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Friday, April 7th, 2017

Dear Mr. Louis Kan:

I am formally reporting Mr. Peter Gray (a member of the Association of Professional Geoscientists of Ontario, APGO) with producing two scientifically erroneous reports that he signed with an APGO stamp. The basis of my complaint is that he intentionally ignored watershed-level processes while characterizing his study site and as a result produced reports that are absent of any basic quorum of scientific integrity. Furthermore, he did so with impunity, believing that the Professional Geoscientists Act (2000) protected him from outside criticisms.

I have attached a report (Appendix A) outlining just a few of my scientific criticisms of Mr. Gray's reports. I have also included two pdf-files, the 2015 Hydrogeological report and the 2016 Hydrogeological report produced by MTE and co-authored by Mr. Gray. I have included email correspondence sent by Mr. Gray to my employer, the University of Toronto (Appendix B). I provide this as evidence that Mr. Gray tried using the Professional Geoscientists Act (2000) to silence my criticisms by claiming that I was acting as a "geoscientist practicing without a license". My employer, the University of Toronto, quickly ascertained that I was commenting on a report that had been submitted in a public forum, that I was responding as both a private citizen and as an academic, and unreservedly told Mr. Gray as such (Appendix C).

That didn't stop Mr. Gray from contacting Mr. Aftab Khan, a Registrar at APGO, in the summer (August) of 2016 after an article was published in *Bancroft This Week* containing an interview with myself. Once again, I heard accusations of being a "geoscientist practicing without a license". Mr. Aftab Khan emailed me again in March 2017 to warn against my being a "geoscientist practicing without a license" just at a time when the second quarry application was receiving comments from the general public. The only way that Mr. Khan was able to contact me at two times when MTE activity was involved had to be because he was contacted by an MTE employee (Mr. Peter Gray). I find the use of the Professional Geoscientists Act (2000) as a means to prevent scientific criticisms from outside sources (i.e. non-APGO members) particularly abhorrent because this law was meant to promote scientific integrity not protect a lack thereof in APGO-authored reports.

I am not a "geoscientist practicing without a license"; just a simple academic who refuses to stand aside while science is being perverted to earn someone a dollar. I am contacting you, Mr. Kan, as CEO of APGO to determine where APGO's professional standards lie; on the side of preserving scientific integrity or on the side of preserving the right of your members to overlook scientific best-practices to earn an exclusive living. It is time that the APGO make its position known to the public, especially to the Ministry of the Environment and Climate Change (MOECC). MOECC has appointed the APGO to act as a regulatory body within the environmental consulting field, but could just as easily decide to remove this exclusive privilege if it is found abusing such power.

Sincerely,

Sharon A. Cowling, Ph.D.



APPENDIX A

Overview

As they relate to the Ontario Aggregate Resources Act (1991), both hydrological reports by MTE (HG-reports 2015, 2016) are technically sound and correct. Scientifically, however, the watershed is the basic unit for understanding hydrology and not a small study site within a watershed, therefore it is from this perspective that I view both of the HG-reports scientifically flawed and lacking of any basic scientific integrity. By ignoring watershed-level features, Mr. Gray was able to fabricate a false identity for the study site in question, implying that it was an unconfined aquifer where groundwater is a relatively unimportant component of the hydrological balance and belowground faults, fissures and springs are completely lacking. I would like to point out here that a first-year university student could have properly identified the hydrological regime of the site by looking at other features within the watershed (i.e. presence of four spring-fed lakes). Consequently, I have no other choice but to conclude that Mr. Gray's ignorance was intentional, and not due to his incomplete B.Sc. education.

Specific Comments and Examples

My specific comments relate to the fact that MTE did not use the watershed as a means to better understand the hydrogeology of the study site in question. The hydrogeology of the study site will not differ from the hydrogeology of the entire watershed, therefore by ignoring hydrological features and processes known to be occurring within the watershed where the study-site is located, Mr. Gray produced two scientifically incorrect reports. Specific examples follow:

In the first report (2015), MTE incorrectly identifies the type of hydrological regime present at the site; they describe it as an "ideal confined aquifer" (middle, page 23). A confined aquifer refers to groundwater where flow is restricted (i.e. blocked movement) by bedrock or some other non-permeable material. An "ideal" confined aquifer refers to conditions of absolutely minimal movement of water into or out of the confined aquifer. Due to the presence of spring-fed lakes elsewhere in the watershed, the word "ideal" is incorrect because water must be moving from one place to another via underground springs created by faulting of the geological bedrock.

MTE did not call the study site an ideal confined aquifer in their second report (2016), rather preferring to use the statement: "The Site and study area are located within the York river sub-watershed which is part of the Madawaska watershed" (middle, page 4). MTE went this route because an unconfined aquifer is a relatively uncomplicated hydrological regime, where faults/fissures/cracks are typically not present in the local geology and therefore springs, and spring-fed lakes are generally not part of the hydrological landscape. I'm not sure why MTE decided to change the characterization of the hydrological regime of the study site between reports, but the actual characterization of the hydrological regime is that it is a complex confined aquifer.

By using the Ontario Base Map (OBM), MTE showed an absence of large bodies of water present on the study site. MTE indicated that they relied on comments made by a subcontracted ecologist

who identified that in addition to two small streams, there were also two semi-permanent ponds and one permanent wetland within the 500 m radius of the proposed site (HG-report 2015). These smaller water features would not have appeared on the OBM. MTE goes on to describe the water balance of the site, indicating that these streams and ponds have all formed as a result of seasonal rainfall flowing over the land surface, with water collecting in topographic lows. Groundwater is a major component of water balance evaluations, but MTE avoided its discussion because they pretended the site was an unconfined aquifer where groundwater is much less important. In reality, MTE should have discussed groundwater as a major component of the water balance of their study site because their study site was in fact a complex confined aquifer.

MTE indicates that they did perform a reconnaissance of the site for their second HG-report (2016), but they fail to identify the permanent wetland that was identified in the previous report. A permanent wetland would have indicated the presence of groundwater on the surface. Because the site was described as containing Precambrian rock, the only way to get groundwater to travel through igneous and metamorphic rock to reach the surface is through fissures in the rock. In other words, MTE would have had to indicate the presence of a spring-fed wetland (which they do not).

In their first report (2015), MTE does not identify any of the four spring-fed lakes found elsewhere in the watershed (up to 2500 m from the site). In the second HG-report (2016), MTE identifies eight lakes within the vicinity of the site (including lakes outside the immediate watershed), with MTE asserting that "water entering these lakes will be primarily from surface water runoff from surrounding lands with a minor component from groundwater" (bottom, page 4). Although this statement is somewhat correct for all lakes grouped together, this statement is absolutely false for the four closest lakes to the site (i.e. Jeffrey, Banner, Bay and Spurr Lakes) all of which are spring-fed (by groundwater) and indicative of the hydrological regime of the entire watershed. All MTE had to do was contact the Ministry of Natural Resources and Forestry (MNR) office in Bancroft to ascertain the hydrology of these lakes. The MNR regularly visit these lakes as several of them are lake trout sanctuary.

A constant theme in MTE's description of the hydrological balance of the study site is an intentional overlooking of the groundwater component. MTE wants to avoid having to present a risk assessment of blasting in an area where faults and fissures underlie the proposed blasting site, therefore they fabricate a hydrological regime for the study site where groundwater is less important and can be justifiably overlooked.

MTE relies on an outdated publication (i.e. Lumbers and Vertolli, 1998) to ascertain the likelihood of finding faults beneath the study site but once again ignore looking at the features found at the watershed-scale. Statements like "there is expected to be minor faulting on the Site" (first report; top of page 8) and "there are no faults mapped on the Site" (second report; middle of page 7) are blatantly false in the face of a watershed containing four spring-fed lakes. You cannot get spring-fed lakes if there is an absence of faulting in the area as the geological processes involved in faulting produce fissures in rocks that allow confined groundwater to seep to the surface to create these lakes. A first-year university student could have easily identified these types of errors contained throughout both reports.

There is one very obvious discrepancy between the different types of reports produced by MTE during their first application (in 2015). A separate environmental assessment report was authored by a subcontracted ecologist, who isn't a member of APGO but who holds a higher post-secondary school degree (i.e. M.Sc.). The ecologist describes the groundwater system that exists at the scale of the watershed in one succinct sentence: "In summary, the estimated ground water table is at 375 m AMSL but varies over the site because water is actually contained in *fractures* within the bedrock" (my italics; bottom, page 6). Somehow, MTE hydrogeologists missed this **basic** hydrological feature of the site and have gone to extremes to avoid using terminology like fissures and fractures within their reports.

Hydraulic conductivity is an important parameter in Hydrogeology as it describes how fast or how slow water flows through belowground material (i.e. soil, rock, gravel, or clay), and in turn will influence the maximum distance on which quarry activities will have an influence. MTE identifies a mean hydraulic conductivity of 1.6×10^{-5} m/day (first report; page 26) which is indicative of an area composed of material that does not allow for fast water flow (i.e. Precambrian rock). This low hydraulic conductivity is used for groundwater modelling calculations as well as for determining the zone of influence (which was determined to be 500 m).

In the second report (2016), MTE provides a range of hydraulic conductivities observed for the study site; from low conductivities such as 4.8×10^{-6} m/day to high conductivities such as 2.9×10^{-1} m/day [note: I have converted the units from s/day to m/day as the latter is the ISI unit for hydraulic conductivity]. If the area contains predominantly Precambrian rock types like MTE indicates, then what explains the presence of such high values of hydraulic conductivity (i.e. 2.9×10^{-1} m/day)? MTE does not address the reason for such a wide range of hydraulic conductivities (i.e. by *five* orders of magnitude) because it would have directly contradicted their claim that there were no faults (fissures) in the geological material below the site.

A scientist with integrity would have used the full range of hydraulic conductivities to compute a range of zone of influences, rather than using the mean conductivity which actually means nothing from a scientific perspective. Instead of following scientific best-practice, MTE used the mean value which resulted in a relatively short (~500-800 m) zone of influence. If MTE had used the full range of hydraulic conductivities to calculate the zone of influence, the zone of influence would have extended well into the watershed and would have included the presence of spring-fed-only lakes.

Please note that these examples were obtained by taking a cursory glance through the reports and by no means represent all of the misrepresentations of hydrological sciences contained within.



Sharon A. Cowling, Ph.D

APPENDIX B

Dear Dr. Pysklywec and Dr. Cameron,

I am submitting this letter of misconduct to you detailing the actions of Dr. Sharon Cowling of the University of Toronto. I recently received copies of letters written by Dr. Sharon Cowling, Dept. of Earth Sciences, University of Toronto regarding a peer review she undertook of a report that I authored for a proposed quarry site in Bancroft. Dr. Cowling can provide you with a copy of the report she has reviewed. I have attached the letters written by Dr. Cameron for your reference. Dr. Cowling states that she owns a summer residence in the Bancroft area, and yet was providing an impartial evaluation of the report for scientific merit and completeness. In my opinion, one cannot be impartial while being a resident in proximity to the proposed application. As such, I believe she is in a conflict of interest position while also acting as an advocate. Whether her claims to my incompetence prove out, which I can assure you they won't, she is acting in an unprofessional manner.

Further, while she has a cross appointment with the Department of Earth Science, she is not, nor does she have the credentials or license to act as Qualified Person (QP) under either the Ministry Of Environment and Climate Change (MOECC) or Ministry of Natural Resources and Forestry (MNRF) definitions and is therefore unqualified to make the assertions she has made to the Reeve, Twp Council, MNRF staff and the public record. She has commented on matters beyond her areas of expertise on University of Toronto letterhead. While she offers her services to oversee any future Earth System science material your council may receive to the Township Council, she is legally unable nor licensed to practice geoscience in Ontario and provide these services as an Earth System Scientist and as such is misrepresenting herself and the University of Toronto. Finally, she attached a Peer-Review of the Hydrogeological Report submitted by MTE to her document and did not follow any professional protocol in completing her peer review. Her writings are technically incorrect and could be considered slander and misrepresentation. For your information, a few examples of where Dr. Cowling is technically incorrect includes her assertions that:

- "Four pristine kettle lakes are located within 5 km of the site" - these lakes are mapped in an area of exposed metamorphic bedrock outcropping at the surface. These lakes are a result of glacial scouring and were not formed as a result of glacial calving, sediment deposition and burial followed by post glacial melting and local subsidence of the ground surface, in unconsolidated sediments to subsequently form a kettle lake. Further, these lakes are not identified as kettle lakes in Barnett's 1989 Quaternary Geology of the Bancroft Area OGS Report 262.

- "Extraction of hornblende" - this is not a mineral extraction mining process. It is not possible to selectively mine certain minerals, especially in this case where the purpose is to mine all the rock and crush the collective rock to be used as an aggregate resource for construction projects.

- Water levels: while water levels measured in monitoring wells on site are indicative of artesian conditions, water does not flow uphill.

- Real Estate Agents: Dr. Cowling claims that data from real estate agents is a reliable source of technical information that we neglected to consider.
- Dr. Cowling claims that the quarry in its existing natural state is already below the water table.
- Dr. Cowling is clearly acting as an advocate to stop the quarry and not an impartial scientist by stating that if anything can be extracted carte blanche from the quarry because if this is the case, then we as concerned citizens will have to take this reality into perspective when we try to let our opinions heard.

According to the Rules of Practice and Practice Direction of The Environmental Review Tribunal, July 9, 2010, technical evidence and opinion evidence should be, and should be seen to be, the independent product of the witness uninfluenced by the interests of any Party and should, therefore, be fair, objective and non-partisan, and the witness must never assume the role of an advocate for a Party. Recognizing that we are not at a hearing stage, the same practice principles apply during the investigative stages of a project.

While I highly respect the UofT as an academic institution and have worked extensively with Dr. Ken Howard, I cannot let Dr. Cowling's assertions go unattested. I look forward to your response.

Thank you for your time and attention to this matter.

Best regards,
Pete

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APPENDIX C

Dear Mr. Gray,

Thank you for your email. I am writing on behalf of Dean Cameron. I have now spoken with Professor Cowling and the Chair of her department. I understand that Professor Cowling intended to write the letter as a personal comment on a public report, and therefore was not making representations as a licensed professional in this area. She is entitled to express her opinion on the proposed quarry site in her capacity as a private citizen and an academic. Therefore, as your complaint does not concern an allegation of research misconduct, I would recommend you address your concerns to Professor Cowling individually.

Best,
Jay Pratt

Vice Dean, Research and Infrastructure
Faculty of Arts & Science
Professor, Psychology
University of Toronto