



# Trenchless Technology Center



Louisiana Tech University

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## Status of TTC Research Process

On October 28, 1993, a meeting took place between TTC staff, Industry Advisory Board (IAB), and Executive Committee in Dallas. The meeting was an example of the continuous cooperation between academia and industry leaders.

Various engineering faculty members submitted over 30 proposals which have been processed through the research proposal plan. Four proposals were selected and discussed. They were:

**Sanitary Sewer Management:** "An Intelligent Sewer Management System," by Dr. Steve McCrary.

The objective of the research is to develop a system that will help the owners and designers of sewer systems evaluate all the alternative methods of construction, maintenance, and rehabilitation—especially trenchless techniques—over the whole life cycle of the project. The current concentration will be on developing an evaluation system that helps in deciding either to replace the existing sewer line or to rehabilitate it.

At this stage, it has been decided to collect software, manuals of practice, and literature developed towards achieving the above-mentioned objective to establish the state of practice in this area. Based on that survey, the maintenance and rehabilitation techniques will be reviewed and models of decision making will be developed.

**Obstacle Detection:** "Obstacle Detection Prior to Drilling Major Crossings," by Dr. Dave Cowling.

The research goal is to investigate the use of low-frequency electromagnetics (EM) to examine the subsurface conditions for trenchless obstacle crossings. The issues identified as the direction of the research include:

- The cost-effectiveness of the EM technology.
- The influence of the powerhead lines and the underground powerlines on the EM.
- The types of soils that will be examined.
- The correlation between the known

subsurface conditions and information obtained by EM technique.

e. Handling variable and heterogenous subsurface conditions.

f. Producing field-ready equipment and software to analyze the results.

**Buckling Behavior:** "Investigation of Buckling Behavior of CIPP Liners," by Dr. Tom Straughan.

The objective of the research is to investigate the buckling behavior of the cured-in-place pipe (CIPP) liners when subjected to an external pressure while within the "host" pipe. Issues that have been discussed include:

- Definition and determination of the point of failure before catastrophic failure.
- Testing the pipe behavior under point loads.
- Inclusion of larger diameter pipes in the testing.
- Effect of adhesion between the CIPP and reinforced concrete pipe and steel pipes.

**Stress Analysis:** "Stress Analysis of Buried Flexible Pipe," by Dr. Fred Akl.

The objective of the research is to formulate a new approach for stress analysis of flexible buried pipes based on modeling the pipe-soil interaction. The following issues have been discussed:

- The mechanic of the pipe distress during both installation and service.
- Investigation of using other pipe material which is less costly.
- Inclusion of the groundwater effects in the model.
- Characterization of soil during installation will be considered at a later stage.

**Future Directions of TTC.** TTC will continue working toward becoming a National Science Foundation (NSF) center and seeking outside funding sources such as NSF, Environmental Protection Agency, Department of Defense, Department of Energy, etc., and building a research facility on campus.

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Les Guice, Assistant Director, TTC  
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Les Guice, Louisiana Tech University  
Tom Iseley, Louisiana Tech University  
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Lynn Osborn, Insituform Technologies, Inc.  
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## CPAR Long-Term Testing Update

The long-term evaluation at Louisiana Tech is continuing and the U.S. Army Corps of Engineers task report is due to be released in June 1994. Some of the liners are approaching 8000 hours under test. Although not all of the tests will be completed by the June report date, as much data as is available will be released. Remaining data may be included in a later appendix.

The CPAR long-term test program was designed to test CIPP and fold-and-formed rehabilitation products under hydrostatic loadings. This type of loading is similar to what would be experienced by relining a sewer in location with groundwater above the invert of

the host pipe. Results of this test will allow information to be obtained about the long-term behavior of these materials under hydrostatic loadings, as well as information on the materials themselves. The test procedure does not allow, nor has there been an attempt to grade or rate individual products. Our test program does not "pass," "fail," or "certify" individual products.

Some of the manufacturers experienced problems during the installation of the test specimens. These incidents will be discussed further in the Corps' task report. The result was that two manufacturers decided to reline specimens for the test program. This test is an

evaluation of long-term behavior of the products. For the results to be reliable and repeatable, there must not be any question as to the quality of the samples used in the program. The decision to reline was made by the individual product manufacturers, not by the Corps or the TTC. The specimens were relined so that the manufacturer could have confidence in the results.

All of the products participating in the test program are still being evaluated. No product has completed all of the long-term tests, although some are over 80 percent complete. The test results will be released with the June report.

## Two Years in Retrospect

by Chris Norris

Of all the things I have done in the past two years with the TTC, without a doubt the hardest is trying to summarize two years of work in a few paragraphs.

One of my concerns upon reaching graduation and the culmination of a three-year co-op program with Roy F. Weston, Inc. was the fact that all the entry-level civil engineering positions with environmental consulting firms seemed rather boring. I don't know if it was an idealistic outlook or simply a short attention span, but the opportunities available were not what I was looking for.

It was about this time that I learned about the TTC and the CPAR program. Weston was looking at becoming involved and had given me information to examine and decide if I would be interested in working on the CPAR program. I interviewed with Dr. Iseley to learn more about the TTC. For a new graduate, the urgency and enthusiasm Dr. Iseley (and others) showed toward trenchless technology was hard to resist. After meeting with some of the professors from my old school my mind was made up.

From a consultant's point of view, some things are surprising. There are a lot of consultants who do not even **consider** trenchless methods when designing projects. To me, this is unprofessional and could almost be considered negligent. One must consider **all available options** and then review all the advantages/disadvantages of each before eliminating any. To arbitrarily decide that trenchless technology is not an option without any consideration is certainly not in the best interest of the client.

Even after two years at the TTC, and after participating in several conferences, seminars, presentations, evaluation programs, etc., there is still so much to learn about trenchless methods. The technology is advancing so rapidly and is so dynamic that I doubt I will be able to keep up to date.

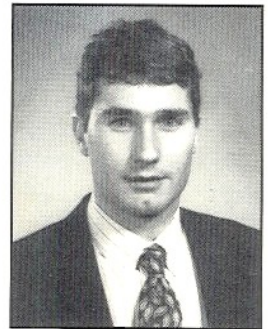
I am reminded of Dr. Peter Tarkoy's thinking that, "If engineers do little more than repeat what has been done before, they can be replaced by a copy machine." It is the engineer's responsibility

to investigate all options and systematically and logically eliminate possibilities to come up with the most cost-effective solution.

Exclusion by ignorance is not an easily defended position.

I am very grateful for the opportunity to work with the TTC, its staff and affiliated faculty. The last two years have been extremely hectic, exciting, and rewarding—both on a professional and personal level. Weston has made a commitment to trenchless technology and any future involvement is sure to include the TTC and the friends I have made over the past two years.

*Chris Norris served as assistant engineer for two years at TTC. On loan from Roy F. Weston, Inc., Norris is now back on staff at the Auburn, Ala. Weston Office*



### Questions on Trenchless Technology?

Do you need more information on trenchless technology? The members of the TTC Industrial Advisory Board have committed themselves to the trenchless technology industry. Should you need information concerning matters in their areas of specialty, please contact them directly. The code after each member's name represents the following areas: **Aug**-Auger Boring; **HDD**-Horizontal Directional Drilling; **MT**-Microtunneling; **Pipe**-Pipe for Microtunneling and Sliplining; **Rehab**-Trenchless Pipeline Rehabilitation; **Tele**-Telecommunications; **TApp**-Trenchless Technology Applications and Environmental Aspects.

### TTC Mailing List Update

The Trenchless Technology Center wants to build and maintain a current mailing list. If you want to receive TTC information, we would appreciate hearing from you. Please provide your mail address, phone and fax, and contact person, so we may add it to or update our records. Fax it to (318) 257-2562, or mail it to: **TTC, P.O. Box 10348, Ruston, LA 71212.**

*The TTC newsletter is incorporated as a department within Trenchless Technology Magazine. All newsletter materials are prepared by TTC. The newsletter is expected to be published every two months. Direct communications to Linda Henderson, TTC Assistant Coordinator.*