Comments on Golder Associates report on Texada "goop"

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Photographs from http://www.texadaslime.org *(this site no longer exists)*

The report Project No. 08-1416-0026/2007 is dated January 7, 2009 but I only first saw a copy on June 2, 2009. Golder Associates report.

Summary

The report, as far as I can judge, is fully to the high professional standards one would expect of a company of Golder Associates standing. I have no criticisms at all of the work itself, but I am very critical of the restricted mandate the company were given, and of the apparent lack of communication of previous results to their technical experts. Specifically, it was not taken into consideration that it was not the failure of the material to meet existing MoT standards that was in question; it was the inadequacy of the MoT standards themselves, particularly with regard to the geochemical properties of the material. The issue of its use in combination with magnesium chloride for dust control is not addressed, or even mentioned in the report. As a result, most of the report is, in my opinion, almost irrelevant to the "goop" problem on Gabriola.

2. Testing program

"In order to completely assess the physical suitability of the material for use as High Fines Surfacing Material, the properties listed in Table 202-B of MoT's "Standard specification for Highway Construction" should be determined…"

The only "physical" issue that is of concern in the Texada material is its clay content. This is difficult to determine consistently because the clay is so mobile. The relevant specification is Table 202-C, not Table 202-B. Table 202-C requires that the silt and clay component (less than 62.5 μm) be in the range 5–15%. Common observation is that this standard is not met, or that the standard is too lax. The clay component is clearly too high. Some results of measurements indicate compliance; others don't. Clay adhering to surfaces as shown in the photograph cannot easily be removed with a garden hose. The clay is the major obstacle to good drainage.

3. Results

3.1 Physical testing

No comment. Not an issue.

3.2 Petrographic examination

The petrographic analysis is instructive in that it conforms pretty well with previous analyses of the material as used on Gabriola, even to the extent that specks of *malachite* (negligible in volume) were observed, as they were on Gabriola even though unreported.

Some of the terminology used differs from that used in previous reports—"diorite", I take to mean mainly *granodiorite*; and "marble" is probably the *crystalline calcite*—but when these differences are taken into account, the petrology seems to be as it was previously thought to be.

3.3 Acid-base accounting

Acid rock drainage was not considered an issue because of the high carbonate content. Even on Denman Island where the carbonate content of the Texada material is very low the measured pH in puddles was 7.7. On Gabriola, pH varies between 8.4 and 9.1.

3.4 Leachable metals

Previous water leachable analysis has indicated compliance with drinking water standards:

mg/L

Al 9.92, Sb 0.0009, As 0.0273, Ba 0.09, Be 0.0003, Bi <0.0005, B 0.187, Cd 0.00025, Ca 115, Cr 0.0055, Co 0.009, Cu 0.203, Fe 9.6, Pb 0.0047, Li 0.013, Mg 12.8, Mn 1.88, Mo 0.026, Ni 0.0091, K 5.3, Se 0.0006, Si 14.4, Ag 0.00034, Na 141, Sr 0.438, S 64, Th 0.00011, Sn 0.002, Ti 0.268, V 0.0211, Zn 0.067.

The measured amount of copper in Bag #341 (.0364 mg/L) is an order of magnitude less than is commonly measured in well water on Gabriola.

The measured amount of molybdenum in Bag #341 (.0557 mg/L) is slightly higher than is measured in some well water on Gabriola, though much less is common.

Information about mercury may be available but I do not have it to hand. The figure of 0.000162 mg/L seems to be acceptably low given that the runoff from the goop will be heavily diluted shortly after leaving the road.

Just for information, an arbitrarily-chosen sandstone well water analysis from Gabriola reads:

Al <0.05, Sb <0.001, As 0.003, Ba <0.005, Be <0.0002, B 0.16, Cd <0.0003, Ca 15.7, Cr <0.003, Co <0.0001, Cu 0.11, Fe 0.05, Pb 0.0007, Li 0.006, Mg 2, Mn 0.003, Mo 0.0004, Ni <0.005, K 0.2, Se <0.003, Si 3.2, Ag <0.001, Na 71.6, Sr 0.096, S 64, Th <0.00005, Sn <0.004, Ti 0.0006, V 0.001, Zn 0.03.

4. Discussion

The concluding remark that the geology of Texada is very varied and further testing may be in order is appreciated as it echoes concerns expressed in previous reports.

Issues that the report fails to address are:

- clay and carbonates form the basis of a natural hydraulic cement that clings to surfaces and hinders drainage, which is what so many people object to. Assertions by Emcon that this problem can be solved by grading, and by only using the material in dry weather, reveals a fundamental lack of understanding of the problem
- the use of magnesium chloride for dust control greatly contributes to the problem as the cement seals in salty moisture under wheel arches and this greatly encourages corrosion of vehicles. Scales of magnesium silicate are a common industrial hot-water problem and may be what is in the coatings that are difficult to remove in the braking systems of Gabriola's vehicles.

Conclusion

This report does nothing to change my conclusion expressed in previous reports that there are sound technical explanations for almost all of the complaints being made about the use of this material on Gabriola, and these should be addressed.