Re: December 16, 2009
From: Rick Reynolds, Chemist / QA Director
For: Basalt Unlimited LLC

Effects of Accelerated High Alkalinity Environment

- **16 micron Basalt Chopped Fiber**
- **12mm (5/8th inch) Basalt Rebar**

Basalt chopped fiber and Basalt rebar have been developed to replace welded wire reinforcement and steel rebar reinforcing bars in concrete structures. The ability to withstand corrosion is a key component. Flexural reinforcement for these products has grown over the past few years, with long term durability as an important consideration. Fresh concrete is a highly alkaline environment. Our testing showed the basalt product has better alkali resistance than E-glass, aramid and poly fibers and does not rust or corrode like steel.

- **The basalt fiber and basalt rebar were subjected to an alkali solution with a pH range of 13.7 to 13.9.**
- **This range is harsher than the range called for from ACI 440 (12.6-13)**
- **The aging temperature was between 76 - 80 degrees C and lasted over 20 days which correlates to 100 years of accelerated exposure.**

The carbon fiber was cut in to 3 inch lengths from a continuous monofilament roving. Although ACI440 allows the ends to be sealed, these were not; in order to represent a normal use environment. The rebar was purposely scored to expose fibers, before emersion.

Although this was not a full and formal 100 yr. aging test since the samples were not hand wedged with clamps, and the temperature varied between 76 degrees C and 80, the alkali solution was considerably stronger than that used for ACI 440.

- **The results show the Basalt Chopped Fiber and Basalt Rebar had minimum degradation less than .0001% after inspection by microscope. The basalt products were minimally affected by the high alkalinity environment.**