

MINISTRY OF EMERGENCY MANAGEMENT AND CLIMATE READINESS INFORMATION BRIEFING NOTE

PREPARED FOR: Honourable Bowinn Ma, Minister of Emergency Management and Climate Readiness

ISSUE: Background Regarding Emergency Plans for the Trans Mountain Corporation (TMC) Pipeline.

BACKGROUND:

- The City of Burnaby has raised concerns/issues regarding the expansion of TMC operations:
 - Spill Management – Burnaby has noted a response to toxic release to air is different from a physical spill and that a regional approach to both types is necessary.
 - Fire Response – City of Burnaby has concerns should a fire spread to the heavily forested areas of Burnaby Mountain
 - Construction standards – Burnaby has concerns regarding building standards, including seismic criteria, for the road networks and any potential requirements to upgrade the older infrastructure, particularly tanks, to the same standard as the new builds.
 - Evacuation planning - Burnaby is not clear on the specific Canadian Energy Regulator (CER) instructions that indicate that TMC must develop evacuation plans for Simon Fraser University (SFU).
- In August 2019 CER arranged a conference with then MLAs Bowinn Ma, Anne Kang, Katrina Chen, Janet Routledge, Bob D'Eith and Raj Chouhan in response to questions raised by Burnaby residents. Key points were:
 - The Trans Mountain Expansion Project is a federally regulated pipeline subject to the *National Energy Board (NEB) Act*.
 - The NEB (now CER) requires that TMC maintain and regularly update their Emergency Management Response Plan as part of their Emergency Management Program required under Section 32 of the NEB's Onshore Pipeline Regulations.
 - TMC has developed Emergency Response Plans for each of the 'Trans Mountain Pipeline', 'Terminals and Tank Farms' and 'Westridge Marine Terminal'. These plans cover spills, security incidents, natural hazards, explosions, and fires, and are publicly available online.
 - TMC tests their Emergency Response Plans through regular exercises with invitations to all levels of government and First Nations.
 - TMC's Emergency Management Program is also subject to audits from the CER. The CER website indicates that the most recent audit was concluded in 2017 with its Final Audit Report released on December 22, 2017.
 - In its Final Audit Report, the NEB indicated that its original audit plan had included specific activities to assess TMC's response preparation for fires at its Westridge, Burnaby and Edmonton Terminals; however, at the time of the report's release this assessment was not complete.

- The NEB completed the required review of the fire response assessment, and on May 31, 2019 the NEB issued a letter/report to TMC as an addendum to its original Final Audit Report: <http://www.neb-one.gc.ca/sftnvrnmnt/cmplnc/rprts/dt/2019/T260/2019-05-31nbltr-eng.html>
- The NEB's audit concluded that TMC's process and practices have addressed the majority of the requirements associated with the company's emergency hazards and associated risk related to fire. This conclusion is consistent with the NEB's previously released Final Audit Report for TMC's Emergency Management Program. Two deficiencies were identified:
 - CER expects TMC to address these deficiencies by undertaking the directions included in the audit report addendum within one year.
- The NEB report "Trans Mountain Expansion Project – Reconsideration" is the governing document that outlines regulatory requirements, considerations and status. It can be found at <https://www.neb-one.gc.ca/pplctnflng/mjrpp/trnsmntnrxpnsn/trnsmntnrxpnsnrprt-eng.pdf>
- A meeting was held on June 30, 2020, with Burnaby Residents Opposing Kinder Morgan Expansion (BROKE), MLA Janet Routledge, and representatives from Ministries of Environment and Public Safety and Solicitor General. At the meeting BROKE expressed concerns regarding the potential for a major disaster at the Trans Mountain Burnaby Terminal and provided a written summary dated July 27, 2020, to Emergency Management BC (now Emergency Management and Climate Readiness – EMCR) and the office of the Minister of Public Safety and Solicitor General (Attachment 1).
- EMCR staff responded to the July 27, 2020, letter by email noting that EMCR does not have the authority to direct federally regulated entities to take any of the actions suggested by BROKE, however, EMCR could assist with the coordination of emergency plans and preparation by bringing all levels of government and other stakeholders together (Attachment 2).
- EMCR staff then reached out to Ministry of Environment and Ministry of Energy, Mines, Energy and Low Carbon Innovation, and confirmed that these agencies will take the lead in supporting discussions between City of Burnaby and the federal regulator on requirements regarding emergency planning as per the Federal requirements, including co-ordination of plans. In May 2022, EMCR provided, at TMC's request, feedback on the draft Burnaby, Sumas, and Westridge Marine Terminal Evacuation Plans in accordance with CER Condition 123 Evacuation Plans.

DISCUSSION:

The Trans Mountain Expansion Project is a federally regulated pipeline subject to the National Energy Board Act and as such, any concerns should be directed to the Canadian Energy Regulator. Ministry of Energy, Mines, Energy and Low Carbon Innovation and Ministry of Environment are best positioned to support those conversations.

INDIGENOUS PEOPLES CONSIDERATIONS:

- Indigenous Peoples may have practices that will need to be considered in the development of a B.C. wide application in BC.

OTHER MINISTRIES IMPACTED/CONSULTED:

- Ministry of Environment, Ministry of Energy, Mines, Energy and Low Carbon Innovation, BC Wildfire Service, Oil and Gas Commission, Canadian Energy Regulator, and Natural Resources Canada

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REVIEWED BY:

	Initials	Date
DM	TR	20/04/2023
Assoc. DM	MSM	20/04/2023
ADM	MM	20/04/2023

ATTACHMENTS:

Attachment 1: BROKE Letter July 27, 2020
Attachment 2: EMBC Email August 28, 2020

To: Andrew Douglas, Ministerial Asst., Minister's Office, B.C. Min. of Public Safety and Solicitor General (PSSG) PSSG.Minister@gov.bc.ca
Stan Bates, Exec. Dir. of Response, Emergency Management BC (EMBC),
Stan.Bates@gov.bc.ca

Cc: BROKE, John Clague, Gordon Dunnet, John Clarke, Dipak Dattani, Chris Bowcock, Mark Lalonde, Tim Takaro, Angela Brooks-Wilson, Joy Johnson, Robert Hackett, Kathy Mezei, Robert Anderson, David Huntley, Rosemary Cornell, Ivan Vince (see page 3 for titles and areas of expertise),
Janet Routledge--MLA Burnaby North, Katrina Chen--MLA Burnaby Lougheed

From: Karl Perrin, a spokesperson for BROKE:
Burnaby Residents Opposing Kinder Morgan Expansion,
and a UniverCity resident on Burnaby Mountain, perrink@shaw.ca
Ann Jarrell, BROKE member and UniverCity resident, ajarrell19@mac.com
Derek Sahota, BROKE member and UniverCity resident dsahota@gmail.com

Date: July 27, 2020

Re: Follow Up from June 30, 2020 Meeting of BROKE, City of Burnaby, MLA Janet Routledge, and Representatives of Ministries of ENV and PSSG

Dear sirs,

BROKE has been aware of the potential for a major disaster at the Trans Mountain Burnaby Terminal (TMBT) since the release of Burnaby Deputy Fire Chief Chris Bowcock's May 1, 2015 report. Since that time, our fears have been compounded by additional reports from other experts. Our participation in the NEB and Ministerial Panel hearings did not reduce our fears, since TMBT dangers were ignored by the federal cabinet. In fact, the Govt. of Canada's purchase of the Trans Mountain properties and TMX construction rights further compounded our fears of a major disaster for 30,000 people who live, work, and study above the only escape route from Simon Fraser University (SFU) and the adjacent residential, elementary school and shopping district, "UniverCity", on Burnaby Mountain.

Therefore, we sought help from the City of Burnaby, Simon Fraser University, our MLA's Katrina Chen and Janet Routledge, among others. Through their efforts, and the support of Honourable George Heyman, MinENV, Kevin Butterworth and additional MinENV staff, we were able to meet with you by tele-conference on June 30, 2020.

We were invited to send you supporting documents before the meeting. I assume you received the description of TMBT risks which I originally sent to the Hon. George Heyman, ENV., attached as "Appendix".

June 30, 2020 Meeting

First we all introduced ourselves. We were very pleased that you attended. Next, Kevin Butterworth announced that federal government representatives were invited but could not attend, although no reason was given. Those of us from BROKE, as well as Burnaby Deputy Fire Chief Chris Bowcock, and Burnaby North MLA Janet Routledge, expressed our concerns re the TMBT (aka Trans Mountain Tank Farm), and soon after that, the meeting ended. We weren't told if you intended further action regarding our concerns.

Follow-up to June 30, 2020 Meeting

We understand that there have been jurisdictional disputes in the past between the City of Burnaby and the NEB re TMX proposed actions in Burnaby. The results were that the NEB (now the Canada Energy Regulator or CER) as a federal government body had paramouncy over the City of Burnaby, so it could override the City's concerns. Of course this was before the Govt. of Canada bought the Trans Mountain properties and the rights to build the TMX. Clearly that put the Govt. of Canada, and the federal cabinet, in a conflict of interest position, as both owner and regulator.

We understand that there is no "paramouncy" between the federal and provincial governments when it comes to preventing foreseeable major disasters, such as the safety of Canadians living in earthquake zones. Since our concern is primarily the likely fire risk at the TMBT resulting from an earthquake, we understand that Emergency Management BC (EMBC) can help to reduce risks of a human life/safety disaster on Burnaby Mountain.

1. EMBC can insist on applying 2015 Building Code of Canada seismic standards to the existing 1953 tanks as well as new tanks.
2. EMBC can insist on safe distances between new tanks, between new tanks and old tanks, and between all tanks and the fenceline/forest.
3. EMBC can insist on constructing a safe evacuation road from SFU / UniverCity which could not be blocked by toxic smoke from a tank farm fire, or fire from a boil over.

(https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/reteria_eq_consultation_report_2014.pdf?bcgovtm=CSMLS

Page 5 of this report confirms our belief that EMBC can help prepare for and reduce the risk of a major disaster on Burnaby Mountain with or without Govt. of Canada support.)

Therefore we seek your response to the information provided to you before and during the June 30 meeting.

We understand that you may wish to investigate further.

Additional Information Available

1. Reports: There are several professional reports not yet sent in the footnotes of Appendix. If you would like additional reports of the risks, some are posted on the CER Trans Mountain TMX web site. However the more recent reports from P.Eng. (Retired) Gordon Dunnet and Emeritus Prof. (Earth Sciences) John Clague were too late for the NEB process. Furthermore the most dangerous tanks were grandfathered in and not considered in the NEB TMX process. Yet they are in close proximity to the new TMX tanks, and all are too close to each other.
2. Interviews: Although I haven't yet asked them, I think the following experts would be willing to convey their concerns in writing or by telephone.
 - a. John Clague, SFU Emeritus Prof. (Earth Sciences), and Order of Canada re: earthquakes, including Boulder Creek Fault south of Abbotsford.
 - b. Gordon Dunnet, P.Eng. (Retired) re multiple problems with the twelve 1953 tanks at the TMBT, especially the six EFR (External Floating Roof) tanks due to sloshing and welding failures in an earthquake.
 - c. John Clarke, TMBT neighbour, re tank foundations and personal communications with Dr. Ivan Vince and others
 - d. Dipak Dattani, City of Burnaby point person on the TMX re: Burnaby's responsibilities and capacities to protect residents, schools, child care centres at UniverCity, on Burnaby Mountain, and within the 5.2 km. Sulphur Dioxide zone.
 - e. Chris Bowcock, Burnaby Deputy Fire Chief,
 - i. re: spacing of old and new tanks from each other and from the forest at the fenceline, also
 - ii. re: no mutual aid agreement with Trans Mountain fire services,
 - iii. TM four hour response time for hazmat responders,
 - iv. Burnaby's responsibilities and capacities to fight a TMBT fire, and protect life/safety of fire fighters, and those who live, work, study, shop, and recreate on Burnaby Mountain including Simon Fraser University.
 - f. Mark Lalonde, Chief Safety Officer, SFU
 - g. Existing SFU Faculty: Tim Takaro and Angie Brooks-Wilson
 - i. re carcinogens and toxic smoke reaching the SFU Burnaby Campus,
 - ii. organizers of "Fire on the Mountain" event, June, 2018.
 - h. Incoming SFU President, Joy Johnson.
 - i. Former SFU Faculty: Robert Hackett (Emeritus Communication), Kathy Mezei (Emerita Humanities), Robert Anderson (Emeritus Communication), David Huntley (Emeritus Physics), Rosemary Cornell (Emerita Molecular Biology and Biochemistry)
 - j. Ivan Vince, author of http://world.350.org/vancouver/files/2017/02/3_Ivan-Vince-Burnaby-Mountain-Tank-Farm-Risks.pdf (UK expert hired by the City of Burnaby, CV is in the above link, pp.10-22).

We hope you can help us understand how we can avoid a major fire disaster at the TMBT due to an earthquake, which would directly affect us. For example:

1. Have you been able to contact your federal counterparts? What were the results?
2. How can the Govt. of BC prevent or reduce the risk of a TMBT disaster due to a spill, a fire, and/or earthquake or all three? (Another spill at Sumas of up to 190,000 litres occurred a few weeks ago: <https://globalnews.ca/news/7068655/spill-trans-mountain->

[facility-abbotsford-bc-update/](#) . Diluted bitumen at the TMBT is more easily ignited than the sweet crude spilled at Sumas.)

3. Could you launch an investigation into the unsafe proximity of the 14 proposed TMX tanks, as well as the existing 12 tanks (six External Floating Roof and six Internal Floating Roof tanks)?
4. Considering the risk of many deaths and permanent injuries if a moderate earthquake caused ground shaking, sloshing, and fire (which could happen at any time) could you call for a moratorium on continued building of TMX new tanks at the TMBT in close proximity to the six 1953 EFR tanks? [A 6.8 M earthquake from the nearby Boulder Creek Fault could cause lateral sloshing, tank deformation, spillage, and fire in the EFR tanks with no fixed roofs (#71, #72, #82-#85).]
5. Could you call for the immediate emptying of the six 1953 EFR (External Floating Roof) tanks (#71, #72, #82 - #85)?

We understand that Covid-19 has interfered with many of your resources for responding to numerous concerns. Please let us know, as soon as possible under the circumstances, when you will be able to respond to our concerns, and if we can be of any assistance.

Sincerely, Karl Perrin, a spokesperson for
BROKE: Burnaby Residents Opposing Kinder Morgan Expansion

Ann Jarrell, BROKE member and UniverCity resident

Derek Sahota, BROKE member and UniverCity resident

Appendix

To: Hon. George Heyman, Min. of Environment and Climate Change Strategy, B.C.
Hon. Katrina Chen, MLA for Burnaby-Lougheed
Hon. Janet Routledge, MLA for Burnaby North
CC: BROKE: Burnaby Residents Opposing Kinder Morgan Expansion

From: Karl Perrin, a spokesperson for
BROKE: Burnaby Residents Opposing Kinder Morgan Expansion

Date: May 11, 2020

Re: Dangers of the Trans Mountain Burnaby Terminal (aka Tank Farm)

s.22, the new residential development next to Simon Fraser University, we had no idea that there was a fire hazard nearby that could kill both of us. When I joined BROKE in 2012 it was purely for Climate Change reasons: to stop more crude oil from coming to Burnaby, and eventually to shut down the Tar Sands.

In 2015 we got a wake up call from Chris Bowcock, Burnaby's Deputy Fire Chief, who wrote a scathing reportⁱ on the extreme dangers of the proposed Burnaby Terminal tank farm expansion, adding 14 new tanks to the existing 12. The proposed 14 tanks were to be crowded into the same perimeter as the existing tanks, and they would be dangerously close to each otherⁱⁱ.

If one tank had a full surface fire, the heat radiating to adjacent tanks could ignite them in a domino effect. Over time a full surface fire could generate a "boil-over"ⁱⁱⁱ. A boil-over occurs in a tank fire, when the heat from an inextinguishable full surface fire reaches the water at the bottom of the tank. The water turns to steam and forces the remaining oil high into the air where the numerous small globs of oil catch fire and spread onto the surrounding forest, townhouses, elementary school and intersection.^{iv}

Still it takes at least five hours for a boil-over to develop in a worst case scenario. By that time we could be far from the fire, we thought. But Chris Bowcock pointed out that the intersection of Gagliardi Way and Burnaby Mt. Parkway, the only exit roads from our home and SFU, would be blocked by toxic smoke coming from the fire. Firefighters could not be positioned above the fire and the intersection would be blocked, leaving 30,000 of us stuck in our homes and classrooms to "shelter in place" for two to four days, while the fire burned itself out^v. Without competent instruction from experts, I googled "shelter in place"^{vi}, and it means closing off all outside air, taping windows and doors. Unfortunately my wife is allergic to smoke, and would undoubtedly suffocate, with no chance of an ambulance getting past the intersection, and no medical service available from SFU.

Deputy Fire Chief Chris Bowcock's 2015 report also described a Sulphur Dioxide cloud emanating from the fire for 5.2 km^{vii}. The heaviest concentration at the Forest Grove Elementary School would kill half the students according to a Trans Mountain risk assessment map^{viii}. Trans Mountain says the chance of that happening in a given year is one in a million. However, they didn't take into consideration the possibility of an earthquake triggering a tank fire^{ix} due to the sloshing of tank contents, especially in the six 1953 floating roof tanks.

When we think of seismic upgrading of schools, we normally think of "The Big One"-- a giant earthquake off shore which caused a tsunami in 1700 and is due again. However, the earthquake which threatens the tank farm is smaller but much closer. Two professional seismologists (Sheri Molnar, John Clague) point to a fault less than 50 km. south of Abbotsford which could cause significant lateral ground motion under the tanks^x. Ground motion would cause sloshing of the liquid crude inside the tanks, causing them to deform, and slosh crude oil outside the tanks. Three of the 1953 tanks at the Burnaby Terminal have fixed exterior roofs which would contain the sloshing crude, but six don't. They have floating roofs which would scrape against the deformed tank walls and spark fires.^{xi} This happened in earthquakes which caused floating roof tank fires in Turkey^{xii}, in Japan, and in Alaska. All of those fires spread to adjacent tanks, the 1999 Turkish fire took five days to put out. There were no fatalities because no one builds petroleum tanks in dense residential areas, on slopes near universities, in earthquake zones. The Burnaby Terminal tank farm, is the only exception, anywhere.

Given a 7.7% rate of asthma in adults^{xiii}, and 30,000 people trapped on Burnaby Mt. sheltering in place for 2-4 days, I estimate a 50% death toll of 1,100 students, faculty and older residents^{xiv}, including my wife.

Local and international experts^{xv} agree that the proposed Trans Mountain Tank Farm expansion should not be built. Simon Fraser University commissioned a study^{xvi} which determined increased risk to the SFU community from tank farm expansion, and SFU President Andrew Petter called for tank farm expansion to stop^{xvii}.

Furthermore, since the existing six 1953 floating roof tanks would cause a tank fire in an earthquake, possibly a massive forest fire on Burnaby Mountain, and a boil-over, they should be demolished. The old 1953 tanks were never considered in the NEB assessment of proposed tanks and are far from meeting the 2015 Building Code of Canada seismic standards. Kinder Morgan aimed for meeting the minimum legal standards rather than industry average standards or best practices. One doesn't store kindling next to a house, nor blasting caps with dynamite. To build new tanks squeezed against 1953 floating roof tanks is just asking for trouble—a whole lot of trouble.

ⁱ <https://www.burnaby.ca/assetfactory.aspx?did=16919> pp. 3-5 Exec. Summary

“Countermeasures

The increased consequences arising from risk occurrence is a direct result of the facility configuration changes and additional storage tank locations which reduce the positive impact of the previously engineered fire and safety protection countermeasures.

The Countermeasures which will be marginalized by the TMEP, include:

♣ **Tank Spacing**

A 33% reduction in the overall facility Tank Spacing

A 45% reduction in the proposed Tank Spacing versus existing Tank Spacing premise

♣ **Application Positions**

A 70% increase in the number of Storage Tanks that do not provide safe deployment positions for fire operations in all potential wind conditions.

100% of the proposed Storage Tanks do not provide safe deployment positions for fire operations in all wind conditions.

♣ **Distance to Fenceline**

A 30% reduction in the facility average Tank to Fenceline Distance

A 61% reduction in the average proposed Tank to Fenceline Distance Subject: Trans Mountain (bold added)

“Hazard Events

The TMEP degrades the original fire protection premise of the facility and increases the likelihood of spill or fire extension exposing the community to the following hazard events.

♣ **Regional Seismic Event**

The consequences of a seismic event occurrence are increased due to the location of the facility elevated immediately above residential communities and sensitive environmental areas, watercourses and eco-systems in close proximity, in the outfall downhill direction.

♣ **Flammable Gas Outfall**

The lighter components of the crude oil when released form flammable outfalls with low ignition points and the significant potential to propagate explosion and fire events.

♣ **Release of Sulphur based Gases**

The loss of containment of crude oil products presents the potential for poisonous Hydrogen Sulfide and Sulphur Dioxide release.

♣ **Watercourse Outfall of Liquid Crude Oil Release**

The release of Crude Oil to areas outside of lined secondary containment diking creates the potential of a crude oil introduction into watercourses exiting the TMTF facility.

♣ Tank Fire Burnout

The operations associated with protection of adjacent tanks and the Burnaby Mountain Conservation Area, as well as evacuating persons potentially impacted by a 4 day tank fire event from a facility with such tight proximity to high density residential communities would require an emergency activation of provincial scale.

♣ Tank Fire Boilover The potential for Boilover exists in any wide boiling range hydrocarbon, such as a crude oil storage tank full surface fire. For a proposed 200' storage tank, a Boilover event can discharge heated and molten crude oil outwards to 2,000', resulting in large area life hazard and the potential for propagation of additional storage tank fires.

Consequences

The Trans Mountain Expansion Project (TMEP) will create elevated risk and consequences of risk occurrence to the community by increasing the number and size of hydrocarbon storage tanks within an already geographically challenged facility. Hydrocarbon storage tanks on Burnaby Mountain present several public safety risks, which include increased potential for, include:

♣ Flammable Gas Outfall against the Fenceline

The potential for flammable gas ignition outside the fenceline is based upon the use of the land areas in proximity to the fenceline. The highly populated areas around the TMEP present a high likelihood of ignition.

♣ Release of Sulphur Based Gases against the Fenceline

Highly toxic Hydrogen Sulfide (H₂S) will very quickly, upon facility release, expose residential areas to conditions that are immediately dangerous to life. Smoke outfalls from fire event may contain Sulphur Dioxide (SO₂), in which KMC analysis shows a potential health concern could be felt up to 5.2 km. downwind.

♣ Release of Toxic Smoke Plumes against the Fenceline

The potential health impacts of exposure to by-products from crude oil combustion are most notably likely to harm those with pre-existing chronic respiratory conditions, increase rates of asthma and cardiovascular illness, with potentially undetermined effects on longer term illness accumulations such as cancer.

♣ Heat Discharge against the Fenceline

The TMEP reduces the Heat Source distance to Wildland Impact and potential Wildfire exposure of the Burnaby Mountain Conservation Area by 66%. The existing TMTF is designed with a set back or buffer distance of not less than 200' from the fenceline.”

For more detail see pp. 52-59 and Appendices

ⁱⁱ Ibid. pp. 25, 40, 88

ⁱⁱⁱ Ibid. pp. 59-62. Also Bob Bossin Pre-B.C. Election YouTube video: <https://www.youtube.com/watch?v=tOyceZiLF-Y&t=11s>

^{iv} Ibid., pp. 59-60

^v Ibid. pp. 61-63, pg. 89

^{vi} <https://www.sfu.ca/srs/risk-emergency-planning/emergency-preparedness/emergency-procedures/shelter-in-place.html>

^{vii} Ibid. pp. 68, 71

^{viii} https://docs2.cer-rec.gc.ca/11-eng/11isapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2981674/3408013/A89029-2_Response_to_NEB_IR_No.3_Burnaby_Terminal_Variance_-_A5Y9T3.pdf?nodeid=3408014&vernum=-2 pg. 33 of 47, Attachment 3.3, Fig.11-5 Rev.1 Forest Grove Elementary School is in the 50% lethality zone
http://world.350.org/vancouver/files/2017/06/9_A81937-4-Trans-Mountain-Appendix-B2-Burnaby-Condition-22-A5J1Y3.pdf pg. 112, Fig. 11-5

https://docs2.cer-rec.gc.ca/11-eng/11isapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2981674/3558263/A91717-2_City_of_Burnaby_Comments_on_Trans_Mountain_s_Response_to_the_National_Energy_Board_s_Information_Requests_-_A6E0E3.pdf?nodeid=3558061&vernum=-2

pg. 8: “...According to the Burnaby Fire Department, the SO₂ lethality of a containment bay fire includes the following impacts: • impact at 100% fatality into community areas and the SFU access roads adjacent to the facility;

• impact at 50% fatality at 300m into the medium density residential area; • impact at 50% fatality at 10m into the SFU building campus area; and • impact at 1% fatality at 600m into the medium density residential area...”

^{ix} <https://www.burnabynow.com/news/trans-mountain-tanks-not-built-to-withstand-sloshing-oil-during-earthquake-engineer-1.23807443> “... (Engineer Gordon) Dunnet said existing Trans Mountain tanks could fail to hold their contents during an earthquake. While the company has published a report detailing how the tanks walls would withstand the ground-shaking forces during a quake, it does not take into account the force of sloshing oil within the tank.

The six tanks in question were built in 1953 and have moveable roofs that float on top of the oil. They were built to outdated standards without considerations made for lateral pressure from seismic or wind forces, Dunnet said. While many people have raised concerns about the risks associated with the proposed expansion of the Trans Mountain pipeline – which would add 14 new tanks to the Burnaby Mountain site – Dunnet said the existing infrastructure already poses a serious safety concern to the 30,000 people who live within two kilometres of the tank farm.

“The serious risk is right now,” he said....”

“...(SFU Geoscientist John) Clague said a major earthquake with an epicentre near Vancouver is unlikely.

“It’s maybe, arguably a low-probability event, but the vulnerability, the consequences are enormous,” he said. “So **the risk is just off-scale.**” (bold added)

The geologist underlined the risk the “sloshing” effect could have on the tanks....”

“Earthquakes are notorious for producing sloshing of the contents of the tanks ... the material begins to slosh almost uncontrollably inside the tank.” That movement exerts an independent force on the tanks “that can cause them to fail if they haven’t been properly designed,” he said.”

x

<https://www.burnaby.ca/Assets/TMEP/Excerpts+from+City+of+Burnaby+Information+Request+No.+1+to+Trans+Mountain.pdf> pg. 11

[https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2450817/2905002/C41-13-2_-](https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2450817/2905002/C41-13-2_-BROKE_Written_Argument-in-Chief_-_A4X4Z7.pdf?nodeid=2905326&vernum=-2)

[BROKE_Written_Argument-in-Chief_-_A4X4Z7.pdf?nodeid=2905326&vernum=-2](https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2450817/2905002/C41-13-2_-BROKE_Written_Argument-in-Chief_-_A4X4Z7.pdf?nodeid=2905326&vernum=-2)

pg. 12: “...53. Dr. Molnar prepared an expert report filed in these proceedings and dated May 26, 2015.²⁸ In it, she calls into question a number of the assumptions and conclusions made in Trans Mountain’s “Seismic Assessment Desktop Study Report” which was prepared by BGC Engineering and dated November 28, 2013.²⁹ Dr. Molnar concludes that there may be concerns with the design standard chosen by Trans Mountain, and that the best seismological evidence available predicts that ground shaking may exceed Trans Mountain’s chosen design standard in a number of scenarios. (underlining added)

^{xi} <https://www.thestar.com/vancouver/2019/04/30/trans-mountain-oil-tanks-could-pose-deadly-quake-risk-say-engineer-and-geoscientist.html>

Abstract: “...Furthermore, it is pointed out that there is a need to check the reliability of existing tank farms, especially those built before the 70s, with the current codes of design.” From

https://www.researchgate.net/publication/228894607_EVALUATION_OF_THE_LIQUID_STORAGE_TANK_FAILURES_IN_THE_1999_KOCAELI_EARTHQUAKE

<https://www.stand.earth/sites/stand/files/Standearth-TransMountainPipelineConstructionReport-September2019-Final.pdf> pg. 43

^{xii} https://www.iitk.ac.in/nicee/wcee/article/14_01-1029.pdf

^{xiii} <https://www.aafa.org/asthma-facts/>

^{xiv} https://www.webmd.com/lung/smoke_inhalation_treatment_firstaid.htm#1

^{xv} http://world.350.org/vancouver/files/2017/02/3_Ivan-Vince-Burnaby-Mountain-Tank-Farm-Risks.pdf

“...CONCLUSIONS (pg. 8)

4.1 The application for **expanding the Burnaby Terminal would, in my opinion, have failed in the UK and, in all probability, throughout the EU.** (bold added) My reasons are as follows:

4.2 I have seen no evidence that the applicant has considered alternative sites for the extra storage tanks in appropriate detail or at all.

4.3 The risk assessment carried out on behalf of the applicant contains several serious deficiencies, the most important of which is that it fails to give due regard to the credible worst case scenario of tank boil-over and incorrectly states that the worst case is a pool fire.

4.4 A valid risk assessment (addressing both severity and likelihood), with due consideration of boil-over, would in my opinion lead to the conclusion that the risk is already high and would become intolerably high (by my understanding of MIACC as well as by UK criteria) if the expansion went ahead, in view of the logistical complexity of fire fighting on a congested and sloping site, the proximity of residential areas and forestry and the difficulty, in an emergency, of safely evacuating Simon Fraser University.”

^{xvi} http://world.350.org/vancouver/files/2017/02/5_SFU_TMEP-Risk-Summary-PGL.pdf pp. 4-6

^{xvii} <https://www.burnabynow.com/news/tank-farm-expansion-poses-significant-risks-to-sfu-report-1.3388025>

From: [Tim Takaro](#)
To: [Bates, Stan EMBC:EX](#)
Cc: [Karl Perrin](#); [BROKE core group](#); [Joy Johnson \(personal\)](#); [Angela Brooks-Wilson](#); [Robert Hackett](#); [Dipak.Dattani@burnaby.ca](#); [Chris.Bowcock@burnaby.ca](#); [John Clague](#); [Gordon DUNNET](#); [John Clarke](#); [Kathy Mezei](#); [Robert Anderson](#); [D Huntley](#); [Rosemary Cornell](#); [Minister, PSSG PSSG:EX](#); [Ivan Vince](#); [Chen.MLA, Katrina LASS:EX](#); [Routledge.MLA, Janet LASS:EX](#); [Maley, Madeline L EMBC:EX](#)
Subject: RE: Follow Up from June 30, 2020 Meeting of BROKE, City of Burnaby, MLA Janet Routledge, and Representatives of Ministries of ENV and PSSG
Date: August 28, 2020 15:34:54 PM

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Thanks Stan!

Prevention is the best medicine. This concept is applied in emergency mgt as well, isn't it?

sent by Tim's fairly smart phone

On Aug. 28, 2020 1:53 p.m., "Bates, Stan EMBC:EX" <Stan.Bates@gov.bc.ca> wrote:

Dear Karl Perrin,

Thank you for raising concerns to Emergency Management BC (EMBC) regarding the Trans Mountain Expansion project. EMBC has not been previously requested to provide comment or input to the regulatory approval process and I required some additional time to consult my colleagues. I appreciate your patience.

EMBC does not have the authority to direct federally regulated entities to take any of the actions that have been suggested such as mandating seismic building codes, specifying tank configurations or insisting that a secondary evacuation route be constructed. These are well articulated observations and we share the concerns that have been identified.

EMBC's role on this file is to assist with the coordination of emergency plans and preparation. We can provide a direct leadership and liaison role to bring local government, First Nations, federal and provincial ministries and the Trans Mountain Corporation to the table to ensure that we have the most comprehensive emergency plan possible and that concerns are addressed. As was mentioned at the June 30 call, this is not solely a Burnaby issue. Regional and cross-jurisdictional planning and cooperation is needed to build the fulsome emergency response plans that will ensure an effective response should an incident occur.

We will be able to assist after the environmental assessment conditions and permits are finalized.

Yours truly,

Stan

Stan Bates | Executive Director, Regional Operations

Emergency Management BC

Block A – Suite 200, 2261 Keating Cross Rd

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Ph: 250-952-4895 Cell: 778-676-2063 Fax: 250-952-4872

24 Hour Emergency: 1-800-663-3456

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From: Karl Perrin <perrink@shaw.ca>

Sent: July 27, 2020 1:47 PM

To: Minister, PSSG PSSG:EX <PSSG.Minister@gov.bc.ca>; Bates, Stan EMBC:EX <Stan.Bates@gov.bc.ca>

Cc: BROKE core group <s.22>; Joy Johnson <joy_johnson@sfu.ca>; Tim Takaro <ttakaro@sfu.ca>; Angie Brooks Wilson <arw6@sfu.ca>; Robert Hackett <robert_hackett@sfu.ca>; Dipak.Dattani@burnaby.ca; Chris.Bowcock@burnaby.ca; John Clague <john_clague@sfu.ca>; GordON DUNNET <s.22>; John Clarke <s.22>; Kathy Mezei <kathy_mezei@sfu.ca>; Robert Anderson <randerso@sfu.ca>; David Huntley <huntley@sfu.ca>; Rosemary Cornell <cornell@sfu.ca>; Ivan Vince <ivince@askconsultants.com>; Chen.MLA, Katrina LASS:EX <Katrina.Chen.MLA@leg.bc.ca>; Routledge.MLA, Janet LASS:EX <Janet.Routledge.mla@leg.bc.ca>

Subject: Follow Up from June 30, 2020 Meeting of BROKE, City of Burnaby, MLA Janet Routledge, and Representatives of Ministries of ENV and PSSG

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Andrew Douglas and Stan Bates,

Please find attached below our letter requesting your response.

Thank you for your attention to this matter at your earliest convenience.

All the best,

Karl Perrin, a spokesperson for BROKE: Burnaby Residents Opposing Kinder Morgan Expansion