

E-mail: February 18, 2008

Frank Rizzardo
President & General Manager, Emcon Services

Dear sir

You probably are already familiar with the fact that the people of Gabriola Island are upset about the use of Texada Gravel by your company on the unpaved roads of the island. Although I do not myself live on an unpaved road, I do have some experience of it when I go to visit friends. It is, believe me, creating a mess. Because I have some knowledge of the geology and hydrology of the island—I am an honorary research associate of the Geology Department of the Malaspina University-College in Nanaimo—I recently undertook on my own initiative and at my own expense a study of the problem. My findings and conclusions are in the attached report. I am, I'll add, a professional engineer; however, my professional engineering expertise is not directly relevant to this topic.

Briefly, what the Texada Gravel is, as you are aware, a mix of predominately limestone chips, some gravel made of the usual volcanic and intrusive rocks, and—unusually for the regular garden-store variety of limestone chips for use on driveways—a clay component.

This clay component is, I suspect on the basis of the geology of the Texada formations and its mineral properties, bentonite or volcanic ash. Bentonite typically contains the common clay montmorillonite. This clay is very sticky when wet, and in some jurisdictions in the much drier parts of North America, I gather this property is welcome as it assists in dust control in summer.

Complaints about the material fall into two categories: health, and safety together with damage to vehicles and property.

The health issue includes complaints that the material is “caustic”, that the dust causes asthma, and that the “goop” as it is called here, is entering and contaminating the aquifers—we rely heavily on groundwater from wells on the island, and many of these are quite shallow as the aquifers are “perched”. I am not qualified to make any comment on these complaints and the inferred “cause and effect” links islanders are drawing beyond the fact that I have tested the water found in potholes and found that it is perfectly “natural”, contains no toxins, and in fact meets all local drinking water quality standards.

The details are contained in the attached report. It appears to me, that one possible cause for it being perceived as “caustic” is that the calcareous clay forms a natural hydraulic cement that might seal in salty and bacteria laden moisture in some circumstances. This is however pure conjecture on my part.

On the second issue, the essential complaint is that the clay makes the roads slippery, and that (to put it briefly) when it dries it forms a hard cake on vehicles that is hard to remove. These complaints I consider it quite possible to substantiate technically for the following reasons:

1. As already mentioned, calcareous clay forms hydraulic cement.
2. The climate on Gabriola in winter is wet and many of our unpaved roads are shaded in the fall and spring by tall trees resulting in little sunshine to dry the clay out. The clay is certainly causing far more problems than did any dust.

3. The roads on Gabriola have been treated in the past with dust control agents. These agents work by being hygroscopic, perhaps even deliquescent. A mix of hygroscopic chemicals and clay is a sure-fire way of prolonging the drying out process. One resident tells me that it never has really dried out since it was first applied more than a year ago.

4. There is indication that one of the dust control agents used in the past was magnesium chloride. A mix of silica-rich bentonite and magnesium compounds is notoriously problematic in industrial systems using hot water because it leads to scaling by magnesium silicate. This scale is very hard to remove from surfaces. I will add here, that even if one maintains that this can only happen at high temperatures, those high temperatures will exist in the interior of the braking systems of vehicles.

In short, I consider there are very good technical reasons for regarding the complaints of citizens as valid and that the root of the problem is the presence of a limestone-clay-sodium/calcium/magnesium chloride mix on the road surfaces.

I hope this has been a useful contribution to an understanding of the problem and of course to your finding a solution. My report and conclusions is attached and naturally I would be very pleased to have it commented on and questioned by your experts. I am, sir, always willing to learn and, as I say, highway maintenance is not within my professional expertise.

Sincerely

E-mail: February 18, 2008

Mr Doe

Thank you for your email and attached report. I am pleased to see that you have come to your own conclusions on the granular material, being used on Gabriolla and other islands, lower mainland, and large centers of population along the west coast of North America. I should advise that the Texada Quarry is one of the three biggest quarries supplying granular material in the markets noted. It is hardly a tailing pile as some have referenced .

I was surprised that in your review you would not have noticed that the material is standing up very well where we had good drainage. In fact there is limited failure using this material and it is substantially in areas of poor base and poor drainage. I agree with your comments that the limited or no removal of trees along roadways is a critical component to lack of road surface drying, and in fact could be causational in accidents experienced in such areas.

Our plan is to improve the drainage to the failed areas, improve base and attempt to improve cross fall to allow surface to drain.

I am appreciative of the effort you have undertaken on preparing your review, but am not able to agree on a your conclusion that the unsupported suppositions should result in the immediate cessation of use of this product. Your own data does not provide the basis for this action. I can advise that we treat the concerns seriously and in fact have committed an additional grader to ensure we are able to respond to the changing conditions without having to transport one from Parksville.

Again I do thank you for your input.

E-mail: February 19, 2008

President & General Manager, Emcon Services

Dear Mr. Rizzardo

I thank you sincerely for your reply because it does I believe move us forward in reaching agreement on this topic. I can appreciate your annoyance at the “technological hayseed” approach. A good friend of mine works in the cement business, is a scientist, and frequently travels to Texada, so I am aware that whatever is causing this problem is not something that can be solely attributed to the material being used. We are looking at a special set of circumstances.

Having said that though, I sense that you are thinking of the problem in terms of drainage, presumably in the form of gullies and gravel. However, if so, I can confidently say, that in my opinion, such remedial measures will have little or no effect. The problem is that the clay material in the “Texada Gravel” is montmorillonite, a marine clay, and it has an intrinsic permeability that is something like nine orders of magnitude less than gravel, seven orders of magnitude less than clean sand, and four orders of magnitude less than even silt—I'm obviously reading from my hydrology textbook. If you put that together with the hygroscopic chemicals that are undoubtedly there, the chemical analyses show it, and that have undoubtedly been applied to the road surface in the past to control dust,— I am told calcium chloride but believe it to be magnesium chloride—you have a material that will dry only very very slowly no matter what the escape routes for the water are once it gets clear of the clay.

I urge you to look at again at this problem. Providing a grader would in other circumstances be a very welcome and appropriate response, but having studied this problem in the field for a couple of weeks, I can assure you that in the present circumstances, it will not resolve the issue.

Islanders are well accustomed to potholes and can and have lived with them for years, but the sticky mess of bentonite clay mixed with chlorides is something entirely new and is, I have to agree with them, most objectionable.

If there is more that I can do in the way of providing technical information relating to the material please let me know, but I repeat that I am not an expert in the field of road construction and maintenance, I just know about rocks.

Yours very sincerely