EES Report

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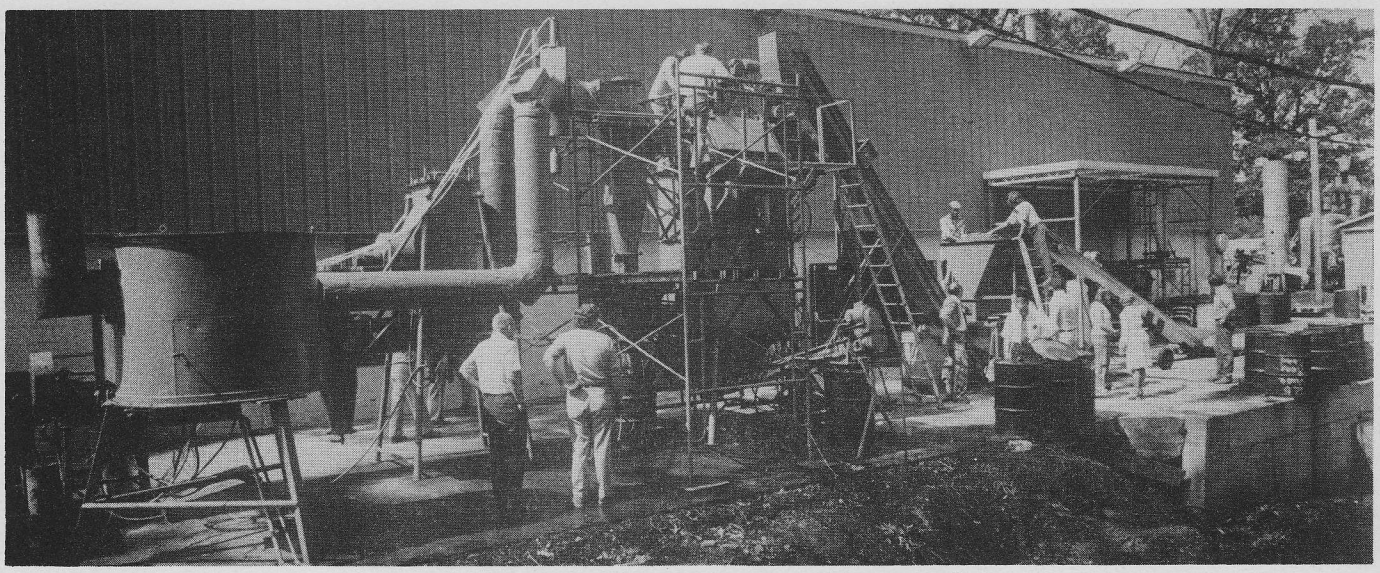

Ga. Tech's research pyrolytic converter in operation

Conversion of Wastes To Useful Fuels

The Atlanta Clean City Commission is conducting a comprehensive program to increase people's awareness of litter, trash and related waste in their daily lives. For some years, EES researchers have been studying methods of converting waste materials of all sorts into energy and other useful by-products.

The utilization of waste materials is of vital concern to all Americans because these materials, particularly agricultural, forestry and municipal wastes, represent an unused resource. The disposal of these materials as wastes present real problems to organizations that must deal with them, and, in many cases, the disposal method represents environmental and economical problems. During the past several years, a great deal of attention has been given to the pyrolysis approach as a means of converting these wastes into useful products, particularly fuels. A pyrolysis process has been developed over the past nine years at EES for converting waste materials to char, pyrolytic oil and combustible gases. This process has been licensed to the Tech-Air Corporation of Atlanta. It has field tested 50 dry tons/day pyrolysis systems with both peanut hulls and wood waste and has successfully demonstrated the process for wood wastes.

Pyrolysis is an old concept and has been utilized in a crude fashion since early times of civilization. It consists of the decomposition of organic material, such as agricultural and forestry materials, with heat. The products that can be obtained are char, pyrolytic oil, water containing soluble organic compounds, and noncondensible combustible gases. The yields of the pyrolytic product are also dependent to some degree upon the feed materials and operating conditions.

Researchers at EES have found that pyrolysis is readily adaptable for the conversion of cellulosic and lignocellulosic wastes into useful fuels and other products. Involvement in the area of conversion of solid wastes by pyrolysis began with efforts to develop a means to dispose of peanut hulls without producing the pollution problems of incineration.

The steady-flow, low temperature pyrolysis process developed at the EES involves processing of the wastes in a porous, vertical bed. Among the advantages of the process are its simplicity and its low temperature operation. These features, together, lead to an economical design. In addition, the pyrolysis reaction in the converter is self-sustaining and requires a minimum of processing of the wood wastes prior to pyrolysis.

A large 50 tons/day demonstration plant which is

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owned and operated by the Tech-Air Corporation is located in a wood yard in Cordele, Georgia, and operates on wastes from the saw mill. This system has been in successful operation now for more than three years and was field tested for two years prior to that. The char produced is sold, and the pyrolytic oil produced is sold as a fuel. A portion of the gas is used to dry the wood wastes, and the remaining is flared. A drier which utilizes hot combustion gases from the off-gas burner reduces the water content of the initially wet wastes to about 5% moisture. Another attractive feature of this system is the cleanliness of its exhaust which is completely invisible to the eye. An analysis of the combustion stack gases was made, and comparison of these data with the EPA exhaust standards reveals that the system easily meets all the federal standards.

Tech Scientists Study Thunderstorms

Since 1976 research scientists at EES have been participating in a joint international program to collect data on severe weather electromagnetic (sferics) emissions. The long term goal of the severe weather research is to develop a tornado prediction and early warning capability.

The Georgia Tech and NASA personnel have been involved in the Thunderstorm Research International Program (TRIP) conducted at the Kennedy Space Center (KSC), Florida, since its inception in 1976. The TRIP program consists of a semi-formal organization of a number of principal investigators and their associates from the atmospheric electricity community. The primary objective of the TRIP program is to develop a better understanding of the structure, dynamics and physical nature of thunderstorms. The Thunderstorm Research International Program was planned to extend over a three year period. Experiments are now being conducted during the summer months at the Kennedy Space Center during 1977 and are planned for 1978.

Thunderstorm research has been going on since World War II but gained momentum during the U.S. space program. Shortly after the launch of Apollo 12 from Kennedy Space Center in November, 1969, during disturbed weather, the vehicle experienced two lightning discharges. These flashes were not initiated naturally but were triggered by the vehicle itself. The discharges caused some alarming but transient malfunctions and some minor permanent damage. However, subsequent tests revealed that the observed level of malfunction and damage would be produced by a lightning stroke of weaker than average strength.

Operations at KSC had long recognized this danger, but the Apollo 12 incident introduced a new factor — the triggering of lightning by a large rocket. Accordingly, a program of collaborative experiments between NASA and various groups of atmospheric electricians was initiated. This program was primarily intended to define the circumstances under which rockets would trigger lightning.

NASA recognized that the hazards at KSC had not ceased with the termination of the Apollo launches. There are problems associated with thunderstorms that are of much significance during the orbiter re-entry phase of the coming Space Shuttle Program. These problems include rain and hail erosion, turbulance, wind-shear and lightning.

Subsequently, NASA issued an invitation to the atmospheric electrical community to participate in a new thunderstorm project to be held at KSC over the summers of 1976, 1977 and 1978.

According to C.S. Wilson of the Electronics Technology Laboratory, the major objectives of this research effort have been the design, development, installation and operation of instrumentation for data collection of severe weather electromagnetic (sferics) emissions. The capability of the sferics instrumentation has been well demonstrated during the numerous field operations.

Additions and modifications have been made to the instrumentation system each year, resulting in improved performance and increased data collection capability.

Project To Help Communities Manage Future Energy Crisis

The research scientists of the Technology and Development Lab have organized an energy contingency planning and management course that is available for area communities to help them cope with future energy crises as well as to better conserve energy in day to day operations.

Instructional courses, workshops and seminars are being held for civic and community officials and managers through the Georgia Area Planning and Development Commissions and by the professionals of EES.

The objective of energy contingency planning is to provide planners an opportunity to prepare themselves and their clients to manage their affairs should a crisis arise as a result of scarce energy supply and/or rapidly escalating cost of energy. An indirect benefit accruing from energy contingency planning will be an improvement in energy management practices in current operations on the part of the public and private managers and planners.

Information and instructional guidance will be presented to those involved in the program through a series of conferences over a twelve-month period. The range of subject matter will include the broad categories of decisions which must be made in periods of emergency and ways in which decision-makers can plan to meet these situations, the major resources currently existing in the public and private sectors, the analysis of the requirements for mobilizing and, finally, the development of contingency plans needed to meet foreseeable energy crises situations.

This project for Georgia Community Continuing Education Service is under the direction of Robert E. Collier, senior research scientist in the Economic Development Division. Interested officials and managers may obtain additional information by calling Collier at (404) 894-3820.

Reception for Indonesian information specialists studying at EED

EES Conducts Program For Indonesian Information Specialists

Eighteen librarians and technical information specialists from Indonesia are participating in a training program at Georgia Tech July 18-September 30. The EES Office of International Programs is conducting the course under the sponsorship of the Agency for International Development.

The main objectives of the program are: to offer professional review of technical information management procedures; to provide a preview of trends in librarianship; to furnish access to facilities for professional research; to demonstrate audiovisual techniques; and to provide an opportunity to learn about the people and institutions of the United States.

The program is directed by Richard Johnston and Kay Auciello of EES. Other instructors are from the Georgia Tech Library, Emory University Division of Librarianship and a number of special libraries in the Atlanta area.

The group of seven men and eleven women has taken field trips to Lockheed's Technical Information Center, information centers at Coca-Cola, Emory Library, the libraries of the Environmental Protection Agency and the Georgia Mental Health Association. The course also includes classroom, workshop and individual instruction aimed at teaching the participants how to relate theory, processes, and techniques to practical situations.

In addition to the 11 weeks in Atlanta, the Indonesians will spend the first and last weeks of the program in Washington, D.C., for orientation and a survey of special libraries and information centers in the area.

Study of Sewage Sludge Phenomenon

Wastewater treatment has become so large and expensive that any ideas for reducing overall costs are considered worthy of study. EES has been awarded a grant by the National Science Foundation — Research Applied to National Needs (NSF-RANN) to study a means of producing a smaller volume of waste activated sewage sludge for ultimate disposal.

According to Dr. Stephen C. Havlicek, project director, the observation to be researched seems to be a chemical phenomenon, and, if proven, the idea may be significant in reducing the size of units for handling sewage sludge.

Sewage sludge is a perennial concern because this residue is the dregs of waste, offensive in odor and difficult regarding satisfactory and inexpensive disposal.

Several years ago, EES scientist Dr. Robert Ingols was involved in the designing of a joint wastewater treatment facility in Macon, Georgia, which treats a mixture of domestic and paper mill wastewater. The observation was made that sunlight appeared to have shrunk the sludge to half its original size; in reality, the sludge does not shrink but becomes twice as dense. At the time at which the phenomenon was first observed, no way of applying it for improving the effluent to the river was conceived. It is now being considered for decreasing the volume of waste-activated sludge that must be handled at this facility and at wastewater facilities in general.

Because a component of paper mill wastewater must be added to the activated sludge process in order to get the advantages of a lower volume of sludge, a cost effectiveness study of the process will be made. It is expected that enough information will be obtained the first year to know how much time and effort should be expended on the research during the second year.

Continuous Operation Laser Pumped By Tech's Nuclear Reactor

Researchers from the University of Florida working at the Georgia Tech Research Reactor have made a breakthrough with the continuous operation of a nuclear-pumped laser for the first time.

The importance of the achievement rests with the use of such a laser (light amplification by stimulated emission of radiation) to provide heat, power and communications capabilities to a space station in orbit. Such a laser could be located on earth or in a satellite also in orbit.

A nuclear-pumped laser converts energy from nuclear reactions directly into coherent light without the need for first generating electricity. Prior to this recent breakthrough, all nuclear-pumped lasers operated in short bursts.

Experiments were conducted in the research reactor at Georgia Tech. The laser operated for between ten and fifteen minutes, long enough to obtain satisfactory data. It was felt that the laser could have been operated for a much longer period of time had it been necessary.

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EDD Study For Georgia Economic Development Council

The Economic Development Division is conducting a nine-month study project sponsored by the Economic Development Administration (EDA) designed to improve the cooperative interaction among the fifteen member organizations in the accomplishment of the duties of the Georgia Economic Development Council. An additional objective of the project, according to Robert Collier, project manager, is to provide EDA an information base on which determinations can be made relative to the need for additional applied research to improve communication and organizational networking of processes and programs involved in economic development in Georgia.

According to Collier, the scope of the project includes: identification of types of interorganizational activity associated with the mission, policy and function of each organizational element represented on the Council with respect to economic development; identification of measures that member organizations are using to determine the economic impact of their activities in the field of economic development; and identification of communication contacts within member organizations (persons, committees, branches or other subordinate divisions) utilized in interaction with other member organizations or with their clientele in economic development.

The project will also include identification of: communication means, media, and control mechanisms that organizations utilize for interaction with other Council members; existing communication channels and networks currently utilized by member organizations for interaction with member organizations; and determination of the need for additional applied behavioral science research directed primarily toward the communication problems involved in the economic development process.

Tech Scientists Prepare Intense Atmosphere Study

By Charles Seabrook — The Atlanta Journal

A host of scientists, led by researchers at Georgia Tech, are preparing to start the most intensive study ever of the lower atmosphere.

When the study is completed seven years from now, scientists say, they will have a more complete picture of the atmosphere and will have answers to several questions concerning little-understood atmospheric processes.

In recent years, a great deal of attention has been focused on the atmosphere because of an apparent change in worldwide climate and because of the possibility that the life-protecting ozone layer is being eroded by man-made pollution.

The bold, new project that will attempt to get a more in-depth understanding of the lower atmosphere (the troposphere) is called "Global Atmospheric Measurements Experiment on Tropospheric Aerosols and Gases (GAMETAG)."

It will be directed by Tech research Dr. Doug Davis, who moved his atmospheric research laboratory last year from the University of Maryland to Tech's Engineering Experiment Station. Because of the work by scientists, the school is gaining a reputation as one of the nation's leading atmospheric research centers.

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