CN MILTON LOGISTICS HUB

REVIEW OF CN ENVIRONMENTAL IMPACT STATEMENT – AIR QUALITY

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Provided to: Region of Halton

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EXECUTIVE SUMMARY

I have been asked by the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton and the Town of Oakville ("Halton Municipalities") to provide a technical review, on matters of air quality, of the Environmental Impact Statement prepared by CN for the proposed Milton Logistics Hub. I focused on the sufficiency of the CN air quality and GHG reports, as well as relevant responses to the CEAA information requests current to the date of this report.

I reviewed the technical validity of the information, the methods and analysis used, and the conclusions regarding the significance of any environmental effects, proposed mitigation measures, and plans for related follow-up programs. In addition, the CN Air Quality (AQ) assessment has been done in response to CEAA requirements and therefore is subject to those requirements. Therefore, I also included a conformance check to the CEAA EIS Guidelines in my review.

My review of the CN AQ assessment is based on the on-site operations scenarios presented by CN as well as the off-site traffic levels assumed by CN in their various reports. Should any of these facets alter or increase in the future, it would nullify the results of this assessment and require a reassessment. In my review, I concentrated on the future operating scenario (I have numerous comments on CN's assessment for construction-related pollution; however to simplify my review, I have not included those comments in this review).

Most of my comments in this review are related to the methodology used and thus fall under section "Review of Methodology". In order to present the results of my review of the methodology, I have presented them in the approximate order one would normally conduct an AQ assessment. In each of those sections, it is requested that CN provide additional information to support the AQ assessment work.

CN did not assess all activities for all sources of air emissions nor did they assess all chemicals of potential concern from all relevant activities. The emission data provided was unclear, and did not seem to provide maximal emission estimates. The dispersion modelling could not be adequately reviewed due to the lack of information. The resultant AQ levels were either missing or could have been significantly underestimated. As a result, the health impact expert did not have complete information in order to conduct an appropriate health assessment. In summary, I believe that the air quality assessment component of the Main EIS, submitted by CN, is not currently sufficient to conduct a full review by the panel.

Overall I request a new evaluation, considering the numerous and various issues described in this report, as well as all accompanying model files for my review. I request that all revised information provided by CN be consolidated into a single AQ assessment report (with accompanying information). Upon provision of such information, and upon further review, I may have further questions.

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QUALIFICATIONS

Airzone One Ltd., a consulting company located in Mississauga, Ontario, specializes in air quality services. It has offered environmental services since 1979, including air permitting and emissions reporting, ambient monitoring and modelling for the purpose of Environmental Assessments and Land Use Compatibility studies (for example), and laboratory analysis with CALA certification for air monitoring methods in relation to particulate matter and VOCs (Volatile Organic Compounds). Airzone also analyzes PAHs (polycyclic aromatic hydrocarbons) including B(a)P (benzo(a)pyrene). I am a Senior Air Quality Modeller for Airzone.

My position at Airzone entails conducting air quality assessments using dispersion modelling for environmental assessments (in Canada and internationally), land use compatibility assessments, permitting purposes and also for general air assessments. I have been in this position since 1999. As part of my experience, I have been involved in reviewing and providing commentary on the regulatory air permitting system in Ontario.

I have a B.Sc. (Honours) in Geology from Imperial College (London) and a Ph.D in Physical Geography from the University of Hull (UK) where my thesis was on modelling airborne particle dispersion. I spent four years conducting postdoctoral research at the University of Guelph and as a Natural Sciences and Engineering Research Council of Canada Visiting Fellow to a Canadian Government Laboratory spent with Environment Canada. During this time I focused my research on modelling particle dispersion in the air. I have several academic publications on the topic of airborne particles, and have taught Air Quality courses at Conestoga and Sheridan Colleges.

I have been retained as an air pollution dispersion modelling expert in approximately a half-dozen litigation (mainly land re-zoning) disputes, which have involved peer-reviews. I have assisted the Town of Oakville develop their Health Protection and Air Quality Bylaw, specifically aimed at assessing stationary facility emissions of fine particulate matter ("PM2.5").

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1. INTRODUCTION

1.1 Purpose of Review

I have been asked by the Halton Municipalities to provide technical review, on matters of air quality, of the assessment conducted by CN for the proposed Milton Logistics Hub ("Hub").

I reviewed the technical validity of the information, the methods and analysis used, and the conclusions regarding the significance of any environmental effects, proposed mitigation measures, and plans for related follow-up programs. In addition, the CN Air Quality Technical Data Report in Appendix E1 ("App. E1") and assessment has been done in response to CEAA requirements and therefore is subject to those requirements. Therefore, I also include a conformance check to the CEAA EIS Guidelines in my review.

My review of the CN App. E1 is based on the on-site operations scenarios presented by CN as well as the off-site traffic levels cited as induced by the project. Should any of these facets alter or increase in the future, it would obviate the results of this AQ assessment and require a re-assessment.

For Acronyms and Abbreviations, as well as a Glossary of Terms, see Appendix A.

1.2 Scope of Review

CN has provided 5 separate assessments related to AQ, all of which I reviewed; see Appendix B for full reference and shorthand used throughout:

1. CN's Report on Greenhouse Gases (June 17, 2016) (GHG report),

2. The main air quality technical data report (App. E1: Appendix E.1 - Milton Logistics Hub Technical Data Report - Air Quality),

3. The Traffic Impact Memo (Appendix C4 of the App. E1),

4. The CN response to CEAA information requests including AQ and Human Health Risk Assessments (HHRA) of "participating receptors" (Att. IR12 CN response May 18), and,

5. The CN response to CEAA information requests including a cumulative AQ assessment of "project, project traffic and public traffic" (Att. IR13-2 CN response Sept 30).

The App. E1 contains most of the available information about the assumptions made and is the primary focus of my review. It contained a cumulative AQ assessment of the project on-site emissions alone combined with air quality baseline data (but did not include emissions from project-related traffic off-site).

The Traffic Memo (Appendix C4) described an AQ assessment of off-site traffic and its sole impacts on AQ but it was not incorporated with the App. E1 assessment nor were its results passed along to the Health Impact Expert. I assumed that the Traffic Memo study has been superseded by the CN response (Sept 30 IR13-2), which included a cumulative AQ assessment of the project components emissions on-site and off-site and included traffic (project-related as well as baseline public traffic). Very little information was included on how this new AQ assessment was completed.

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The CN response (May 18) included AQ and HHRA assessments of "participating receptors", those that had not been examined in the App. E1 and the results were passed along to the Health Impact Expert.

In my review, I concentrated on the future operating scenario, once the Hub is fully implemented. To simplify my review report, I have not included my review of the AQ assessment of construction-related emissions. Emissions due to accidents were not reviewed as this was assumed to be a part of the "risk assessment". I also note that I have not cross-referenced the input data used in the App. E1 (such as the Review of Terminal-Generated Truck Traffic report) to check if the Hub operating conditions or traffic input data used are reasonable and correspond with data used in other parts of the EIS.

In order to present the results of my review, I provide my comments under headings, following the approximate order one would normally conduct an AQ assessment, as listed below.

- 2.1.1 Identification of project activities (on-site and off-site) that are sources of air emissions
- 2.1.2 Identification of all Chemicals of Potential Concern (CoPCs) from all relevant activities
- 2.1.3 Maximal emissions for each CoPC
- 2.1.4 Modelling the dispersion of each CoPC from on-site/off-site project sources
- 2.1.5 Baseline air quality levels, accounting for local spatial/temporal hotspots
- 2.1.6 Combination of project air quality impacts with existing and future baseline levels
- 2.1.7 Required provision of exposure data to a Health Impact Expert
- 2.1.8 Mitigation proposals

2. CN EIS AND TECHNICAL APPENDICES – REVIEW AND INFORMATION REQUESTS

2.0 Introduction to Air Quality Assessment of CN's proposed Milton Logistics Hub

CN's proposed Milton Logistics Hub ("Hub") includes the introduction of additional locomotives on-site, diesel-fuelled trucks and other vehicles on-site and on surrounding public roads. This will introduce new air emission sources into the surrounding community. Emissions, largely from vehicle-related exhaust fumes and road dust, will be emitted from the proposed project components and carried towards sensitive receptors in the surrounding community by winds. In terms of potential effects on human beings, these emitted contaminants will be present in the air (as a direct human inhalation risk).

Multiple contaminants can be emitted from diesel exhaust and road dust including particulate matter and its various size fractions and species, oxides of nitrogen (NO_x), carbon monoxide, sulphur dioxide (SO_2), and a wide variety of organic compounds (commonly known as "VOCs") and polycyclic aromatic hydrocarbons ("PAHs").

Throughout this report, I will discuss dust emissions in terms of "particulate matter". In regards to the dust emissions, dust particles vary in size and composition. The total amount of dust in the air is known as Total Suspended Particles ("TSP"). The size fractions of dust particles can vary from very fine particles, less than 2.5 micrometres (µm) in aerodynamic diameter, through to particles greater than 44 µm in diameter. Dust particles smaller than 10 µm in aerodynamic diameter are known as "PM10." The finer dusts (especially those smaller than 2.5 µm in aerodynamic diameter, termed "PM2.5") are known to cause health effects.

Air quality impact assessments must, at the very least, address the worst-case impacts on AQ, which lead to the biggest increases in AQ levels above the pre-existing background level. An AQ assessment of worst-case impacts is required because it answers the basic question "what are the worst effects of this project on my community?" For air contaminants, this is done by considering maximum emissions and worst-case atmospheric dispersion conditions together under maximal production or activity levels so that maximal impacts on AQ levels can be considered and assessed. It is important that the maximum emission rates that could happen, or will be allowed to happen, are assessed; these limits could be set by (i) the facility (management limits), with appropriate over-sight (e.g., CN claims it will not exceed 800 road trucks per day through the Hub), or, (ii) may be limited by the machinery or processes in the facility itself (production/mechanical limits; e.g., certain diesel engines may be limited to a maximum RPM (revolutions per minute) and therefore exhaust emission rate).

One way to determine airborne pollutant levels, resulting from emissions from project sources, would be to measure the levels of all substances emitted to the surrounding community. However, actual measurements are not available for proposed projects, as they have not been constructed nor have they begun operating yet. Instead, to assess air quality risk we rely on predicted changes in air quality, using air quality computer models, to assess estimated changes in air pollution levels. In fact, to assess the levels of an air contaminant surrounding a set of facilities, due to emissions from those facilities, most jurisdictions require the use of quantitative computer models that predict the dispersion of contaminants from a discharge point (or points) to a receptor in the surrounding community ("dispersion models").

In its simplest form, a dispersion model requires input on (1) the sources of pollution, including the emission rate, (2) meteorological data such as wind speed and turbulence, and, (3) topography. The model then simulates, mathematically, the pollutant's transport and diffusion through the air. The model output is an air pollutant concentration over a particular assessment time period (say 1 or 24 hours) at one or more specific receptor locations in the surrounding community. Dispersion modelling is the only way to estimate air quality levels from a proposed facility not yet built.

In dispersion modelling, worst-case emissions are then combined with a range of meteorological conditions (simulated by modelling with long, such as five years, meteorological data sets) to ensure that worst-case emissions are reasonably combined with worst-case meteorological conditions and so to provide worst-case impacts on AQ in the surrounding community.

Many facilities will run their operations differently according to the time of day or year. In general, the operational scenario assessed for the subject sources should be that which causes the highest off-site increases in AQ. It is the responsibility of the proponent to assess all likely operating scenarios and find the one(s) that cause the highest off-site impacts on a contaminant-by-contaminant basis. It is also the responsibility of the proponent to demonstrate that it has tested all scenarios and found the worst-case operating scenario, which must then be used in the AQ assessment.

I use the term "conservative" throughout this report. Due, in part, to the lack of site-specific information when estimating emissions, it is normal practice that such calculations be conducted in a "conservative" manner. The term "conservative" refers to a methodology that ensures that emissions and air quality levels are not underestimated and applies to all levels of decision-making where assumptions must be made. For example, to estimate dust emissions from future roads it is necessary to know the level of dustiness on that road; however, that information will not be known because the road does not currently exist to allow site-specific measurements. Therefore, the level of dustiness must be estimated; it is required that the estimate be made (in light of lack of specific data) conservatively. In this example, we must ensure that the level of road dustiness used in our calculations is as high as it could reasonably be to ensure we do not underestimate road dust emissions under any future circumstance.

2.1 Topics of information requests

2.1.1 Identification of project activities (on-site and off-site) that are sources of air emissions

With most projects that are subject to environmental assessments, there are generally numerous actual and potential sources of air contaminant emissions. In order to correctly identify all emission sources it is important that detailed information on processes (that will lead to air emissions) are provided. Provision of such detailed information is required to allow review and confirmation that all emissions sources have been properly accounted for. It is important that all sources be identified because even weak sources of air emissions, when situated close to points of reception in the surrounding community, can have a significant impact on air quality at those receptors. Based on the information available to us, I have found the following insufficiencies in this category. Note that this list could change as more information is provided.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2 CN response Sept 30 pdf pg 51-94, App. E1 pg 54 Sect. 6.5	**AQ1. Paved roads for off-site project related trucks and on-site non-road vehicles** Include an AQ assessment of paved road dust emissions on public roads that will incorporate project-related traffic off-site and on-site non-road vehicles.	The AQ assessment of paved road dust emissions was not conducted for off-site project-related trucks or non-road mobile equipment on-site. A paved road dust emissions assessment was completed for project-related truck movements within the property line (App. E1 pdf pg 176 App. C2) but did not appear to be completed for off-site project-related and non-project related vehicles (CN response Sept 30 pdf pg 51-94, App. E1 pg 54 Sect. 6.5). Also, only tailpipe emissions were determined for non-road mobile equipment on-site and not paved road dust emissions on-site. These are sources of dust emissions that are related to the project that were not considered. The project will add extra vehicles to the public roads and the quantity of road dust emitted from that source should be determined. Also, if on-site truck road dust was assessed, then road dust from non-road mobile equipment on-site should also be assessed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 48 Sect. 6.2.1 CN response Sept 30 pdf pg 51-94	**AQ2. Locomotive travel off-site** Include locomotive travel off-site in the AQ assessment or provide quantitative justification for how off-site travel was determined to be negligible.	Locomotive travel off-site was not assessed. The Air Emissions Sources and Emissions Inventory (App. E1 pg 48 Sect. 6.2.1) states "*emissions from locomotive travel off-site are not the subject of this study*". It is unclear why locomotive travel off-site was not included in the AQ assessment given that Hub-related off-site truck emissions were assessed (in CN response Sept 30 pdf pg 51-94). All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	Main EIS pg 5-6 Sect. 1.2.2 App. E1	**AQ3. Locomotive refuelling and refuelling facilities** Include locomotive refuelling operations and fuel storage tank emissions in the AQ assessment or provide quantitative justification for how these sources were determined to be negligible.	Locomotive refuelling and refuelling facilities were not assessed. This is an example of a project activity described (Main EIS pg 5-6 Sect. 1.2.2) whose air emissions are not described in the App. E1. There is no mention in the App. E1 of locomotive refuelling operations and associated potential emissions. Likewise, no emissions from fuel storage tanks appear to be assessed. All sources from all relevant activities need to be included in the AQ assessment in order to arrive at valid predictions regarding AQ.

2.1.2 Identification of all Chemicals of Potential Concern from all relevant activities

Once sources have been identified, the next stage is to identify the contaminants being emitted. It is important that all contaminants that could be emitted be included in the AQ assessment. In my opinion, the list of contaminants considered by CN was overly narrow and missed several important contaminants, which could have a significant impact on AQ, as detailed below.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	HC review pdf pg 3 App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3	**AQ4. Diesel Particulate Matter (DPM) not assessed** A quantitative AQ assessment of airborne DPM levels is required for all diesel exhausts.	DPM is a crucial contaminant to quantify. As articulated by Health Canada in its Conformity Review of the Milton Logistics Hub Environmental Impact Statement dated February 15, 2016, "*DPM are typically fine to ultra-fine in particle size, and thus considered a highly respirable toxic air contaminant associated with cancer and adverse health problems such as respiratory illnesses and increased risk of heart disease*." The EIS Guidelines also identified DPM as a Chemical of Potential Concern that should be considered. However, this was not done in any of the work described by CN relating to diesel sources.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg ii Executive Summary App. E1 pg 15 Sect. 3.4	**AQ5. Ozone and ammonia not assessed** Please provide quantitative justification for not including O_3 (ozone) and NH_3 (ammonia) in the AQ assessment, including evidence of negligibility.	CN did not provide a quantitative AQ assessment of O_3 or NH_3. These contaminants were specifically requested in the EIS Guidelines and therefore should be part of the AQ assessment.
Air Quality EIS Guidelines pg 23 Sect. 6.1.10 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	EIS Guidelines pg 23 Sect. 6.1.10 App. E1	**AQ6. Secondary particulate matter not assessed** Please provide an AQ assessment of secondary PM that could form from gaseous precursors emitted from the project.	The EIS Guidelines Human Environment section (EIS Guidelines pg 23 Sect. 6.1.10) describes "Health" and footnotes the following: "*The proponent should refer to Health Canada's Useful Information for Environmental Assessment in order to include the appropriate basic information relevant to human health.*" (HC 2010). An excerpt from that document (pg 5) is as follows: "*1. Air Quality Effects* *In an assessment of potential changes in air quality, it is advisable to consider local, regional, and where appropriate,*

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			long-range impacts on air quality during all phases of the project. It is advisable to also consider the following: *An inventory of all potential contaminants and emissions from the proposed project (including) . . . <u>secondary particulate matter [secondary PM])</u> . . ."* (my underlining) The underlined part was not addressed in the App. E1. There was also no consideration of secondary PM that can be formed as a result of a series of chemical/physical reactions involving precursor organic or inorganic gases (the project emits precursors VOCs, NO_x and SO_x). Secondary particulate matter contributes to the PM2.5 concentrations and thus a complete AQ assessment will need to include this particulate matter formation pathway.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3 App. E1 pg 14 Sect. 3.4	**AQ7. Polycyclic aromatic hydrocarbons (PAHs) other than Benzo(a)pyrene not addressed** Please provide an AQ assessment of all PAHs emitted from the site.	Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. Internal combustion engines fuelled by diesel release numerous types of PAHs. In terms of PAHs, only B(a)P was assessed from diesel exhaust emissions from the Hub. This is far fewer than the typical number of PAHs that are considered necessary for assessment in an environmental review. For example, the US EPA AP-42 Chap. 3.3 provides emission factors for 16 PAH species. The Chemicals of Potential Concern Section (App. E1 pg 14 Sect. 3.4) refers to MOECC guidance (MOECC 2012), which states that while it is suitable for B(a)P to be used as a surrogate, if an individual PAH has a

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			standard, it must be assessed separately. The EIS Guidelines (Sect. 6.1.1) further references the CEPA list of toxic substances through its connection to HC 2010. That list includes PAHs in general, and not just B(a)P. It should also be noted that the EIS Guidelines do not specify that only B(a)P should be measured. Rather, it lists "*polycyclic aromatic hydrocarbons (PAHs)*". All possible contaminants from the sources of the project should therefore be assessed, including PAHs other than B(a)P.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165-166 App. C1, pdf pg 169-175 App. C2, pdf pg 177-182 App. C2, pdf pg 185-200 App. C3	**AQ8. Volatile Organic Compounds and other hydrocarbons not addressed** Please provide an AQ assessment of toluene, xylene and propylene, as well as any other VOCs and hydrocarbons that could be emitted from the project.	Volatile Organic Compounds (VOCs) are a sub-set of hydrocarbons that participate in atmospheric photochemical reactions. Hydrocarbons are a more general class of compounds that do not necessarily participate in atmospheric photochemical reactions; they can, however, cause human inhalation concerns. There are numerous different types of hydrocarbons and VOCs emitted from engine exhausts. For mobile equipment, App. E1 only mentioned a limited number of VOCs for diesel-fired sources. However, toluene, xylenes and propylene are also emitted from all of the diesel engines assessed but were excluded from the assessment. The On-Road Vehicle Emissions in Future Facility section in the Appendix (App. E1 pdf pg 175 App. C2) outlines the contaminants considered for project operations for on-road vehicles driving within the property line. CN used a modelling tool provided by the US EPA called the MOVES model, to determine vehicular emissions. The MOVES model provides output for many organic species that may be emitted from vehicles, but only a few of those were selected by CN. See Figure 1 (in Appendix C of this report) for a list of those contaminants.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Also, line-haul locomotives emit more hydrocarbon contaminants than what was accounted for. In the Rail Locomotive Emissions in Future Facility section in the Appendix (App. E1 pdf pg 171-172 App. C2), the sum total of emissions from the six selected VOCs is only approximately 10% of the Tier 2 hydrocarbon total emissions for line-haul locomotives (US EPA 2016), therefore 90% of these emissions remain unaccounted for. The CEPA list of toxic substances, referenced in the EIS Guidelines through HC 2010 as explained previously, includes any VOCs participating in photochemical reactions, as well as hydrocarbons. The EIS Guidelines also states that study is required for "*volatile organic compounds (VOCs)*" generally. This suggests that all possible contaminants in this category should be assessed. The information should also be made available to the HHRA.
Air Quality EIS Guidelines pg 19 Sect. 6.1.1 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2	**AQ9. Composition of vehicle-related road dust** Please provide a full AQ assessment including speciation of road dust.	There was no consideration of the composition of the vehicle-related road dust. Fugitive road dusts vary by composition as well as by size fraction. If the road surface material contains quartz (a form of crystalline silica common in rocks and soils), then the dust raised from that road may contribute an additional inhalation hazard, since crystalline silica has known health effects if inhaled. A comprehensive AQ assessment should include consideration of all species of fugitive dusts. The Traffic Emissions from the Paved Road in Future Facility section in the Appendix (App. E1 pdf pg 176 App. C2) shows that only the size fractions PM, PM10 and PM2.5 were assessed. There is no mention of speciated road dust, and no justification provided about why this was not done.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Speciated road dust should be considered as there may be health effects.

2.1.3 Maximal emissions for each Chemical of Potential Concern

The next step is to quantify the emission rates for each contaminant from each source.

As described earlier, it can be difficult to estimate emission rates when a proponent does not have site- and project-specific input data for various aspects of emissions estimates. Therefore, the routine practise is to make assumptions or utilize surrogate data in place. However, the manner in which those substitute data are chosen is critical. A conservative assumption (or choice) for substitute data is necessary; it is an assumption that does not lead to a potential underestimate of the true emissions.

In the case of the CN AQ and GHG study, I have found a number of instances of "average" calculation inputs or assumptions used rather than either "worst-case/upper-limit" values or "conservative" assumptions. Very limited justification was provided for many assumptions used. Using "average" activity levels as the basis for emissions calculations is generally insufficient for a worst-case, conservatively-based AQ impact assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 67 Table 7.2 App. E1 pdf pg 175 App. C2 Main EIS pg 4 Sect. 1.2.1 Main EIS pg 61 Sect. 3.4.2.1	**AQ10. Truck idling and travel** Please provide evidence and justification that 20 trucks idling will be the maximum amount given that the site can accommodate a queue of 140 trucks. Also, please describe and rationalize the assumptions made for categorizing certain emission sources as attributable to truck idling, versus those attributable to truck travel (App. E1 pg 67 Table 7.2 for sources labelled OR1 through OR4).	The number of trucks allowed to queue on-site (140) is higher than the number of trucks assumed to idle in the AQ assessment (20), and therefore the idling assumption does not appear conservative. It is also unclear which emission sources account for idling and which emission sources account for truck travel. Assessing the required worst-case scenario ensures that the actual AQ impacts will not be underestimated by the predictions.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 161 App. C App. E1 pdf pg 176 App. C2 CN response Sept 30 pdf pg 52 Att. IR13-2 Main EIS pdf pg 15	**AQ11. Daily truck traffic** Please explain the rationale behind the maximum number of trucks per day being set at 800, rather than 1233. If 1233 is the correct maximum, please provide a revised AQ assessment in respect of this parameter.	Appendix C (App. E1 pdf pg 161 App. C) describes the "*maximum number of trucks per day for shipping containers in or out of the facility*" as 1233. However, the on-site vehicular emissions calculations assume a maximum of 800 trucks per day (App. E1 pdf pg 176 App. C2). This number is repeated in CN's later response to CEAA IR13-2, dated Sept 30, 2016. It is not clear why the maximum value of 1233 trucks/day was not used and instead 800 trucks/day was assumed. This is important because assessing the worst-case scenario ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 8, Sect.2.4 App. E1 pdf pg 161 App. C GHG report pg 7 Sect. 2.4	**AQ12. Daily locomotive traffic** Please advise what the daily maximum number of trains will be in the Hub, including deadhead runs, and use this figure for modelling purposes in the emissions analysis.	The Operation Activities section (App. E1 pg 8, Sect.2.4) describes that the average rail traffic consists of 26 freight trains, and this figure is used in the emissions calculations. However, the daily upper limit of train traffic, which appears to be 30 trains per day, should be used in calculations in order to take the required conservative approach. Also, it is not clear if the above discussions of train traffic include deadhead runs, which are non-revenue-generating train trips. Deadhead runs will also generate emissions and should also be considered in the analysis.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 78 Sect. 7.4.1.4 App. E1 pdf pg 173 App. C2 App. E1 pdf pg 177 App. C2 App. E1 pdf pg 169 and 171, App. C2	**AQ13. Particulate matter size fraction assumptions** Please provide a re-assessment with the conservative scenario, which was implied in Sect. 7.4.1.4, that 100% of Particulate Matter (PM) is PM2.5. Alternatively, provide PM2.5 test emissions data to justify the assumptions made. If re-assessment is not completed, please provide justification that the emission factors for Stationary	In the Non-road mobile equipment calculation assumptions, (App. E1 pdf pg 173 App. C2) a footnote to the Table with the title "*Emission Calculations – Criteria Contaminants*" states "*For PM emissions from the tailpipe of the equipment, based on US EPA AP-42 Appendix B.2 Generalized Particle Size Distributions for gasoline and diesel fuel combustion engines, PM10 = 96% PM; PM2.5 = 90% PM.*" However, these generalized particle size distributions are <u>average</u> values (and apply to

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		Internal Combustion Engines running on Gasoline or Diesel Fuel (US EPA AP-42 Appendix B.2) are applicable to non-road mobile equipment and locomotives.	Stationary Internal Combustion Engines running on Gasoline or Diesel Fuel, US EPA AP-42 Appendix B.2). Maximum values for PM10 and PM2.5 in that reference are equal to 99%. Therefore, it would be conservative to assume that 100% of PM consists of PM2.5. The PM10/PM2.5 fractions used were based on averages rather than upper limits o Same comment for stationary equipment (App. E1 pdf pg 177 App. C2) o Same comment for locomotives (App. E1 pdf pg 169 and 171, App. C2) The Air Quality Predictions and Discussion subsection (App. E1 pg 78 Sect. 7.4.1.4) with the title Particulate Matter (PM, PM10 and PM2.5) states: "*Note that it was conservatively assumed that the PM emissions from the fossil fuel combustions in the equipment engines are equal to PM10 and PM2.5*." This would have been conservative but the calculations were not done in accordance with the above statement. In multiple places in the App. E1, CN provides the footnote to tables in Appendix C2 and C3, outlining that "*PM10 = 96% PM; PM2.5 = 90% PM*", as just described. Note also that those size distributions apply to Stationary Internal Combustion Engines running on Gasoline or Diesel Fuel (US EPA AP-42 Appendix B.2) and not necessarily non-road mobile equipment or locomotives (as was assumed in the App. E1). Therefore, it is unclear whether it is appropriate to use these size distribution assumptions for non-road mobile equipment and locomotives in this case.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Assessing emissions conservatively ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2 App. E1 pdf pg 162 App. C	**AQ14. Vehicular speed assumptions** Please explain how the average speed assumption used in the calculations provides the maximal emissions of the various contaminants, compared to other possible speeds used on-site.	The On-site vehicular emissions calculation assumptions (App. E1 pdf pg 175 App. C2) state that the vehicle speed assumed was "10 mi/h" for on-site truck traffic. However, this appears to be an average speed, based on comments made in Appendix C (App. E1 pdf pg 162 App. C) that sets the <u>average speed</u> at 15 km/h, which converts to 9.32 mi/h. Similarly, the speeds for other mobile sources in the speed consideration table in Appendix C (i.e. trains passing by, trains, hostlers and reach stackers) appear to be average speeds. Vehicular speeds that cause maximum emissions should be used in the calculations, so that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 162 App. C GHG report App. A pg 4 GHG report App. A pg 5-6	**AQ15. Operating load assumptions** Please provide rationale that the assumptions made for operating load for all project equipment are maximal or conservative.	For Non-road mobile equipment, Stationary Equipment, Locomotive and On-road Equipment calculations, CN used the "*<u>Average</u> Operating Load On-site*" (my underlining) (App. E1 pdf pg 162 App. C; GHG report App. A pg 4 GHG emissions from Direct Project Sources; GHG report App. A pg 5-6 GHG emissions from Direct Project Sources). Using an average means that the predictions may not consider the worst-case scenario. Assumption of worst-case scenarios ensures that the actual AQ impacts will not be underestimated by the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy	App. E1 pg 89 Sect. 7.7 App. E1 pdf pg 161 App. C GHG report App. A pg 5-6	**AQ16. Manufacturer specifications, in particular fuel usage values, power rating and type of equipment** Please provide necessary documentation relating to manufacturer specifications of the actual equipment to be used, or	The Uncertainties of Prediction section (App. E1 pg 89 Sect. 7.7) states "*Equipment specifications, power rating, fuel usage rate and average loading percentage during their operation at the Terminal were not available for some on-road and non-road sources and these data were estimated or assumed based on similar types of equipment*." However, no manufacturer specifications of any sort,

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Communities – Air Quality	GHG Report App. A pg 10 App. E1 pdf pg 165 App. C1, pdf pg 169 App C2, pdf pg 171 App C2	similar equipment to be used, so that assumptions made throughout the emission estimate calculations can be verified. Please provide manufacturer data or specifications, quantitative justification of the selected assumptions, and/or sample calculations, if needed, in respect of the values chosen for fuel usage, power rating and type of equipment with tier ratings.	whether for actual equipment to be used or "similar" types of equipment, were provided to confirm values used. In particular, the table entitled "*Non-road and stationary equipment*" (App. E1 pdf pg 161 App. C) lists a number of different assumptions, but with no justification provided. For instance, numbers are listed in the "*fuel usage rate*" column, and the only explanation are provided for them are in the "*notes*" column, which indicates the fuel usage data was "*obtained from the equipment specs data, if data available; otherwise, fuel consumption data is estimated based on data from similar equipment*", neither of which were provided and therefore, I cannot review these assumptions. Similarly, the fuel usage values provided in the GHG report (App. A pg 5-6 GHG emissions from direct project sources) are not backed up by manufacturer data or specifications. In addition, the numbers listed as "*power rating*" are not backed up by manufacturer data or specifications (App. E1 pdf pg 161 App. C, pdf pg 165 App. C1, pdf pg 169 App C2, pdf pg 171 App C2, and GHG Report App. A pg 10). As well, in the column "*type of equipment*" (App. E1 pdf pg 161 App. C), the tier ratings for various pieces of equipment are listed. No manufacturer specifications are provided to verify the tier rating assumptions. The tier ratings are important as they are used in the emission calculations. Without justification, there is no evidence of where the assumption originated. In order to assess whether the calculations take into account worst-case scenarios, justification is required, and explanations and documentation for assumptions are needed.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2	**AQ17. Silt Loading assumption** Please use an appropriate conservative silt loading value or provide justification for the ubiquitous silt loading assumption used to project the "dustiness" of the Hub roads.	A common method to predict dust emissions from paved roads is to use the emission factor from the US EPA AP-42 (Chap. 13.2.1). An important input variable for the emission factor calculation is the silt level of the future road. Silt is comprised of dust particles on the road surface that are less than 75 µm in diameter. Essentially, silt levels indicate the "dustiness" of the road. With higher silt levels, the equations predict higher dust emissions. For CN, the silt loading assumption (App. E1 pdf pg 176 App. C2) in the On-site Paved Road dust emissions calculations included "*ubiquitous silt loading default values*" for the average daily traffic (ADT) category of 500-5000. However, the "*Ubiquitous silt loading*" assumptions from the US EPA AP-42 Chap. 13.2.1 (pg 8-9) are designed for public roads, not facility roads. Facility roads are usually dustier than public roads. Therefore, CN should use a silt loading assumption that corresponds to facility roads so that worst-case scenarios are used in the predictions.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 161 App. C App. E1 pdf pg 171-172 GHG report App. A pg 4	**AQ18. Locomotive operation and idling** Please provide evidence that the trains will idle for a maximum of 5 hours, and provide the basis for locomotive operational times on-site. Please also describe if there are emissions during the remaining 5 hours the trains are on-site. Outline how train movement is accounted for and if it was not considered, include consideration of train movement in the AQ assessment.	The Production and Equipment Data Input Tables (App. E1 pdf pg 161 App. C) list operational details for the locomotives, including train operational times and idling times. The duration of train stay on-site is said to be 10 hours, and the idling time is said to be 5 hours, but no explanation or rationale is provided for these durations. As well, only emissions while the locomotives are idling appear to be used in the AQ calculations (App. E1 pdf pg 171-172). However, emissions would also be released while the trains are moving, so this should be taken into account. The same two issues are seen in the corresponding entries in the GHG emissions table (GHG report App. A pg 4).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Without justification for these figures and assumptions, there is no evidence of where they came from and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 169-170 App. C2 and pdf pg 162 App. C	**AQ19. Locomotive speeds** Please advise which realizable speed results in maximal emissions while the bypass locomotives remain in the project area, and use these findings in the AQ assessment.	For the locomotive emissions (App. E1 pdf pg 169-170 App. C2 and pdf pg 162 App. C), CN has defined a project area and attempted to quantify air emissions from within that area, including emissions from locomotives moving through the area but not stopping at the hub ("bypass" locomotives). To calculate diesel exhaust emissions from those bypass locomotives, while in the project area, CN has assumed a certain travel speed. From that speed, given the length of track within the project area, CN calculates the residence time the locomotive remains in the project area and thus contributes to on-site project emissions. Therefore, the faster the locomotive moves, the less time it spends in the project area, and so the less time it emits air contaminants while within the area. However, at the same time, the faster the locomotive travels the higher the emission rate of air contaminants as the engine operates at a higher rate. Therefore, there are two opposing factors to consider; the higher emission rate at higher speeds, but the decrease in residence time at higher speed. This analysis has not been done. This analysis is required because there will be a worst-case speed that maximizes emissions. Assessment using this worst-case speed ensures that maximal air quality impacts are not underestimated from these calculations.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 165 App. C1	**AQ20. Diesel engine sulphur dioxide (SO_2) calculations** Please provide specifications for specific diesel engines that will be used on-site, in particular in terms of "diesel engine efficiency". Also, please provide a sample calculation for SO_2 in terms of grams per brake-horsepower hour (g/bhp-h).	The emission calculations for locomotives (App. E1 pdf pg 165 App. C1) include an estimate of the emissions of SO_2. Calculation of the emissions of SO_2 includes an estimate of diesel engine efficiency. However, CN provides only a generic diesel engine efficiency without justification that this applies to locomotives relevant to this project. Sample calculations for locomotive SO_2 emissions were also not provided. This information is needed so that it can be determined whether a worst-case scenario was used for this aspect of the AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	GHG report App. A pg 7 and pg 10	**AQ21. Moderate control assumption for diesel trucks** Please explain the meaning of the "moderate control" assumption for on-road diesel trucks used in the GHG assessment, and provide a rationale for why this equates to a worst-case scenario.	The GHG report (GHG report App. A pg 7 GHG emissions from direct project sources; pg 10 GHG emissions from future operation with project) states emission factors for on-road diesel trucks were assumed to have "*moderate control*". No justification was provided for this assumption, nor was a definition provided for "*moderate control*". Without justification, there is no evidence of where the assumption came from and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 174 App. C2 App. E1 pdf pg 178 App. C2	**AQ22. Compressed Natural Gas (CNG)-fired shunter and Powerpack genset assumptions** Please provide a reference for the CNG-fired shunter emission factor value or justify the use of gasoline and diesel industrial engine emission factors for a CNG-fired source. Please also provide sample calculations for the emission rates for the CNG-fired shunter and the powerpack genset (Cummins QSB7) for a sample VOC.	There will be two kinds of Shunters that will be used at the facility, one of which is fuelled by compressed natural gas (CNG) (App. E1 pdf pg 174 App. C2) (as well as other non-road mobile equipment). Also, there will be a Powerpack Genset (App. E1 pdf pg 178 App. C2) used at the facility (as well as other stationary equipment). In calculating emissions from these machines, CN referred to emission factors set out in a standard reference, EPA AP-42 Chap. 33. However, this chapter provides factors for gasoline and diesel-powered engines. These may not be valid for CNG-powered engines, like the CNG-

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			fired shunter. As well, there are discrepancies between the numbers used by CN in its calculations, and the actual published numbers in the EPA reference for both of the CNG-fired shunter and the powerpack genset, as well as the diesel-fired shunter. As well, sample calculations of the VOC assessments were not provided in order to allow review of the work and whether it is premised on a worst-case scenario.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2	**AQ23. Climate normals** Please provide justification and explanation for the assumptions made about climate normals, including a description of what normals were used and how those assumptions lead to worst-case emissions.	"Climate Normals" are long-term averages of climatological variables such as temperature or precipitation. These were used in modelling on-site truck emissions (App. E1 pdf pg 175 App. C2). However, in assessing AQ impacts, it is necessary to consider worst-case scenarios. CN may need to employ an alternate variable that leads to a worst-case emissions scenario.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 48, Sect. 6.2.2 App. E1 pdf pg 171 App. C2	**AQ24. Tier 2/3 emission standards for locomotives** Please provide justification for the types of trains assumed and the engine type, and please explain the rationale for the assumption that all of the locomotives will achieve at least Tier 2 or 3 emissions status.	In the Future Operation section for Locomotives servicing Milton Logistics Hub On-Site (App. E1 pg 48, Sect. 6.2.2), it states for locomotives that "*Tier 2/3 emission standards are used*." Tiered emission standards for locomotives are set by the US EPA, and go from a scale of 0-4. The types of trains, the engine type, and the basis for the assumption that the locomotives will achieve at least Tier 2 or 3 emissions status is not described in App. E1. Without justification, there is no evidence of where the assumption came from and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1	GHG report App. A pg 5	**AQ25. Operating time in GHG report** Please provide explanation and rationale for the operating time	In the assumptions for the GHG emissions from project sources (GHG report App. A pg 5), an operating time of 20 hours was assumed for all non-road equipment on-site. However, in the Project Operation section

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 65-66 Sect. 7.2.2	assumption of 20 hours per day for non-road equipment on-site.	(App. E1 pg 65-66 Sect. 7.2.2), it states non-road equipment will operate 24 hours per day. No rationale or justification was provided for the 20 hour assumption. This is required so that it can be determined whether use of the assumption makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 8, Sect. 2.4 GHG report pg 7 Sect. 2.4	**AQ26. Future projections of train traffic** Please provide future projections of the anticipated number of trains or provide rationale that 28 trains will be the maximum number of trains that will ever pass through the PDA. Please include discussion of whether these are design limitations or if future on-site expansions could allow for greater throughputs.	The Operation Activities section (App. E1 pg 8, Sect. 2.4) assumes 26 trains travelling through the corridor daily, and an additional two trains being added due to project. This assumption is then incorporated in the emission calculations. However, there is no indication that this will be a maximum upper limit in terms of train traffic for the foreseeable future. Future projections are necessary to assess the AQ emissions projected for the future and to help plan follow-up and monitoring for this project.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 176 App. C2 App. E1 pdf pg 161 App. C CN response Sept 30 pdf pg 51 GHG report pg 2 Sect. 1.1.1	**AQ27. Future projections of truck traffic** Please provide future projections of the anticipated number of trucks, or if 800 will be the maximum number that will ever pass through the PDA in the future, please provide a rationale. Please discuss if these are design limitations or if future on-site expansions could allow for greater throughputs.	The On-site vehicular emissions calculations (in App. E1 pdf pg 176 App. C2, and App. E1 pdf pg 161 App. C) state that the maximum daily traffic will be 800 trucks per day. This upper limit is also assumed when discussing future projections in 2021 and 2031, as set out in CN's further response dated September 30, 2016. However, there is no indication that this is the actual maximum upper limit in terms of truck traffic for the foreseeable future. Future projections are necessary to assess the AQ emissions projected for the future and to help plan follow-up and monitoring for this project.
Air Quality EIS Guidelines 6.2.1	GHG report pg 7 Sect. 2.4	**AQ28. GHG emissions – assumption for daily number of trains** Please provide justification that the daily assumption of 28 trains, with 4 of those stopping at the Hub, is	GHG emissions are estimated on an annual basis, and are based in part on emissions calculated from the predicted train traffic. CN predicted that a daily average of 28 trains would pass through the Hub, with 4 of those trains stopping. However, it is unclear if the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality		applicable for use in the yearly GHG emissions calculations. If so, please explain why this is the maximum worst-case number of trains.	daily assumptions are applicable for the calculations of the annual GHG emissions, and if a worst-case scenario would result. This should be clarified by showing the calculations and rationale that the daily assumption of 28 trains with 4 stopping at the Hub leads to maximum annual GHG emissions.

2.1.4 Modelling dispersion from on-site/off-site project sources

In dispersion modelling for AQ impact assessments, worst-case emissions are combined with a range of meteorological conditions to ensure that worst-case emissions are reasonably combined with worst-case meteorological conditions to provide potential worst-case impacts on AQ in the surrounding region.

In the case of CN, they used a US EPA dispersion model to predict changes in air quality due to on-site (i.e. Hub operations) and off-site sources (i.e. CN Hub-related trucks on local roads). In order to review this work, it is necessary to check the proponent's assumptions and calculations, and be able to replicate their AQ assessment results. This requires access to the model input and output files. I have reviewed their use of this dispersion model (as was described in the App. E1 report and associated documents) and have found the below insufficiencies in this category.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 51-94 App. E1 pg 85-86 and pdf pg 227 CN response May 18 pdf pg 87-110	**AQ29. Model input/output files** Please provide the following explanations and data: - clarifications concerning whether the assumptions, data used and methods were the same in the CN response (Sept 30) as the original App. E1 report, or if there were differences. - a table of source characteristics used in the dispersion modelling,	In the revised AQ assessment submitted by CN in response to CEAA information requests (CN response Sept 30 pdf pg 51-94), very little information was provided about the assumptions considered. Table 1 in the revised AQ assessment (CN response Sept 30 pdf pg 94) indicated maximum predicted ground-level air concentrations due to the CN project alone and CN traffic alone, but the numbers indicated do not match what was previously shown in the App. E1 (App. E1 pg 85-86 and pdf pg 227, respectively).

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
		including rationale for source characteristics. - details of the traffic data inputs to the MOVES model used for the latest iteration (assuming MOVES was used, that was not indicated in CN response Sept 30, but MOVES was used in the App. E1). - provide the MOVES model input and output files used in this, or an updated and consolidated AQ assessment. - the AERMOD model files used in the most recent, or an updated and consolidated, AQ assessment (i.e. Lakes GUI backup files). As well, please consolidate all revised aspects of the App. E1 into an updated, single App. E1 (including the "participating receptors" assessment set out in CN response dated May 18, 2016, at pdf pg 87-110).	Therefore, seemingly different assumptions were made in this Sept 30 AQ assessment; these different assumptions should be provided to allow independent review. Without the input and output model files for all scenarios, I cannot confirm if the modelling was conducted appropriately. I need to be able to replicate the findings to confirm their validity. Additional details about assumptions and what was used as model inputs is important to ensure an appropriate review can be conducted.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 131 Figure 5a	**AQ30. Locations of mobile sources** Please provide mapping of the locational envelope of all possible locations where all on-site mobile sources can emit contaminants from.	Source characteristics (in this case, locations) assumed in the model for mobile source locations were not justified/explained. Mobile sources such as on-site locomotives, reachers and stackers and on-road trucks can be located in many areas on the property including relatively close to the off-site sensitive receptors. As those sources get closer to off-site sensitive receptors, impacts on the AQ at those receptors can increase (App. E1 pdf pg 131 Figure 5a). Information on the limit of all potential source locations is required so that it can be confirmed that the worst-case locations for mobile sources have been included in the modelling.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 59 Table 6.2 App. E1 pdf pg 131 Figure 5a	**AQ31. On-site road traffic (source: OR4)** Provide explanation of whether OR4 was intended to be a line or a volume source, as an error in the referencing appears to have occurred. Please ensure consistency between the table and figure. Source characteristics should be provided, as well as revised tables/figures/modelling as needed.	The Source Summary – Project Operation Table (App. E1 pg 59 Table 6.2) lists the source ID OR4 (on-site road traffic) as being a line source (called link 4). However, the figure with the title "*Location of Terminal Sources – Operations*" (App. E1 pdf pg 131 Figure 5a) shows the source OR4 as a volume source. See Figure 2 (in Appendix C of this report) for this comparison. In the model, CN assumed the location of entrance idling is a volume source in the model, not a line source. It is not clear whether it was supposed to be modelled as a line source as indicated in Table 6.2. Without source characteristics clearly indicated, there is no evidence the assumptions are reasonable and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	Main EIS pg 4 Sect. 1.2.1 App. E1 pg 66 Sect. 7.2.2	**AQ32. Modelled truck and locomotive idling and movements** Please provide maps and figures that reflect the operations and configurations of idling trucks along the 1.7 km distance, as well as the queuing area of 140 trucks and truck movement areas. Please provide maps and figures that reflect the operations and configurations of locomotive movement and idling. Please indicate how the mapping provides information to allow modelling of the worst-case operating scenario for truck traffic and idling, as well as locomotive operations.	The EIS Project Components section (EIS pg 4 Sect. 1.2.1) describes a 1.7 km private entrance road designated queuing area to accommodate up to 140 trucks within the Hub. However, the layout is not sufficiently described in App. E1 so that the location of idling trucks and moving trucks can be understood. Similarly, insufficient information is provided for locomotive idling and movements (App. E1 pg 66 Sect. 7.2.2). A worst-case operating scenario for trucks and locomotives involves considering idling locations that are as close as possible to property boundaries and sensitive receptors. Without the input and output model files for all scenarios, it cannot be confirmed whether the modelling was conducted appropriately. Without source characteristics clearly indicated that

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			coincide with actual operating scenarios, there is no evidence the assumptions are reasonable and whether they make sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 63-64 Sect. 7.1.1	**AQ33. Representativeness of meteorological data** Please provide rationale that this data set is representative of the project location.	The Meteorological Data section (App. E1 pg 63-64 Sect. 7.1.1) states: "*A five-year regional meteorological dataset available from the MOECC for the Halton-Peel area was used in the modelling assessment. These data are pre-processed by the MOECC for the LAA. Project site-specific meteorological data are not available from the MOECC.*" The statement "*These data are pre-processed by the MOECC for the LAA*." is misleading. The MOECC did not pre-process this data specifically for the LAA. Everyone completing ECA applications (i.e. for permits for the MOECC) in Halton Region, Peel Region, Greater Toronto Area, York Region and Durham Region use the same default meteorological data set unless instructed to use alternates. It is not known when CN began to consider this project - they possibly could have begun site specific meteorological measurements at that time, therefore maximizing available site-specific data that could have been used for this AQ assessment. Justification is required for the use of this dataset as without justification, there is insufficient evidence that the meteorological data set used is fully representative of this site and whether it makes sense for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1	App. E1 pg 64 Table 7.1 CN response Sept 30 pdf	**AQ34. Meteorological data from 1996-2000** Please re-evaluate all relevant model runs and emission	The Meteorological Station Table (App. E1 pg 64 Table 7.1), states that an old meteorological data set was used (1996-2000). The CN response Sept 30 (CN response Sept 30 pdf pg 54 Att. IR13-2)

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Halton Brief, Table D.7 Healthy Communities – Air Quality	pg 54 Att. IR13-2 App. E1 pg 64 Sect. 7.1.1 CN response May 18 pdf pg 87-110 Att. IR12 CN response Sept 30 pdf pg 51-94 Att. IR13-2 App. E1 pdf pg 175 App. C2 CN response Sept 30 pdf pg 51-94 Att. IR13-2 App. E1 pg 49 Sect 6.2.4, pg 50 Sect. 6.3 ECCC review (pg 2)	estimates using a newer (preferably site-specific or proven equivalent) meteorological data set.	mentions a newer meteorological data set "*(2010-2015) from the nearest met station*" but it is not clear this newer meteorological data set was included in the updated modelling nor is it clear which meteorological station was considered the "*nearest*". If the 1996-2000 meteorology data set is the data set used in the AERMOD simulations (App. E1 pg 64 Sect. 7.1.1; CN response May 18 pdf pg 87-110 Att. IR12; CN response Sept 30 pdf pg 51-94 Att. IR13-2) and the MOVES model (App. E1 pdf pg 175 App. C2; CN response Sept 30 pdf pg 51-94 Att. IR13-2), as well as assumptions made in the emissions calculations (App. E1 pg 49 Sect 6.2.4, pg 50 Sect. 6.3), a newer available data set should have been used, a point that the ECCC review (pg 2) also brought up. A 1996-2000 data set is outdated for a project that will exist into the foreseeable future. The most accurate, up-to-date, data set available should be used.
Air Quality EIS Guidelines pg 29 Sect. 6.6.2 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 71 Sect. 7.3	**AQ35. Anomalous meteorological data** Please re-evaluate using the "anomalous" meteorological data that was previously removed or justify otherwise.	In the Air Quality Predictions and Discussion – Existing CN Operations Alone section (App. E1 pg 71 Sect. 7.3) describes that the "*meteorological anomalies*" were removed for the "*predicted off-site concentrations*" (i.e. receptor grid). Meteorological "anomalies" still occur (as they exist in the dataset), however, and therefore still may contribute to impacts on the surrounding environment. There is no rationale provided for why removal of "anomalous" meteorological data was appropriate for this assessment. Removal of this data will not provide maximum impact from the project. The EIS Guidelines (pg 29) specifically required that

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			CN's work take into account severe and extreme weather conditions. Therefore, meteorological anomalies should be returned to the dataset and the analysis re-done or justification for otherwise is required.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 64 Sect. 7.1.3	**AQ36. Topographical data** Please provide the source of this data and rationale for use of this topographical data in the modelling.	The Topographic Data section (App. E1 pg 64 Sect. 7.1.3) states: "*The terrain of the subject area is also incorporated into the modelling input. Terrain data was acquired and evaluated using AERMOD's terrain processor (AERMAP) for use in the dispersion modelling.*" The source of the terrain data was not provided. This information is required in order to confirm whether the modelling was conducted appropriately.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 175 App. C2 App. E1 pdf pg 211 App. C4	**AQ37. Variable emissions** Please re-assess with variable emissions for all applicable emission scenarios for all relevant project sources including locomotive and truck traffic. Alternatively, the worst-case emissions scenario (for example, 124 trucks/hour at all times of day) should be applied in the modelling and justification provided.	Variable emissions should have been used but were not. If peak activities coincide with poor dispersion conditions (i.e., dawn/dusk), this should be accounted for as maximal air contaminants emissions may then coincide with poor dispersion conditions and result in worst-case AQ impacts in the local community. As an example, the On-Road Vehicle Emissions in Future Facility emission estimates table with the title "*key input data to MOVES*" (App. E1 pdf pg 175 App. C2) states that 84 trucks/hour were "*conservatively used based on the traffic data for peak AM hour*". However, the Traffic Memo (App. E1 pdf pg 211 App. C4) provides the number of trucks every hour of a 24 hour period, projected to 2017 and 2022. The Traffic Memo also states there will be 124 trucks per hour at 13:00. This hourly variable data set was available for CN to use in their AQ assessment.

Topic	**Reference to CN EIS and Information Responses**	**Requested Information**	**Rationale**
			Also, it is not clear how the use of 84 trucks per hour is a conservative assumption given that Appendix C4 of App. E1 indicates the worst-case hour will have 124 trucks on-site. Justification is required for assumptions used. In the modelling, CN did not vary emissions temporally. This is important for longer term averages (i.e. 24 hour averages or longer). Also, there are hourly air quality criteria (as opposed to 24 hour air quality criteria) for some contaminants, e.g. NO_2, which requires that the maximal operational hour should have been chosen for AQ assessment of those short-term contaminants.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 65 Sect. 7.1.5	**AQ38. Ozone limiting method (OLM) for nitrogen dioxide (NO_2)** Please provide rationale for the use of the Tier 3 OLM approach as opposed to the more conservative methods of Tier 1 or Tier 2.	In the Modelling Assessment Approach section for NO to NO_2 conversions (App. E1 pg 65 Sect. 7.1.5), it is stated: "*A standard methodology for determining ambient NO_2 concentrations based on maximum NO_x concentrations predicted by a dispersion model is the Ozone Limiting Method (OLM). The OLM assumes that some NO_2 is emitted directly from the exhaust and that additional NO_2 is formed in the atmosphere by the direct mole for mole oxidation of NO by O_3 in the presence of organic radicals and sunlight. The OLM method is also referred to as the US EPA Tier 3 approach to the NO to NO_2 conversion.*" The Tier 1 (or Tier 2) approach of assuming full conversion of NO_x to NO_2 would be conservative. Tier 1 is the default approach, which assumes that all NO_x is converted to NO_2. In contrast, Tier 3 considers atmospheric conditions and a lower conversion rate. It is therefore less conservative than Tier 1. CN refers to the Tier 3 approach as "*standard methodology*". However, the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			Tier 3 approach is not a default option in AERMOD, and requires pre-approval from regulatory authorities for its use. Without justification, there is no evidence that this Tier 3 approach is appropriate and whether it is appropriate for a worst-case scenario AQ assessment.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 54 Att. IR13-2 App. E1 pg 24-25 Table 5.5 CN response Sept 30 pdf pg 92 figure IR13-1 CN response Sept 30 pdf pg 94 Table 1	**AQ39. Receptors** Please provide an updated and consolidated AQ assessment report combining all assessments. Provide clear tables and figures identifying all, non-gridded, receptors used in the dispersion modelling. Identify if the chosen receptors included predicted future receptor locations, such as areas already zoned for sensitive receptors including residential areas. Identify all currently zoned, as-of-right, receptors (special or otherwise) in the AQ assessment even if they do not presently exist. Please add rationale for inclusion and (where appropriate) exclusion of receptors chosen.	The CN response to CEAA (CN response Sept 30 pdf pg 54 Att. IR13-2) indicates "*a total of 58 special receptors*" and references the App. E1 report for the location of the receptors (App. E1 pg 24-25 Table 5.5). However, there are only 40 receptors listed in Table 5.5. However, Figure IR13-1 (CN response Sept 30 pdf pg 92) shows more than 110 receptors. It is unclear whether all receptors in the figure were used in this evaluation, and whether different receptors for each scenario shown in Table 1 (CN response Sept 30 pdf pg 94) were used. It is also not clear which of those receptors are current residential homes or areas zoned for residential in the future. Without the appropriate input options provided in the AQ assessment, it cannot be confirmed whether the modelling was conducted appropriately.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 68 Table 7.4 App. E1 pg 57 Table 6.2	**AQ40. Emission rates in model input table and source summary tables** Please confirm the emission rates that were used in the model are correct.	Tabulated emission rates do not match between the modelling input table and the source summary table. In the AERMOD Modelling Input – Emission Data for Identical Volume Sources Table (App. E1 pg 68 Table 7.4), the model inputs listed for the overall emissions of benzene and 1,3-butadiene, for non-road equipment do not match the values listed in the Source Summary Table for Project Operation (App. E1 pg 57 Table 6.2). This suggests the wrong emission rates were used in the model.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			The estimated emission rates need to be used in the model. Errors need to be corrected.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pdf pg 227 App. C4 CN response Sept 30 pdf pg 94	**AQ41. Traffic assessments** Please describe the difference between the two AQ assessments done in the traffic memos. It currently appears that the assumptions were the same but the outcome was very different.	Two traffic impact assessments were done: one in the original EIS, and another in response to an information request. However, the results are very different in each, in particular for the assessments of B(a)P: - the original traffic memo said that B(a)P related to "CN Traffic" was 111% of the Air Quality Criteria for the 24 hour AQ assessment, and 138% of the Air Quality Criteria for the annual AQ assessment, and therefore was in excess (App. E1 pdf pg 227 App. C4). - the second traffic assessment done as part of the September 30 response stated the corresponding numbers for B(a)P as 40% and 60% (CN response Sept 30 pdf pg 94). Differences between these two AQ assessments and how they were each conducted should be explained.

2.1.5 Baseline air quality levels, accounting for local spatial/temporal hotspots

Baseline (or "background") levels of air pollutants are not the same at all locations. For example, closer to a non-subject source (i.e. sources of similar contaminants as the project but located off-site and not a part of the project), background levels will be higher as they will be affected by emissions of CoPCs from that non-subject source.

A specific example would be consideration of major roadways in the area, for example along Britannia Road or along Highway 25. These roadways will emit PM2.5 (for example) due to automobile exhaust and road dust and therefore airborne levels will be higher close to these locations. Roadways will also be emission sources of oxides of nitrogen (NO_x). Therefore, locations closer to off-site roadways will also experience higher background levels of NO_x. Thus, significant concentration gradients may exist close to these non-subject sources; if these "hotspots" coincide with areas of significant impact from the subject source, then relatively high levels of air quality degradation may occur in those locations.

Other non-subject sources also emitting the same CoPCs as the project include agricultural fields (dust), municipal waste disposal sites (dusts and VOCs) and other transportation facilities (e.g., Burlington airpark). Some potential non-subject sources that could have been assessed have been identified and are shown in Figure 3 (in Appendix C of this report). These sources already exist in the community.

Equally, baseline levels may not remain constant over time. Again using the example of major roadways, baseline levels for PM2.5 and NO_x near roadways are usually higher during rush-hour periods than during low-traffic periods. Also, dust levels close to existing agricultural fields will be higher during crop plowing or harvesting times; ammonia levels may also be higher during periods of manure application.

It is important that the proponent properly account for these spatial and temporal variations to ensure that cumulative levels (i.e. subject source emissions added to existing and future predictable baseline) of AQ are not underestimated. Conservative screening methods, such as the use of a constant, maximal (over space and time) baseline level could be permissible as long as it can be shown that the proposed baseline level will not underestimate actual levels at any particular place or time for each contaminant.

If more accurate estimates of background are required, the proponent can conduct measurements in the area surrounding the project, for example, at nearby residences. As with gathering site-specific meteorological measurements, the proponent should allow sufficient time to collect a statistically significant data set of pre-existing background levels at appropriate receptors.

Topic	**Reference to CN EIS and Information Responses**	**Requested Information**	**Rationale**
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 45-46 Sect. 5.3.2.7 App. E1 pdf pg 241 App. C5 App. E1 pg 95 Sect 9.0 CN response May 18 pg 13-14, IR11	**AQ42. Project Site Air Monitoring Program Purpose** Please clarify the technical goals of the monitoring program.	CN provided a brief description of the Project Site Air Monitoring Program (App. E1 pg 45-46 Sect. 5.3.2.7) and some Preliminary Ambient Monitoring data (App. E1 pdf pg 241 App. C5). The Conclusions (App. E1 pg 95 Sect 9.0) state "*CN has established a site-specific air monitoring station to confirm the existing background air quality for the site. The station was initially brought on line during the months of July to August 2015, with further changes as systems were revised October 2015. Preliminary raw data from the monitoring cannot yet be considered representative . . . A sensitivity analysis comparing the site specific air station dataset and the published background dataset can be completed when sufficient site data is available. This is expected to be nominally one year from the time of first obtaining valid data*" (my underlining). CN

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			implied they would use this monitoring data as part of the determination of baseline AQ levels. CEAA asked for additional information about this monitoring campaign (CN response May 18 pg 13-14, IR11-Baseline Air Quality). However, CN responded (pg 14 Sect. IR11) with: "*The supplemental collection of ambient air quality data described in EIS Section 9.4.1 (pages 333 to 334) is not part of the baseline data collection program in support of the EIS. This data collection program, which is currently underway, is part of the proposed follow-up monitoring program*." (my underlining). The final statement above would seem to contradict their original stated intentions in App. E1. The purposes of their measurement program should be clarified as the purposes dictate the sampling design; whether it be to collect data representative of baseline AQ at sensitive receptors, or, fenceline (or similar) monitoring as part of the post-implementation monitoring program.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 45 Sect. 5.3.2.7 App. E1 pdf pg 233-260 App. C5 App. E1 pg 13 Sect. 3.4	**AQ43. Project Site Air Monitoring Program technical issues** Clarification of the purpose of CN's monitoring program is needed. In addition, please provide the sampling location(s), information on the sampling methods and calibration procedures, and a quality controlled data set. Please also ensure the study includes measurement of all CoPCs (and with appropriate detection limits) or justify otherwise.	There are technical issues with the Project Site Air Monitoring Program sampling techniques. For example, does the location of the monitoring site fit the purposes of the monitoring program? It is claimed that the location is "*within the local assessment area (LAA)*" (App. E1 pg 45 Sect. 5.3.2.7) but this is a large area. There was no information provided on exact sampling location(s) or how this monitoring data is related to the proposed project location. Given that the location or locations of the monitoring have not been provided, it is not known if those measurements are placed in an area suitable for its purpose.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			There was also no information provided on sampling methods and calibration procedures. For instance, the Preliminary Ambient Monitoring raw data (App. E1 pdf pg 233 App. C5) showed all 3 non-continuous NH_3 samples in the App. E1 as "*non-detect measurements*". CN should have used instrumentation with a better detection limit, as is available with other methods outside of those used in the App. E1; it seems an inappropriate method was used. As well, only selected VOCs were considered (App. E1 pdf pg 234-237), even though additional CoPCs were identified (App. E1 pg 13 Sect. 3.4). For instance, there was no analysis provided of acrolein, acetaldehyde, and formaldehyde, which are defined as CoPCs for this study. Data had not been quality controlled. There were negative concentrations and missing data. For example, the PM10 concentrations were approximately two times higher than the TSP concentrations for 2015-07-11. This is indicative of a significant problem, as PM10 is a size fraction of TSP and therefore PM10 should never exceed TSP at the same location and time. Clarity is required as to the purposes of their measurement program so that its design can be assessed. Independent of this, it appears that different instrumentation should be used due to the indications that the quality of the data collected so far is poor.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7	App. E1 pg 25-26 Sect. 5.3 App. E1 pdf pg 127 Figure 3	**AQ44. Influence of local non-subject sources on the baseline** Please provide an assessment of local emissions that may be experienced by receptors that will also be impacted by the CN	CN relied on existing data from the National Air Pollution Surveillance (NAPS) program of measurements obtained at specific localities in Southern Ontario as its assumed baseline AQ in the LAA (App. E1 pg 25-26 Sect. 5.3).

Topic	**Reference to CN EIS and Information Responses**	**Requested Information**	**Rationale**
Healthy Communities – Air Quality		site, and that may not have been reflected in the data from the National Air Pollution Surveillance Program (NAPS). Alternatively, please provide evidence that the NAPS stations represent a conservative estimate of baseline AQ at all sensitive receptors for all CoPCs.	However, the influence of specific non-subject sources in the LAA was generally not included. By using NAPS data alone, the baseline will reflect the area that the NAPS sites are located in and not necessarily reflect all of the sources interacting in the surrounding region of the PDA, which will be different. Further, NAPS stations are all located in developed/urban areas, while the project location is in a semi-rural region. Periodic agricultural sources of dust and other contaminants would not be represented in the NAPS data used, for example. Figure 4 (in Appendix C of this report) shows the selected NAPS stations and their proximity to the CN PDA (the NAPS stations are also shown in App. E1 pdf pg 127 Figure 3) . CN has not considered site-specific, non-subject local sources, such as waste treatment facilities in the area. Some potential non-subject sources that could have been assessed have been identified and are shown in Figure 3 (in Appendix C of this report). These sources may have similar contaminants as the project. These local, non-subject, sources could influence the local air quality and were not likely captured by the chosen NAPS sites, and therefore could result in underestimated AQ levels for some contaminants.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy	App. E1 pg 44 Sect. 5.3.2.6	**AQ45. NAPS baseline 90th percentile** Please recalculate the baselines by using the 100th percentile or justify otherwise.	In the Summary of Background Levels of CoPCs section (App. E1 pg 44 Sect. 5.3.2.6), CN used a baseline of the 90th percentile for ambient monitoring data, stating that the 90th percentile assumption is conservative. However, the 90th percentile is not conservative, 100th percentile is conservative, as it would result in the

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Communities – Air Quality			maximum value for each CoPC being considered.
Air Quality EIS Guidelines pg 8 Sect. 4.2 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	EIS Guidelines pg 8 Sect. 4.2 App. E1 pg 25-46 Sect. 5.3	**AQ46. Baseline statistics and margins of error** Please provide margin of error and statistical information in regards to the baseline data.	The EIS Guidelines at section 4.2, page 8 requires that calculations of margins of error and other relevant statistical information be provided for baseline data. However, none has been provided in regard to the AQ baseline data used by CN in App. E1.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 85 Table 7.13, pg 86 Table 7.14 CN response Sept 30 pdf pg 94 Table 1	**AQ47. Baseline air quality levels for PM, acrolein, acetaldehyde, and formaldehyde** Please provide background concentrations for PM, acrolein, acetaldehyde and formaldehyde, either estimated or measured. Re-evaluate all relevant cumulative AQ assessments by taking these into account. If the background concentration of acrolein, acetaldehyde and formaldehyde have been set at zero, please provide justification for the assumptions.	There appears to be some errors with setting the baseline air quality levels for the contaminants PM, acrolein, acetaldehyde, formaldehyde, and in some cases it appears that they were set at zero. In the case of PM, no baseline was provided for this category. However, baseline concentrations were provided for subsets of this category, for PM2.5 and PM10 (e.g. App. E1 pg 85 Table 7.13). This means that the baseline for PM must be at least at the level for the baselines for PM2.5 or PM10, but this point should be clarified. This is an important point as this oversight has resulted in an underestimation of the cumulative maximum receptor concentration for PM, which is shown to be a smaller number than for PM10 alone (e.g. Table 7.13). In the case of acrolein, acetaldehyde, and formaldehyde, CN stated in the Cumulative Effects Assessment at App. E1 pg 85 Table 7.13, pg 86 Table 7.14 and in the response to CEAA information requests (CN response Sept 30 pdf pg 94 Table 1) that there were no background measurements or estimates

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
			for PM or for these contaminants. However, this is unclear because the calculations of the "cumulative" concentrations for some contaminants was larger than the "project alone", meaning that there must have been some background level assumed for these, but which background level was assumed is unknown (e.g. Table 7.13 for acrolein). If baseline levels for these CoPCs are not estimated, then cumulative air quality levels at receptors will be underestimated.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pdf pg 51-94 App. E1 pg 36 Graph 5.14	**AQ48. Baseline future projections** Please provide a complete prediction of future changes in baseline concentrations of Chemicals of Potential Concern (CoPCs), to be used in the projected future AQ assessments.	CN seemed to have taken into account future traffic predictions (CN response Sept 30 pdf pg 51-94) but that may not be the only source of future increases or changes in emissions of all CoPCs from non-subject sources. This is of concern because, for example, it can be seen that some parameters, such as PM2.5, shows an increasing trend from 2009-2013 as seen in App. E1 pg 36 Graph 5.14 (also replicated as Figure 5 in Appendix C of this report). Future baseline projections should be conducted so that all foreseeable future effects can be assessed (for example, in 5, 10 or 20 years).

2.1.6 Combination of project air quality impacts with existing and future baseline levels

As pollutants from the proposed CN-related sources (both on and off the fixed site) disperse through the air, they will add to pre-existing levels of those same pollutants (which are present at so-called "background" or "baseline" levels) that have been emitted from other pre-existing and future predictable non-subject sources. For example, since PM2.5 is emitted from diesel exhaust from locomotives, on-site mobile equipment (e.g. reachers, stackers, etc.) and trucks (both on- and off-site), PM2.5 is considered a CoPC for this study. However, airborne PM2.5 is also present in the area before the project is constructed and operating due to emissions from many surrounding activities, such as from public roads, agricultural operations as well as from other industrial facilities, etc. Future planned and predictable changes in these non-subject sources may also increase future emissions of PM2.5 and other CoPCs. For example, much of the land surrounding the proposed CN facility is already zoned residential and, once houses are built there, there will be increases in air emissions from residential heating furnaces and family vehicles.

In previous sections of this review report, I have provided descriptions of insufficiencies in the CN AQ assessment; these are all precursors to the final, cumulative AQ impact assessment, discussed here. Therefore, all previous issues found have an additive bearing on the final results, including the facts that not all sources were assessed, not all CoPCs were assessed, maximal emissions were not determined, the methods used in the dispersion modelling are unclear, and issues exist with the manner in which the baseline concentrations were determined (or in some cases, not determined). Given all of these preliminary issues, it is somewhat premature to discuss the resultant cumulative AQ levels predicted by CN; however, I have a few specific issues in this category in addition to those previously mentioned.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pg 11-12 IR13, and pdf pg 51-94 Att. IR 13-2 App. E1 pdf pg 203-229 App. C4	**AQ49. Project emissions combined with off-site project-related traffic** In order to provide adequate information to allow full review and assessment of the final consolidated AQ assessment (as requested earlier), please include a map indicating all components of the AQ assessment.	In a further response to IR-13 dated September 30 (pg 11-12 and pdf pg 51-94, attachment IR 13-2), a cumulative assessment was provided combining baseline and project emissions and incorporating project-related truck traffic and future public traffic, presumably replacing the Traffic Memo provided in the initial EIS (App. E1 pdf pg 203-229 App. C4). Further basic information such as a map (with either satellite imagery or roads indicated) indicating all components of the revised AQ assessment, including all 166 road segments in the AQ assessment, the location of the project itself, the future developments, the outline of the RAA used in this AQ assessment, receptors considered in this cumulative AQ assessment and any other components in the AQ assessment will be needed in order to fully understand and assess this work. Maps indicating all aspects considered in the study are required for conducting an appropriate review and correlating to model inputs (which have also been separately requested).
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7	CN response Sept 30 pdf pg 94 Table 1 App. E1 pg 85 Table 7.13	**AQ50. Cumulative AQ levels** Please provide corrected AQ assessments at appropriate receptors for acetaldehyde, in particular, as well as the other	A “cumulative effects assessment” includes the combination of the project emissions and background levels. However, there appears to be problems with the numbers provided by CN, as for several CoPCs, the value attributed to project emissions is higher than the cumulative value.

Topic	**Reference to CN EIS and Information Responses**	**Requested Information**	**Rationale**
Healthy Communities – Air Quality	App. E1 pg 86 Table 7.14	contaminants as needed, if additional inconsistencies are found. Please provide justification for any assumptions, and re-evaluate all relevant cumulative AQ assessments accordingly.	For instance, the cumulative contribution (project+traffic+background) for acetaldehyde in CN response Sept 30 pdf pg 94 Table 1 was 0.0754 $\mu g/m^3$ (for 0.5 hour time period, year 2021), yet the impacts calculated for the corresponding project + project traffic effects was 0.422 $\mu g/m^3$ (with no background included). The project alone had 0.0952 $\mu g/m^3$ concentration, which is greater than the cumulative assessment concentration. A similar discrepancy occurred for the year 2031 assessment. This suggests issues with methodology, which may extend to all contaminants considered. Similar issues are seen with the data for formaldehyde (App. E1 pg 85 Table 7.13) and acrolein (App. E1 pg 86 Table 7.14). All numbers should be checked and any illogical results such as the above should be explained.

2.1.7 Required provision of exposure data to a Health Impact Expert

The EIS Guidelines refers the proponent to a Health Canada 2010 document "*Useful Information for Environmental Assessment in order to include the appropriate basic information relevant to human health.*" (HC 2010). This document states that AQ predictions should be connected to a discussion of the potential effects on human health.

In environmental assessments, a health impact expert frequently provides an opinion in the form of an HHRA based upon the community-level exposure to CoPCs estimated by dispersion modelling, as described above. This is especially the case when existing air quality criteria values (e.g., for PM2.5) may not be fully protective of human health.

It does not appear that CN has submitted a complete AQ assessment to the HHRA. For example, there were several contaminants that were never assessed by CN and therefore could not have been subsequently reviewed in terms of HHRA. In this section I point out additional insufficiencies relevant to this topic.

For the purposes of my report, I defer to the Halton Municipalities' Health Impact Expert to opine on the sufficiency of CN's HHRA (App. E7) in regard to PM2.5 exposures, as well as other contaminants that may be relevant.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 14 Sect. 3.4	**AQ51. Diesel Particulate Matter information for Human Health Risk Assessment** Please complete an assessment of Diesel Particulate Matter for all diesel exhausts (baseline, project, construction and on-road traffic), to be passed along to the Human Health Risk Assessment.	CN states in its Chemicals of Potential Concern section (App. E1 pg 14 Sect. 3.4) that any analysis of Diesel Particulate Matter (DPM) was addressed in the same category as other fine particulate matter. However, some analysis of the effects of DPM could be lost or obscured if it is addressed in the broader category of fine particulate matter. DPM should have been treated as a separate species, and forwarded to the HHRA.
Air Quality EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	CN response Sept 30 pg 11-12 IR 13 and pdf pg 51-94 Att. IR13-2 App. E1 pg 82-86, Sect. 7.6 App. E7 pg 17 Table 7 App. E1 pdf pg 203-229 App. C4 CN response Sept 30 2016 IR13 and IR 13-2	**AQ52. Off-site traffic exposure data to be included in Human Health Risk Assessment** Once the cumulative assessment is re-evaluated, including all sources and CoPCs and emission rate estimates that were not completed appropriately before, the full assessment needs to be passed along to a HHRA.	The cumulative AQ assessment that included off-site traffic exposure data (CN response to information request Sept 30 pg 11-12 IR 13 and pdf pg 51-94 Att. IR13-2) appeared to not be supplied to HHRA (App. E7). It appears that the HHRA only evaluated an earlier cumulative AQ assessment from the original EIS (at App. E1 pg 82-86, Sect. 7.6) that did not include off-site traffic data (App. E7 pg 17 Table 7). The same applies to the Traffic Impact Memo (App. E1 pdf pg 203-229 App. C4), which was presumably superseded by CN's response to CEAA Sept 30 2016 IR13 and IR 13-2. It does not appear to have been forwarded for HHRA. The HHRA cannot be completed appropriately unless all relevant sources, CoPCs and emission rates are included in the full cumulative AQ assessment, including project emissions (on- and off-site) and future traffic projections, as well as future predictions of the baseline concentrations in the area.

2.1.8 Mitigation proposals

Normally once the HHRA is conducted, and identifies unacceptable adverse effects, the proponent is required to reduce emissions by various means of mitigation. These means of mitigation should be quantifiable and verifiable. In other words, for example, watering roads to reduce dust emissions should include evidence of the effectiveness and the quantitative level of effectiveness (e.g. Is watering 90% effective at reducing dust emissions? 80% effective?)

In this particular case, there are a significant number of issues with the AQ assessment methods used in the App. E1 and associated documents and so any detailed discussion of the required mitigation is premature at this point. However, I make a few preliminary comments at this juncture.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
Air Quality EIS Guidelines pg 27 Sect. 6.4 EIS Guidelines 6.2.1 Halton Brief, Table D.7 Healthy Communities – Air Quality	App. E1 pg 91-92 Sect. 8.0 GHG report pg 31 Sect. 8.0 CN response May 18 pdf pg 155-157 Att. IR23	**AQ53. Mitigation** Please provide quantification related to efficacy of all mitigation measures proposed.	There are many mitigation measures described in the App. E1 (pg 91-92 Sect. 8.0), the CN response to CEAA information request (CN response May 18 pdf pg 155-157 Att. IR23) and the GHG report (pg 31 Sect. 8.0) but none are quantified. The EIS Guidelines require that all mitigation measures are "*specific, achievable, measurable and verifiable*". The efficacy of any given mitigation measures should therefore be quantified. In order to learn if mitigation measures are effective, these measures must be quantified.

Signed this 10th day of March, 2017

Franco DiGiovanni

3. REFERENCES

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US EPA AP-42 Chapter 3.3 "Gasoline And Diesel Industrial Engines" (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors)

US EPA AP-42 Chapter 13.2.1 "Paved Roads" (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors)

US EPA AP-42 Appendix B.2 "Generalized Particle Size Distributions" (https://www3.epa.gov/ttn/chief/ap42/appendix/appb-2.pdf)

CEPA 2016: Toxic Substance List Schedule 1 http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=0DA2924D-1&wsdoc=4ABEFFC8-5BEC-B57A-F4BF-11069545E434

HC 2010: Health Canada's Useful Information for Environmental Assessment, 2010 *http://publications.gc.ca/collections/collection_2015/sc-hc/H128-1-10-599-eng.pdf*

MOECC 2012: SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419/05 - Air Pollution – Local Air Quality (including Schedule 6 of O. Reg. 419/05 on UPPER RISK THRESHOLDS); MOE PIBS # 6569e01, April 2012

US EPA 2016 Locomotives: Exhaust Emission Standards. OTAQ EPA-420-B-16-024, March 2016

APPENDIX A: ACRONYMS, ABBREVIATIONS, GLOSSARY

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Dispersion Model (See Glossary: Dispersion Model)
AP-42	A Compilation of Air Pollutant Emission Factors assembled by the US EPA (see Glossary)
AQ	Air Quality
B(a)P	benzo(a)pyrene
CAC	Criteria Air Contaminant
CALA	Canadian Association for Laboratory Accreditation Inc.
CoPC(s)	Chemical(s) of Potential Concern (see Glossary)
DPM	Diesel Particulate Matter
ECA	Environmental Compliance Approvals (see Glossary)
ECCC	Environment and Climate Change Canada
GHG	Greenhouse gas
g/bhp-h	units of grams per brake horsepower-hour
g/hp-h	units of grams per horsepower-hour
HC	Health Canada
HHRA	Human Health Risk Assessment
hp	unit of horse power
hp-h	unit of horse power hour
Hub	Milton Logistics Intermodal Hub
IR	Information Request (related to CEAA Information Request, followed by numbering according to CEAA)
L/year	units of litres per year
LAA	Local Assessment Area, assumed to be equivalent to RAA in the CN AQ report
lb/MMBTU	units of pounds per million British Thermal Units
mi/h	units of miles per hour
MOECC	Ministry of the Environment and Climate Change (Ontario)
MOVES	MOtor Vehicle Emission Simulator model (US EPA)
NAPS	National Air Pollution Surveillance Program
NH_3	Ammonia

NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen (NO, NO_2)
O_3	Ozone
OLM	ozone limiting method
PAHs	Polycyclic aromatic hydrocarbons (see Glossary)
PDA	Project Development Area
PM	Particulate Matter (see Glossary: Particulate Matter)
PM10	dust particles smaller than 10 µm in aerodynamic diameter (a fraction of PM) (see Glossary: Particulate Matter)
PM2.5	dust particles smaller than 2.5 µm in aerodynamic diameter (a fraction of PM10 and PM) (see Glossary: Particulate Matter)
RAA	Regional Assessment Area, assumed to be equivalent to LAA in the CN AQ report
SO_x	Sulphur oxides
SO_2	Sulphur dioxide
TSP	Total Suspended Particulates (see Glossary: Particulate Matter)
VOCs	Volatile Organic Compounds (see Glossary)
$\mu g/m^3$	units of microgram per cubic metre

GLOSSARY

Air quality criteria	Benchmark guideline values to compare concentrations measured/calculated at a receptor. Criteria can vary from jurisdiction to jurisdiction and some criteria are more of a general guideline than an actual threshold value (above which there are adverse effects and below there are none). Types of air quality criteria include federal/provincial standards and guidelines.
AP-42	A Compilation of Air Pollutant Emission Factors assembled by the US EPA, has been published since 1972 as the primary compilation of EPA's emission factor information. It contains emission factors and process information for more than 200 air pollution source categories. (A source category is a specific industry sector or group of similar emitting sources.) The emission factors have been developed and compiled from source test data, material balance studies, and other estimates.
Assessment Time Period	A time frame over which contaminant emissions and resultant air quality levels are determined (so as to be correctly compared with air quality criteria of the same assessment time frame). Some contaminants have air quality criteria over different assessment time periods, depending on if there is a potential issue with odour (i.e. shorter time period, such as 10 minute), short-term exposures (acute health effects), or prolonged, repeated exposures (chronic health effects) (i.e. longer assessment time periods, such as annual), as a few examples. (Note CN refers to this as "averaging period" or "averaging hours" or "averaging times" in the App. E1)
Background/baseline	Pre-existing levels of pollutants in a region of interest before the introduction of porject impacts on air quality. Background levels of air pollutants are not the same at all locations and levels can vary over time. A specific example would be consideration of major roadways in the area; locations closer to roadways will experience higher background levels in certain contaminants (background is used interchangeably with baseline).
Chemical of Potential Concern	Project-related pollutants/contaminants emitted to the air that have the potential to elicit adverse human health effects or ecological effects.
Conservative	The term "conservative" generally refers to an estimation methodology that ensures air quality levels are not underestimated. Due in part to lack of site-specific information, when estimating future emissions, it is normal practice to estimate such information or data; such estimates should be made so as not to underestimate future emissions, with a high degree of certainty; such estimates are deemed "conservative". For example, to estimate dust emissions from future roads it is necessary to know the level of dustiness on that road; however, that information will not be known exactly because the road does not currently exist to allow site-specific measurements. Therefore the level of dustiness must be estimated; it is required that the estimate be made (in light of lack of specific data) conservatively. We must ensure that the level of road

	dustiness used in our calculations is as high as it could reasonably be to ensure we do not underestimate road dust emissions under any circumstance. The term "conservative" also applies to all levels of decision-making where assumptions must be made, not just in estimating emissions; for example, where required in dispersion modelling. Note "conservative" is similar to "precautionary", which is a general methodological approach that ensures air quality levels are not underestimated. The EIS Guidelines state that an Environmental Assessment "*is a planning tool used to ensure that projects are considered in a careful and precautionary manner in order to avoid or mitigate possible environmental effects and to encourage decision makers to take actions that promote sustainable development*."
Contaminant	Any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse effect.
Cumulative assessment	An assessment that determines the effects on air quality likely to result from a designated project in combination with other physical activities that have been, continue to, or will be carried out in the future.
Dispersion Model	Atmospheric dispersion modelling is the mathematical simulation of how air pollutants disperse in the ambient atmosphere. It is performed with computer programs that solve the mathematical equations and algorithms which simulate the pollutant dispersion. The dispersion models are used to estimate the downwind ambient concentration of air pollutants emitted from sources at a facility. They can also be used to predict future concentrations under specific scenarios (i.e. changes in emission sources). The US EPA AERMOD model is an example of a widely used atmospheric dispersion model.
Emission Factors	An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e. g., kilograms of particulate emitted per megagram of coal burned). The US EPA AP-42 is a collection of emission factors for many different processes/sources and was developed from emission testing at sources.
Emission Rates	The emission rate is the amount of emission of a contaminant (i.e. mass) per unit time. It is calculated from the emission factor of that source combined with information on the operating conditions.
Environmental Compliance Approvals	
	A permitting approval that is a requirement in Ontario for facilities with air emissions (with respect to our scope of work and expertise). Note there are other environmental compliance approvals that can be obtained from the MOECC, such as for waste or sewage as examples.
Maximum predicted ground-level concentration	

For a particular contaminant, the highest air quality level (mass per volume) determined, via dispersion modelling, at the selected receptors (receptor grid or special receptors) used in that model run. The units of this value in this review are generally µg/m^3. The maximum predicted ground-level concentration could occur at different receptor locations for different contaminants. The choice of receptor locations for determination is very important when estimating what the maximum air quality levels induced by a project will be. These concentrations can be compared to air quality criteria and passed along to a health expert to determine if adverse effects are possible at those locations.

Non-subject source — Sources of the same contaminants as emitted by the project itself but located off-site and not a part of the project.

Participating Receptor — In the App. E1, a property that is associated with the Project, located on land owned by CN that was not initially considered as Receptors in the effects assessment.

Particulate matter — Airborne dust is commonly termed as "particulate matter" (i.e. PM). In regards to the dust emissions, dust particles vary in size and composition. The total amount of dust in the air is known as Total Suspended Particles (TSP). The size fractions of dust particles can vary from very fine particles, less than 2.5 micrometres (µm) in aerodynamic diameter, through to particles greater than 44 µm in diameter. Dust particles smaller than 10 µm in aerodynamic diameter are known as PM10. The finer dusts (especially those smaller than 2.5 µm in aerodynamic diameter) are termed PM2.5.

Polycyclic aromatic hydrocarbons — A group of more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat. Internal combustion engines fuelled by diesel release numerous types of PAHs.

Receptor — A location off-site, or at a location of interest, that may be impacted by contaminants (also called Point of Impingement). In dispersion modelling only a limited number of points of reception can be considered (where air quality levels are calculated) due to computational limits; therefore the location and spacing of points of reception must be chosen judiciously, so as not to miss locations with highest impacts on air quality and/or where adverse effects may occur.

Receptor grid — A grid pattern of computational receptors, distributed consistently in the area where air quality predictions are made.

Sensitive receptor — A particular receptor location identified as a sensitive land use including buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a subject source. Sensitive land uses may be a part of the natural or built environment. Examples may include, but are not limited to: residences, child day care centres, senior

	citizens' residence or long-term care facility and educational and health care facilities.
Silt	Silt is dust particles on the road surface that are less than 75 µm in diameter; essentially, silt levels indicate the "dustiness" of the road. With higher silt levels one would expect higher dust emissions.
Source	An operation or piece of equipment at a facility from which emissions of a contaminant may occur.
Special receptors	Additional receptors of interest, identified by and specific to CN. The locations of these receptors were defined in CN's dispersion modelling domain before compiling output to enable prediction of dispersion at locations in addition to the standard receptor grid output.
Subject source	Air emission sources belonging to, or caused by, the proposed project/facility itself.
Volatile Organic Compounds	A group of compounds that contain carbon (i.e. organic) and that participate in atmospheric photochemical reactions. Generally, they have high vapour pressures (i.e. volatile or semi-volatile) at room temperature. There are numerous different types of VOCs emitted from engine exhausts.
Worst-case	Air quality impact assessments must, at the very least, address the worst-case impacts on AQ (which lead to the biggest increases in AQ levels). An assessment of worst-case impacts is required because it answers the basic question "what are the worst effects of this project on my community?" Worst-case impacts on air quality are usually (but not always) caused by maximal activity rates; locations of air emission sources, if they stray particularly close to off-site receptor locations, can also cause worst-case air quality impacts.

APPENDIX B: LIST OF DOCUMENTS REVIEWED

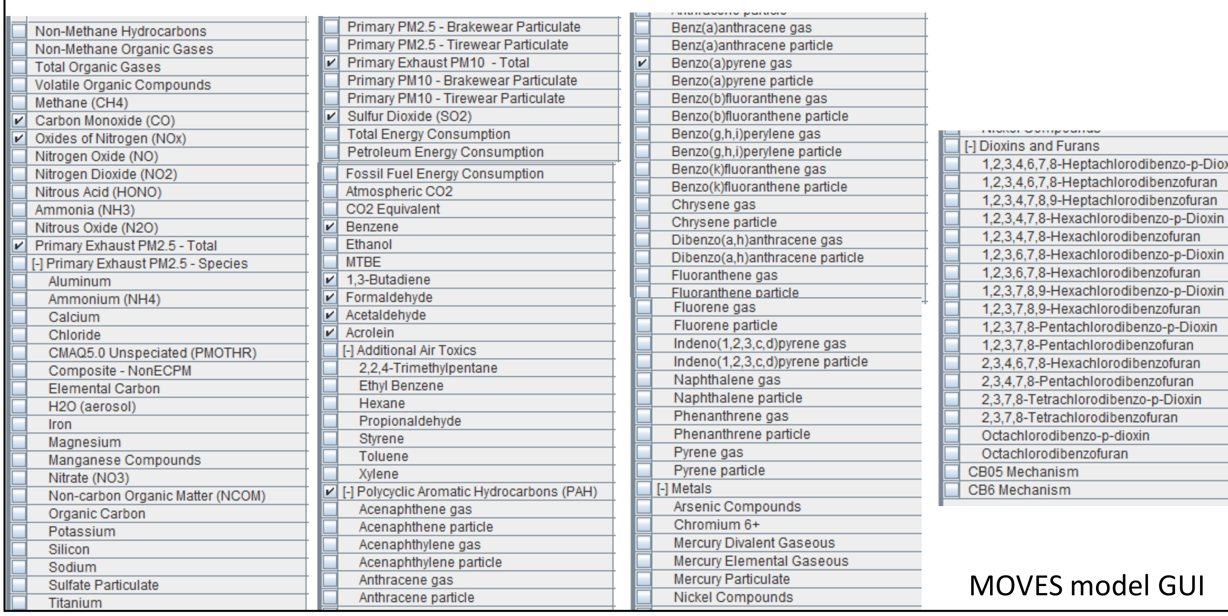
Reference	Shorthand Reference (used throughout this document)
• Cover Letter from CN, RE: Canadian National Railway Company Environmental Impact Statement – Milton Logistics Hub (December 7, 2015)	
• EIS Summary: Milton Logistics Hub Environmental Impact Statement, Summary of the Environmental Impact Statement, written by Stantec Consulting Ltd. (December 7, 2015)	
• Main EIS: Milton Logistics Hub Environmental Impact Statement, written by Stantec Consulting Ltd. (December 7, 2015)	Main EIS
• Appendix A (Final EIS Guidelines) Guidelines for the Preparation of an Environmental Impact Statement – Milton Logistics Hub Project (July 2015)	EIS Guidelines
• Appendix B of Main EIS (Figures), by Stantec Consulting Ltd. (December 7, 2015)	
• Appendix C of Main EIS (Renderings), by CN (December 7, 2015)	
• Appendix E.1 - Milton Logistics Hub Technical Data Report - Air Quality, dated December 7, 2015, written by Stantec Consulting Ltd.	App. E1
• Appendix G of Main EIS - Mitigation Measures and Commitments, dated December 7, 2015, written by Stantec Consulting Ltd.	
• CEAA Additional Information Requirements (March 15, 2016)	
• CN response to CEAA on Information Requirements Request 1 received March 15, 2016 (dated May 18, 2016, written by Stantec Consulting Ltd.)	CN response May 18
• Appendix E.7 - Milton Logistics Hub Technical Data Report - Human Health Risk Assessment, dated December 7, 2015, written by Stantec Consulting Ltd.	App. E7
• CN Report on Greenhouse Gases (June 17, 2016) [supplied in response to CEAA Requirements Mar. 15, comment IR10]	GHG report
• CEAA Additional Information Requirement (July 28, 2016)	
• CN response to CEAA Additional Information Request 2 received July 14 and July 28, 2016 (dated September 30, 2016, written by Stantec Consulting Ltd.)	CN response Sept 30
• Halton Municipalities Brief: Role of Halton Planning Framework within CEAA Panel Review of the CN Milton Logistics Hub Project, 2016 (posted on December 13, 2016 to CEAA website)	Halton Brief
• Health Canada: Conformity Review of the Milton Logistics Hub Environmental Impact Statement, February 15, 2016	HC review

Reference	Shorthand Reference (used throughout this document)
• Environment and Climate Change Canada: Conformity Review of the Milton Logistics Hub Environmental Impact Statement, February 18, 2016	ECCC review
• Compilation of comments received by the Canadian Environmental Assessment Agency re: the invitation to comment on the draft Environmental Impact Statement (EIS) Guidelines, June 21, 2015	

APPENDIX C: FIGURES

Figure 1: Contaminants available in the US EPA MOVES Model for vehicular emissions. The actual contaminants indicated with a √ are those that were assessed by CN. The others were not.

The following contaminants are from the US EPA MOVES model (2014):



MOVES model GUI

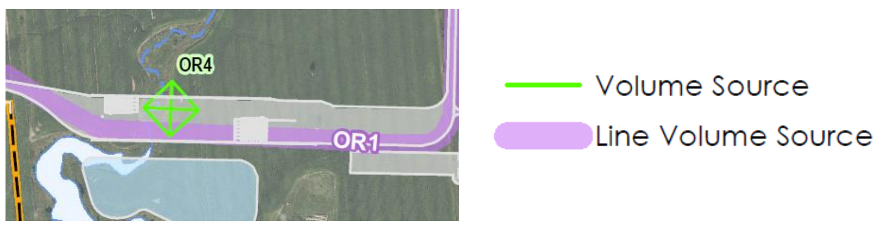
Figure 2: Conflicting assumptions made in the App. E1 concerning the On-site road traffic source called OR4. In the Table indicated at the top, it is considered a line source in the AERMOD dispersion model. In the image on the bottom, it is shown in green as a volume source.

Assumption in the model (line source for OR4, line source for OR1) according to Table 6.2:

Table 6.2: Source Summary – Project Operation

Source ID	Source Description	Type of Source and Location	Contaminant	CAS	Averaging Hours	Emission Rate (g/s)	% of Overall Emissions	Note
OR4	On-site road traffic	Line - Link4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	The source operates 24 hours per day.
			PM_{10}	N/A (PM_{10})	24	0.035	5%	
			$PM_{2.5}$	N/A ($PM_{2.5}$)	24	0.032	6%	
			Benzene	71-43-2	24	0.0005	7%	
			1,3-Butadiene	106-99-0	24	0.0002	13%	

Assumption in the model (volume source for OR4, line source for OR1) according to Figure 5a in AQ TDR:



AQ TDR pg 59 (Sect. 6.4), AQ TDR pdf pg 131 (fig)

Figure 3: The location of the proposed CN Milton Logistics Hub (i.e. the subject source) and non-subject sources in the area that may contribute to the general baseline air quality in the area but are not related to the Hub.

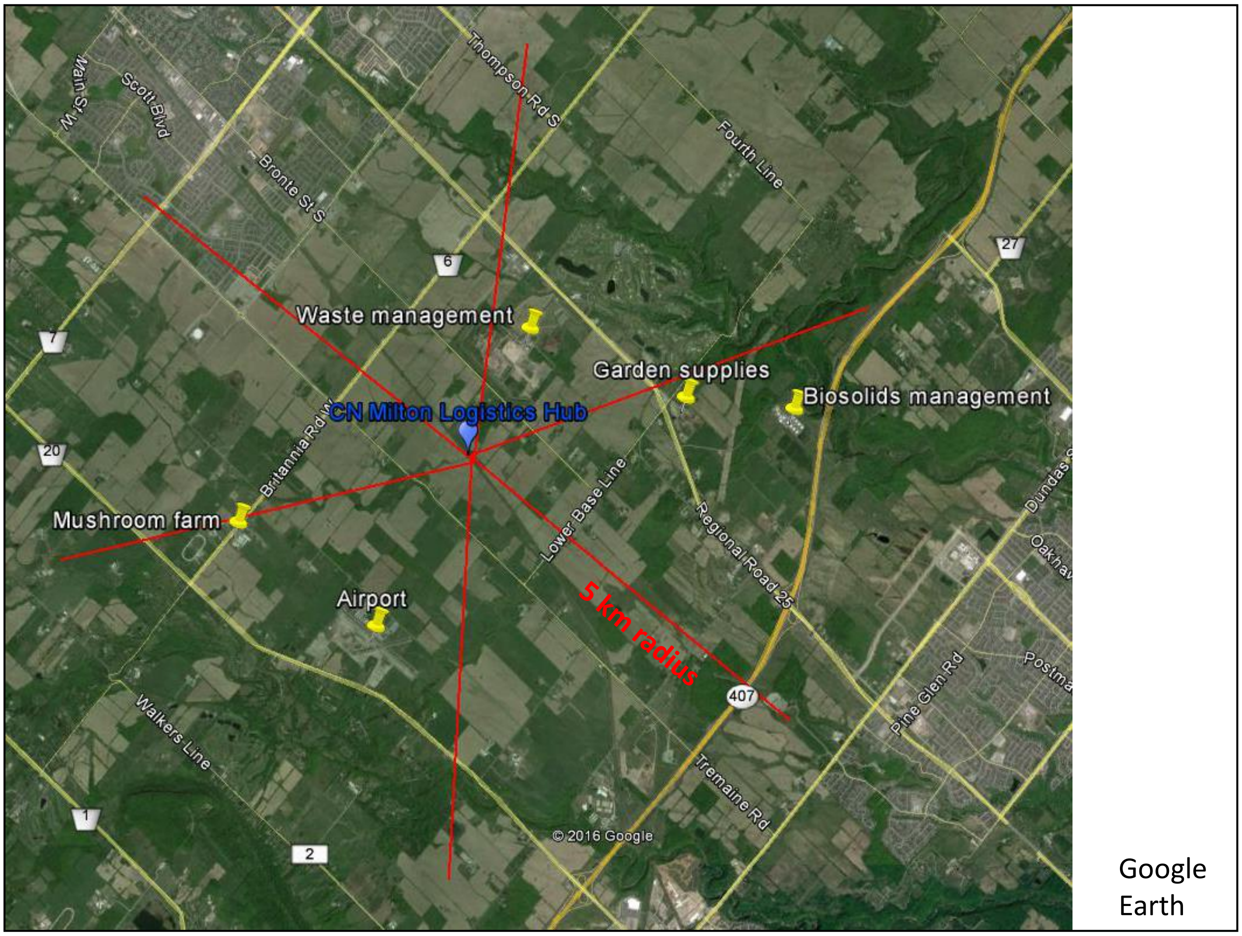


Figure 4: The location of the proposed CN Milton Logistics Hub and the locations of the NAPS monitoring stations, the data from which were assumed as baseline concentrations in the App. E1.

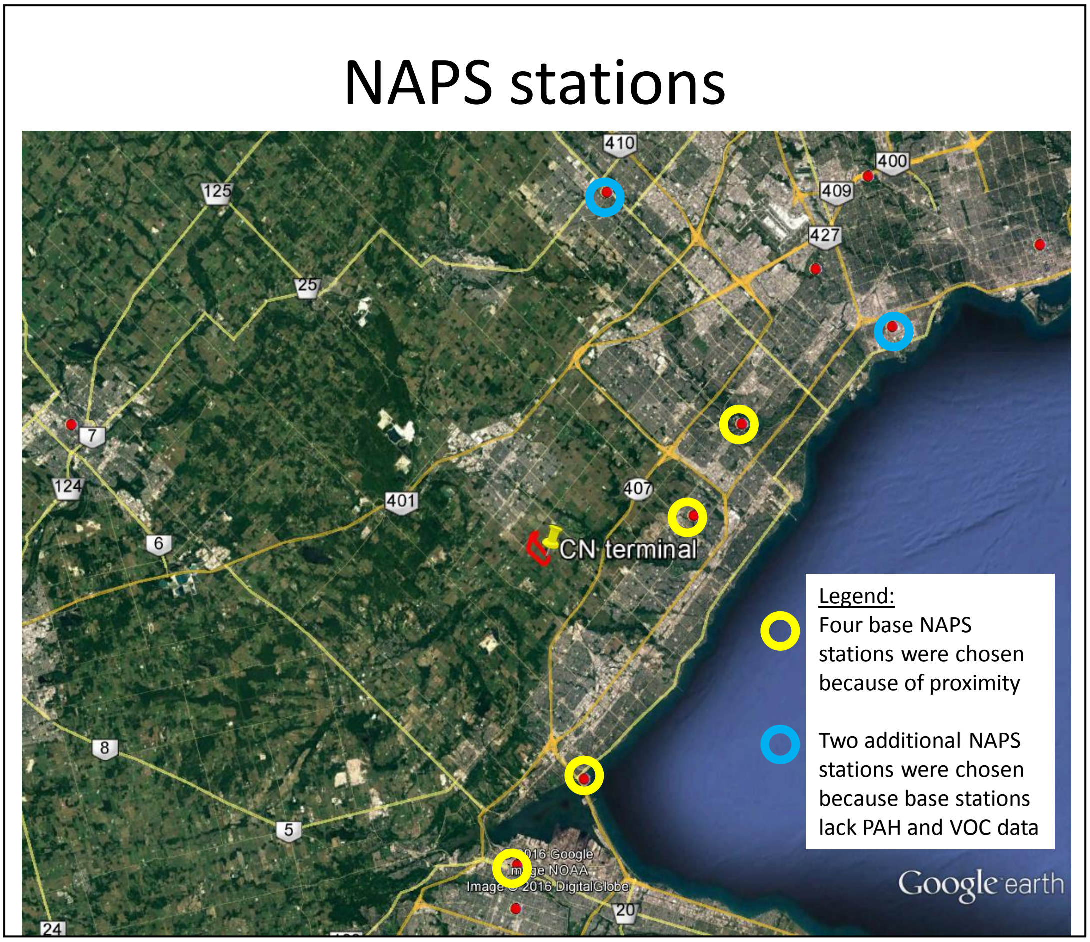


Figure 5: A copy of Graph 5.14 of NAPS PM2.5 concentration data from the App. E1, showing the increase in PM2.5 over the 5 year period for all NAPS sites examined.

Graph 5.14: Measured Annual Average PM2.5 Concentrations (2009 - 2013)