GUIDELINES FOR THE PREPARATION OF WHITE PAPER

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Geoenvironmental Research Experience (list projects in progress or completed within the past 5 years)**:**

I have been involved in geoenvironmental research in the following three projects in the last five years:

1. Title: Mitigation of Heave and Shrinkage Distress of Expansive Soils Using Recycled Waste; Funding Agency: Texas Higher Education Coordinating Board, Austin, Texas (1999-2002; Completed).
2. Title: Novel Stabilizers to Treat Expansive Subgrade Soils of North Texas; Funding Agency: City of Arlington, Texas 1998-Current (on-going)
3. Title: The effects of Using Compost as a Preventive Measure to Mitigate Shoulder Cracking; Funding Agency: Texas Department of Transportation; 2002- 2004 (on-going).

Geoenvironmental Teaching Experience (list related courses, including short courses, taught within the past 5 years)**:**

I have been teaching one graduate level course, Geoenvironmental Engineering (CE 5373) since 1996. I also teach geoenvironmental components in another graduate core course, Soil Behavior (CE 5371).

Geoenvironmental Consulting Experience (list major projects only)**:**

None – Have not participated in external consulting.

Appraisal of Geoenvironmental Research, Education and Practice (limit to 1-2 pages)**:**

I am an active participant in both geoenvironmental research and education. My interest in geoenvironmental area is primarily associated with recycled materials and their applications in subsoil modifications. My first research project was on boiler slag materials to be used as a backfill material. This project conducted at Louisiana State University resulted in two refereed publications in ASTM Journal and ASTM special publication.

In my current position at UT Arlington, I have been involved in a few research studies that focus on geoenvironmental issues. One of the earlier projects funded by the Texas Department of Transportation (TxDOT), focused on construction material compatibilities with different chemical pollutants in the ground. We developed software for Texas Department of Transportation for the selection of appropriate sewer materials in sites where contamination was encountered. Another research project funded by the State of Texas's Higher Education Coordinating Board focused on potentials of several recycled ashes (Fly Ash and Bottom Ash) and fibers (Nylon and Polypropylene) to modify expansive soils. This study was completed in 2002 and resulted in numerous publications.

Two on-going research studies funded by both TxDOT and City of Arlington focus on ground granulated blast furnace slag (GGBFS), fly ash and recycled compost products (Biosolids Compost and Dairy Manure Compost) to effectively stabilize expansive subgrades supporting transportation infrastructures. Two PhD students and two MS students are currently working with me on this research.

I have been teaching two graduate courses (CE 5371 Soil Behavior and CE 5373 Geoenvironmental Engineering) since 1996. These courses cover geoenvironmental aspects of soils, landfills, geomembrane and clay liners, diffusion theories, recycled materials and applications. The geotechnical and environmental laboratories at UT Arlington are also well equipped to perform geoenvironmental research.

Perspective on Emerging Geoenvironmental Issues and Technologies (limit to 1-2 pages)**:**

One of the interesting, if not the emerging geoenvironmental research areas, is to study the potentials of recycled materials to stabilize problematic expansive soils and hence decrease the infrastructure damage caused by the soil movements. Several recycled materials have been researched in the last few years and a few of them have already showed promising results in the laboratory studies. The potential of coal combustion ashes including class F fly ash, bottom ash, blast furnace slag and recycled fibers including carpet and plastic fibers to mitigate volume changes in expansive soils were recently addressed. Both fly ash and bottom ash provided beneficial, but moderate improvements to expansive soils whereas fiber treatment provided considerable reductions in shrinkage cracking. These materials are currently evaluated for stabilizing expansive soils under true field conditions. Potential successful applications of these recycled materials would solve two major problems; reducing expansive soil induced structural damages and conserving landfill spaces used for storing these waste materials.

Another interesting recycled material that can provide beneficial improvements to the expansive soils is compost material. Composting is a process to reduce pathogenic bacteria in the wastes, and results in a product that could be used for on-site applications including landscaping. Examples of composts for soil amendments are Dairy Manure and Biosolids composts. Biosolids are sludges produced from wastewater treatment plants and manure is the waste collected from cattle. Disposal costs of these wastes could be quite high due to increased costs of landfilling and environmental regulations. Hence, recycling options are deemed attractive for reusing these wastes. Among several modes of recycling options, composting of the wastes is receiving greater attention due to above mentioned benefits. Another advantage is that the composted material is rich in two nutrients (nitrogen and phosphorous) best for the growth of plants and grass. Currently, the U.S. EPA estimates that 7% and 4% of the biosolids and dairy manure are subjected to the composting process. This implies that large amounts of composts produced with a few recycling application areas available.

The Texas Department of Transportation (TxDOT) and Environmental Protection Agency (EPA) initiated research studies on composts to investigate their expansive soil stabilization potentials when used as soil amendments. Composts are considered since they are mingled with wooden fibers and exhibit hydrophilic characteristics. These characteristics are expected to help in the stabilization of expansive soils. The UTA is currently involved in this research. These composts are currently evaluated by studying them in both laboratory and field environments. Laboratory investigations revealed the potentials of composts in reducing shrinkage strain potentials of local expansive soils. Currently, field studies are in progress to address their effectiveness in real field conditions. Successful applications of these composts will lead to a new recycling application of compost materials for expansive soil treatments with reduced or minimum contamination risks.