IN THE MATTER OF the National Energy Board Act
R.S.C. 1985, c. N-7, as amended, ("NEB Act")
and the Regulations made thereunder;

AND IN THE MATTER OF
an Application dated December 16, 2015,
by Trans Mountain Pipeline ULC, as General Partner
of Trans Mountain Pipeline L.P.
(collectively, “Trans Mountain” or “TM”)
for a Certificate of Public Convenience and Necessity and
other related approvals pursuant to the NEB Act
dated December 16, 2013 (the “Application”)
for approval of the Trans Mountain Expansion Project (“Project” or “TMEP”)

AND IN THE MATTER OF
National Energy Board Hearing Order OH-001-2014
dated April 2, 2014 and National Energy Board File Number
OF-FAC-OIL-T260-2013-03-02

WRITTEN EVIDENCE OF SIMON FRASER UNIVERSITY

May 27, 2015
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1. Introduction

Simon Fraser University ("SFU") submits the following written evidence of Terry Waterhouse, Chief Safety Officer at Simon Fraser University, as well as copies of the documents referenced in Mr. Waterhouse’s written evidence which are attached as Appendices to Mr. Waterhouse’s written evidence and identified in the Table of Contents contained herein.

In addition to Mr. Waterhouse’s written evidence, SFU also submits the following reports and Curriculum Vitae as part of its evidence:

1. Report dated May 21, 2015, prepared by David Etkin, Kaz Higuchi, Sarah Thompson, and Markus Dunn, Hazards to Simon Fraser University Associated with the Trans Mountain Expansion Project, A Gap Analysis

2. Curriculum Vitae of: David Etkin, Kaz Higuchi, Sarah Thompson and Markus Dunn


4. Curriculum Vitae of Michael Shum and Matt Hammond

5. Publically Available Report dated May 1, 2015, prepared by Chris Bowcock, Deputy Fire Chief, City of Burnaby, Trans Mountain Tank Farm Tactical Risk Analysis

1.1 Preliminary Questions and Answers

Q1. Please state your name and business address.

A1. Dr. Terry Waterhouse, Chief Safety Officer, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6.

Q2. Please provide you background and work history.

A2. Resume filed concurrently (Curriculum Vitae of Terry Waterhouse, Appendix A).

Q3. As SFU’s Chief Safety Officer, do your responsibilities include emergency response planning and development of emergency response procedures for SFU?

A4. Yes, I am responsible for all aspects of emergency response and business continuity planning, including the implementation and monitoring of all plans and protocols.

Q5. Have you previously testified or given evidence before the National Energy Board?

A5. No.
Q6. Are you authorized to give this testimony on behalf of Simon Fraser University?

A6. Yes.

Q7. Please provide the history of Simon Fraser University ("SFU") and outline its governance structure and the Faculties and programs offered by SFU, as well as SFU’s concerns regarding the Trans Mountain Expansion Project.

A7: See the following responses:

1.1.1 History of SFU

Simon Fraser University ("SFU" or "University") is a public research university in Burnaby, British Columbia, with its main campus on Burnaby Mountain and its satellite campuses in Vancouver and Surrey.

SFU is a body incorporated under the University Act, R.S.B.C. 1996, c. 468 (University Act, Appendix B). The Act prescribes SFU’s governance system, which is composed of a Chancellor, a Convocation, a Board of Governors, a Senate, and various Faculties. The Board of Governors and the Senate are the principal governing bodies and the University Act sets out the scope and limits of each one’s authority, membership, and responsibilities. The University Act grants SFU the power to award its various degrees and diplomas.

SFU is located on the top of Burnaby Mountain, which is bounded by a water body to the north and by a relatively flat urban development on the rest of the area of the campus. SFU owns or controls approximately 5.0 square kilometers of land on Burnaby Mountain. SFU’s main campus on Burnaby Mountain occupies approximately 1.7 square kilometers (or 0.66 square miles) and contains numerous buildings, student residences and outside athletic fields and running tracks (the “Burnaby Mountain campus”). The Burnaby Mountain campus is located less than 1.7 km from Trans Mountain’s Burnaby Tank Farm.

In addition to the Burnaby Mountain campus, SFU has campuses in downtown Vancouver, and Surrey.

The Burnaby Mountain campus is adjacent to an urban village also located on Burnaby Mountain known as UniverCity. UniverCity contains a large number of private and commercial residents within SFU’s additional 3.3 square kilometer land base. UniverCity is built on lands controlled by the SFU Community Trust.

1.1.2 Infrastructure

In conjunction with the ongoing development of the SFU’s Surrey and Vancouver campuses, the Burnaby Mountain campus infrastructure has grown with the addition of new academic buildings to accommodate increases in student enrollment and provide safe, appropriate, and accessible facilities to both full-time and part-time students on Burnaby Mountain campus.
Of the 400,415 square meters that constitute SFU’s total building area (Table SF-04 SFU Space Inventory, Appendix C), the Burnaby Mountain campus comprises 84.42% (338,042 sq. meters), while all the other regions such as Vancouver and Surrey campuses total 15.58% (62,373 sq. meters), making the Burnaby Mountain campus the centre of SFU-related teaching, research, community involvement, as well as the center of all of SFU’s administration, management, planning and operations.

As a research-focused university, SFU allocates significant portions of its buildings’ space to various teaching and research laboratories, as well as animal care facilities, all of which require additional physical and procedural controls around their use. Based on SFU’s last assessment of its area use by department and COU code (Table SF-02 SFU Area by Building and COU Code, Appendix D), the ratio of research labs to teaching labs is 2.26:1 (excluding animal care facilities), further exemplifying the value that the University puts on innovative research outside of knowledge transfer activities, all of which require more extensive and uninterrupted access to the Burnaby Mountain campus than may be otherwise assumed.

Many of SFU research and teaching facilities across the Burnaby Mountain campus require that students, faculty, and staff have 24-hour, 7-days per week access to the University and buildings due to issues related to animal care, and time sensitive chemical and biological research, which are unique to SFU relative to other Canadian universities. Further, there is a potential for the loss of individual’s life’s work if their research materials are lost due to a prolonged period where access to the campus was blocked.

In addition to the foregoing, 24-hour, 7-day per week access to the Burnaby Mountain campus and its various buildings is required for those students who live on campus and their visitors, as well as for SFU operations, maintenance, safety and security personnel to ensure the integrity, safety and security of the University, its students, faculty and staff, as well as University operations.

1.1.3 Road Access to SFU

There are only two (2) access roads that serve SFU: Burnaby Mountain Parkway and Gaglardi Way. Both roads parallel the Burnaby Tank Farm Terminal and pass through a single intersection directly adjacent to Burnaby Terminal. Burnaby Mountain Parkway is located to the north of the Burnaby Tank Farm and has a predominant east-west orientation down Burnaby Mountain until it approaches Hastings Street. At the bottom of Burnaby Mountain Burnaby Mountain Parkway has a slight north-south orientation, near the Westridge Terminal. Gaglardi Way is located on the east side of the Burnaby Tank Farm and runs in a north-south orientation.

Gaglardi Way and Burnaby Mountain Parkway share a common intersection a short distance south of the campus. This intersection will be within 150 meters of the proposed tanks to be installed in the north–east corner of the Burnaby Tank Farm. Gaglardi Way and Burnaby Mountain Parkway provide the only road access to the Burnaby Mountain campus and as such must be maintained and open to traffic at all time, notwithstanding construction of the Project.
SFU is extremely concerned by the lack of detailed evidence from Trans Mountain regarding the impact of the Project on SFU generally, and the potential impacts of the Project during construction and after construction, on Burnaby Mountain Parkway and Gaglardi Way.

A full or temporary closure of one or both roads could prevent faculty and staff and emergency personnel from accessing the Burnaby Mountain campus. SFU is particularly concerned that a closure of the access roads to SFU could prevent faculty, staff and/or security and emergency personnel, including but not limited to first responders, from accessing the research laboratories to ensure the integrity of the labs and the materials in those labs, some of which are hazardous biological and chemical contaminants, as well as care for the animals in the animal care labs. An inability to access science labs in the event of an emergency incident caused by an event at the Tank Farm or the Westridge Terminal could potentially put people living on campus and in adjacent communities at risk of harm due to an inadvertent release of contaminants (such as chemically unstable or hazardous compounds, or some of the biological agents requiring containment) from these lab buildings and which could have deleterious effects on the surrounding population and/or the environment. SFU currently has safety policies in place to deal with an inadvertent release of a contaminant or biological agent (Biosafety Policy, Appendix E), however, SFU is concerned that its ability to respond and deal with such a release could be severely and adversely impacted by a road closure or a restriction of access to SFU as a result of a major event, such as a fire or explosion at the Burnaby Tank Farm or the Westridge Terminal, or a smoke plume containing soot or other contaminants, toxins and/or gases, such as SO2.

In addition, SFU is concerned that its ability to evacuate the Burnaby Mountain campus, and adjacent communities and facilities, should it become necessary, could be limited, if not completely restricted, by the proximity of the expansion of the Burnaby Tank Farm to the only access roads to/from SFU.

SFU understands that Trans Mountain intends to continue to operate, accept, and store product in the existing tanks located in the Burnaby Tank Farm, during the construction and expansion of the Tank Farm and the installation of 14 new tanks. SFU is concerned about the potential impact on the two access roads and the Burnaby Mountain campus, should there be a significant event, such as a tank or dyke fire at the Tank Farm during construction, and/or the release of toxic fumes, gases, or plumes.

Given the proximity of the Tank Farm to the Burnaby Mountain campus and the only two roads into and out of the University, SFU has concerns that a significant event at the Tank Farm could result in a substantial risk to those attending, working, and living in or around the Burnaby Mountain campus (Etkin et al, Bowcock).

1.1.4 Fraser International College (FIC)

Navitas Education Ltd. operates a small private college, Fraser International College (FIC) (Fraser International College, Appendix F), for international students on the Burnaby Mountain campus. FIC is an independent entity operating at arm's length from SFU. FIC is co-branded with SFU for the purposes of student recruitment, charges the same international student tuition rate, and offers a selection of SFU-specific lower-division courses taught by qualified instructors hired by the College.
Given FIC’s location on campus as well as SFU’s reliance on recruitment and placement of international students on FIC’s premises, any incident involving a spill, fire, seepage, or other types of contamination stemming from the Trans Mountain Project’s construction or operations, will have a direct financial and reputational effect on FIC, SFU, and the neighbouring communities, notwithstanding environmental, health, and other foreseeable and unforeseeable impacts (*Map of SFU Burnaby Campus and Surrounding Facilities, Appendix G*).

1.1.5 Staff

SFU employs over 5,000 continuing and temporary academic and non-academic staff who work at its three campuses and are represented by seven different employee groups (labour and trade unions). Over 2,000 of them are academic staff whose tasks, depending on the nature of their appointments, may include teaching classes, leading or assisting with research, performing and creating art, advancing their disciplines, and serving the University and its various communities.

Over 3000 non-academic staff provide support and services to credit and non-credit students and other members of the SFU community and its external constituencies. SFU anticipates it will maintain, if not continue to grow, its staff capacity in the near future.

1.2 Governance

1.2.1 Board of Governors

The Board of Governors is the senior governing body at the University and is constituted under the *University Act* (*Appendix B*). The Board of Governors is comprised of fifteen (15) members, the majority of whom must not have any employment, contractual, or financial relationship with the University, ensuring that impartiality, objectivity, and compliance with the University Act is maintained. The Board is thus composed of the Chancellor, the President, two (2) student members, two (2) faculty members, one (1) staff member, and eight (8) individuals appointed by the government of British Columbia.

The Board is responsible for the general management and governance of the University.

The powers of the Board of Governors include, but are not limited to, the management, governance, and administration of the University, including the use and control of the University’s real property, revenues, and the business and affairs of the University, and to advance SFU’s purposes (*Appendix B, University Act*, Section 27). The Board of Governors has the power to make rules with respect to the management, government, and control of the real property, buildings and structures (*Appendix B, University Act*, Section 27(d)). From time to time, the University develops policies affecting the use and occupation of the University property and buildings. Typically, these policies would be provided to the Board for information or final approval. However, policies that affect the academic governance of the University are approved by the Senate, even though the Board remains accountable for their oversight.
1.2.2 Senate

The University Senate is responsible for the academic governance of the University and as such it is concerned with teaching and research-related matters, including the development of new initiatives, the formation of priorities, and the consideration and approval of academic policies. The Senate is composed of the Chancellor; the President, who is also the Chair; Vice-President, Academic; Vice-President, Research; Deans of all Faculties; Dean of Graduate Studies; Dean of Continuing Studies’ Associate Vice-President, Academic; University Librarian; Registrar (as Senate secretary), 14 student members, 28 faculty members, and 4 convocation members (who are not members of the faculties).

The academic governance of the University is vested in the Senate.

The Board of Governors and the Senate are the principal governing bodies, with the University Act defining the scope and limits of each one’s authority, membership, and responsibilities. The governance structures established in the University Act are reinforced and refined in SFU’s policy and procedural documents at all levels of the University.

1.2.3 Institutional Integrity

SFU defines and preserves its institutional integrity using a number of institutional policy documents and processes. SFU’s statement of SFU Values and Commitments (Appendix H), were approved by the Senate and Board of Governors in early 2000. Articulated in Appendix H is the University's commitment to abide by the highest standards in carrying out its mandates in teaching, research, and community service, as well as the University's determination to contribute to the building of a robust and ethical society. These values and commitments profoundly inform SFU's activities and shape its relationships with stakeholders, including the general public and the members of its internal community. These values and commitments would also profoundly inform SFU’s interactions and discussions with Trans Mountain regarding Trans Mountain’s current operations, as well as the proposed expansion and post-construction operations.

1.2.3.1 University Policies

SFU communicates many of its key institutional decisions in policy statements or documents. Policies define how the University’s business will be carried out, stating a key principle or rule, establishing the context or providing a rationale for it, prescribing how the policy will be implemented, defining roles and responsibilities, specifying the scope of application, and otherwise providing basic guidance to community members on the policy’s relevance and application.

Policies also elaborate or translate legislation and regulation established by external governing bodies into the University context – examples of policies based on government regulation include Radiological Safety Policy (Appendix I), Environmental Management Policy (Appendix J), and previously mentioned Biosafety Policy (Appendix E), to name a few.

SFU has over 220 institutional policies providing a robust framework that supports and guides institutional activities at all levels. All policies are posted on the University's website where they are grouped both by broad descriptor (e.g., research, information, Board, etc.) and by functional
categories based on the University's file classification plan (e.g., committees, administration, facilities, etc.).

1.2.4 Strategic Vision/Mission

SFU strives to be the leading engaged university defined by its dynamic integration of innovative education, cutting-edge research, and far-reaching community engagement. Its mission and core themes are clearly defined and adopted by its governing bodies and are appropriate to a degree-granting institution of higher education. A fundamental purpose of SFU is to serve the educational interests of its students and its principal programs that lead to recognized degrees. As a result, SFU devotes all, or substantially all, of its resources to support its educational mission, research activities, and its three core themes. The three defining themes that guide SFU’s mission are:

i. SFU’s commitment to students
ii. SFU’s dedication to research
iii. SFU’s engagement with community

1.2.4.1 Engaging Students

Engaging students and assisting them in achieving their educational and life objectives is at the core of SFU’s Vision/Mission. From its initial formation to-date, SFU has grown tremendously, and in 2015 offers educational opportunities to 29,802 undergraduate and 5,339 graduate students (SFU Fingertip Statistics, Appendix K). SFU also enrolls 5,490 international students who have come to Canada to achieve their life and educational objectives in a supportive learning and safe campus environment.

1.2.4.2 Engaging Research

SFU leverages its research strengths, including interdisciplinary research, close community connections, partnerships, and collaborations to be a global leader in research activities. In the decade 1999-2009, SFU researchers achieved a greater growth in the number of research publications than any other comprehensive university in Canada. SFU researchers produced 526 publications in 1999, and 1,078 publications in 2008, a growth of 105% compared to an average growth of 64% among the Canadian universities (Spotlight on University International Research Collaboration, Appendix L). The most recent field-normalized ranking of Canadian universities by Higher Education Strategy Associates (HESA), done in 2012, places SFU in the top 10, ahead of many U-15 institutions, both in science and engineering (#6), and social sciences and humanities (#10) (Measuring Academic Research in Canada, Appendix M).

1.2.4.3 Engaging Communities

SFU’s communities are local, provincial, national, and global, and its partnerships and initiatives involve both public and private organizations in a variety of sectors, industries, and academic and professional networks. SFU plans to expand its community connections as an integral part of its academic mission, creating opportunities for practical and experiential learning, informing and inspiring research, and contributing to its relevance and success. In addition to programs such as co-operative education (where over 3,000 SFU students/year are working in local,
national, and international workplaces), or careers services (which involves networking with over 5,000 employers and professional groups), there are other projects such as the Trottier Observatory that serve to reach out to the general public. The Observatory is open to the public and accessible to amateur and professional astronomers, as well as school-aged children.

Fruitful and successful community engagement depends on a variety of factors, starting with the ability to provide regular and uninterrupted access to the University, and a physically and psychologically safe environment to those visiting, living on or attending the Burnaby Mountain campus and adjacent communities.

1.2.5 Underlying Principles of the Vision/Mission

Underlying its mission and themes, SFU is committed to the following principles:

i. Academic and Intellectual Freedom

ii. Diversity

iii. Internationalization

iv. Respect for Aboriginal Peoples and Cultures

v. Supportive and Healthy Work Environment

vi. Sustainability

It is imperative to SFU’s brand and identity, as well as its core operational values, that the underlying principles of its vision are maintained. More specifically, when it comes to principle (v) - Supportive and Healthy Work Environment, it is imperative that SFU’s ability to continue providing an equitable, supportive, rewarding, enjoyable, safe, and healthy work environment to its students, staff and faculty is not threatened.

Similarly, principle (vi) - Sustainability illustrates that the University is committed to pursuing ecological, social, and economic sustainability through its programs, operations, research, and community engagement, where maximization of its social health and minimization of its ecological footprint are at the centre of this principle.

SFU is concerned that its ability to provide a supportive and healthy work environment and operate in accordance with its principles of sustainability may be adversely impacted by the proposed Project. Trans Mountain has provided no evidence that specifically addresses the impact of the Project on SFU. As a result, SFU is concerned that a significant event during construction or daily operations of the pipeline and Tank Farm could severely impact the University and its ability to provide a safe and healthy work environment for its students, faculty and staff.

1.3 Current Student Population and Enrollment

Comprehensive universities have a significant degree of research activity and a wide range of programs at the undergraduate and graduate levels, including professional degrees. SFU has repeatedly been rated as Canada's best comprehensive university (in 1993, 1996-1998, 2000, 2008-2013 and 2015 respectively) in the annual rankings of Canadian universities, most recently in 2015 (The 2015 Maclean's University Rankings, Appendix N), and is rated among the best
Canadian universities when it comes to research strength measured through normalized rankings, as already mentioned (*Measuring Academic Research in Canada, Appendix M*).

The Higher Education Strategy Associates (HESA)’s proprietary H-index Benchmarking of Academic Research (HiBAR) database lists SFU as one of top 10 universities in both the Natural Sciences and Engineering, and the Social Sciences and Humanities, with its relative strength in the former being more dominant. SFU believes that its consistently high ranking has resulted in steady enrollment growth, as Tables 1, 2, and 3 illustrate below:

**Table 1 – Undergraduate and Graduate Enrolment and Ministry Funded Targets (FTE)**

<table>
<thead>
<tr>
<th></th>
<th>2010/11</th>
<th>2011/12</th>
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<tbody>
<tr>
<td>FTE</td>
<td>Funded</td>
<td>Actual</td>
<td>Funded</td>
<td>Actual</td>
</tr>
<tr>
<td></td>
<td>20,215</td>
<td>22,388</td>
<td>20,215</td>
<td>22,796</td>
</tr>
<tr>
<td>% Achieved</td>
<td>110.8%</td>
<td>112.8%</td>
<td>112.2%</td>
<td>112.4%</td>
</tr>
</tbody>
</table>

**Table 2 – Domestic Undergraduate Enrolment and Ministry Funded Targets (FTE)**

<table>
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<td>Actual</td>
<td>Funded</td>
<td>Actual</td>
</tr>
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<td></td>
<td>17,682</td>
<td>18,593</td>
<td>17,682</td>
<td>19,043</td>
</tr>
<tr>
<td>% Achieved</td>
<td>105.2%</td>
<td>107.7%</td>
<td>107.6%</td>
<td>107.9%</td>
</tr>
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</table>

**Table 3 – Graduate Enrolment and Ministry Funded Targets (FTE)**

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<tr>
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<th>2010/11</th>
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<tr>
<td>FTE</td>
<td>Funded</td>
<td>Actual</td>
<td>Funded</td>
<td>Actual</td>
</tr>
<tr>
<td></td>
<td>2,533</td>
<td>3,795</td>
<td>2,533</td>
<td>3,753</td>
</tr>
<tr>
<td>% Achieved</td>
<td>149.8%</td>
<td>148.2%</td>
<td>144.5%</td>
<td>144.5%</td>
</tr>
</tbody>
</table>

Total student Full-Time Equivalent (FTE) has grown by 58.6% from 2001/02 to 2013/14, with undergraduate domestic students growing by 38.9%, graduate students by 59.8%, and undergraduate international students by 414.5%, especially since 2008/09.

With a planned expansion of its Surrey campus, it is anticipated that student enrollment in the South Fraser regions will be significantly higher and the trend of growth is expected to continue steadily over the next decade.

### 1.4 Other Relevant Populations at SFU

#### 1.4.1 SFU Residence and Housing

SFU Residence and Housing has 1500+ students living in one of five different residences: The Towers (727 student capacity), Shell House (130 student capacity), McTaggart-Cowan Hall (200 student capacity), The Townhouses (396 student capacity), and Hamilton Hall (103 student capacity). There are three full-time SFU staff living in the residence halls, as well as many guests. There is a dining hall that operates 24-hours 7-days a week to accommodate over 700 students who do not have cooking facilities in their units. The Residence Administration Office is located below the dining hall. There are over 25 full-time management and administrative staff employed by the SFU Residence Housing Office. The Residence Life Office is located in
Madge Hogarth House. Both offices serve as reception (keys, maintenance requests, student payments and support) for students and hotel guests. It is essential that there be 24-hours 7-days per week access to the Residence and Housing buildings and the Administrative and Residence Life Offices in the event of an emergency on campus arising from the Burnaby Tank Farm, the Westridge Terminal, or the pipeline.

1.4.2 SFU Guest Accommodations

SFU Conference and Guest Accommodations provide a variety of accommodation and meeting room choices in a safe and comfortable environment, giving clients and guests the opportunity to choose from three different alternative accommodations: The Simon Hotel (14 rooms), Private Residence Rooms (located in Jack and Doris Shadbolt House, Barbara Rae House, and Pauline Jewitt House), and Town House Quad Units (located in Cowichan House, Chilcotin House, Kitimat House, Penticton House, and Qualicum House) (SFU Guest Accommodations, Appendix O).

1.4.3 UniverCity

UniverCity has over 3,600 people currently living in the community. Recent projections indicate that UniverCity’s population will exceed 8,000 – 10,000 within this decade (UniverCity Report, Appendix P). Immediate projections for the end of 2015 and 2016 show an increase to 3,850 and 4,660 respectively:

Figure 1: UniverCity Population Growth

In a residents’ survey conducted in 2014, 30% of respondents said they travel to SFU for work and 4 in 10 households reported having someone in the home associated with SFU (UniverCity Resident Survey, Appendix Q). Those travelling to SFU must use either Burnaby Mountain Parkway or Gaglardi Way to access and leave SFU. An increasing population in UniverCity will result in a greater number of vehicles needing to access each of these roads.
1.4.4 SFU Childcare Society

The SFU Childcare Society operates three facilities on Burnaby Mountain (one on the campus and two in the UniverCity community). These facilities provide care to 314 children and employ 62 staff dedicated to a variety of different programs: Infant/Toddler Care (for 3-36 month olds), Preschool Programs (for 3-5 year olds), School Age Care programs (for 5-8 year olds), and School Age Care programs (for 8-12 year olds). Both Infant and Preschool programs care for children during the work week from 8:00 am – 5:30 pm, while the two School Age Care programs provide pre- and post-school care for students attending University Highlands Elementary (English catchment school) and École Sperling Elementary (French immersion catchment school), as well as full-day childcare on school holidays (including the Winter Break, Spring Break, and Summer Break) (SFU Childcare Society, Appendix R).

École Sperling Elementary is located at the base of Burnaby Mountain and students must be shuttled up and down the mountain from and to the child care facilities. Access to all childcare facilities is via either Gaglardi Way or Burnaby Mountain Parkway, which must be maintained at all times to allow safe ingress and egress of the registered children, parents, and staff.

1.4.5 University Highlands Elementary

The University Highlands Elementary School has 235 children and averages 20 staff, serving students in grades K-7. The school building is nestled on top of Burnaby Mountain, beside the SFU campus (University Highlands Elementary School, Appendix S). The students and their parents, as well as staff must access the school via Gaglardi Way or Burnaby Mountain Parkway. It is imperative that vehicular access on these routes is maintained at all times to allow safe ingress and egress of the registered children, parents, faculty, and staff (Map of SFU Burnaby Campus and Surrounding Facilities, Appendix G).

1.4.6 SFU Camps

SFU Camps runs fall, spring and summer camps with daily attendance varying. During the fall/spring camps over 200 children and staff attend the camps, with up to approximately 1,500 children and staff during the summer camps. During summer camp drop-off and pick-up times, the number of people associated with the camps increases significantly due to accompanying parents/guardians and siblings. Most camps run from 8:30 am to 3:30 pm. A significant number of summer camps are held outside, on or around the Burnaby Mountain campus sports facilities. SFU Camps’ mission is to foster fun and skill development through physical activity, educational programming, and creative endeavors in a safe, inclusive, and positive environment. The SFU Camps program is committed to establishing a workplace that is student-centered and focused on mentorship and leadership development, while executing a business model that is founded on best practices and collaboration.

1.5 Faculties and Program Offerings

SFU has eight (8) faculties, each being subject to the governing bodies’ operational and academic compliance parameters:
1. Faculty of Applied Science
2. Faculty of Arts and Social Sciences
3. Faculty of Business Administration
4. Faculty of Communication, Art and Technology
5. Faculty of Education
6. Faculty of Environment
7. Faculty of Health Sciences
8. Faculty of Science

1.5.1 The Faculty of Applied Sciences (FAS)

FAS offers internationally recognized academic programs in a wide range of technology areas under three schools: Computing Science, Engineering Science, and Mechatronic Systems Engineering. Each school within FAS is engaged in research with industry, government, and other academic institutions in a range of areas including the Science and Technology priority areas of Canada (i.e., information and communication technologies, health and related life sciences and technologies, environmental science and technologies, and natural resources and energy).

1.5.2 The Faculty of Arts and Social Sciences

This is the largest and most diverse Faculty at SFU with 305 faculty members and 110 staff spread across 16 departments and schools, 9 programs, one institute, and a variety of research centers. The Faculty teaches more than 14,000 full-time and part-time undergraduate and graduate students annually. The Faculty has a large number of international students, and plays an important role in international recruitment through its contributions to the Fraser International College curriculum and its English as an Additional Language programs.

1.5.3 The Faculty of Business Administration

The Beedie School of Business at SFU is a leading institution for management education and research, and is a hub for innovation, sustainability, global business, and risk management. Home to the country's first Executive MBA as well as Western Canada's largest undergraduate business program at a research institution, the Beedie School is ranked in the UTDallas Top 100 Worldwide Business Schools and the Top 100 North American Business Schools based on publications in 24 elite business journals from 1990 to 2015 (The UTD Top 100 Business School Research Rankings, Appendix T). The Beedie School enjoys a rare joint accreditation from both the European Federation for Management Development (EFMD) and the Association for the Advancement of Collegiate Schools of Business (AACSB).

1.5.4 The Faculty of Communication, Art and Technology (FCAT)

The Faculty of Communication, Art and Technology (FCAT) works at the intersection of communication, art, and design. FCAT brings together three schools: The School of Communication, The School for the Contemporary Arts, and The School of Interactive Arts and Technology (SIAT). FCAT also has two professional programs: The Publishing Program which leads to Canada’s only graduate degree in publishing, and The Master’s in Digital Media (MDM) which is similarly Canada’s first professional graduate program in digital media.
1.5.5 The Faculty of Education

The Faculty of Education offers undergraduate programs for those interested in teaching and other education-related service fields, professional development programs for future teachers, field programs for the professional development of in-service teachers, and graduate programs including a variety of research-intensive and applied practice master’s and doctoral programs. The Faculty follows a rigorous research program to investigate theory and provide innovative leadership in issues of educational pedagogy.

1.5.6 The Faculty of Environment

The Faculty of Environment is committed to being student-centered, creating learning environments that are challenging, collaborative, experiential, interdisciplinary, skill-based, and ethically-informed, with the intent to educate and train the next generation of environmental leaders. In the face of rapid global environmental change, societies around the globe face growing environmental and developmental threats posed by climate change, loss of biodiversity, resource depletion, and pollution. Whether promoting research, education, dialogue on Canada’s coastal ecosystems, informing and influencing policies in response to climate change, or exploring human/environmental interactions from ancient to modern times, the Faculty, research centers, and networks promote community outreach, knowledge mobilization, and collaboration.

1.5.7 The Faculty of Health Sciences

Health Sciences at SFU is one of Canada’s most interdisciplinary programs in the health sciences field. This unique Faculty serves as an innovative platform to support and develop interdisciplinary education and research, integrating the social and natural sciences with population health outcomes, societal application, and policy analysis through its undergraduate and graduate programs that lead to degrees like BA, BSc, or PhD in Health Sciences, Master of Public Health (MPH), and Master of Science (MSc). The Faculty of Health Sciences has crosscutting research interests in global health, health system policy, and public health practice, and supports strong interdisciplinary research groups addressing critical population level concerns in mental health and addictions, environmental and occupational health, and prevention of infectious and chronic disease.

1.5.8 Faculty of Science

The Faculty of Science offers undergraduate and graduate degrees in a full range of science disciplines: actuarial science, molecular biology and biochemistry, biological sciences, biomedical physiology, kinesiology, chemistry, earth sciences, mathematics, physics, and statistics. The Faculty of Science also offers chemistry and earth science, biological physics, behavioural neuroscience, business administration and molecular biology, biochemistry and computing science, management and systems science, and operations research programs. Research plays an essential role in the Faculty of Science with over 95% of its faculty receiving support from grants and/or contracts.

The Faculty’s commitment to science education also extends into the community. Every year, the Faculty brings over 5,000 children, youth, and teachers to campus for science-based programs. The Faculty recently opened the Trottier Studio for Innovative Science Education; a
$2.5 million child-friendly lab facility. In addition, the Faculty operates the Trottier Observatory which is capable of tracking distant galaxies billions of years old. Both Trottier facilities are available to the general public, amateur astronomers, and SFU students, which results in an increased unknown number of people at SFU on any given day.

2. Location of SFU Relative to Tank Farm and Proposed Pipeline

The Burnaby Tank Farm (also described as the “Burnaby Terminal”) is physically located at the foot of the Burnaby Mountain, south west of the University and is less than 1.7 kms from the Burnaby Mountain campus. SFU understands that the Burnaby Tank Farm represents the terminus of the Trans Mountain Pipeline (TMPL) mainline and receives crude oil and refined products for temporary storage and distribution through separate pipelines to different terminals and refineries. Based on the information contained in the Application, SFU understands that the Burnaby Terminal currently has thirteen (13) storage tanks that can handle up to 300,000 barrels/day, a water treatment facility that ensures all water released offsite meets environmental requirements, and a vapour recovery system to minimize the release of odours.

SFU understands that Trans Mountain seeks to expand the Tank Farm and increase storage capacity by constructing fourteen (14) new storage within the existing Tank Farm fence line. Storage capacity at the Tank Farm will increase to approximately 890,000 barrels/day. SFU understands that this will result in a 51.85% increase in the number of storage tanks, a 66.3% increase in the barrels/day processing capacity, and a 230% increase of existing storage capacity and result in increased densification of the Tank Farm (Etkin, et al).

Post expansion, the Burnaby Mountain campus will be less than 1 km from the northeast corner of the Tank Farm and the two access roads to the University will be within 200 meters or less of the Tank Farm.

3. Concerns of SFU

3.1 SFU Emergency Response Planning

3.1.1 Safety Risk Services (SRS)

Safety and Risk Services (SRS) is a service department reporting to the Vice President of Finance and Administration. The senior administrative manager of the department is the Chief Safety Officer. The department consists of five units including Campus Security, Environmental Health and Research Safety, Risk Management, Emergency and Continuity Planning, and Program and Policy Development.

The mandate of SRS is to collaboratively enhance safety and mitigate risks across the SFU community by:

- Developing systems, procedures and protocols that seek to prevent incidents which could compromise the safety of any member of the community;
- Reducing the incidence of injuries and risks by proactive trend analysis and planning;
Responding in a timely fashion to all incidents related to safety and risk; and
Supporting individuals impacted by incidents which affect their safety or wellbeing.

The mission of SRS is to collaboratively develop and implement community focused, world leading practices in campus safety and risk mitigation. Our vision is a university community where safety is embedded in our culture.

SRS is committed to core values of:

- Being proactive through creative anticipation, preparation and response;
- Respect through trust, honour and inclusion; and
- Leadership through dedication, integrity and mentoring.

### 3.1.2 Comprehensive Emergency Management Plan (CEMP)

SRS, under the direction of the Chief Safety Officer, is responsible for developing and updating all aspects of the SFU comprehensive emergency management plan in the event of a significant incident on or near the Burnaby Mountain campus. SFU’s *Comprehensive Emergency Management Plan (CEMP)* (Appendix U), relies on SFU’s policy Appendix V GP-31 Policy: *Emergency Management (Appendix V)*, which describes “the responsibility of and how the University will respond to emergencies and disasters in order to save lives; protect public health, safety, and property; restore essential services; and facilitate recovery.” Objectives of SFU’s CEMP include establishing a framework for the emergency preparedness, response and recovery operations specific to SFU, as well as defining the University’s emergency management responsibilities and roles of external groups and agencies with whom it will interact.

In order to properly prepare, maintain and update its CEMP, it is especially important that SFU has a clear understanding of all possible risk scenarios to SFU, their likelihood and the potential impacts to SFU, so as to be able to develop procedures and emergency management plans to be followed in response to a specific event. SFU’s CEMP takes an “all-hazards approach” to emergency management, ensuring decisions made to mitigate and respond to one type of risk do not increase vulnerability for another. This approach is predicated on and relies upon SFU’s ability to gather appropriate information from stakeholders that are introducing elements and risks into the SFU environment that may result in an emergency or a disaster.

SFU defines emergency as “a present or imminent event that is caused by accident, fire, explosion, or technical failure, or by the forces of nature, and requires prompt coordination of action of persons or property to protect the health, safety, or welfare of people or to limit damage to property.” Disaster is defined to mean “a calamity that is caused by accident, fire, explosion, or technical failure, or by the forces of nature, and has resulted in serious harm to the health, safety, or welfare of people or has caused widespread damage to property.” (*Comprehensive Emergency Management Plan (CEMP), Appendix U*).

Based on its internal scope categorizations, aside from pre-event monitoring, SFU tends to deal with three (3) levels of impact and response to a disaster or an emergency:
i. Level 1 – limited to minor, localized incidents that occur in a building or a particular university property area or that affect a small segment of the University community and can be resolved with little or no outside help. Examples: localized fire; localized chemical spill.

ii. Level 2 – reserved for a major emergency that disrupts significant portions of the University property, community, or activities and may necessitate external resources involvement due to potential for quick escalation or ability to impact life safety. Examples: building fire/structural damage; major chemical spill.

iii. Level 3 – used for a disaster that would affect either the entire campus grounds or the community, necessitating involvement of and extensive coordination with external jurisdictions. Examples: fire that threatens an extensive area; widespread chemical, biological, radiological contamination.

SFU’s current CEMP does not address or respond to the potential risk scenarios to SFU from the existing Tank Farm and must be updated to reflect those risks. SFU has become increasingly concerned by the potential risks to SFU arising from the existing Tank Farm, as well as the expanded Tank Farm and Westridge Terminal. It is extremely disconcerting to SFU that Trans Mountain did not provide any information indicating that it has considered or developed emergency plans relevant to SFU that address the risks posed by a major fire at the Tank Farm or a toxic cloud release from a fire.

In order to prepare an appropriate emergency response plan that deals with the potential risks to SFU and adjacent communities on top of Burnaby Mountain it is essential that SFU be provided with detailed information regarding the risks posed to SFU from Trans Mountain’s existing operations as well as those arising after the expansion. These concerns were fundamental to the Information Requests filed by SFU that were directed at Trans Mountain’s assessment of the risks specific to SFU, as well as Trans Mountain/KMC’s Emergency Response Plan (“ERP”), its Integrated Command System (“ICS”) and its Emergency Management Plan (“EMP”). SFU sought to obtain this information to better understand the potential impacts and risks from the existing Tank Farm and the expansion of the Tank Farm and Westridge Terminal. However, most of SFU’s questions regarding Trans Mountain emergency planning and consideration went unanswered or Trans Mountain did not provide a response specific to the question posed.

In its response to SFU IR No. 2.4.0.1(1) in which SFU requested information as to how Trans Mountain would respond to an incident at the Burnaby Terminal such as a fire, security, land slide, or any other hazard events, Trans Mountain response, states in part that:

....

It is KMC’s intent to continue to share un-redacted versions of the EMP [Emergency Management Program] documents with agencies tasked with ensuring public safety. KMC’s EMP is shared, tested and regularly exercised with federal, provincial and local agencies. The EMP meets regulatory requirements and KMC works with emergency planners and emergency responders to maintain relationships and to ensure their
awareness of KMC’s system, as well as mutual awareness of joint
exercises and programs.

KMC is willing to provide copies of the EMP documents to local authorities, such
as SFU, provincial and federal authorities who satisfy the following conditions:

- The authority has/is willing to participate in consultations with KMC;
- The authority could be called upon to respond to an event associated with the
  TMPL system within their jurisdiction;
- The authority has requested a copy and/or requires a copy by legislation,
- The authority has signed a confidentiality agreement and/or has a method by
  which the document can be filed confidentially.

The Application, Volume 7, Section 4.8 outlines the process to enhance KMC’s
existing EMP as they relate to the TMPL system to address the needs of the
Project (Filing ID A3S4V5). The final programs will be developed in a manner
consistent with the NEB draft conditions related to emergency response (Filing ID
A3V8Z8).

Since the updated EMP depends on the final detailed design of the Project, a
process which will not be carried out unless the Project receives approval and
until KMC has an opportunity to review the conditions of such approval, the
updated EMP cannot be provided during the NEB’s regulatory review of the
Project. However, to ensure affected parties have the opportunity to express
concerns and provide input which will inform the updated EMP, KMC will
conduct a consultation program as part of developing the updated EMP as
described in the NEB draft conditions related to emergency management (Filing
ID A3V8Z8).

Following receipt of a Certificate of Public Convenience and Necessity (CPCN)
for the Project, KMC will file with the NEB a consultation plan related to KMC’s
EMP review that will include consultation scope, objectives, preliminary lists of
regulatory authorities, communities, Aboriginal groups with whom KMC will
engage, and a preliminary list of consultation locations and time, as well as any
other information that the NEB requires. The consultation plan will periodically
file reports with the NEB on progress of its EMP review including summaries of
interested parties consulted and how their comments were considered.

KMC will file with the NEB the reviewed ERP for the pipeline as part of the
approval conditions for the Project. The plan will demonstrate KMC’s ability to
prepare for, respond to, recover from, and mitigate the potential effects of
emergencies of any type related to the TMPL system. Filing of the ERP will
include, for the NEB’s consideration, a final report on the consultation process as
well as confirmation that an independent third party has reviewed and assessed
the ERP and that KMC has considered and incorporated the comments generated
by the independent review and assessment into the plan.
Ultimately, updates to the EMP incorporating feedback from consultation activities must result in an EMP that continues to meet the requirements of the National Energy Board Onshore Pipeline Regulations (2013) (NEB OPR). As it does for the existing system, the OPR provides lifecycle regulation for all aspects of the Project operation including requirements for emergency response programs. KMC must maintain and update the EMP throughout the lifecycle of the expanded TMPL system. As well, throughout the life of the expanded system, NEB staff will continue to conduct emergency response exercise evaluations and emergency procedures manual reviews to verify that the companies are prepared to anticipate, prevent, manage, and mitigate emergency situations.

In reviewing the Application and trying to understand the risks posed to SFU from the proposed expansion Project, SFU realized that its current CEMP does not include plans and responses for a potential emergency event arising at the operation and location of the existing Tank Farm, Westridge Terminal or the pipeline. SFU is concerned that expansion of the existing tank farm will dramatically increase the risk of incidents that would fall into SFU’s Level 2 or Level 3 emergency planning category. SFU requires information from Trans Mountain on the worst-case risk scenarios specific to SFU in order to update SFU’s CEMP and be prepared to appropriately respond in case of an emergency or a disaster that originated from the existing Tank Farm or the proposed expansion Project. On December 9, 2014, representatives from Trans Mountain and SFU met to discuss SFU’s concerns and Trans Mountain’s EMP. Although un-redacted copies of the KMC’s EMP were brought to the meeting, no reference was made to them in the meeting, nor were SFU employees informed that they would be provided with copies of them.

SFU seeks to engage in a dialogue with Kinder Morgan to better understand the potential risks from the existing Tank Farm, Westridge Facility and pipeline facilities and operations, as well as Trans Mountain/KMC’s existing EMP, so that SFU can use that information to update its CEMP. When SFU did not hear anything further following the December meeting, SFU recently contacted Trans Mountain/KMC in early May to express its interest to engage in productive meetings with senior representatives of Trans Mountain/KMC to discuss SFU’s concerns and requests for information and to establish a working relationship between SFU and Trans Mountain/KMC that will ensure that SFU has unfettered access to the existing and updated Trans Mountain/KMC EMP documents, so that, once necessary risk assessments are done and emergency plans updated, the two parties can collaborate on the development of incident-specific response protocols. Although SFU was recently contacted by a representative from Trans Mountain/KMC about these issues, SFU has not been advised whether Trans Mountain/KMC is prepared to consider SFU’s requirements and establishing a working relationship with senior representatives of Trans Mountain/KMC and SFU, nor have firm meeting dates been arranged.

As a result of SFU’s concerns regarding the potential risks to SFU from the pipeline, the Burnaby Tank Farm, and the Westridge Terminal, SFU retained David Etkin, et al, to review Trans Mountain’s emergency planning documentation provided as part of the Application and the risk assessment methodology related to the air dispersion modelling used by Trans Mountain. Etkin, et al, reported that Trans Mountain did not fully consider the worst case scenarios of fires or explosions, and exposure to resulting plumes which have the potential to impact and even envelop and/or isolate the University making evacuation difficult or impossible. Etkin, et al
indicate that there is no evidence to show that Trans Mountain has been sufficiently diligent in applying the CALPUFF model to address the case of a catastrophic release of buoyant material and the resulting impacts. Etkin, et al also states that the risks associated with the pipeline and Tank Farms, as they might impact SFU, need to be more comprehensively analyzed than they have been by Trans Mountain and that SFU should develop its emergency plans to reflect these new risks.

In response to NEB IR 1.98, Trans Mountain filed a report prepared by Doug McCutcheon and Associates dated October 1, 2013, discussing the Risk Assessment done for the Burnaby Terminal Portion of the Project (B22-29). Upon reviewing this report, SFU became concerned that SFU is located within the ranges that McCutcheon identifies in Tables 11, 12 and 13 of the report as the distances at which ERPG-2 (Emergency planning level) and ERPG-3 (Impacting people’s health) toxic exposure levels could result in irreversible harmful effects being experienced by persons within the identified ranges, assuming 70% and 100% combustion efficiency. SFU notes that in his conclusions, McCutcheon states that appropriate emergency planning involving foam addition, and shelter-in-place or evacuation plans are needed.

Based on the reports of McCutcheon, Etkin, et al, and M. Shum, et al, SFU is concerned that it and the two access roads to SFU are located within the ranges identified as being at risk for potentially serious impacts should there be a significant event such as a fire or explosion at the Tank Farm. SFU is currently working on developing a better understanding of the potential risks posed to it by Trans Mountain/KMC’s existing operations as well as those posed by this Project so that it can develop the appropriate emergency response plans to deal with these risks.

SFU is willing to engage in a dialogue with Trans Mountain to better understand the potential risks from the existing Tank Farm and Westridge Terminal operations and the risks posed by the expansion project. SFU will also request that Trans Mountain provide SFU an unredacted copy of Trans Mountain’s current EMP for the existing Tank Farm so that SFU can better understand the risks to SFU and update its CEMP to ensure that the best strategies are developed and can be implemented for dealing with an emergency affecting SFU from a major fire or explosive event at the Tank Farm or the Westridge Terminal.

### 3.2 Impact on SFU of Expanded Tank Farm

SFU acknowledges that Trans Mountain has stated it is committed to working with both public and private organizations to ensure any impact to stakeholders is either minimized or avoided. However, Trans Mountain has not been very forthcoming when it comes to sharing its EMP, procedures, detailed risk assessments, nor has it expressed a willingness to engage in collaborative emergency planning with SFU, despite the fact that the University’s ability to assess the impact of the expanded tank farm and create appropriate safety plans and procedures is limited to known risks only.

Etkin et al, and Bowcock indicate that the risks to SFU associated with expansion of the existing Tank Farm are significant as a result of the doubling of the number of tanks and the increased tank size that have potential for much larger spills, less manageable fires due to tank density and reduced distance between tanks, or negative impacts on air quality. SFU is concerned that Trans Mountain may not have policies and processes in place that would enable it to assess accurately,
as well as respond appropriately and in a timely fashion, to an incident at the Tank Farm that could impact or put SFU and the neighbouring communities at greater risk. To illustrate why SFU is concerned about Trans Mountain’s policies and procedures, SFU notes that Etkin, et al, indicate that although Trans Mountain has indicated in the Application that an Automated Monitoring System (SAM) unit is operational at the Burnaby Terminal, Etkin et al indicate that it is not clear from the Application whether this unit is capable of response (automatically shutting off systems, reducing flow, etc.) or is limited to monitoring, recording, and reporting air emissions. Etkin, et al, further indicate that this in itself would not be an issue except that in a previous occurrence of a significant oil leak at Trans Mountain facilities in Sumas 2012, the National Energy Board found Trans Mountain’s management procedures inadequate. Bowcock refers to an overfilling event in 2009 that caused a spill and exposed the community to the fumes from the spill and indicates that the Burnaby Fire Department was not informed of this spill by Trans Mountain and learned of it by responding to complaints from citizens about foul odours. Bowcock also indicates that the lack of notification likely presented the risk of a flammable gas cloud ignition and that a similar event in the new tanks located in the northeast corner of the Tank Farm could likely present a significant fire and life hazard risk due to the proximity of these tanks to Burnaby Mountain Parkway and Gaglardi Way and the potential of ignition caused by vehicles using these roads. Given that virtually all of SFU’s students, faculty and staff use these roads, SFU is concerned that Trans Mountain/KMC may not consider an event at the Tank Farm serious enough to notify SFU, thus putting students, faculty and staff and others at the top of Burnaby Mountain at risk given the relative proximity to SFU of the Tank Farm and/or the Westridge Terminal.

3.2.1 Plume, Smoke and Gas Released in a Tank Farm Fire

In McCutcheon’s report filed by Trans Mountain in response to NEB IR 1.98, McCutcheon evaluated the potential fire scenarios at the Tank Farm based on the guidance provided by the Major Industrial Accidents Council of Canada (MIACC). The risk assessment evaluated the effects and consequences of a fire scenario from three accident scenarios: tank fire caused by a major oil tank release; toxic cloud release from a fire (includes smoke and sulphur dioxide SO₂); and boil-over (specific type of fire scenario). Two effects, radiant heat and smoke, were considered most significant. The potential extent of impact was estimated for radiant heat, the smoke plume, and SO₂. The modelled concentrations for smoke and SO₂ were compared to Emergency Response Planning Guidelines and Immediately Dangerous to Life and Health levels. Smoke is estimated to drift down gradient up to 43km; SO₂ is modelled to extend as far as 5.2km. M. Shum et al indicate that given that the Burnaby Mountain campus is less than 1km to the northeast from the Burnaby Tank Farm, the adequacy of Trans Mountain’s proposed emergency planning to mitigate or avoid significant effects to human health at SFU is unknown at this time. Etkin et al make similar comments and recommend that SFU gain further information about the impacts of such events.

In assessing the risks from a tank or dyke fire, a boilover event, or the release of toxic smoke, McCutcheon assumed that a fire would be vertical with no presence of wind. However, Etkin et al. indicate that the presence of a wind would greatly change the nature of the hazard, decreasing it upwind and magnifying it enormously downwind. Etkin et al also indicate that Trans Mountain’s analysis used weather date from the Vancouver Airport and that it is uncertain how representative the wind data from the Vancouver Airport is to Burnaby Mountain. Etkin et al.
considered the frequency of wind directions at Burnaby Mountain using data from the Burnaby Mountain Weather Station and found that the data shows a much higher frequency of southerly winds than at the Vancouver Airport. The significance of this finding is that winds from a southerly direction pose a greater threat to SFU since they would carry a plume or toxic cloud towards SFU.

The Westridge Terminal is northeast of SFU at the foot of Burnaby Mountain. A fire at the terminal could expose SFU to smoke and toxic fumes and gases. Etkin et al, indicate that wind data from the top of Burnaby Mountain indicates a wind frequency from a northerly or easterly direction as being 24% and 32% respectively. SFU is concerned that should there be a fire or explosion at the Westridge Terminal, the Burnaby Mountain campus, as well as the adjacent communities will potentially be at risk. SFU is also concerned that Burnaby Mountain Parkway could be closed given its proximity to the Westridge Terminal, making evacuation of SFU and adjacent communities difficult as the only route down the mountain would be Gaglardi Way.

SFU is concerned that Trans Mountain has not provided sufficient information about the potential risks to SFU from a tank or dyke fire, or a boilover event and/or the resulting smoke plume and contaminants and toxins that could reach SFU from a fire at the Tank Farm or the Westridge Terminal. SFU needs clear and concise information regarding the nature and scope of all potential risks to which it may be exposed in order to develop the appropriate emergency response plans and procedures.

3.2.2 Hazard Plumes and Access

The Trans Mountain risk analysis does not include hazard zones around the existing and proposed pipeline expansion or the Tank Farm and Westridge Terminal adjacent to SFU Burnaby Mountain campus. Figure 5.2 in the Etkin et al. report shows a map of the Burnaby Tank Farm relative to the Burnaby Mountain campus. The proposed new tank locations are such that several of the scenarios described by TM/McCutcheon and Associates in the report referenced by Etkin put the Burnaby Mountain campus and adjacent communities into highly dangerous hazard zones. The two in Figure 5.2 red circles on the map are at approximate distances of 0.5 km and 1 km from the nearest proposed tanks. Given that the most dangerous scenarios (Immediately Dangerous to Life or Health - IDLH) include distances of 1.1 km for no wind situations, it is clear that SFU is at a very high risk from a catastrophic failure at the Burnaby Tank Farm.

SFU is extremely concerned that there is no evidence that Trans Mountain has incorporated local meteorological data from SFU in its analyses. With respect to risks to SFU from toxic plumes, sophisticated meteorological modeling of the boundary layer wind field that includes data from the Burnaby Mountain weather station is required (Etkin et al.).
3.2.3 Emissions and Impact on Air Quality at SFU

Human health risk assessment (HHRA) is an appraisal procedure that gauges both the type of hazard, its probability, and all possible impacts to people that may have been exposed to environmental chemical contamination. According to M. Shum, et al, the idea behind conducting an HHRA is to develop hazard and dose-response assessments that would help evaluate health effects of the exposure to contaminants, the outcome of which would feed into emergency response procedures relevant to a particular incident.

Shum, et al indicate that based on Trans Mountain’s Application, once Trans Mountain commences construction, it intends to develop a Fire Prevention Plan and Fire Contingency Plan, neither of which will directly include mitigation of air quality impacts to SFU campus or its communities, nor will air quality monitoring of surrounding locations be completed until and unless there is a specific factor that requires it (size of fire, wind direction, etc.). SFU is extremely concerned about the potential for harmful and toxic emissions from a fire or substantial spill at either the Burnaby Tank Farm or Westridge Terminal reaching SFU.

SFU is also concerned that Trans Mountain plans on following only its own minimum guidelines outlined in the TMMP Health and Safety Management Plan, and it is not clear whether these guidelines include mitigation measures to be implemented in the event that the ambient air quality monitoring for specific parameters exceeds the regulatory standards at SFU.

SFU is also concerned that air impact modeling did not take into consideration the unique weather patterns and conditions experienced on the Burnaby Mountain.

When reviewed for comprehensiveness and consistency with typical guidance for conducting the assessments, M. Shum, et al, determined that there are several gaps in the Trans Mountain’s Human health risk assessment (“HHRA”) which may be contributing to a limited ability to understand the magnitude of the risks to SFU and the suitability of the emergency management plans. Specifically, Shum et al, indicate that the Trans Mountain’s HHRAs do not address:

i. the risks from exposure to fire-related emissions (e.g., smoke and SO₂), from an accident and/or malfunction, to human receptors at SFU and its related communities;

ii. The risks from exposure from the potential release of products that might be transported or stored other than the Cold Lake Winter Blend; and

iii. The risks to human receptors under high intensity exposure scenarios.

SFU is concerned that because of the above gaps, the adequacy of Trans Mountain/KMC’s proposed emergency planning to mitigate or avoid significant effects to human health at SFU is unknown. In other words, SFU is concerned that the Application does not sufficiently inform SFU of the potential risks to which SFU may be exposed or to comprehensively understand the human health risks to its populations. Without filling the information gaps identified herein, it is difficult to determine whether or not there are serious health risks that need specific attention in the emergency plans of SFU (M. Shum et al.).
3.3 Evacuation of SFU

3.3.1 Difficulty due to road access in event of tank farm fire being impacted by fire

Although SFU does work with Burnaby Emergency Services on a regular basis when it comes to provision of the emergency services to its commercial or student residents, SFU does not have any formal agreements with the City of Burnaby or external agencies. Emergency services would be provided to the Burnaby Mountain campus by the City of Burnaby under the same municipal obligations that any other resident in Burnaby would be entitled to. Campus Security provides first response, first aid response, and immediate Incident Command for emergencies affecting the Burnaby Mountain campus. In such situations, the University relies heavily on external police/fire/ambulance/transit to provide intermediate response and support. When it comes to emergency calls made from campus grounds, First Responders are typically involved within the first ten (10) minutes, and one of three (3) fire halls typically respond to the reported incident (Duthie, Government Road or Hastings). Being able to communicate with students, faculty, and staff quickly and by a variety of methods is imperative when it comes to handling an event: SFU utilizes an emergency alert notification system for this purpose.

Depending on Trans Mountain’s ability and willingness to inform SFU of any and all incidents pertaining to the Burnaby Tank Farm and/or the Westridge Terminal, the University may be able to use its alert notification system to disperse relevant and potentially life-saving information in real time to its stakeholders, including but not limited to issuing orders that the population on campus must be “sheltered in place” or be required to remain indoors until further notice.

Trans Mountain has indicated its willingness to engage SFU in communications only if SFU is directly affected by an incident. However, SFU is concerned that Trans Mountain’s assessment of whether SFU is or will be impacted by an incident may not be done on a timely basis because of personnel being engaged in dealing with the incident. Conversely, Trans Mountain’s determination that the incident does not involve SFU may be incorrect or may need to be reassessed as the incident and responses unfold.

SFU does not wish to burden Trans Mountain with unreasonable reporting and notice obligations regarding incidents at the Burnaby Tank Farm or the Westridge Terminal, however, in order to properly assess and respond to an emergency event, SFU emergency response plans and programs require timely information about the nature and risk of each significant incident. As a result, SFU’s strong preference is to be notified about and be involved in all significant incidents from an initial monitoring stage onwards, to ensure appropriate steps can be implemented in a staged and methodical way for protecting the University, its students, residents, faculty and staff, as well as the communities adjacent to SFU.

SFU acknowledges that not all incidents will necessarily involve or put SFU at risk of harm. Nonetheless, SFU is concerned that a significant incident could be upgraded or quickly expand to other areas of the Tank Farm or Westridge Terminal which would put the SFU community at risk. Without the requisite and timely information, SFU cannot properly respond to the emergency. Opportunities to consider and arrange the early evacuation of the University, if necessary, could be lost in the event of an incident that requires possible evacuation from the University and its environs, the roadways off campus are critical to a safe egress, as is the
availability of public transit. As has been noted, there are only two roads off campus, Gaglardi Way and Burnaby Mountain Parkway. Both these roads border the tank farm fence line.

If evacuation is not possible, and sheltering-in-place is deemed safer than evacuation, SFU must have timely notice and be involved in the emergency response to be able to deal with this eventuality. SFU’s ability to provide overnight support to non-residents is severely limited and the inability of first responders to access the top of Burnaby Mountain could cause a threat to life safety at SFU and other surrounding communities. During a severe weather event, the Burnaby Mountain campus experienced a temporary isolation due to road conditions; in such situations SFU has used all available rooms in the Residences and the gym as primary locations for shelter to provide overnight support to the more than 100 people who needed assistance for shelter. This accounts for less than 1% of all students, staff, and faculty combined. Etkin, et al. indicate that the absence of emergency response zone maps from Trans Mountain’s application makes it difficult, if not impossible to truly assess the readiness or adequacy of provisions for evacuation or shelter-in-place. Etkin et al recommend that such maps be prepared so as to understand and plan for emergency events.

3.3.2 Lack of Resources to Fight a Large Fire or Tank Breach

Trans Mountain noted in its Application, as well as in its responses to various stakeholders, that it is committed to ensuring a prompt and immediate response to any fire that involves its facilities, and suggests that it will rely on its own forces as well as outside emergency responders who would come and help with emergencies. SFU understands that since that Trans Mountain has also committed to adding a fixed, automated, full-surface fire protection so as to improve the full-surface fire-fighting capability on fixed-roof tanks. Nonetheless, SFU is extremely concerned that Trans Mountain may not be prepared to effectively manage a major fire or tank breach incident that could occur at the Burnaby Tank Farm.

SFU is aware that the City of Burnaby has repeatedly indicated in its evidence that it does not have the resources to fight a major fire at the Burnaby Tank Farm. SFU was recently provided a copy of the report prepared by Chris Bowcock, the Deputy Fire Chief for the City of Burnaby, dated May 1, 2015 (the “Bowcock Report”) which discusses the potential impacts and risks of the Project. This report confirms that the Burnaby Fire Department does not have the resources to fight a large tank fire at the Tank. SFU understands that the Bowcock Report was made publicly available and will be filed as part of the City of Burnaby’s Intervenor evidence. However, for convenience, SFU has included a copy of this publicly available report in its evidence. SFU does not intend to obtain an affidavit in connection with this report.

Representatives of SFU recently met with the Deputy Fire Chief to discuss his report and the potential risks to SFU. Bowcock indicated, and I verily believe it to be true, that Trans Mountain advised the Burnaby Fire Department that the Burnaby Tank Farm no longer has the emergency response ability to extinguish fires with internal facility resources and that specialized hydrocarbon firefighting resources are no longer available from regional facilities. Bowcock also indicated, and I verily believe it to be true, that the City of Burnaby Fire Department does not provide technical hydrocarbon firefighting, but will support and assist companies within Burnaby with fence line operations and basic structural firefighting activities such as augmenting remote water supply and low hazard exposure protection.
In his report, Bowcock indicates that the risk of a major fire at the Burnaby Tank Farm is significantly increased as a result of the increased density at the Tank Farm. Should there be a major fire in the north east corner of the Tank Farm, the report indicates that both Burnaby Mountain Parkway and Gaglardi Way would be closed making evacuation of SFU virtually impossible and giving rise to the need to shelter-in-place all those on campus, for an indeterminate amount of time. Bowcock indicates that adopting a strategy of allowing a tank fire to burn itself out could mean that the fire and smoke would impact the surrounding community, including SFU, for several days.

Consequently, SFU must develop emergency response plans to deal with scenarios that would be based on an understanding of the potential risks to SFU, including the need to order that people remain indoors because of the potential harmful effects from the smoke from the fire containing particulate matter, soot, and/or toxic gases. SFU has become increasingly concerned by its proximity to the Tank Farm and potential risks to SFU and the lack of information from Trans Mountain regarding how it will respond to a major event. That lack of information also hampers SFU’s ability to properly understand and develop the appropriate emergency response plans and protocols to a major incident impacting SFU.

3.3.3 Impact of Construction

Trans Mountain has applied to increase the capacity of the existing pipeline system from 300,000 bbl/d to 890,000 bbl/d by twinning or looping segments of the existing pipeline and increasing both the size as well as the number of oil storage tanks at the existing Tank Farm located at the base of Burnaby Mountain. Trans Mountain also proposes to construct a portion of the pipeline in a tunnel through the base of Burnaby Mountain. The Application does not contain specific details with respect to the construction of the Tank Farm, the Pipeline under Burnaby Mountain and the Westridge Terminal.

SFU is concerned by the lack of information set out in the Application regarding the impacts of construction on the surrounding communities and SFU. For example, the Application does not provide any information about the potential impact on Burnaby Mountain Parkway and Gaglardi Way, if any, caused by construction vehicles, particularly dump trucks and cement and material supply trucks, using these roads to access and leave the construction site at Burnaby Mountain. SFU is concerned that traffic along these routes will be blocked or severely restricted during the construction period. It is not clear from the Application, just how many vehicles might use these roads on any given day during the construction schedule, but given the size and scope of the Project, SFU expects the numbers to be significant and the impact to traffic and access to and from SFU significant.

SFU is also concerned that should there be an accident during construction which creates an emergency incident at the Tank Farm, the presences of large numbers of construction vehicles along Gaglardi Way or Burnaby Mountain Parkway could have significant consequences for SFU and people wishing to access or leave SFU and Burnaby Mountain, including creating gridlock along these routes, as well as potentially hampering an evacuation of SFU and its environs.
In the past, severe weather conditions at Burnaby Mountain resulted in re-routing of buses and other types of transit to and from campus. However, it is unlikely that the same procedures would be appropriate or could be utilized in the event of any construction-related delays, disruptions, or significant incidents at the Burnaby Tank Farm or Westridge Terminal.

3.4 SFU is Willing to Work and Meet With Trans Mountain to Address and Resolve SFU’s Concerns.

Notwithstanding SFU’s concerns set out above, University representatives are willing to meet with senior Trans Mountain/KMC representatives as a matter of urgency, to discuss SFU’s concerns and to develop strategies and responses to address them. SFU believes that by meeting and discussing its concerns with Trans Mountain, and in particular its concerns regarding Trans Mountain’s plans, procedures and protocols for dealing with large scale incidents and emergencies, SFU will be better equipped to deal with and mitigate the risks to SFU by developing appropriate and incident specific emergency response plans and protocols. Etkin, et al set out a number of recommendations, most of which address the need for SFU to obtain additional information from Trans Mountain, or others, which they consider necessary to enable SFU to develop appropriate emergency response plans and procedures to address the potential risks to SFU from the Project.

ALL OF WHICH IS RESPECTFULLY SUBMITTED this 27th day of May, 2015.

Simon Fraser University
Per: __________________
Dr. Terry Waterhouse
Chief Safety Officer