ALS Chemex

29 January, 2002

Golden Earth Distributors
1331 N. Cuyamaca St., Ste. G
El Cajon, CA 92020

RE: Summary of Testing for Higromite Product

In recent months, we have performed a series of physical and chemical tests on the calcined pozzolan that constitutes your Higromite product. Herein, I shall summarize these results addressing the moisture retention, capillarity, expansion, and compaction properties of the Higromite.

MOISTURE RETENTION

In a number of different tests, including the ASTM F 726-99 water adsorbency test, we have measured the moisture retention properties of the Higromite. The calcined Higromite retained between 92 and 102% of its mass in water based on the ASTM standard method. The results from the tests run last May are attached here.

The material thus exhibits strong moisture retention properties when compared with ordinary soils or even some of commercially available soil additives.

In December, Don D. Haller and Malcom Beck of Texas concluded their farming experiments using Higromite supplemented soils. As shown in the attached memo from Mr. Haller, experimental plantings of cabbage and broccoli in both control and Higromite augmented soils demonstrated that the retained moisture is benefiting the plant growth dramatically. A 20% Higromite in soil mixture seems to ensure consistent delivery of moisture to the plants' root systems.

CAPILLARITY

The wicking ability or conduit effect of the Higromite has been observed in a number of informal trials. Subcontracting AMEC Earth and Environmental, we sought to formally evaluate this property of the material. The experimental design included two clear plastic capillarity tubes of 2 ¼ inches diameter and 18 inches height. Raw parent soil was loosely packed into one of the tubes, while a 20% Higromite soil mixture was packed into the other. Placing the tubes in a tray of water, the capillary rise of water with time was monitored in both tubes. After two days of testing, the water column in the Higromite blend was 11.5 inches above the water line, while the water rose to only 2.75 inches above the water line in the parent soil.

ALS Chemex
994 Glendale Ave – Sparks, NV 89431-5730 – USA
Tel 775-356-5395 Fax 775-355-0179

This dramatic improvement in the capillarity of the soil with the addition of Higromite is strong evidence of the product's ability to evenly distribute moisture throughout the soil column. I have attached the letter from AMEC Earth and Environmental describing the experiments and results in detail.

EXPANSION

Because of the concerns raised by expansive soils, it is important to document a soil additive's expansion characteristics. While one would not expect significant expansion from the highly siliceous material, the test results confirmed these expectations. AMEC Earth and Environmental performed a standard expansion test and found no expansion. A specimen of pure Higromite was tamped into a ring and compressed at 100 pounds per square inch. Once settled, the sample was saturated and monitored for expansion. The technicians observed none.

COMPACTION

The ability of a soil additive to aerate a soil is a function of the compaction properties of the material. If the product compacts dramatically, soil porosity will decrease, resulting in a less aerated soil. There is a standard compaction test performed by soils testing labs. AMEC Earth and Environmental performed this test on a 20% blend of Higromite with a parent soil.

After moisture conditioning, a parent soil was compacted to standardized conditions, at which point a dry density of 108.4 pounds per cubic foot and a moisture content of 8.8% was determined. The porosity of this raw compacted soil was 34.6%. The 20% blend of Higromite and soil was similarly compacted. The resulting density was 80.8 pounds per cubit foot with moisture content of 7.1%. The resulting porosity in the blend was 50.5%, a 46% improvement in porosity in the Higromite blend.

The Higromite blended into the soil resulted in a dramatic improvement of porosity, attesting to the material's inherent ability to improve the aeration of soils. Again, the experiment and the results are summarized in the attached letter from AMEC Earth and Environmental.

Yours sincerely,

R. Patrick Highsmith
Chief Geochemist