Question to Horizon Environmental:
I think it would help (since these are posted for public review) that the results be measured against a quality metric. For example, what does a turbidity value of 6.0 indicate?

Response: Horizon Environmental

Good question. Unfortunately, the pertinent regulations do not provide a numeric standard for turbidity or total suspended solids (TSS). R323.1050 of the Michigan Water Quality Standards (Part 4 of Public Act 451) states that*waters of the state shall not have any of the following unnatural physical properties in quantities which are or may become injurious to any designated use: turbidity, color, oil films, floating solids, foam, settleable solids, suspended solids, and deposits*. This regulation does not provide a numeric standard, but rather establishes a "narrative standard" that is tethered to demonstrated impairments of designated uses.

Application of narrative standards can result in precisely the type of confusion we have seen at the VGT site, since observed turbidity in runoff and even within the creek is not, standing alone, necessarily indicative that a violation of the standard has occurred. The difficulty of assessing compliance with narrative standards often leads regulators and the public to default to differing levels of "observed turbidity" in runoff or the stream as indicative of a "violation" of the standard. But this is a highly subjective exercise that leads different people to different conclusions—a phenomenon we have seen played out repeatedly at the VGT site. At the extreme, some regulators and members of the public interpret the standard to essentially mean a "zero discharge" standard. But this interpretation is not grounded in applicable regulations or the practical reality of a construction site. (There is a reason the primary regulatory program governing this site is known as Soil Erosion and Sedimentation Control instead of "Elimination.")

We intend to work with the MDEQ's Surface Water Assessment Section (SWAS) to develop a site specific approach that clarifies application of R323.1050 at the VGT site going forward. We hope to complete this work over the winter and have it in place for the spring rain/snowmelt. This approach may well include application of a numeric standard along with the collection of quantitative creek monitoring data. The duration of any exceedance over a numeric standard could also factor into the compliance analysis. The goal will be to see if we can come up with a framework that would eliminate a lot of the ambiguity re: the quality of storm water runoff from the site. This should simplify the compliance assessment and go a long way to allaying resident concerns that the site is having an adverse effect on the creek. While I don't know where we will end up with the MDEQ on this question, I can offer the following additional information on numeric turbidity standards by way of general context based on the literature.

Most people consider water with a TSS concentration of <20-40 mg/L to be clear. Water with TSS levels between 40 and 80 mg/L tends to appear somewhat cloudy, while water with concentrations over 150 mg/l usually appears very cloudy. The size and composition of the particles that comprise the suspended solids may cause these numbers to vary. Vohs et al. (1993) has indicated that chemically inert suspended solids of 100 mg/L appears to separate those streams with a fish population from those without. The European Inland Fisheries Advisory Commission (EFIAC) stated that, in the absence of other pollution, a fishery would not be harmed at suspended solids concentrations less than 25 mg/L. Good to moderate fisheries can be found at 25 to 80 mg/L suspended solids, good fisheries were unlikely to be found at 80 to 400 mg/L, while only poor fisheries would be found at 400 mg/l (Alabaster, 1972). Gammons (1970) demonstrated decreases in the standing crop of both fish and macroinvertebrates in

an area receiving continuous suspended solids loadings of 40 mg/L . (It is important to note that some level of suspended solids load is necessary to support a healthy fishery inasmuch as it is the primary mechanism by which nutrients and organic matter are conveyed/replenished in the stream.)

I want to make a couple of points about these studies. First, these studies do not necessarily distinguish between the natural (or background) suspended solids load that may be present in any given watershed and anthropogenic sources of suspended solids nor are their findings necessarily broadly applicable because there a lot of site-specific factors that come into play (such as the hydraulics of the receiving stream and the size of the suspended solids). Second, there is a temporal aspect to the observation of adverse effects (i.e., adverse effects are related to not only the concentration of TSS, but also the duration of the discharge event). High levels of turbidity for a short period of time may not be significant and may even be less of a problem than a lower level that persists for a longer period of time.

Based on its own review of the literature, the MDEQ has put forward the following general water quality criteria categories for suspended solids (finely divided solids) in several TMDL (Total Maximum Daily Limit) evaluations conducted for other streams in Michigan. These categories are based on protection of aquatic life and support of fisheries:

Optimum = < 25 mg/l
Good to Moderate = >25 to 80 mg/l
Less than moderate = >80 to 400 mg/l
Poor = >400 mg/l

Until such a time as we can finalize a compliance framework for the VGT site with the MDEQ, the important conclusions presented in our November and December monitoring report are as follows: (1) the water at all creek sampling locations was observed to be visibly clear at the time samples were collected; and (2) there was no significant difference in temperature, turbidity, or TSS between upstream and downstream sampling locations. Taken together, these data indicate that storm water runoff from the site during these rain events was not having an adverse effect on the creek.