July 20-23, 1987

DATE	Stories and Cutlines		Locals (75)	Reg. Dailies (25)	Reg. Weeklies (A 37 / B 39)	50 M's (16)	Reg. Radio	X-List (26)	Adj. Counties (15)	Hometowners	PSA's	Ag list	Ag boxes (16)	MISC. (#)	CONTACT	REMARKS
1-7-20-87	Mittimeyer Profile														pl	WT c of c
2-7-22-87	toxic														mdw	TX A+M
3-7-23-87	med tip sheet	56													pl	
4-7-23-87	seniors	29													pl	
5-7-23-87	kidd	30													pl	

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TEXAS TECH UNIVERSITY/TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER
NEWS AND PUBLICATIONS/P.O. BOX 4640/LUBBOCK, TEXAS 79409/(806) 742-2136

By Marydawn Webber 2-7-22-87

LUBBOCK -- An interdisciplinary attack on hazardous waste waged by Texas Tech University researchers promises safer, more efficient and less costly measures toward eliminating toxins from the environment.

Researchers in engineering, biology and agriculture are collaborating through a network of strategies that run the gamut from remedial cleanup and restoration to immediate destruction of waste materials as they are generated.

Current methods of eradication research involves the conversion of hazardous waste into nontoxic forms through processes of chemical oxidation, biological consummation, and destruction of waste by use of submerged electrical arcs.

Eliminating waste on site will alleviate much of the cost and safety considerations related with transporting waste materials to incinerators, which studies show emit certain toxic chemicals including dioxanes, arsenic and polychlorinated biphenyls into the air.

The Environmental Protection Agency has already proposed pollution-control devices be installed in new municipal incinerators, and will regulate installation of the devices in existing incinerator facilities by the latter part of 1989.

The EPA estimated the total cost of the pollution control devices will add between 10 and 15 percent to the cost to the consumer of waste disposal in cities using incineration.

"There's room for universities everywhere to work to improve upon the current technology for waste removal," said Dr. Lloyd V. Urban, director of Tech's Water Resources Center.

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The EPA has estimated about one-third of underground storage is not sound, mainly due to corrosion of piping systems, resulting in leakage of fuels such as gas and oil, according to Urban.

The WRC's focus on encouraging, conducting and coordinating water resources research evolves around water augmentation, conservation and protection from these and other forms of pollution.

Research efforts by the center address quality reduction from irrigation practices, wastewater disposal, agricultural chemicals, oil production practices, feed lots and playa lake interactions.

Urban said the WRC is looking at coping with problems created by improper waste control practices in the past that have resulted in the deterioration of groundwater quality.

"One attack we've taken is trying to restore the quality of polluted water supplies by applying some new concepts and innovations," Urban said.

A current investigative effort spins off from research into secondary recovery of groundwater through air injection; applying the techniques of secondary recovery of groundwater to the removal of contaminants originating from leaking tanks or other concentrated flows.

"If we can inject air under pressure into the ground and use it to move water, why not other liquids?" Urban explains.

Ken Rainwater, assistant professor in civil engineering, working with B.J. Claborn, associate professor, is investigating air injection for removal of contaminants in the unsaturated zones.

Most instances of groundwater pollution are apt to occur through accidental spills, poorly managed waste disposal sites or in situ mining techniques.

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"The alternative methods most commonly applied to prevent further damage are physical containment by structural or hydraulic barriers, withdrawal and treatment of the contaminated groundwater, and/or in situ treatment," Rainwater states.

When petroleum fuels or other organic liquids leak downward from the ground surface or from underground storage tanks, the liquids can exist as a continuous liquid phase atop the water table and as residual liquid in the unsaturated zone above the water table. One present method of removal of these liquids is by passing air through the unsaturated zone, by injection and/or production, to evaporate the volatile organics.

"This process has been used at several sites around the country with some success, but the fundamental mechanisms which control it are not well understood. It is possible that the air injection could cause less volatile components to move, as a liquid phase, away from the targeted clean-up area," Rainwater said.

Drs. Rainwater and Claborn have, with funding from the WRC, constructed a large laboratory experiment to observe the evaporation of a hydrocarbon liquid mixture from a soil.

The current expense, and safety considerations associated with ground excavation and waste removal and transport are the primary reasons for research into more efficient methods of treatment and storage of waste materials.

The large-scale lab experiment is set up with two soil columns measuring 10 feet in height and three feet in diameter. A simplified mixture of four hydrocarbons represent typical gasoline compounds.

The mixture consists of hexane, toluene, xylene and pentane, and a gas chromatograph is used to monitor the hydrocarbons as they exit the system into the atmosphere.

The results of the experiments should provide data for theoretical study of the process in addition to insight for efficient removal process design.

"Engineers must often go into the field without perfect knowledge of organic liquid in the ground or the physics of the removal process. In this controlled experiment, we know exactly how much hydrocarbon liquid is in the soil initially, how much is removed, and how much is left at the end.

"The states of the four components should be well documented," said Rainwater.

"Most environmental engineering has, historically, been by trial and error," he added.

Dr. Harry W. Parker of the chemical engineering department is collaborating with Rainwater in experimental restoration of groundwater quality based on research Parker conducted in the 1960's while working as an engineer for Phillips Petroleum Company.

"We observed spontaneous oxidation in the reservoir that prevented application of a process for enhanced oil recovery. Now, at Tech, we're utilizing this process of spontaneous oxidation for the rehabilitation of petroleum contaminated aquifers," he explained.

Parker uses 150 milliliter cells packed with sand, oil and water representative of a contaminated aquifer. A valve allows the cell to be pressurized with air. After contacting the oil for days, or even weeks, the air is analyzed for oxygen to determine the rate at which the oil is being oxidized.

Parker has found that at low temperatures the rates are quite slow. He anticipates that some tests may last a year or more.

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The key to utilizing the process, Parker explained, is to measure oxidation rates at aquifer and elevated temperatures to provide experimental data for a mathematical model to predict behavior of the aquifer.

Parker and Rainwater will present the initial results of their investigations at the annual meeting of the American Institute of Chemical Engineering this November in New York. The research is being supported by the Water Resources Center at Tech and by an industrial fellowship from Phillips Petroleum.

As the immediacy of current ground water pollution problems persist, researchers say the pressure is on to get waste out of the ground and expedite the cleanup.

Concerns are also focused on heavier fuels, such as diesel, which are less volatile and pose a potent threat if leaked to groundwater.

In an associated project with Dr. Caryl Heintz, an associate professor in biological sciences, researchers including Rainwater, Claborn, R.H. Ramsey of civil engineering and Clifford Fedler, professor of agricultural engineering, are looking at enhanced biodegradation of petroleum fuels in situ, with an emphasis on isolating bacteria which will biodegrade diesel fuel at a rapid rate.

The process essentially consists of utilizing microbes that live in the soil and which learn to acclimatize to and subsist upon the hydrocarbons.

Heintz said the experiment is unique in its application, which is based upon 20-year-old knowledge, but will take advantage of chemically-inducing the microbes to consume pollutants at a quicker rate, and thus producing a nontoxic biological mass of the microbes.

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Researchers around the country have found that most of the biodegradation takes place where the water and hydrocarbons meet beneath the soil, and is limited by the amount of available oxygen or nutrients which prompt the "bugs" to work faster.

"One way to get oxygen and nutrients to the microbes is by injection through wells. Field applications have indicated that this technique can lead to concentration of the degradation near the well and cause clogging of the formation," Rainwater said.

A solution, the researchers say, is to manipulate the elevation of the underground water table in a cyclical manner that will alternately provide oxygen, water and organic substrate to the microbes. This technique will avoid the injection problem and possibly affect a larger area.

Researchers say water or air injection/production can be used to move the water table.

Application of all of the processes is beneficial to cleaning leaky storage facilities and fuel dispensing stations, in addition to problems existing at older refineries in Texas and across the country.

In other research, Parker and Dr. Richard Tock, professor of chemical engineering, are evaluating a project to destroy hazardous and toxic wastes with a high-temperature submerged electric arc.

"Many modern synthetic chemicals cannot be morally or legally disposed by dumping. They must be safely stored or destroyed," said Tock, citing as examples pesticides, chlorinated transformer oils (PCBs) as well as many process chemicals used in manufacturing.

While most research has been directed towards large-scale destruction of these materials, Tock said the technology he and Parker are developing offers a novel route for small-scale destruction of waste materials.

The process utilizes an electric arc where the waste materials are transformed into gases by pyrolysis and by reaction with water. Investment costs for the waste destruction process are minimized by submerging the arc in liquids containing the wastes to be destroyed.

In a laboratory environment, an AC arc is struck between metallic electrodes submerged in a nonconducting oil and a conducting water layer beneath the oil. A proprietary power supply allows control of the arc intensity.

Tock describes the high-temperature discharge as similar to underwater welding. The gases are then analyzed as they are transformed to determine that they are nontoxic.

According to the researchers, a patent has been allowed on this process and will soon be issued. The patent is assigned to Al-Chem Fuels.

During the past year, researchers in the Department of Chemical Engineering have evaluated the waste destruction capabilities of the device.

The lab evaluation includes a theoretical development of how the cell operates plus material and energy balances. These data have permitted estimates of costs associated with disposal of hazardous and toxic wastes by this method, which the researchers say are competitive with other processes.

Currently, negotiations are in progress with a major international company to test a larger version of the cell, and Tock said sufficient data will be gathered to seek approval of the technique by federal and state agencies for disposal of hazardous and toxic wastes.

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"We try to get our students who will be practicing engineers to recognize there will be chemical wastes that are hazardous to people and the environment, so we want to try to keep waste concentrated at the lab site and treat it there," he adds.

According to Tock, "part of the solution to pollution is dilution."

But he adds, "The reason I got into this project is because there are some synthetic chemicals, (such as) PCBs, so toxic that even dilution is not a viable way of working with it. It tends to be reconcentrated in the ecosystem.

"We have to treat this so we get near absolute removal," he said.

"The point of the new technology is that it's small, done on site and we don't have to transfer the waste and risk spill."

Agricultural Engineering Professor Fedler is also involved in waste control, with assistance from the Texas Water Development Board, and is seeking out ways of tracing pollutants in groundwater.

He explains that by tracing existing pollutants in the ground, through injection of a salt tracer, he can predict the future occurrences of movement of chemicals.

"I've just completed collecting data that will give us an indication how the pollutant moves when someone dumps or spills chemicals in the soil. If we know where it's at and in what concentration, we can predict how it will move," Fedler said.

The treatment process is composed of two phases: modeling to determine movement of contaminants in saturated and unsaturated fields.

Fedler said the method of treating waste anaerobically is a viable alternative to in situ treatment.

He said he would like to combine treatment of waste aerobically, which requires oxygen, and anaerobically, which requires no oxygen to degrade. "All those organisms occur in nature. The plan is to combine the two treatments, only separately, not simultaneously."

Fedler is also conducting tests on a research project he has near completion that will improve storage of hazardous waste in expanded time increments of thousands of years, a lengthy period over current storage processes which use containers that must be replaced after several hundred years.

"Nuclear waste takes a time frame in the order of ten thousand years before it degrades to where it does not harm the environment. We must keep replacing the vessels before the waste finally degrades," he said.

"I'm now in the process of testing, and if it proves favorable, this has the viability to change drastically the way waste is stored, more safely and for a longer period of time."

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MEDICAL TIPSHEET
from
TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER
July 23, 1987

SLEEPING SICKNESS--During the summer months, it may strike as many as a couple hundred Texans, but it is such a dramatic disease that one or two cases are enough to be considered an outbreak. The disease is encephalitis, commonly called sleeping sickness, and it is an inflamation of the brain. St. Louis encephalitis and western equine encephalitis are transmitted to humans by only two of the more than 65 mosquito species found in the state. The western equine variety can be especially dangerous to young children, causing deterioration of the central nervous system, while the St. Louis variety generally strikes older people. Humans infected with encephalitis will experience severe frontal headaches and symptoms resembling a mild case of the flu. The disease is difficult to diagnose and many times cannot be positively identified until the patient has already begun to recover. Birds are the host carriers of the virus which mosquitoes Culex tarsalis and Culex quinquefasciatus transmit to humans. For more on the disease and the insects which carry it, contact TTUHSC preventive medicine, microbiology and pediatrics Professor Jack Hayes, Ph.D., at (806) 743-2485.

GARDEN OF REMEDIES--When ancient man needed a medicine, he usually turned to the same source that provided him food, clothing and shelter -- the plants. To this day, plants remain a major source of the compounds used in medicines. In fact, says TTUHSC family medicine Professor Charles E. Shields, M.D., about 70 percent of the medicines on the market today rely on plants. Take aspirin, for instance. The major ingredient is a derivative of salicylic acid which is found in the elm family. The leaf of the foxglove plant provides digitalis which is commonly used in treating heart disease. The Madagascar periwinkle, once thought to lower blood sugar levels, today is one of the more effective weapons against leukemia. Aloe vera, which was valued during the reign of Cleopatra to treat minor cuts and stings, is today used to treat skin problems and x-ray burns. Those are just a few examples of how plants benefit us through the medicines we take. Along with petrochemical compounds -- themselves plant derivatives, plants provide a major source of our medicines. For more on plants and their medical uses through the years, contact Shields at (806) 743-2770.

For assistance in covering these or other stories, contact TTUHSC news manager Preston Lewis at (806) 743-2143. Photographs and video footage can be arranged upon request.

3-7-23-87

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Story ideas for week of July 27, 1987. 3-7-23-87

TURNING THE CORNER ON TEXAS HIGHER EDUCATION---With the special session of the Texas Legislature completed, the new budget for the state will include an increase in funding for state universities for the first time since the state's economic crisis began. Vice President for Finance and Administration at Texas Tech Dr. Eugene Payne said the state found itself at a cross-road and decided on the right road; the one that provides for progress in Texas higher education. For more on Dr. Payne's comments, call the Broadcast Bureau. 742-2042.

LAW OF LAWYERING---The image of lawyers is often as hired guns willing, able and clothed with access to governmental institutions, to achieve a client's goals at all costs. Some clients do cheat and lie and steal. But lawyers cannot permit themselves to be used as a medium through which clients can engage in that activity. Texas Tech School of Law Professor David Cummins focuses on the law of lawyering and answers questions of just how far a lawyer may go in supporting a client's cause. For more, contact Cummins. 742-3626.

For assistance on these and other stories, contact Dorothy White/Don Vanlandingham. University News & Publications. 742-2136.

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CONTACT: Preston Lewis 4-7-23-87

LUBBOCK--"Especially for Seniors," a series of 15 half-hour programs designed to cover issues and personalities of interest to senior citizens, will debut at 11 a.m. Aug. 7 on KTXT-TV.

The series, produced by the Texas Tech University Health Sciences Center in conjunction with KTXT-TV, will air at 11 a.m. each Friday through Nov. 13.

After the introductory program, each broadcast will include segments on lifestyles, medical updates and senior profiles. The lifestyles segments will cover such issues as retirement planning and living, taxes, city services, Social Security, support groups and grandparenting.

The medical section will cover health topics, treatments and developments of interest to senior citizens. The senior profiles will focus on an active senior citizen and his or her activities. Profile subjects will include former Texas Gov. Preston Smith, Lubbock Mayor B.C. "Peck" McMinn and his wife, Betty, and Texas Tech Horn Professor Emeritus B.Z. Cobb, who was a pioneer in therapy for cancer stricken patients.

Sheryl H. Boyd, assistant chairman of the TTUHSC Department of Internal Medicine and host for the shows, coordinated the series to address issues of significance to the growing senior citizen population on the South Plains.

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"Seniors represent the fastest growing age brackets in the U.S., the most powerful voting block and the largest potential consumer block for health care and lifestyle-related goods, services and facilities," she said. "To better address senior needs, the 'Especially for Seniors' series presents the myriad of opportunities and challenges they will face and the support services that are available to them."

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CONTACT: Preston Lewis 5-7-23-87

LUBBOCK--When Christina Trevino and Bernard Abarca looked for jobs this summer, they set their sights higher than the neighborhood supermarket or the fast-food franchise down the street.

Instead, they found work at the Texas Tech University Health Sciences Center as research apprentices in the Department of Pharmacology.

Trevino and Abarca are participants in the Minority High School Student Research Apprenticeship Program funded through the National Institutes of Health. Each student gets $1,500 in wages during the summer while working and learning in the medical setting.

Pharmacology Department Chairman Alexander D. Kenny, who directs the program, said, "This program gives the students an opportunity they wouldn't otherwise have to observe and participate in laboratory research and to determine if they might be interested in scientific careers.

"While they are helpful for the work they do in our labs, the major benefit could come in maybe five to 10 years if they do pursue careers in science," Kenny said.

Trevino, a 1987 Lubbock High School graduate, will be a freshman this fall at Texas Tech University where she plans to major in psychology. Abarca will be a Lubbock High School junior when fall classes resume.

They work full time in the Pharmacology Department with Abarca assisting Dr. Kenny in his laboratory and Trevino helping Dr. John B. Lombardini with his research.

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Abarca oversees the breeding of Japanese quail which are used in experiments determining how certain drugs affect bone growth.

"I've been interested in science and my parents have emphasized the importance of science and mathematics," Abarca said. "Though I'm not doing the actual research here, I'm learning how it's done."

Trevino is assisting with the glaucoma research of Dr. Lombardini.

"Through the apprenticeship, I've learned a lot more than I would have through many summer jobs," Trevino said. "Everything is new to me and I am seeing there are career possibilities I never knew existed."

The department has sponsored the program for three years. Kenny said high school students wanting information on the program for future summers should write the TTUHSC Pharmacology Department for additional information.

Abarca is the son of Ramon and Ruby Abarca of 8017 Richmond Ave. and Trevino is the daughter of Tony and Dora Treviono of 1217 47th St., Lubbock.

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