Bunin, Analog Engineering; staff assistant Ruby Dukes, General Accounting; technician Michael Frazier, Systems Services, Systems Branch; engineer James Kamperschroer, Neutral Beams; engineer Walter Nixon, Neutral Beam Vacuum; engineer Raymond Ritter, Thermo-mechanical Branch; technician Thomas Shea, Instrumentation; master instrument maker Peter Stapperfenne, Machine Shop, Engineering; and technician William Webb, Mechanical Trades, Maintenance.

New in May were technician Ralph Cianci, Engineering Services; technician Jeffrey Cotter, Facility Operations; safety technician Dennis Derewsky, Emergency Services Section; engineer Patrick Drake, User Support; physicist Grant Hart, S-1; safety technician John J. Jones, Emergency Services Section; physicist Cynthia Kieras-Phillips, APP Division Office; engineer Stephen Kilpatrick, Surface Diagnostics; and engineer Vijay Tendulkar, Power Systems.



Joining the lab in April were engineer W. Kosakowski Bennett, Engineering Low Frequency, RF; technician D. Black, General Trades; engineer Chris Brunkhorst, Engineering Low Frequency,

RF; head of QA/QC Operations Harry Howard, Technology Division Office; staff assistant Edna Kalmus, PM&O, Project Engineering; technician Richard Krsnak, PDX; technician Ray Pysher,

Experimental/S-1; engineer Daniel Orfe, Computer/CICADA; and Deputy Director for Technical Operations James R. Thompson.

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## Volunteers People People --

*The information on the SHARP program was submitted to HOTLINE by the Voluntary Action Center (VAC) of Somerset County, a division of the United Way of Somerset Valley.*

- Adults who have suffered strokes need recreational and social stimulation. Thanks to a new Somerset County program called SHARP, those activities will be available. Volunteers are needed to help with the SHARP exercise program, craft instruction, trips and other activities tailored to meet the needs of stroke victims. For details, call the VAC at 201-725-6643.

*The voluntary opportunities that follow were supplied by the VAC of Mercer County, a member agency of the United Way. For further information about any listing, call the VAC at 609-249-1912.*

- Like crafts and other recreational pursuits? The Ewing Neighborhood Center is searching for a sewing instructor, while the Camp Fire Girls are seeking a self defense instructor.
- Enjoy helping senior citizens? Donnelly Memorial Hospital needs volunteers to help feed their elderly patients. The St. Lawrence Reha-

bilitation Center is looking for volunteers to visit their "seniors", while Morris Hall needs both feeders and visitors.

- Do you keep your head in a crisis? Then volunteer as a disaster action team member with the American Red Cross.
- Thinking about a return to "college"? The Little People College can put your clean-up skills to good use.
- Are you a born organizer? The Association for the Advancement of the Mentally Handicapped is seeking a volunteer coordinator for many of its programs.

*The next six listings were provided by the VAC of Morris County. Positions are listed by general duty outlines; further information is available from the VAC at 201-538-7200.*

- Are you a data devotee? If you're comfortable with numbers, or with compiling statistics from raw data, a children's service organization needs you to gather and update data.
- Do you love the great outdoors? Help an environmental group by researching possible grants and establishing contacts within the organizations providing those grants. You'll

have a chance to develop your proposal research, writing and communications skills.

- Mad for mapping? Volunteer your time to inventory the farmlands of Morris County. Interests in natural resources and farmland preservation are helpful.
- Are you good at circumventing a crisis? A disaster chairman is needed by a Morris County organization. Duties include preventing disasters to the extent possible, meeting emergency needs, and supplying assistance to support personnel. Skill in first aid and CPR is desirable but not mandatory.
- Are you administrative material? A new organization to assist small businesses is seeking a volunteer administrator to arrange meetings, keep records and expand services. Choose your own hours -- the office and desk are waiting for you.
- On-the-job training is available for volunteers interested in becoming newsletter writers, drinking/driving campaign workers, bookkeepers, fund raisers or media liaisons for an organization concerned with drug and alcohol abuse.

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*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.*

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## --- Tour Thank Yous ---

Taking its cue from the season, the laboratory's Spring tour program grew with a vengeance. From April through June, 168 guides conducted 91 tours, showing 2,263 visitors just what makes PPL tick. April led the period with 960 visitors, led by 87 guides on 38 tours. To these hardy souls who keep our "tourists" enthralled, we extend our sincere thanks.

<b>APRIL</b>	Richard Jensen	Conrad Stout	Randall Knize	Joe Cecchi
Halsey Allen	Harold Johnson	Fred Tenney	Robert Kaita	T.K. Chu
Dale Ashcroft	Robert Kaita	Marilee Thompson	Ed Lawson	John Coonrod
Suzen Bayer	Fred Kloiber	Felix Ullrich	Sid Medley	Anthony DeMeo
Michael Bell	Naren Kokatnur	Randy Wilson	Robert Mills	Frank Dreher
Pat Bergbauer	Robert Krawchuk	Masaaki Yamada	Dennis Mueller	Fred Dylla
Bill Blanchard	Ed Lawson	Irving Zatz	Milt Machalek	Donald Hay
Manfred Bitter	George Levitski		Dennis Manos	Raymond Helmich
Fred Boody	Doug Loesser	<b>MAY</b>	Peter Materna	Harold Johnson
Kevin Brau	Milt Machalek	Charlie Ancher	George Martin	Fred Kloiber
Charlie Bushnell	Dennis Manos	Halsey Allen	M. Okabayashi	Naren Kokatnur
Donald Carden	George Martin	Suzen Bayer	David O'Neill	Ed Lawson
Sal Cavalluzzo	Peter Materna	Pat Bergbauer	Richard Palladino	Doug Loesser
Liu Chen	Sid Medley	Norton Bretz	Mike Periera	Pieter Manintveld
Sam Cohen	Lorand Meray	Robert Budny	Alan Ramsey	Peter Mathe
John Coonrod	Robert Mills	John Bradish	Keith Sapp	Dale Meade
Steve Davis	Don Monticello	Richard Cassel	Ted Terpstra	Lorand Meray
Ernst deHaas	Henry Moreau	Sal Cavalluzzo	Felix Ullrich	David Meyerhofer
Frank Dreher	Holt Murray	John Coonrod	Al von Halle	David McNeill
Ray Fonck	Stephen Paul	Fred Dylla	Ken Young	Gary Oliaro
Sam Goldfarb	Mike Periera	Ernst deHaas	Irving Zatz	Greg Rewoldt
Ray Grimm	Alan Ramsey	Robert Ellis	<b>JUNE</b>	Gerd Schilling
Richard Hawryluk	Albert Reid	Mel Gottlieb	Halsey Allen	Paul Snook
Donald Hay	Greg Rewoldt	Richard Hawryluk	Charlie Ancher	Marilee Thompson
Phil Heitzenroeder	Paul Rutherford	Daniel Huttar	Suzen Bayer	Phil Thompson
Daniel Huttar	Keith Sapp	Fred Kloiber	Bill Blanchard	Al von Halle
David Ignat	Greg Schmidt	Naren Kokatnur	Charlie Bushnell	Hal Wexler
Alan Janos	Joe Stencil			Irving Zatz
	Larry Stewart			