

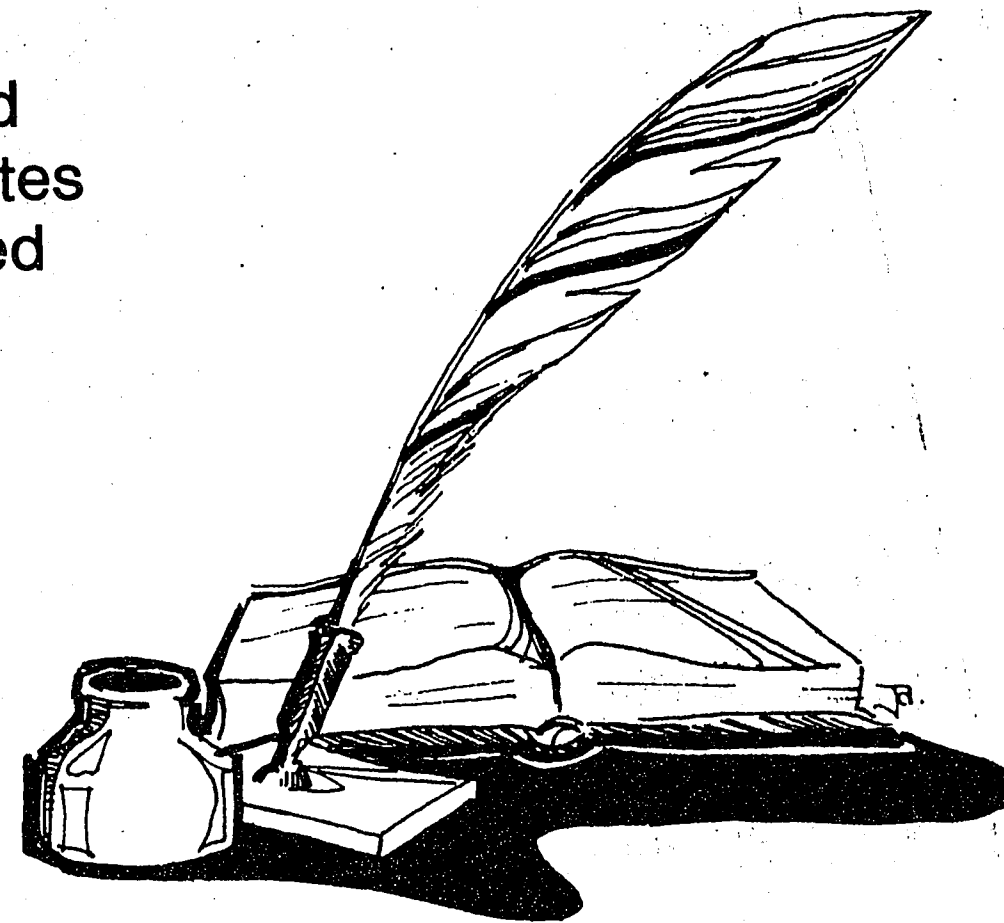
THE PRESIDENT'S FRESHMAN AWARDS

The President's Freshman Awards are presented annually to those undergraduate degree candidates who have carried a full-time credit load and earned a 4.00 (A) term average for any of the first three terms of their freshman year of study.

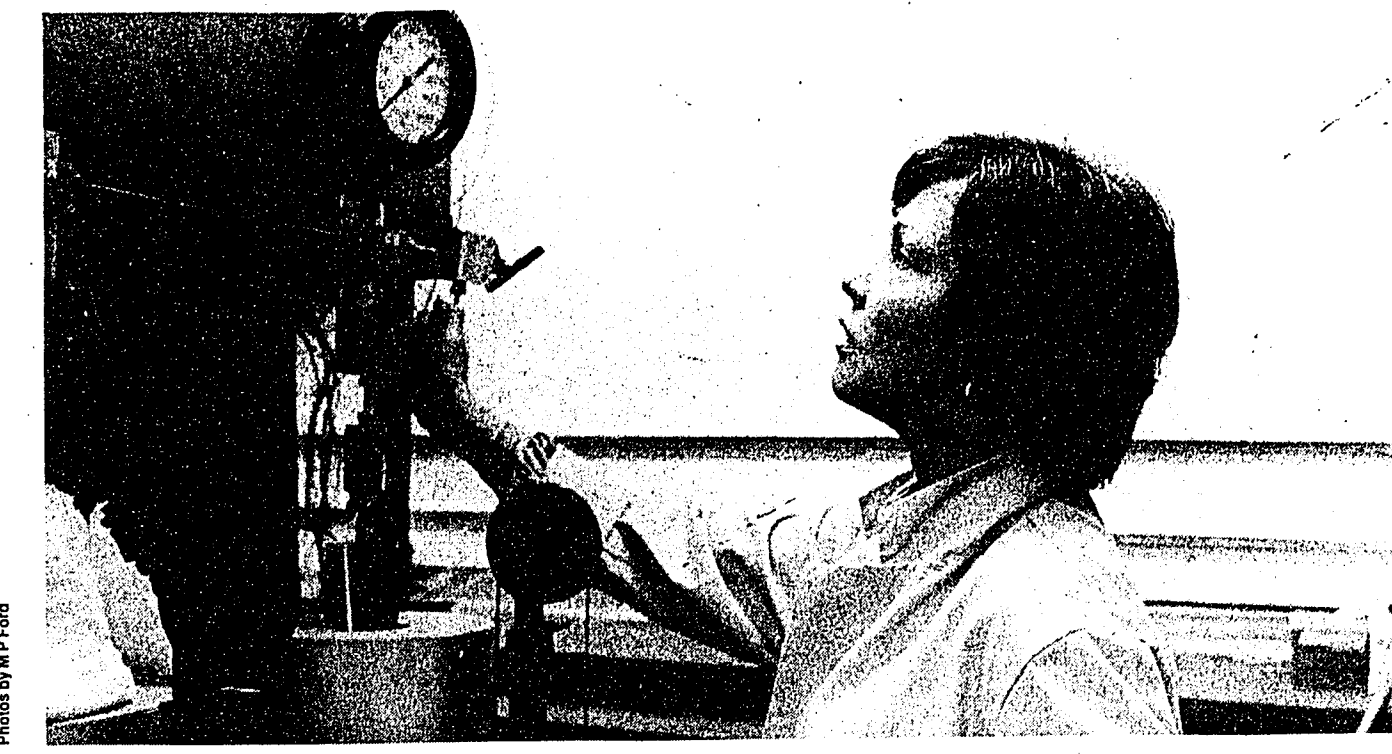
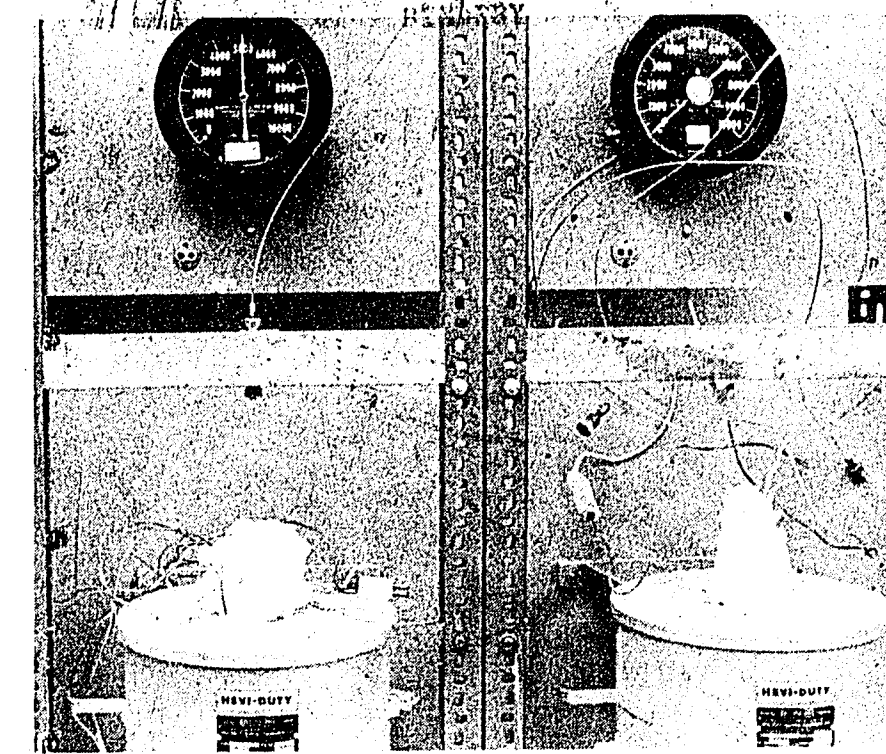
The Awards will be presented at the Honors Convocation at 2:00 p.m. on Sunday, May 11, in the Milton S. Eisenhower Auditorium.

The 1980 President's Freshman Award will be presented to:

- Donna L. Angotti, Erie, PA, Behrend, Division of Undergraduate Studies
- Melanie E. Archangeli, Pittsburgh, PA, University Park, Business Administration
- Daniel J. Armburst, Irvon, PA, University Park, Earth and Mineral Sciences
- Lisa A. Arters, Glen Mills, PA, University Park, Arts and Architecture
- Catherine E. Baker, Harrisburg, PA, York, Business Administration
- Laurie A. Baker, Saxton, PA, Altoona, Arts and Architecture
- Betsy A. Barnicle, Hollidaysburg, PA, University Park, Arts and Architecture
- Robert G. Barrago, Natona Heights, OH, University Park, Science
- Michael H. Bastisa, Middleburg Heights, OH, University Park, Science
- Robert A. Baust, Dalton, PA, Worthington Scranton, Liberal Arts
- Norma J. Beauville, Ashland, ME, University Park, Education
- Lee F. Bellows, Towanda, PA, University Park, Liberal Arts
- Renee A. Belovich, Nesquehoning, PA, University Park, Human Development
- Alfred W. Bidwell, Jr., Forty Fort, PA, Wilkes-Barre, Engineering
- Glenn A. Biery, Leechburg, PA, New Kensington, Engineering
- Gary R. Black, State College, PA, University Park, Business Administration
- Janet E. Bourne, Towanda, PA, University Park, Liberal Arts
- Melinda R. Brandon, Cranberry, PA, Behrend, Engineering
- Leslie R. Brown, Kingston, PA, University Park, Liberal Arts
- Gregory M. Bubel, Westville, PA, University Park, Engineering
- Janis E. Burger, Doylestown, PA, University Park, Liberal Arts
- Peter D. Calder, Brookville, PA, University Park, Science
- Francis K. Cannon, Logansport, PA, University Park, Human Development
- Darlene M. Capp, Altoona, PA, University Park, Education
- Sussana R. Carbaugh, New Oxford, PA, Berks, Engineering
- Monica A. Carletto, Connettsville, PA, Fayette, Liberal Arts
- Barry W. Carney, New Kensington, PA, New Kensington, Liberal Arts
- John W. Carroll, Monaca, PA, University Park, Liberal Arts
- Matthew G. Cimbal, North Huntingdon, PA, University Park, Science
- Herbert T. Cohen, Levittown, PA, University Park, Science
- Francis R. Colangelo, Pittsburgh, PA, University Park, Science
- Carole J. Courlet, Brookside, NJ, University Park, Health, Physical Education, & Recreation
- Donna S. Cowell, Greensburg, PA, University Park, Engineering
- Cheryl C. Cowen, Weyersburg, PA, Fayette, Liberal Arts
- Robert C. Cradley, Cranberry, PA, University Park, Business Administration
- Kevin M. Crupp, Sinking Spring, PA, Berks, Earth and Mineral Sciences
- James R. Davis, Pittsburgh, PA, McKeesport, Engineering
- Danise L. Delozier, Altoona, PA, Altoona, Earth and Mineral Sciences
- Francis J. Demanico, Philadelphia, PA, University Park, Business Administration
- Ralph J. DeStefano, Altoona, PA, Altoona, Engineering
- Jane P. Devlin, Philadelphia, PA, Mont Alto, Engineering
- Catherine L. Dick, Hollidaysburg, PA, Altoona, Science
- Robert A. Dieckhoff, Altoona, PA, Altoona, Science
- Stephen N. Dilco, Altoona, PA, Altoona, Liberal Arts
- Barbara J. Doyle, Clarion, PA, Altoona, Business Administration
- Patricia L. Doyle, Pittsburgh, PA, University Park, Liberal Arts
- Richard J. Egan, Jr., Pittsburgh, PA, University Park, Science
- David J. Erb, Levittown, PA, Hazleton, Engineering
- Laura M. Erickson, Chadds Ford, PA, University Park, Business Administration
- John C. Evert, York, PA, York, Liberal Arts
- Mark A. Featherstone, Wilkes-Barre, PA, University Park, Liberal Arts
- Ferne M. Fishman, Philadelphia, PA, University Park, Liberal Arts
- Patricia M. Fitzgerald, Woodbury, PA, University Park, Liberal Arts
- Paul M. Fitzpatrick, Millersville, PA, McKeesport, Engineering
- Raymond F. Fletcher, Lancaster, PA, Altoona, Business Administration
- William L. Fluke, Levittown, PA, Altoona, Business Administration
- Mariheresa F. Fran, Philadelphia, PA, Ogonitz, Liberal Arts
- Ronald L. Frantz, Pottsville, PA, Schuylkill, Division of Undergraduate Studies
- William A. Funk, Schuylkill, PA, Schuylkill, Engineering
- John E. Galanko, Greensboro, PA, Fayette, Engineering
- Glenn S. Gernard, Tamaca, PA, University Park, Science
- Denise J. Gesser, Schuylkill Haven, PA, University Park, Education
- Pamela K. Gasford, Harrisburg, PA, DuBois, Science
- Teresa J. Gill, Altoona, PA, University Park, Business Administration
- John E. Goehenaer, Wyckoff, NJ, University Park, Engineering
- Cindy A. Gover, Altoona, PA, University Park, Engineering
- Alaska B. Graham, Philadelphia, PA, University Park, Liberal Arts
- Christine A. Gray, Waterford, PA, University Park, Liberal Arts
- David Gross, Pittsburgh, PA, University Park, Business Administration
- Elaime M. Hazala, Latrobe, PA, McKeesport, Engineering
- Elizabeth A. Hambricht, Harrisburg, PA, University Park, Education
- Deborah A. Hammit, Meadville, PA, University Park, Liberal Arts
- Donald R. Harris, DuBois, PA, DuBois, Education
- Amy L. Helget, St. Mary's, PA, DuBois, Education
- Marilyn A. Hellig, Rockville Centre, NY, University Park, Liberal Arts
- Michael E. Hertzog, Reading, PA, Fayette, Liberal Arts
- David M. Karchner, Selinsgrove, PA, University Park, Science
- Scott M. Hoffman, Belle Vernon, PA, Fayette, Engineering
- Jeffrey B. Hoke, State College, PA, University Park, Engineering
- Thomas D. Hollinger, Lebanon, PA, Berks, Business Administration
- Kevin F. Hornberger, Philadelphia, PA, University Park, Liberal Arts
- Jeffrey S. Horoshak, New Cumberland, PA, University Park, Engineering
- Lynne C. Houch, Codersport, PA, York, Human Development
- Peter J. Hughes, Media, PA, University Park, Science
- James R. Hunter, Chadds Ford, PA, Delaware County, Science
- Jeffrey J. Hushon, Springfield, PA, University Park, Science
- James L. Hutton, Vandergrift, PA, University Park, Liberal Arts
- Angela F. Ibberson, Philipsburg, PA, DuBois, Business Administration
- Mark S. Jackly, Central Islip, NY, University Park, Earth and Mineral Sciences
- Jeannie M. Jacko, North Versailles, PA, University Park, Division of Undergraduate Studies
- Shelley Jettell, Columbia, MD, University Park, Science
- Deepak A. Kapoor, Melville, NY, University Park, Science
- Roger S. Karpalin, York, PA, York, Liberal Arts
- David M. Karchner, Selinsgrove, PA, University Park, Business Administration
- Melissa A. Keenan, Audubon, PA, University Park, Arts and Architecture
- Mary Anne Keintz, York, PA, York, Business Administration
- David A. Kenney, Blawieville, PA, University Park, Engineering
- Barbara L. Kessler, Hollidaysburg, PA, University Park, Liberal Arts
- Gregory S. Koelle, Blue Bell, PA, University Park, Liberal Arts
- Maureen S. Kolasa, State College, PA, University Park, Human Development
- Timothy E. Korber, Ettersburg, PA, University Park, Science
- Michael E. Kostick, Nazareth, PA, Hazleton, Agriculture
- Todd M. Kravits, Uniontown, PA, Fayette, Engineering
- Clare M. Kristofco, Altoona, PA, Altoona, Liberal Arts



- Charles F. Kroen, Allison Park, PA, University Park, Earth and Mineral Sciences
- Susan Kuchta, Smock, PA, Fayette, Division of Undergraduate Studies
- Randall J. Lasater, Lansdowne, PA, Delaware County, Liberal Arts
- Ann L. Lawrence, Mechanicsburg, PA, University Park, Engineering
- Lois M. Leach, Chelmsford, MA, University Park, Science
- Karen A. Lehman, Philadelphia, PA, University Park, Liberal Arts
- Bruce K. Leidy, Pittsburgh, PA, McKeesport, Agriculture
- Norman R. Lettich, Sacramento, PA, Schuylkill, Business Administration
- Kathleen A. Lettifer, Hopewell Junction, NY, University Park, Liberal Arts
- Jean M. Lien, Allentown, PA, University Park, Science
- Lori A. Lutzker, Harrisburg, PA, University Park, Liberal Arts
- Alexander J. Macones, Philadelphia, PA, University Park, Science
- Barbara J. Maddern, Havertown, PA, University Park, Liberal Arts
- Eileen M. Malton, Pittsburgh, PA, University Park, Liberal Arts
- David M. Marnatt, Ridgway, PA, DuBois, Engineering
- Sally A. Maurer, Altoona, PA, Altoona, Division of Undergraduate Studies
- Stephen L. Mayo, Kennett Square, PA, University Park, Education
- Joseph M. Mazzarella, Clarks Summit, PA, Worthington-Scranton, Science
- Scott D. McAuley, Cowansville, PA, Berks, Engineering
- James K. McCarthy, Reading, PA, University Park, Science
- Margaret M. McCool, Oreland, PA, University Park, Science
- James A. McDaniel, Drexel Hill, PA, Schuylkill, Engineering
- Amy A. McCadden, Ashland, PA, Ogonitz, Liberal Arts
- Richard L. McNally, DuBois, PA, DuBois, Engineering
- Stephen G. Mendel, DuBois, PA, DuBois, Engineering
- Tobi D. Mingle, Orwigsburg, PA, Schuylkill, Engineering
- Helaine Meyers, New Milford, NJ, University Park, Liberal Arts
- Barry A. Mikucki, Quakertown, PA, Ogonitz, Earth and Mineral Sciences
- Jon A. Miliene, Patton, PA, Altoona, Business Administration
- Laurie A. Miller, Lilly, PA, Altoona, Science
- Stephen D. Miller, Stroudsburg, PA, University Park, Agriculture
- Alexandra L. Miller, Pittsburgh, PA, University Park, Business Administration
- Gloria J. Mulik, Macungie, PA, Allentown, Business Administration
- Heidi R. Munn, Zionsville, PA, Berks, Science
- Russell S. Myers, Coatesville, PA, Delaware County, Agriculture
- Mary L. Napierkowski, Altoona, PA, Altoona, Arts and Architecture
- Jon M. Nese, Steubenville, OH, University Park, Earth and Mineral Sciences
- Phu Duc Nguyen, Gettysburg, PA, Mont Alto, Science
- Mona Rita Niamel, Penn, PA, University Park, Arts and Architecture
- Nashle L. Nitsky, Douglassville, PA, Berks, Human Development
- Patricia L. Novak, Industry, PA, Berks, Liberal Arts
- Angela J. Nudo, Uniontown, PA, Fayette, Science
- Vivian E. Oakley, Kingstley, PA, University Park, Health, Physical Education, and Recreation
- Ariana A. Palky, Allison Park, PA, New Kensington, Liberal Arts
- Constance M. Pappas, Philadelphia, PA, University Park, Division of Undergraduate Studies
- Matthew A. Parinella, Pittsburgh, PA, McKeesport, Business Administration
- Andrew H. Paterson, Glen Mills, PA, University Park, Business Administration
- Teresa A. Pearson, Scranton, PA, Worthington Park, Science
- Lisa B. Peden, Gibsonsia, PA, Berks, Human Development
- Joseph K. Perry, Altoona, PA, University Park, Education
- Ryan J. Pettiford, Springettsville, PA, University Park, Science
- Fawn J. Phillips, Tyrone, PA, Altoona, Education
- Barbara A. Pierce, Monroeville, PA, University Park, Engineering
- Catherine M. Pihoker, Cooperburg, PA, University Park, Science
- Karen S. Pinsky, Philadelphia, PA, Ogonitz, Liberal Arts
- Stephen J. Polinowski, Philadelphia, PA, Ogonitz, Liberal Arts
- Kelly A. Porter, New Stanton, PA, University Park, Science
- Klanwood J. Puhak, West Hazleton, PA, Hazleton, Liberal Arts
- Gren D. Rader, Hazleton, PA, University Park, Liberal Arts
- Betsy L. Rice, Duncansville, PA, Altoona, Education
- Randall G. Richards, Altoona, PA, Altoona, Engineering
- Cathy R. Riemer, Kendall Park, NJ, University Park, Science
- Mark A. Ritter, York, PA, York, Liberal Arts
- Tracie Ritts, Valencia, PA, University Park, Agriculture
- Lynda C. Robinson, Southampton, PA, Ogonitz, Liberal Arts
- Eric Z. Rosenbaum, University Park, PA, Human Development
- Leslie A. Rubinkowski, Connettsville, PA, Fayette, Liberal Arts
- Phillip E. Savage, Monaca, PA, Berks, Engineering
- Virginia A. Schmitt, Edinboro, PA, University Park, Health, Physical Education, & Recreation
- Michael I. Schoon, Philadelphia, PA, University Park, Science
- Renee M. Scott, Woodbury, NJ, University Park, Human Development
- Gregory S. Shopper, Reading, PA, Berks, Science
- James P. Shute, Doylestown, PA, University Park, Business Administration
- Douglas T. Smith, York, PA, York, Engineering
- Merle C. Smith, McKeesport, PA, University Park, Science
- Joseph C. Smouse, Jr., Altoona, PA, Altoona, Business Administration
- Christina B. Snoddy, Allentown, PA, University Park, Science
- Edward L. Snyder, Reading, PA, Berks, Engineering
- Susan R. Snyder, Williamsport, PA, University Park, Business Administration
- Richard J. Spontek, St. Clair, PA, Schuylkill, Engineering
- Linda M. Stasi, Somerset, PA, University Park, Human Development
- Elizabeth Stumpff, St. Mary's, PA, DuBois, Education
- Teresa M. Tangeman, Tyrone, PA, Altoona, Liberal Arts
- Robert A. Taylor, Oil City, PA, DuBois, Engineering
- Mark S. Thompson, Doylestown, PA, University Park, Business Administration
- Michael T. Toole, Wilkes-Barre, PA, University Park, Liberal Arts
- Dennis M. Unks, Fairview, PA, University Park, Science
- Brenda D. Usin, Hamburg, PA, University Park, Agriculture
- Madhumati M. Veerappan, Altoona, PA, Altoona, Education
- Jeffrey M. Wasilkeski, Mt. Carmel, PA, University Park, Liberal Arts
- Rene D. Weaver, Johnstown, PA, University Park, Education
- David R. Wenzel, Arlington Heights, IL, University Park, Science
- Donald B. Wheatley, Monroeville, PA, University Park, Engineering
- David A. White, Sharon, PA, Shenango Valley, Division of Undergraduate Studies
- Joel C. Wilkison, Cresco, PA, University Park, Health, Physical Education & Recreation
- Elizabeth A. Wilson, Shippenburg, PA, University Park, Liberal Arts
- David S. Wise, Echota, PA, University Park, Agriculture
- Patricia Wisniewski, Florham Park, NJ, University Park, Health, Physical Education & Recreation
- Rex M. Yanello, Pittsford, PA, Worthington Scranton, Liberal Arts
- Theodore E. Yast, West Lawn, PA, Berks, Engineering
- Michael T. Zamboli, Indiana, PA, University Park, Engineering
- Georgianne Zoffel, Pittsburgh, PA, University Park, Liberal Arts



The Materials Research Laboratory director, Rustum Roy, and William White, professor of geochimistry, have headed research in developing new ways to store nuclear waste. Right, Judy Garland, a MRL technician, checks the pressure gauge on one of the machines used in the nuclear waste disposal project. Left, wires connected to another machine sprawl and crisscross around the gauges.

University leads nuclear waste disposal research

By IRIS NAAR Daily Collegian Staff Writer

Safe disposal of nuclear wastes is a pressing problem that cannot be ignored. One of the most extensive research projects of the University of Pittsburgh is the University's Materials Research Laboratory.

"I think we're the only university much into the development," said William White, professor of geochimistry. "None of the programs are one-tenth the size of the one here."

Since September, White has been jointly responsible with the MRL's director, Rustum Roy, in developing new synthetic waste forms designed to last in spite of any geological event. Funded by the United States Department of Energy, the MRL, in cooperation with the Rockwell Science Center, a subsidiary of Rockwell Corporation of Pittsburgh, is trying to find the most stable and most economical synthetic waste forms to be buried in the near future.

"It's a project that runs on a pretty short time fuse," White said. The Department of Energy has cited 1982 as the year that a waste form must be chosen, and 1984 as the year that this form would be put to use. White said that the two basic constraints of the research program are that a waste form be specified, and that these wastes be so stable that it would not matter what happened to them during storage.

Other countries, such as France, are currently interested in the glass form of waste material, White said. However, glass, when exposed to temperatures of a few hundred degrees Celsius, can disintegrate in a matter of days.

"If the canister breaks, water will get in, and the glass will break down," White said. "If the glass does break down, it may react with the surrounding rock to form new minerals. The real problem, though, he said, is the factor of unpredictability involved in the breaking down of glass.

"Our strategy, and it's one that has pretty well evolved in the lab, is to look at nature—what kind of forms can we look for in rocks that have survived a million years."

For instance, White said that the mineral monazite, found in nature, has been virtually insoluble for over a billion years. It has survived mountain building, erosion, earthquakes, volcanic activity and the ice age. "You use those kinds of minerals as guidelines," he said.

"What we're trying to do is devise types of crystalline waste forms that can be designed for any waste," White said. "Our end is to try to invent very flexible waste form designs. Waste form is really the most important part."

The nuclear wastes, after being turned into a synthetic form, would be buried 1,000 to 2,000 feet underground, in the form of large canisters.

White said that one of the hottest political questions is where to put the canisters. A site was selected near Carlsbad, New Mexico, and at first the governor and citizens of the state did not protest, since jobs and dollars would be coming. "When sites are identified the fireworks start."

One suggestion is that the federal government choose and take care of one site. Better security, control and trained personnel would be the result, White said. Or perhaps each state would take care of its own wastes. Six or seven waste sites are presently being examined, White said.

Researchers from the MRL are working with scientists from the Rockwell Corporation's Corporate Science Center and its Atomic International Laboratories in Los Angeles. "We are the basic research part of it," White said. Rockwell is in charge of the engineering development, and will be working with hot material, whereas the MRL does chemical simulations, he said.

The Rockwell Corporation operates the federal radioactive waste facility at Hanford, Washington. However, most of the wastes the MRL is interested in are from the Savannah River Laboratory in South Carolina, which are chemically different, and described by White as "black, slimy glop."

White said that some of the nuclear wastes have been sitting in storage tanks for 20 years. The tanks can become old and corroded. Though the Savannah tanks were made well, White said that the tanks at Hanford have suffered leakage problems. In fact, the problem of permanent storage of wastes was not taken very seriously until the Hanford tank leakage.

White said that people just didn't consider nuclear wastes as a problem. "I don't think the public was really aware of it," he said. "In hindsight, I think this was a colossal mistake. We're working like the devil trying to catch up."

The Daily Collegian Research

More highway light needed for night driving

By LIZ FOX Daily Collegian Staff Writer

The incidence of serious traffic accidents, particularly those involving pedestrians, increases at night. However, recent studies have shown that increased illumination along highways has significantly cut down on the number of these nighttime auto accidents.

Herschel Leibowitz, Evan Pugh professor of psychology and expert in the field of visual perception, has been studying the relationship between the human visual system and driving perception at night.

"Until recently, most vision authorities have focused on the focal visual system which is the one through which we read and recognize objects. Through his research, Leibowitz has come to recognize the importance of the other system, the ambient, in our daily lives but especially in automobile driving."

"Ambient or peripheral vision is the 'where' of perception. It is an unconscious process which lets us know where we are in relationship to objects. It permits us to move about freely and orient ourselves in space," Leibowitz said.

Focal vision seems to be controlled by the visual cortex, the outer grey matter which covers the brain's two hemispheres, Leibowitz said. Ambient vision appears to originate down inside the mid-brain. Although the two systems interact considerably, they also can operate independently.

Thus, depending on the problem, a person can lose both visual systems or only one. Glaucoma destroys the peripheral field of the retina and leaves the person with only the ability to see objects directly in front of him.

Others may lose this focal ability while being able to orient in space and perform simple locomotion functions. This was one of the major findings of Leibowitz and his colleagues.

"In many cases these people are not aware of their visually mediated orientation ability. If you ask whether they see a wall to their side they will say 'no.' Yet, they can move around without walking into it, while someone who is really totally blind will strike the wall. They don't realize they are still 'seeing' something, because the ambient system is so unconscious," Leibowitz said.

"This is the reason many nighttime driving accidents occur. A driver can have perfect ambient vision, which controls the steering function, while lacking the necessary focal vision to see road signs or pedestrians crossing the street."

"People who see poorly at night through their focal vision still drive their cars. Everyone who drives at night should slow down even though they do have the orientation vision necessary to steer the car," Leibowitz said.

Leibowitz's research, sponsored by the National Institute of Mental Health and the National Eye Institute, suggests that the reason most nighttime driving accidents occur in relatively unlighted places is that only the focal vision system, not the ambient one, is influenced by the level of light.

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ambient system is still intact, the driver feels just as confident at night as in the daytime.

"I thought many drivers were irrational until I started doing research," Leibowitz said. "We should all really slow down at night since we all see so poorly."

"What we fail to realize is that our focal vision is so greatly impaired that we cannot recognize and react to obstacles in time. Awareness of this selective degradation will permit drivers, as well as safety authorities to take preventive measures," Leibowitz said.

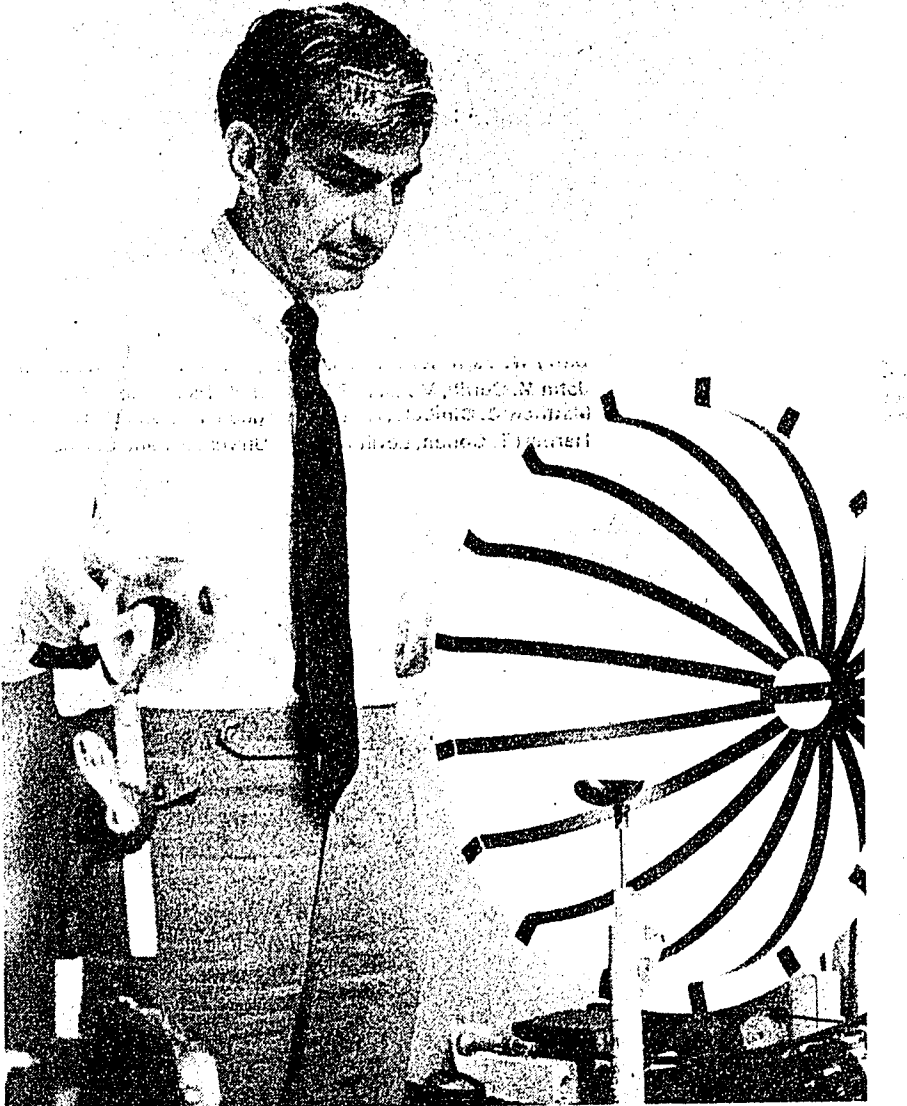
Leibowitz and his colleagues have developed one such preventive measure, a test for "night myopia," which can lead to a prescription for special nighttime driving glasses. These prescription glasses effectively correct this vision problem which affects a large percentage of the population.

"With a test which only takes a few minutes, it is possible to prevent the loss of significant focal vision at night," Leibowitz said. "Even with this procedure, focal vision is degraded at night compared to the daytime."

Other precautions suggested by Leibowitz are increasing the visibility of unexpected road obstacles by improving roadway illumination and screening drivers for nighttime vision in addition to daytime driving vision.

"One major change that Leibowitz would like to see is the lowering of the speed limit at night."

"I think that there should be different day and night driving speeds," Leibowitz said. "Daytime speeds are not safe at night. They shouldn't be the same."



Herschel Leibowitz, professor of psychology, sets up a model of an eye, part of his research in the effects of human visual systems on nighttime automobile and airplane accidents. An Evan Pugh professor, he has received various awards for accomplishments in research and teaching. He says he believes a professor can excel in both research and teaching. Leibowitz hopes that his studies will help change the nighttime driving speed and other night driving safety precautions. At the University since 1962, he has published more than 100 articles on his work.

Manure gas use open to dairy farmers

By LISA MORANO Daily Collegian Staff Writer

With inflation, energy crisis, devaluation, energy crisis, devaluation... they are hitting every segment of the working class — with no end in sight and no escape.

But a better alternative exists for the large dairy farmer. Through the efforts of a group of University researchers, cow manure can be transformed into an energy source that could supply up to 20 percent of a farm's energy needs.

In 1975, Howard D. Bartlett, professor of agricultural engineering, and other department members began designing an anaerobic digester that uses cow manure to produce a methane gas called "biogas."

Bartlett said after a year of design consultation, a 20-foot by 15-foot digester was built on the University's dairy farm. Then, tests were run during three different periods, each six to nine months long.

According to a circular published by the agricultural engineering department, the process of turning cow manure into methane gas takes place within the digester, which is an air-tight tank.

"The process of anaerobic digestion is not an idea originally formulated by Penn State researchers but was developed 17 years ago by Humphrey Davy. Davy's claim to fame is its unique adaptation to dairy use. A traditional use of the process has been municipal waste treatment."

The circular said that manure is transformed into a mixture of nitrogen and carbon dioxide at least to 10 days in the tank. The average time the manure mixture stays in the tank depends on the amount of manure initially loaded. Both these conditions must exist to allow bacteria to grow and digest the manure.

A by-product of the process is a fertilizer labeled "effluent" that is easily absorbed by plants because its structure is chemically broken down by the process.

According to the circular, cow, pig and other livestock manure have been successfully used as digester material. Poultry manure has been an exception because of a lack of a proper carbon to nitrogen ratio.

Along with a proper carbon/nitrogen ratio, a proper pH level of 7 or more is also initially loaded. Both these conditions must exist to allow bacteria to grow and digest the manure.

The amount of energy and daily manure supply of the farm. If the daily loading rate is high, the digester will be more efficient and economical to run.

According to a table in the circular, 763 pounds of manure are collected daily from about 50 cows, 2,263 cubic feet of gas will be produced in 35 days. But if 2,270 pounds of manure are collected daily from 150 cows, 7,130 cubic feet of gas will be produced in 11 days.

Therefore, the digester is most beneficial to large dairy farms whose energy needs and manure supply are constant and great.

Bartlett said the composition of the biogas produced is 60 percent methane and is used to power an engine that could generate electricity to run dairy milking machines and cooling systems plus supply energy for space and hot water heating.

A future wish for Bartlett and the anaerobic digester is to "encourage manufacturers to put together a package that is economically feasible to the average farmer."

"Penn State is the next time you look at a dairy cow in the eye, you can ask her if she gives regular or unloaded."

He added that within one year, the digester could pay for itself through energy savings and a profit might be realized depending on labor expenditures.

If a farmer wanted to buy a digester system, he would have to hire a consultant to design one that fits his farm. Bartlett said all separate from the University, Bartlett said.

"The digester needs to be controlled by the farmer. It is not a sophisticated piece of equipment," Bartlett said. "It has to be of good quality and dependable during operation," he added.

Bartlett said a digester has been privately built on a large dairy farm in southern Pennsylvania and "so far, it has been operating well without bio-gas."

Digesters are also used by the Amish and Mennonite farmers and Chinese commune farmers, Bartlett said.

"The Chinese farmers view the use of their digesters as labor-saving devices because they no longer have to chop and tow wood from distant forests, he said, adding an estimate of future bio-gas use. Digesters are also used by the Amish and Mennonite farmers and Chinese commune farmers, Bartlett said.

