



# 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 surprised 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



*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).*

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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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 try-

ing 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."

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## 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 especially 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<sub>2</sub> 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 em-

ploying 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 be-

ing 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 recombining carbon plasma to produce soft (long-wavelength) x-ray laser radiation of 182Å wavelength.



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 Pittsburgh 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<sup>+</sup> 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 Alfvén 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.

## 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.

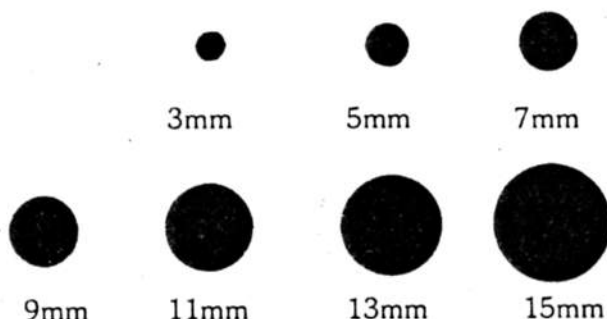
The safest fuel to use in a wood-burning stove is hardwood that has been seasoned for 12 months, with larger pieces split to promote drying. Trash should never be used as fuel, nor should charcoal be used in an indoor stove.

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

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## MEASUREMENT GUIDE

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



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.

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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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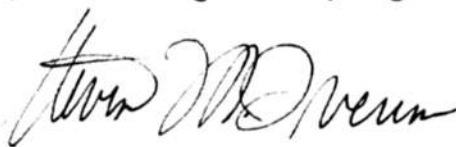
## Spotlight On Drinking and Driving

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 alco-

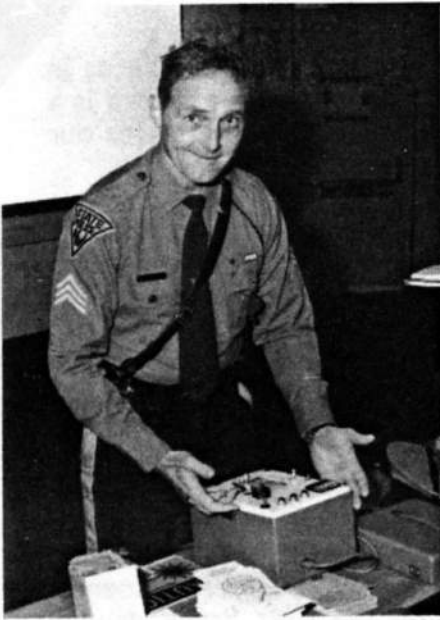
hol will be served. At the beginning of the party, several guests "volunteer" to drink nonalcoholic beverages. These "designated drivers" can then drive other celebrants home safely.

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 freelance 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 ba-

nana 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) non-professional 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 milli-

grams, 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

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

### HANGOVERS: MYTH VS. FACT

- **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.

- **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.

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### 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 Air-flow 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, and Texas Instruments. He has 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.