



UNIVERSAL'S SERVICES FOR THE PHOSPHATE INDUSTRY

Universal Engineering Sciences, Inc. (Universal) is a privately-owned geotechnical and materials testing firm based in Florida. The company was founded 47 years ago and is still owned and managed by its original family. With over 400 employees, Universal was recently ranked among *Engineering News-Record's* largest 500 engineering companies (of any type) in the country and is the largest geotechnical, environmental, and materials testing company in Florida.

With headquarters in Orlando and 17 additional offices in Florida and Atlanta, Universal has on-going operations throughout the Southeast including a large presence in Louisiana. This geographical coverage is well-suited to serve the needs of the phosphate and chemical industry in Florida and the Southeast.

Safety has always been a top priority throughout Universal's 47-year history. Universal meets all applicable Occupational Safety and Health Administration (OSHA) standards, for both general industry and the construction industry standards which are applicable for diverse work operations and work environments. Of critical importance for mining areas is compliance with all Mine Safety and Health Administration (MSHA) standards and requirements including orientation & training, safety and health protocols, development of Job Safety Analyses (JSAs) for all work activities, emergency action procedures and compliance with all applicable Mine Health and Safety Plans.

Universal has partnered with Britt Watson, P.E., to offer a blend of services for the phosphate and chemical industry. Britt's 25-years experience includes several years of reclamation design as well as 15-years working for CF Industries managing reclamation activities. Britt has a unique understanding of the industry's needs having represented the owner in procuring geotechnical, environmental and materials testing services. Britt's expertise together with Universal's expertise and tremendous capabilities forms a team well tailored to serve many of the phosphate and chemical industry's needs. These services are described below.

Geotechnical Services

Universal's geotechnical engineers have a solid understanding of the consulting services that are unique to the phosphate industry so there is no "learning curve" required to provide such services. Our geotechnical laboratory capabilities include routine classifications tests as well as consolidation testing and tri-axial permeability of in-situ or remolded samples. Universal has a strong track record of not taking the most conservative approach but rather a practical and





cost-effective approach tailored to the unique requirement of each assignment and each client's needs and expectations.

Universal's personnel have considerable experience in providing geotechnical services for the phosphate industry. These services have included:

- Stability analyses of cut slopes for new mine areas and existing mine areas that are more deeply mined;
- Bearing capacity and settlement analyses for cooling towers, storage tanks, silos and other phosphate plant structures;
- Pile and shaft foundation design for above grade pipe racks and raw product conveyor systems;
- Quality control monitoring and testing of clay and synthetic liner installations for new gypsum stacks;
- Forensic evaluation of soil heave due to crystallization of sands from sulfuric acid leachate;
- Installation and sampling of groundwater monitoring wells;
- Forensic evaluation of gypsum stack cover/liner integrity;
- Earth dam construction testing; and
- Land development over reclaimed mine areas underlain by phosphatic slimes, including groundwater studies and recommendations for building foundations, utilities, pavement, and stormwater ponds.

Subsurface Exploration Services

Universal has the largest fleet of drill rigs in the state of Florida including several mud-bug rigs, truck rigs, limited access rubber track rigs, portable rigs, and various barge and drill rig combinations available for special assignments—over **40** company-owned drill rigs in all. Our crews are available for clients on an as-needed basis, even with short notice.



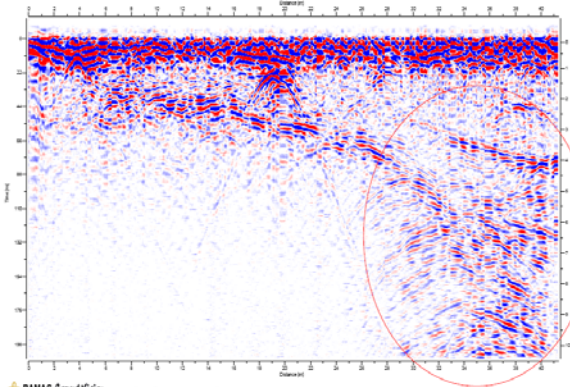
Specialty exploration equipment includes a direct push rig (Geoprobe) and CPT (cone penetrometer test) rig to collect data continuously and a CME-85 mounted on an all-wheel drive truck. The CME-85 is the largest hollow stem auger rig operating in the southeastern United States and is capable of installing recovery wells up to 10 inches in diameter.

Universal is registered in all of the Florida Water Management Districts. Our drilling crews have installed various geotechnical collection instruments including inclinometers and clustered piezometers as well as utilizing various samplers to collect soft soils. Available expertise includes piezometer installation for land reclamation and seasonal water table determination in created wetlands.



Sinkhole Evaluation and Remediation Services

The focus of a sinkhole evaluation is to locate potential zones of weakness and problematic subsurface conditions and define their extent. Universal Engineering



Sciences, Inc. (Universal) has evaluated thousands of sites for sinkhole activity. For the phosphate industry, sinkholes can form rapidly due to preexisting cavities within limestone layers that underlie dams, gypsum stacks, and or plant facilities. Universal has the resources to quickly evaluate sinkhole occurrences, potential sinkhole activity, and water loss in mining cuts.

Sinkhole development under existing gypsum stacks may be accelerated by the chemical properties of the acidic slurry and by the increasing weight of the stacks. Many of the gypsum stacks located within west-central Florida are unlined which can cause potential contaminant pathways to the Floridan aquifer system when a sinkhole develops. **All new gypsum stacks must be evaluated for potential sinkhole activity.**

Universal has many geophysical tools including ground penetrating radar (GPR), electromagnetic, and seismic surveys that can be used to detect subsurface anomalies. Shallow soils can also be analyzed by performing cone penetrometers and hand augers. We also utilizes numerous types of drilling rigs and crews with experience in directional borings that can be used to locate any weak pathways and the exact location of a sinkhole throat. Universal has the expertise necessary to complete, implement, and inspect any remedial design and recommendation plans needed to accurately and effectively treat any sinkhole in a timely and aggressive manner.



Materials Testing and Inspection Services

Universal Engineering Sciences, Inc. (Universal) has performed construction materials testing and inspections services for thousands of construction projects of various types throughout the southeastern United States. Projects have included major transportation projects, earthen dams and landfills, airports, levees, high-rise buildings, commercial projects, and both commercial and residential development projects.



A wide variety of construction testing and inspection services are offered, including, but not limited to:

- Field density testing of soils
- Inspection of soil placement & compaction
- Turbidity testing
- Piezometer & well monitoring
- Inclinator & settlement plate monitoring
- Plastic property testing of concrete
- Making and curing concrete cylinders
- Certified welding inspection
- Threshold inspection
- Field conductivity testing

Universal has the largest materials testing and inspection staff in Florida. This staff is supported by 17 full-service laboratories accredited by the following agencies:

- AASHTO Materials Reference Laboratory Accreditation (AMRL)
- Cement / Concrete Reference Laboratory Accreditation (CCRL)
- Construction Materials Engineering Council (CMEC)
- US Army Corps of Engineers (USACE)
- Florida Department of Transportation (FDOT)



Environmental Services

Universal Engineering Sciences, Inc. (Universal) assists a wide variety of clients with environmental facility permitting, assessing environmental problems, and finding the



least costly methods to bring them into compliance with current environmental regulations. Universal has been performing contamination assessment, drilling, emergency response and site clean-up continuously since entering the environmental business in 1984. The company is also familiar with Florida DEP Water Resource Management rules, specifically Chapter 62 referencing phosphate mining waste treatment requirements, phosphate mining and beneficiation operations, phosphogypsum management, and mine reclamation. In addition, Universal offers expertise in the areas of wetland assessments, delineation and permitting as well as protected species assessments, surveys and permitting. Environmental services provided by Universal include (partial listing):

- Groundwater flow and transport modeling
- Regulatory interface and expert testimony
- Hydrogeological investigations to assess subsurface conditions and contamination
- Development of site specific safety, health, and emergency response plans
- Air pollution source permitting (Title V)
- Air pollution control design and troubleshooting
- RCRA corrective action programs (Work Plans, RFI, CMS)
- CERCLA remedial investigations and feasibility studies
- Air sampling and dispersion modeling
- Wetland assessments
- Formal wetland determinations
- Regulatory compliance: safety & environmental
- Spill detection and tracking
- Design, implementation, and operation of contamination remediation systems
- Environmental resource permit application preparation and consulting
- Indoor air quality/industrial hygiene
- Stormwater management and pollution prevention plans
- Hydrogeological modeling of groundwater movement
- Preliminary Protected Species Assessments & Environmental Assessments
- Species Specific Surveys and Permitting
- Wetland delineation
- Wetlands permitting & Mitigation



Groundwater Monitoring and Modeling Services

For new dry-pit extraction, groundwater drawdown contour maps can be prepared to evaluate the potential impact to the Floridan and surficial aquifers. In order to generate a drawdown contour map, a rigorous analysis consisting of a groundwater flow model, using either a finite difference model or analytical model, is used.

Once the subsurface data is reviewed, pre- and post-development groundwater models are generated. The groundwater models can be created to simulate groundwater fluctuations for the proposed withdrawal(s) in an effort to evaluate the potential impact to the aquifers.

The same models are used to simulate the impact on the Floridan aquifer from mine water extraction wells and the mounding effect on the surficial aquifer from hydraulic mining flooded pit operations.



For off-site impacts, regional peer-reviewed transient model datasets made available by the local water management districts would be used to carry out an evaluation. The model data can be imported into the Groundwater Vistas[®] software package to perform the necessary simulations.

Major Projects

Universal has performed significant projects throughout the southeastern United States from Texas to the Carolinas to Florida. These projects have included providing a full-service US Army Corps of Engineers-certified laboratory as well as 18 full-time staff in Louisiana and inspection services at the ThyssenKrupp Steel Mill in Calvert Alabama providing 29 full-time staff. Our team is experienced in providing “out-of-town” services on both large and small projects.

