City of Pitt Meadows THE Natural PLACE

Staff Report to Council

Planning and Development

REPORT DATE:	March 26, 2021	**MEETING DATE:**	April 13, 2021
TO:	Mayor and Council		
FROM:	Anne Berry, Director of Planning and Development		
SUBJECT:	**Update on Environmental Study of CP Rail Operations**		

CHIEF ADMINISTRATIVE OFFICER REVIEW/APPROVAL:

RECOMMENDATION(S): THAT Council:

A. Receive for information the staff report, "Update on Environmental Study of CP Rail Operations", dated March 26, 2021; OR

B. Other.

PURPOSE

To provide an update on City staff's review of background materials; information received from Metro Vancouver's Air Quality and Fraser Health staff; and, how the collected information has informed the study of CP Rail operational impacts on air quality and community health.

☒ Information Report ☐ Decision Report ☐ Direction Report

DISCUSSION

Background:

At the December 8, 2020 Regular Meeting, Council directed staff to commission an environmental study of CP Rail's existing and proposed expansion of operations in Pitt Meadows. Based on the discussion at the December 8 meeting, staff understood the key objectives of the study are to: collect an air quality baseline and understand the impacts of locomotive emissions on the health of community members.

City staff collected background information on the health impacts of rail emissions and on the design of related studies to prepare a request for proposals for the study. To support this effort, staff reached out to Metro Vancouver's Air Quality staff for information and to understand what types of support they could offer for this investigation. Metro Vancouver's air quality monitoring programs employ a network of fixed air quality monitoring stations (including one in Pitt Meadows), plus a mobile monitoring station and other data collection equipment for studies of specific air quality issues. While Metro Vancouver's project-specific air quality monitoring resources are already committed to ongoing and planned projects, their staff reviewed the City's draft study scope to provide feedback, answered questions, and shared relevant background information.

Fraser Health was also contacted for information on health impact of locomotive emissions and to understand what types of support they could offer. Their staff also provided background materials on related studies and recommendations for the study's scope.

While neither agency has resources available to conduct the study, both have offered to review the outcomes to ensure the methods support the findings on health implications and that they are compliant with Metro Vancouver's standards for air quality monitoring studies.

Relevant Policy, Bylaw or Legislation:

The Pitt Meadows Strategic Plan includes policies of advocating for issues of importance to our community; and, supporting healthy, inclusive and accessible living.

The Canadian Federal *Locomotive Emission Regulations* set emissions, labelling, and testing standards for new, refurbished, and upgraded locomotives for federally regulated railway companies. It also identifies idling restrictions and record-keeping requirements.

While not enforceable for federally-regulated railways, the Province of British Columbia has adopted legislation and supporting regulations regarding vehicle emission standards and air quality standards, including:

- *Climate Change Accountability Act* – sets greenhouse gas emission reduction targets
- *Environmental Management Act* – enables Metro Vancouver to regulate air pollution
- *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act* – sets low carbon fuel standards for all gasoline and diesel fuel (on-road only)

The Metro Vancouver Clean Air Plan identifies standards and targets for emission reduction and air quality; however, is also not enforceable for federally-regulated railways.

Analysis:

Preliminary review of health implications

According to Health Canada, the major chemical components of diesel exhaust include:

- CO Carbon monoxide
- NH_3 Methane
- NO_X Nitrogen oxides
- PM_{10} Inhalable particulate matter 10 micrometres in diameter
- $PM_{2.5}$ Inhalable fine particulate matter 2.5 micrometres in diameter
- UFP Ultrafine particulate matter less than 0.1 micrometers in diameter
- SO_2 Sulphur dioxide
- VOCs Volatile organic compounds

In addition to diesel engines being a significant source in urban areas, these contaminants are also produced in varying amounts by other sources, including: gasoline engines, agricultural equipment and activities, construction, industry, and natural sources.

Health Canada's 2016 report, *Human Health Risk Assessment for Diesel Exhaust*, indicates $PM_{2.5}$ and NO_2 levels are directly linked to community health impacts. Similarly, research cited in a Metro Vancouver's 2020 report, *Near-Road Air Quality Monitoring Study*, identifies even low concentrations of $PM_{2.5}$ and NO_2 can cause measurable health impacts. Other contaminants of concern include O_3 (ground level ozone) and UFPs. O_3 (ground level ozone), is created indirectly through chemical interaction of emission components and has also been linked to health impacts. UFPs can constitute up to 90% of diesel emission particles and are very likely to cause health issues; however, several reports identified they are difficult to measure and more research was needed to clarify their impacts.

Based on a review of available health-impact studies, Health Canada indicates there is sufficient evidence that the contaminants found in diesel emissions are carcinogenic (particularly for lung cancer) and can worsen or promote respiratory illnesses (e.g., asthma development and respiratory inflammation). Other potential health impacts under study include implications for the cardiovascular system, immune system, and reproduction and development.

Locomotive emission regulations

Health Canada notes vehicle diesel fuel and emission standards have improved over the past 20 years, resulting in lower emissions per liter consumed; however, Transport Canada is separately responsible for regulating fuel and engine emission standards for aircraft, locomotives, and commercial marine vessels.

In 2017, the Federal *Locomotive Emission Regulations* were established for federally regulated railway companies, including CP Rail. The Regulations set emissions, labelling, and testing standards for new, refurbished, and upgraded locomotives not already certified by the United States Environmental Protection Agency (EPA). The Regulations also set a 30-minute maximum idling time, but do offer several exceptions where this

could be exceeded (e.g., for passenger or crew health and safety, for maintenance, or to maintain brake air pressure).

Prior to 2017, Transport Canada had memorandums of understanding (MOUs) with the Railway Association of Canada (including CP Rail) to voluntarily reduce emissions and comply with EPA emission standards. According to recent reports, fuel efficiency has improved and emission levels have decreased by up to 34% since 2011; however, many locomotives in use were built or refurbished prior to the Regulations and the MOUs and may not meet the EPA standards.

Air quality and emission study considerations and limitations

Health risk assessments of diesel emissions and railway operations have been based on contaminant level information identified through air quality monitoring studies and/or dispersion modelling studies. Both methods provide different insights and have unique limitations that affect study design for Pitt Meadows.

Air quality monitoring studies use multiple testing stations to collect data over set periods of time, each having the same set of sensors and/or contaminant traps. This type of study is helpful for measuring contaminant levels and how they change over time.

The stations collect information on the:

- observed amount of each contaminant of interest over time; and,
- weather immediately around the station to help evaluate how wind direction, seasonality, and other conditions may impact the levels of contaminants recorded at each station.

Multiple stations are used for each study to understand how the contaminant levels change with distance from the source, isolate source contributions from background levels, and examine the impacts of local weather and geographical conditions. Information on source intensity (e.g., traffic volumes or operational timeframes) is also collected to identify how the measured contaminant levels change with source operation.

Several variables affect the findings of monitoring studies, including: presence and distance of other contaminant sources, seasonality and temporal variation of the study source and other contaminant sources, relative background contaminant levels, persistence or transformation of contaminant compounds in the atmosphere, and variability of weather patterns over time and by location.

To illustrate how the limitations can impact the findings, two Metro Vancouver studies are summarized here:

- A 2014-2015 study of coal train impacts in White Rock and Delta included four testing sites between 5 and 15m from the rail line, one testing site at 50m, another at 900m, and data from a permanent Metro Vancouver monitoring station that was about 500m from the rail line.

The findings indicated that contaminant levels around railway lines remained within the regional air quality standards. The passage and marshalling of trains in the study area were identifiable in the collected air monitoring data; however, the difference in contaminant levels at the different distances from the rail was not statistically significant. Weather patterns and the open nature of the landscape may have increased dispersal of the rail-sourced contaminants. Also, the average measured contaminant levels may have been affected more by other nearby sources (e.g., agriculture, road traffic, or natural sources) than railway activity.

- A 2015-2017 study of near-road traffic emissions involved data collection at three sites: along Clark Drive in Vancouver, in downtown Toronto, and along Highway 401 in Toronto. Each study site used monitoring stations close to the roads under investigation, plus nearby background monitoring stations (both temporary and permanent) for comparison.

  While the Clark Road portion of the study was able to quantify the volumes and dispersion of diesel emissions from heavy-truck traffic, the findings noted the several variables impacted the data collection and comparison of findings from the three sites: proximity of the monitoring stations to the sources of interest; the relative intensity of the emission source (i.e., volume of heavy duty truck traffic) compared to other sources; the influence of the physical environment immediately surrounding the stations on air dispersion and wind patterns; and, the impacts of seasonal weather patterns.

Preliminary review of these and similar studies revealed several complexities in designing and undertaking robust localized air quality studies. Additionally, staff were concerned the complex relationship between the different variables meant the findings may only be valid for the testing station locations and could not be reliably extrapolated to nearby areas. Staff, therefore, thought it prudent to discuss these concerns at length with Metro Vancouver air quality staff to better understand the limitations of this approach and how the various considerations may impact the City's study.

Dispersion modelling uses estimates or collected data of emission sources combined with models of weather and wind flow patterns to estimate how given levels of airborne contaminants will spread out from a source. This type of analysis can be used to estimate current or future contaminant levels. The reliability of the findings is, however, heavily dependent on the quality and detail of the input data, including:

- emission and background sources and their characteristics (e.g., fuel types, engine types, throttle settings relative to their specific locations at any given time, surrounding land uses, daily and seasonal variations);
- modelled spatial environment (e.g., source location(s), buildings and vegetation that might affect air flows);

- detail of local weather pattern data;
- baseline air quality data and historical regional air quality trends;
- type and change in surrounding land uses; and,
- modelling of chemical interactions between emission components and with background air components.

Dispersion models are often used as a basis for human health risk assessments and, therefore, are generally designed to err on the high side of projecting air contaminant concentrations. Because models are necessarily simplifications of actual conditions, erring on the high side is intended to avoid situations where risk assessments and policy decisions are based on under-estimations of hazardous contaminants. The Province provides recommended standards and methods and if the City commission such a study Metro Vancouver and Fraser Health staff have offered to review the methods and findings.

As with the air quality monitoring studies, preliminary review of similar dispersion modelling studies revealed a number of potential constraints and limitations that could affect whether such a study would meet the City's objectives. In particular, the potential difficulty of obtaining source data characteristics from CP Rail (e.g., locomotive engine types, locomotive locations and throttle settings, idling periods, etc.), plus the compounding of modelling assumptions and resulting uncertainty regarding the projected contaminant concentrations. Similar human health risk assessments of railyards in California, where emission source data was readily available from the rail companies, were clear that the dispersion modelling did not provide definitive levels of contaminants or projections of their dispersal to surrounding areas. The findings were, instead, only to be regarded as a potential dispersion scenario.

Lessons learned

Based on the review of constraints and limitations of these approaches, and discussions with Metro Vancouver air quality staff, several complexities for conducting either type of study in Pitt Meadows were identified, including:

- local wind and landscape patterns create challenging monitoring conditions;
- nearby non-rail sources (i.e., Lougheed Highway and Kennedy Road traffic, dust from surrounding agricultural and commercial activities) contribute to background levels that could make it hard to differentiate levels of locomotive emissions;
- extent of the CP Rail operations and that the emission sources (i.e., locomotives) move and are not predictably positioned greatly increases the difficulty of adequately monitoring and modelling emissions; and,
- detailed emission source data for locomotive engine types, locations, throttle settings, and movement patterns may be difficult to obtain from CP Rail which jeopardizes the quality and reliability of dispersion modelling.

To address the apparent complexities, staff have developed a project scope for a human health risk assessment that will ask a qualified professional to:

1. review existing available air quality data and studies of railway and railyard emissions to estimate the potential for current and future rail emission levels to exceed relevant health standards;
2. identify areas with potentially higher human health risks due to rail emissions from current and proposed railway operations;
3. conduct short-term air quality sampling of areas with potentially higher health risks due to current rail operations and compare the findings with relevant standards;
4. prepare a human health risk assessment based on the collected data; and,
5. use the collected information to identify locations of specific concern, plus locations where more monitoring would help refine the risk assessment and could be used to monitor changing risk levels due to changing railway and railyard operational levels.

Rather than commissioning a large and lengthy air quality monitoring campaign or a dispersion modelling study that relies on data from CP Rail and would have significant limitations, the approach defined here provides a more strategic approach for meeting the City's objectives. The findings will provide the City with:

- a clear understanding of the relevant standards,
- a preliminary health risk assessment,
- baseline air quality information for current areas of specific concern, and
- specific areas where further monitoring or risk assessment is recommended.

Harris Road underpass

An air quality health risk assessment for a future condition, such as following construction of the proposed Harris Road underpass, requires: forecasting rail, road and other nearby emission sources; evaluating background air quality levels; and, estimating dispersal patterns using a dispersion model. In this case, emission estimates would include projecting vehicle traffic on Harris Road and those from CP Rail operations. The model outputs would be compared to relevant health standards to assess the potential health risks. As mentioned, however, the reliability of the findings would be affected by several modelling assumptions, plus the availability and quality of data from CP Rail regarding their projected operational activities.

A health risk assessment of emission levels associated with the current crossing could be done using air quality monitoring data collected prior to construction of the underpass. A direct comparison with a risk assessment of a future condition, based on a dispersion model, to understand the net change in emissions and health risks would likely be problematic, however, due to the assumptions and caveats associated with dispersion models. Any findings from a direct comparison would need to be treated as largely hypothetical rather than conclusive.

Instead, both the Harris Road rail crossing and proposed underpass are intended to be included as part of the community health risk review approach recommended in this

report. The study will include reviewing whether locations in and around the Harris Road rail crossing likely have, or will have, increased health risks due to rail emissions. If so, initial air quality measuring and a preliminary health risk assessment will be done to establish baseline information for the existing crossing and inform recommendations for any additional or future monitoring or risk assessments of the underpass.

Timeline

The study is anticipated to take approximately six to eight months to complete. At the time of writing, staff were waiting for additional feedback on the recommended approach from Fraser Health's, Human Health Risk Assessment Specialist in order to finalize the request for proposal (RFP). Staff anticipate issuing the RFP towards the end of April.

Depending on the findings and recommendations of the consultant, the City will consider a follow-up, long-term air quality monitoring study at locations identified to be of specific concern. Long-term monitoring (e.g., one to two years of data collection) will provide data for a more robust health risk assessment of rail operations and any operational changes made during that time period.

CP Rail's Environmental Effects Evaluation Scoping Document

Included in the CP Rail Logistic Park engagement documents was one entitled *Environmental Effects Evaluation Scoping Document*. This document proposes a series of environmental and socio-economic studies CP Rail would include in their application to the Canadian Transport Agency. The list of studies includes an air quality study of: diesel emissions, loading/unloading activities, and holding tanks; impacts to local and regional air quality and greenhouse gas emissions; human health impacts; and, regulation and best management practices.

The document was very high-level and several assumptions and criteria for each of the identified studies were questioned by both staff and members of the community. When asked about the specifics of the identified studies (i.e., methods and assumptions), CP Rail stated qualified professionals in the relevant fields will undertake these studies and the information will be shared with the City of Pitt Meadows.

COUNCIL STRATEGIC PLAN ALIGNMENT

☒ Principled Governance ☐ Balanced Economic Prosperity ☐ Corporate Excellence

☒ Community Spirit & Wellbeing ☐ Transportation & Infrastructure Initiatives

☐ Not Applicable

Advocacy. Actively advocate for issues of importance to our community.

Regional Relationships. Proactively connect, collaborate and build strong relationships with our regional partners.

Wellness. Provide and encourage a community conducive to healthy, inclusive and accessible living.

FINANCIAL IMPLICATIONS

☐ None ☒ Budget Previously Approved ☐ Referral to Business Planning

☐ Other

Based on input from Metro Vancouver's air quality staff, the suggested study should fit within the $75,000 project budget previously approved by Council.

Eight consulting firms were contacted to request cost and timeline estimates based on the suggested approach. Of the four that responded, three identified a conflict due to CP Rail being an existing client, the fourth identified they did not have the equipment or expertise to conduct the air quality monitoring portion. That CP Rail works with many consulting firms could create challenges with attracting a suitable consultant; however, staff recommend proceeding with issuing the request for proposal (RFP).

PUBLIC PARTICIPATION

☒ Inform ☐ Consult ☐ Involve ☐ Collaborate ☐ Empower

Comment(s): Once a consultant is selected and has initiated the study, staff anticipate they will provide, at minimum, an update report and a presentation of the final report at future Council meetings.

KATZIE FIRST NATION CONSIDERATIONS

Referral ☐ Yes ☒ No

SIGN-OFFS

Written by:	Reviewed by:
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ATTACHMENT(S)

None.