Discussion Paper:

Cumulative Effects Assessment in Air Approvals

November 2017

Standards Development Branch

Ministry of the Environment and Climate Change

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Document de travail – Évaluation des effets cumulatifs au moment d'accorder une autorisation relative à l'air

Ce document présente les raisons et le cadre qui sous-tendent la proposition prévoyant l'évaluation des effets cumulatifs (ÉEC) au moment d'accorder une autorisation relative à l'air décrite dans *Proposal for Cumulative Effets Assessment (CEA) in Air Approvals*, un document d'accompagnement distinct. Cette proposition porte sur l'évaluation et la gestion des émissions atmosphériques cumulatives des installations réglementées en Ontario.

La proposition de l'Ontario comprend quatre éléments clés :

1) Détermination (de la région et du contaminant en cause) : Les données de surveillance de l'air ambiant et l'inventaire des émissions peuvent être utilisés pour repérer les contaminants et les régions géographiques qui ne respectent pas les Critères de qualité de l'air ambiant (CQAA).

2) Évaluation (méthodologie utilisée pour définir les sources) : Le ministère a mis au point un outil de modélisation de sources multiples (MULTI-SOURCE MODELLING) fondé sur le modèle de dispersion atmosphérique prévu par le Règl. de l'Ont. 419/05 afin de déterminer les effets cumulatifs des sources industrielles et non industrielles sur la qualité de l'air d'une collectivité en faisant appel à l'attribution des sources.

3) Gestion (détermination des niveaux d'intervention et des mesures réglementaires connexes) : Il est proposé que, lorsque l'outil de MULTI-SOURCE MODELLING et l'attribution des sources démontrent que les rejets de contaminants d'une industrie ne respectent pas les CQAA, on impose d'autres exigences pour l'obtention d'un permis et des mesures de lutte contre la pollution supplémentaires dans les régions nécessitant une intervention accrue. Les exigences connexes pour l'obtention d'un permis seraient adaptées au contaminant et à la source d'émission.

4) Mobilisation (information et sensibilisation du public) : La proposition fait état de l'approche du ministère visant à mobiliser les collectivités et à répondre à leurs questions afin de les aider à comprendre les risques pour la santé. Le ministère propose de mobiliser les intervenants et le public dans les collectivités où s'appliquerait la politique sur les effets cumulatifs en tenant compte de la diversité culturelle, de l'équité environnementale et des besoins particuliers en matière de communication.

La politique du ministère s'appliquerait d'abord aux installations nouvelles et agrandies qui demandent une autorisation environnementale pour leurs émissions de benzo[a]pyrène ou de benzène dans les localités de Sarnia/Corunna et de Hamilton/Burlington. Les mesures de gestion peuvent comprendre des analyses techniques comparatives, des technologies de lutte contre la pollution et des pratiques exemplaires de gestion. Le ministère entend étudier d'autres endroits, sources de données, contaminants et sources d'émissions (p. ex., les installations existantes, pas seulement les installations nouvelles et agrandies) pour suivre l'évolution des politiques, des recherches scientifiques et des outils utilisés pour évaluer les émissions atmosphériques cumulatives.

Preamble

This document describes the framework and supporting rationale for the proposal *Cumulative Effects Assessment in Air Approvals.*

For the purpose of this document, the term cumulative effect will apply to the concentration of a contaminant in air which results from the discharges from multiple emitters in a given geographic or local area. In developing the framework, the ministry had input from a subgroup of the Local Air Quality/Air Standards External Working Group (Cumulative Air Emissions Assessment (CAEA) subgroup), with representatives of industry, some First Nations community members, environmental groups, public health units, and various branches and regions of the ministry. The ministry worked with the CAEA subgroup to invite speakers from suggested jurisdictions across North America, to discuss their approaches to managing cumulative effects from multiple air emission sources. The CAEA subgroup heard from government representatives of Texas, California, Minnesota, Alberta, and Quebec. Each of these jurisdictions addressed cumulative effects in different ways, depending on their underlying policy and/or legislative framework. Ontario considered how best to apply the elements of cumulative effects assessments in the development of its framework to be used in making air approvals decisions within Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05).

Thus, Ontario's CEA framework includes four key elements:

1) Identification (identifying areas and contaminants of interest):

2) Analysis (methodology to define sources)

3) Management (determination of action levels and associated requirements):

4) Engagement (education and outreach to the public)

Briefly, available ambient Ontario monitoring data and national emissions inventory information may be used to identify contaminants and geographic areas with industrial sources where the ministry ambient air quality criteria (AAQCs) are exceeded. The ministry has developed a multi-source model based on the air dispersion modelling currently used in O. Reg. 419/05, to identify the cumulative impact on air quality of industrial and non-industrial sources in a community to better understand the relative contributions of individual sources. In cases where regulated industry is a major contributor of a contaminant that exceeds the AAQC, additional requirements for approval would be applied, with increasing actions paired with increasing concentrations of a contaminant in air. Aligned with other O. Reg. 419/05 compliance tools, management actions may include Technology Benchmarking Reports (TBR), best available pollution control technologies, and best management practices. Communication and community engagement are important elements of development and implementation of the policy. The ministry has and will continue to engage stakeholders, First Nations and the public in communities where the cumulative effects policy applies. Finally, future approaches are discussed, to be considered when expanding this policy, to include other locations, data sources, contaminants, and emission sources. Consultation questions on future phases are included at the end of this document.

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1 Introduction

This discussion document presents the framework and rationale underlying the ministry's *Proposal for Cumulative Effects Assessment (CEA) in Air Approvals*. The development of the framework and rationale have been informed by work performed by ministry staff and members of the Local Air Quality/Air Standards External Working Group (EWG), made up of representatives of some First Nation communities as well as stakeholders from industry, public health and environmental groups.

This document also discusses potential future steps to include additional communities and contaminants.

2 Background: Ontario's Local Air Quality Regulation

Ontario protects air quality through a comprehensive air management framework that includes regulations, targeted programs, and partnerships with other jurisdictions to address sources of air pollution. While Ontario works with the federal and international governments to tackle regional issues affecting air quality, such as smog causing pollutants and greenhouse gases, Ontario is the primary regulator for local air issues. Existing under the Environmental Protection Act, Ontario's local air quality regulation (Ontario Regulation 419/05: Air Pollution – Local Air Quality; O. Reg. 419/05) works within the framework to protect local communities from the effects of air pollution by regulating air contaminants released by various sources, including industrial and commercial facilities. The regulation aims to limit exposure to contaminants released into air that can affect human health and the environment, while requiring industry to operate responsibly under a set of rules that are publicly transparent.

Air standards within O. Reg. 419/05 are legal limits used to evaluate environmental performance of a regulated facility and drive actions when needed to reduce emissions. A facility's contributions of a contaminant are estimated through air dispersion modelling, or via a combination of modelling and monitoring and compared to the air standard.

Facilities that are not able to meet the air standard may request a site-specific standard or register to a technical standard, if one exists. These standards require companies to invest in the best available technologies and practices to reduce air emissions over time.

Thus, O. Reg. 419/05 allows for three compliance approaches. A facility can:

- meet the air standard,
- request and meet a Site-Specific Standard, or
- register and meet the requirements of a sector-based Technical Standard (if available).

3 Cumulative Effects under O. Reg. 419/05

3.1 Definition

There has been a greater appreciation within the regulatory community of the impact of cumulative exposure to multiple sources or multiple contaminants, which may result in increased health risk. This is reflected in the ministry's Statement of Environmental Values (SEVs), which states that the ministry must consider cumulative effects on the environment when decisions are made that might significantly affect the environment.

Cumulative effects is a broad term that generally refers to all the environmental and/or human health effects that result from physical, biological, and chemical stressors. Different jurisdictions and regulatory agencies have unique definitions, often reflecting language specific to their respective regulatory frameworks. The scope of a cumulative effects policy can be wide if all potential stressors are considered, and may stretch beyond the mandate of the Ministry of the Environment and Climate Change; the ministry is continuing to consider approaches for various media and stressors. However, for the purpose of this document, the term cumulative effects will be specific to air quality, and reflected by the concentration of a contaminant or contaminants in air that results from all sources in a given geographic area.

3.2 Current Ministry Approaches to Cumulative Effects

When a facility applies for an Environmental Compliance Approval (ECA)[1] an Emission Summary and Dispersion Modelling (ESDM) Report is generally required to estimate a point of impingement (POI) concentration of an individual contaminant (i.e., the point at which a contaminant contacts the ground or a building), which is then compared to an air standard or guideline for that contaminant. The ministry reviews the ECA request and ESDM report in order to make an approvals decision. Currently, the ministry considers cumulative effects on a case-by-case basis, based on available information, past practice, submitted comments and initiatives of ministry staff.

In setting air standards, the ministry uses conservative assumptions about exposure and may combine contaminants into groups, when information is available, to develop standards that are protective, even if multiple contaminants are present. For example, the ministry sets air standards for carcinogens based on an assumed continuous lifetime exposure at a concentration equivalent to an additional cancer risk of 1 in 1 million (or 0.0001% chance). The ministry considers negligible risk to be within the range of 1 in 1 million to 1 in 100,000 (or 0.001% chance) and uses the lower end of that range (1 in 1 million) in standards setting to maintain a negligible additional risk of cancer even when more than one carcinogen or source is present. Additionally, the ministry may set a single air standard as a protective level for a mixture of compounds in air (e.g., dioxins and furans, total reduced sulphur, and benzo[a]pyrene, which can be used to assess benzo[a]pyrene alone or to represent a mixture of

[1] Similarly, an Environmental Activity and Sector Registry (EASR) ESDM Report is required to be prepared by persons engaging in activities prescribed by O. Reg. 1/17 (Registrations Under Part II.2 of the Act – Activities Requiring Assessment of Air Emissions) in order to register in the EASR.

polycyclic aromatic hydrocarbons). The ministry is now moving forward with a more formal approach to addressing cumulative effects in air approvals. This approach has been informed by the work of the EWG and its cumulative air emissions assessment (CAEA) subgroup.

4 Jurisdictional Review

4.1 Cumulative Air Emissions Assessment (CAEA) subgroup

The CAEA subgroup was formed in 2015 in response to a survey of EWG members who indicated an interest in the ministry's approach towards cumulative effects. The membership of the CAEA subgroup included representatives of industry, some First Nations, environmental groups, public health units, and various branches and regions of the ministry. While the subgroup was initially scoped to provide recommendations to the ministry on O.Reg.419/05 cumulative effects approaches, the scope was expanded to discuss cumulative effects issues related to ECAs for air and other abatement tools. From the discussion held over a series of meetings (21 in total over 2015-2017), the subgroup arrived at a number of preliminary points of consensus. The subgroup agreed that a cumulative effects assessment (CEA) should include the following:

- A contaminant or group of contaminants to be identified on a case-by-case basis.
- Geographic areas identified based on available data (e.g., existing ambient monitoring or point source monitoring, National Pollutant Release Inventory (NPRI), other information).
- Multi-source air dispersion modelling carried out in the geographic area using all available information.
- Source apportionment resulting from modelling to determine whether the major contributors of the contaminant are industrial or non-industrial.

These preliminary points of consensus, and other discussion topics requiring further work, were instrumental in establishing this rationale, and the resulting development of a proposal for the assessment and management of cumulative air emissions in ECAs for air. A key determinant in producing these consensus points was the discussions with peer regulatory agencies from jurisdictions across North America, to better understand how they assess and manage cumulative effects in their air programs.

4.2 Findings from the Jurisdictional Review

The ministry worked with CAEA subgroup members to invite speakers from suggested jurisdictions across North America, to discuss their approaches to managing cumulative effects from multiple air emission sources. Over several meetings, discussions were held between the CAEA subgroup and government representatives from Texas, California, Minnesota, Alberta, and Quebec. Topics discussed included specific requirements for approval, the addressing of near-by sources, background ambient levels, health risk assessments, the role of environmental justice, refusal of approvals (permits), and public reporting and community engagement.

Similar to the current ministry approaches for setting AAQCs and air standards, it was realized that no jurisdiction addressed cumulative exposures in the *setting* of a health-protective science-based air limits; in all cases, the examples identified addressed cumulative effects during the *implementation* of their air limits (e.g., at the approval stage).

One key finding from this review was that each approach was unique and fit within their regulatory framework. Thus, Ontario cannot simply adopt an approach from another jurisdiction, but rather can use the concepts from other jurisdictions to develop an Ontario CEA for air approvals, building upon the framework of O. Reg. 419/05.

From this understanding, four key elements were revealed from comparing and contrasting the various jurisdictional approaches:

1. Identification (defining the area and contaminant of interest)
2. Assessment (methodology to define sources)
3. Management (determination of action levels and associated requirements for approval)
4. Engagement (education and outreach)

Using these four key elements, the rationale for an Ontario CEA for air approvals proposal was developed, and is discussed in greater detail below.

5 Establishing an Approach for Ontario

In establishing the ministry's framework and specific proposal, four key elements were identified through the CAEA subgroup jurisdictional review. How these elements could be implemented within the Ontario regulatory framework, considering ministry expertise and capabilities, is discussed below.

Please see the *Proposal for Cumulative Effects Assessment (CEA) in Air Approvals* for details specific to the proposal. As done in other jurisdictions examined, the ministry is proposing to add this policy to the regulatory framework for local air quality, which already incorporates O. Reg. 419/05.

5.1 Identification (area and contaminant of interest)

Areas of interest are those with elevated concentrations of contaminants in air.

Ambient monitoring data is one indicator that could be used to help identify a contaminant or area for assessment. For example, National Air Pollutant Surveillance (NAPS) monitors, or Ontario's Air Quality Monitoring Stations (which are typically not located near industrial sources) may be used to identify ambient concentrations (Table 5.1). In addition, point source monitors

located near industrial sources (i.e., products from other current ministry programs) may also provide useful information, where available. From these data, considerations could be made regarding how the concentration of a contaminant of interest has changed over time in ambient air.

To assess ambient air quality resulting from *all sources of a contaminant* to air (reflected by measured levels of contaminants in air) the ministry uses Ambient Air Quality Criteria (AAQCs). AAQCs are available for over 300 contaminants and reflect a concentration that is protective against adverse effects on health and/or the environment. Concentrations above AAQCs do not necessarily mean an adverse effect will occur but may suggest action is required to reduce risks. Concentrations of contaminants may exceed AAQCs in some locales due to a variety of reasons (clusters of industrial facilities, non-industrial emission sources such as highways, transboundary sources, etc.) even where individual facilities meet the air standard.

Emission inventory information can also be used to identify the contaminants and/or clusters of industrial sources. One example of emission inventories is the National Pollutant Release Inventory (NPRI) (Table 5.2). In part, these data would help set the appropriate boundaries for an area of interest (e.g., based on multiple emission sources of a contaminant and nearby sensitive land uses, such as home, hospitals, and schools). Additionally, other major sources of the contaminant independent of emission inventory information (e.g., transportation, transboundary) would need to be identified at this step, along with human receptor locations.

Together, the available ambient monitoring data and inventory information may be used to identify contaminants and geographic areas of industrial sources where Ontario AAQCs are exceeded, thus becoming the initial stage of an Ontario cumulative effects assessment approach.

In developing the proposal, the ministry worked with the CAEA Subgroup to identify candidate communities based on the presence of industrial emitters, available air monitoring data and historical exceedances of ambient air quality criteria. The group focused its attention on large urban communities in Ontario.

The ministry analysed the monitoring data available for selected urban communities and identified benzene and benzo[a[pyrene as the two most significant carcinogens, with the highest concentrations measured at stations in the Hamilton and Sarnia areas. Other carcinogens were detected but did not exceed their AAQCs and, when assessed cumulatively, were insignificant compared to benzene and benzo[a]pyrene.

The ministry also considered the addition of sulphur dioxide to the CEA proposal. However, the ministry is proposing new more stringent air standards for sulphur dioxide as well as other regulatory measures to address emissions during transitional operating conditions and, therefore, this contaminant has not been included in the CEA proposal (EBR 013-0903).

Table 5.1. Annual average concentrations of several known or probable carcinogens at selected Ontario ambient air monitoring stations, with respect to their AAQCs.

ANNUAL AVERAGE CONTAMINANT CONCENTRATION AT AMBIENT AIR MONITORING STATION

colour code multiple of AAQC	< or = 1xAAQC	> 1x AAQC, < or = 10x AAQC	>10x AAQC, < or = 100x AAQC	>100xAAQC

Contaminants identified as: IARC Group 1 - Carcinogenic to human, or IARC Group 2A - Probably carcinogenic to humans

CONTAMINANT	Benzo(a)pyrene (PAH)	Benzene	1,3-Butadiene	1,2-Dichloroethane	Chloroform	Dichloromethane	Trichloroethylene	Vinylchloride
AAQC - annual (ug/m3)	0.00001	0.45	2	0.4	0.2	44	2.3	0.2

YEAR: 2014

Monitoring Network	STATION Number	STATION Location	STATION Municipality	Benzo(a)pyrene	Benzene	1,3-Butadiene	1,2-Dichloroethane	Chloroform	Dichloromethane	Trichloroethylene	Vinylchloride
NAPS	S60104	RIDEAU & WURTEMBURG	OTTAWA	-	0.413	0.028	0.064	0.121	0.411	0.020	0.001
NAPS	S60211	COLLEGE & SOUTH ST	WINDSOR	-	0.610	0.046	0.067	0.118	0.332	0.028	0.002
NAPS	S60413	ELMCREST ROAD	TORONTO	-	0.487	0.042	0.067	0.110	0.405	0.035	0.002
NAPS	S60427	223 COLLEGE STREET	TORONTO	0.000044	0.589	0.044	0.071	0.140	0.591	0.031	0.002
NAPS	S60428	525 MAIN ST. N. BRAMPTON	BRAMPTON	-	0.508	0.040	0.067	0.107	0.386	0.034	0.001
NAPS	S60435	461 KIPLING AVENUE	TORONTO	-	0.480	0.039	0.067	0.121	0.464	0.042	0.002
NAPS	S60512	Elgin and Kelly	HAMILTON	0.000384	0.899	0.036	0.066	0.103	0.347	0.039	0.002
NAPS	S60903	900 HIGHBURY AVENUE	LONDON	-	-	-	-	-	-	-	-
NAPS	S60904	42 ST. JULIEN STREET	LONDON	-	0.446	0.029	0.064	0.105	0.364	0.026	0.002
NAPS	S61004	FRONT ST. AT C.N. TRACKS	SARNIA	-	1.007	0.124	0.079	0.113	0.304	0.026	0.002
NAPS	S61007	1300 TASHMOO AVE.	SARNIA	0.000044	-	-	-	-	-	-	-
NAPS	S61502	WEST AVE. & HOMEWOOD	KITCHENER	-	0.483	0.032	0.068	0.107	0.463	0.020	0.002
NAPS	S61902	8147 MEADOWVALE LINE	CHATHAM-KENT	-	-	-	-	-	-	-	-
NAPS	S62601	Experimental farm	SIMCOE	0.000028	0.337	0.009	0.062	0.085	0.273	0.012	0.003
NAPS	S63601	LONGWOODS CONS. AUTHOR	LONGWOODS	-	0.307	0.009	0.060	0.081	1.825	0.012	0.002
NAPS	S64401	EGBERT	EGBERT	-	-	-	-	-	-	-	-
NAPS	S64601	PT. PETRE	PT. PETRE	-	-	-	-	-	-	-	-
NAPS	S65101	EAGLE ST. & McCAFFREY RD.	NEWMARKET	-	0.422	0.020	0.064	0.111	0.305	0.019	0.001
NAPS	S65501	BURNT ISLAND	BURNT ISLAND	-	-	-	-	-	-	-	-
HAMN	STN29102	Beach Strip	HAMILTON	-	1.400	0.04	0.1	0.1	0.3	0.02	0.0
HAMN	STN29180	Burlington/Gage	HAMILTON	0.000940	1.500	0.100	0.100	0.100	1.000	0.100	0.000
HAMN	STN29547	Eastport Blvd	HAMILTON	0.001140	-	-	-	-	-	-	-
HAMN	STN29567	Niagara/Land	HAMILTON	0.000470	1.400	0.050	0.100	0.100	0.400	0.030	0.000

Data from several monitors show exceedances of annual AAQCs for benzene, and benzo[a]pyrene (B[a]P) (which is used as a surrogate for a mixture of polycyclic aromatic hydrocarbons (PAHs) in air), and represent areas which may benefit from a CEA.

Table 5.2. Illustration of ambient air concentrations at selected locations along with NPRI information to identify areas for further assessment.

	BENZENE				BENZO(a)PYRENE			
GEOGRAPHIC AREA	**NAPS stations**	**NPRI**			**NAPS stations**	**NPRI**		
	how much higher was the annual average concentration than AAQC in 2014 (number of times higher)	emissions reported (tonnes)	% of Ontario's reported NPRI emissions	# facilities reported to NPRI	how much higher was the annual average concentration than AAQC in 2014 (number of times higher)	emissions reported (kilograms)	% of Ontario's reported NPRI emissions	# facilities reported to NPRI
Hamilton	2.0	65.9	38.4%	4	38.4	95.0	72.3%	4
Sarnia	2.2	29.1	17.0%	5	4.4	0.7	0.5%	4
Corruna	not monitored	20.9	12.2%	1	not monitored	No		
Sault St. Marie	not monitored	21.7	12.7%	1	not monitored	25.9	19.7%	1
Toronto (downtown)	1.3	No			4.4	No		
Windsor	1.4	No			not monitored	No		
Brampton	1.1	No			not monitored	0.0	0.0%	1
Etobicoke	1.1	No			not monitored	No		
Simcoe (rural)	lower than AAQC	No			2.8	No		

5.2 Assessment (methodology to define sources)

Once contaminants and areas have been identified, a methodology is required for assessing the emissions sources and determining their relative contribution to the local ambient air. For this, the ministry has developed a multi-source model, based on the air dispersion modelling currently used in O. Reg. 419/05 (i.e., AERMOD), to identify the cumulative impact on air quality of both industrial and non-industrial sources in a community, via source apportionment. Multi-source modelling requires information about the emission sources, terrain and meteorological data. Emission sources may be, but are not limited to:

- Industrial sources: large industrial facilities on Canadian and USA sides of the border;
- Off-road vehicles: e.g., construction equipment, lawn mowers;
- Non-industrial sources: on-road vehicles, human activities in urban and rural areas, and marine sources.

The results from the modelling are compared with monitoring data where available. The modelling identifies if industrial sources are a major contributor to contaminant concentrations in the community, and whether additional requirements would be pursued.

It should be noted that essential to the success of multi-source modelling and source apportionment is the use of the appropriate technical considerations, such as the use of approved meteorological data and other atmospheric parameters, accurate terrain generation, and other considerations (e.g., building downwash, atmospheric turbulence, proper receptor location). Additional technical information is available on request from the ministry.

The multi-source models were used to generate concentration plots in Hamilton and Sarnia. For the Hamilton multi-source model, the emissions of benzene and benzo[a]pyrene were added together to create a single plot including the two contaminants. For the Sarnia multi-source model only benzene was modelled and a concentration plot was established for this contaminant alone. Based on the information available, the ministry determined that industrial emissions of benzo[a]pyrene do not significantly contribute to modelled levels beyond the property lines of industrial sources.

5.3 Management (action levels and associated requirements for approval)

5.3.1 Action Levels

Once the modelling was completed, the ministry identified geographic areas where actions would be required to manage cumulative effects of contaminants on air based on Action Levels.

The CAEA subgroup discussed various approaches for identifying action levels including the Framework for Managing Risk under the local air quality regulation and other approaches such as those established for Canadian Ambient Air Quality Standards (CAAQS), as part of the Air Quality Management Framework. Generally, action levels would be defined based on

increasing concentrations of a contaminant or summed contaminants and would be associated with increasing required actions.

In the Ontario proposal, each action level is a 10-fold increase above the AAQC and follows the ministry's framework for managing risk, described in the Guideline for Implementation of Air Standards in Ontario under the local air quality regulation. The framework was established in cooperation with Public Health Units and helps manage risks to local communities from a facility's emissions of a contaminant to air (Table 5.3).

For contaminants causing effects other than cancer, action levels would be based on the nature of the contaminant such as the severity of the effect, frequency, magnitude and duration of elevated concentrations, and sensitivity of various individuals.

Table 5.3. Proposed action levels for carcinogens and associated risk basis

Action Level	Interpretation of Risk
Up to AAQC	Concentration reflects risk no greater than 1 in a million
> AAQC to 10X AAQC	Concentration exceeds AAQC but is still within negligible risk range (e.g., Health Canada, US EPA, the ministry) (greater than 1 in 1 million and no greater than 1 in 100,000)
>10X AAQC to 100X AAQC	Exceeds negligible risk range but within range of risks considered for risk management (e.g., Health Canada, US EPA, the ministry) (greater than 1 in 100,000 and no greater than 1 in 10,000)
>100X AAQC	Above target risk management range (greater than 1 in 10,000)

Table 5.4: Management actions associated with action levels for carcinogens

Concentration in Air and Action Level of CEA Contaminants	Management Actions
Up to AAQC	Does not trigger further action
ACTION LEVEL 1 AAQC to 10X AAQC	No further action for industry. • Triggers periodic evaluation (by ministry)
ACTION LEVEL 2 10X AAQC to 100X AAQC	ECA Applications for New or Expanding Facilities: • must include a technology benchmarking report with some exceptions (see section 2.4 of proposal document) • may be required to include best available pollution control methods
ACTION LEVEL 3 Greater than 100 AAQC	ECA Applications for New or Expanding facilities must: • include a technology benchmarking report with some exceptions (see section 2.4 of proposal document) • include pollution control methods to achieve the lowest possible emission rates as compared to an existing pollution source of the same kind in North America

In the Ontario proposal, the ministry applied action levels to the multi-source modelling results to identify where and how the CEA policy applies (Table 5.4). In the multi-source models, Action Level 1, Action Level 2 and Action Level 3 areas were identified in some areas of Hamilton/Burlington. Action Level 1 areas were identified in Sarnia/Corunna. Additional information on the modelling may

be obtained from the ministry on request. The ministry is working on an interactive tool where a street address, or co-ordinates can be entered and the resulting action level will be provided.

5.3.2 Requirements for Approvals

A key aspect of the management step would be performing technology benchmarking requirements to determine the most appropriate requirements for approval. The use of technology benchmarking assessments aligns with the requirements for the O. Reg. 419/05 Site-Specific standard process, and is outlined according to the ministry document *Guide to Requesting a Site-Specific Standard, Appendix A: Technology Benchmarking Reports (February 2017)*.

5.4 Engagement (education and outreach)

Risk communication and community engagement are important elements of the framework to ensure that people are proactively informed about the sources of contaminants in their community, how the ministry assessed these contaminants and the strategies and actions to reduce and manage the cumulative effects on air quality. Identification of key stakeholders and potential agency partners and their unique roles in addressing community health and /or air pollution is key.

In general, the basic information to be presented to the various audiences may include:

- The scope of the CEA assessment
- The risks estimated for the CEA area identified through multi-source modelling
- The chemicals and sources that account for the risk, and their relative contributions
- A comparison of the hazard or risk estimates to other risks, such as background risk
- The major assumptions, limitations, and uncertainties associated with the CEA process
- Expectations of negligible and acceptable risk levels, and those areas where the expectations may be exceeded
- Risk management plans to be undertaken

6 Future Steps

In future, this proposal may be expanded to include additional communities and contaminants. Community engagement would be a significant part of any future expansion of the CEA policy. Future steps can be considered for the key elements of identification, assessment and management.

6.1 Identification

The ministry will continue to review other inventory sources (beyond NPRI) for identification purposes; for example, the Great Lakes Network Inventory and Monitoring Program, and other municipal information such as the City of Toronto's ChemTRAC data.

The ministry also reviews our monitoring network and may through review of other inventories identify areas where additional monitoring is warranted.

Additional contaminants for review may also be identified through information gathered from other ministry programs (e.g., Ontario's Toxics Reduction Act). High use/high toxic non-carcinogens, acutely toxic contaminants, and/or contaminants with persistent bio-accumulative characteristics will also be considered.

6.2 Assessment

Further work may be carried out by the ministry in assessing multiple contaminants, including developing benchmarks for groups of contaminants (e.g. petroleum hydrocarbons) and grouping contaminants which cause similar effects (e.g respiratory irritants).

Depending upon review of other inventories and contaminants, the ministry may want to consider modelling the impacts of multiple minor sources in an area (e.g. industrial park of adjacent small facilities).

Incorporation of forecasting in multi-source modelling can help communities to understand how air quality will be improving as a result of actions underway or planned by facilities. For example, facilities operating under Technical or Site Specific Standards already have action plans in place to reduce their emissions.

The ministry could assess other models for potential applications in multi-source modelling (e.g., CALPUFF).

6.3 Management

The proposal applies to new and expanding facilities. The ministry can assess the need for applying the policy to existing facilities.

Technical Standards already include technology requirements for new and expanding sources. When Technical Standards are reviewed by the ministry, we will consider whether amendments are required to address this new cumulative effects policy.

Similarly, the ministry will consider this new cumulative effects policy in reviewing requests for new Site Specific Standards.

The ministry recognizes that in some areas, non-industrial sources need to be addressed as part of a broader cumulative effects policy. The ministry is developing an Air Zone Management Framework as part of the work to implement the national Air Quality Management System. The Air Zone Management Framework will provide guidance on management, monitoring and reporting

actions that could be implemented in an air zone by industrial and non-industrial emissions sources to achieve Canadian Ambient Air Quality Standards established for ozone, PM2.5, sulphur dioxide and nitrogen oxides.

With respect to next steps, the ministry is interested in responses to the following questions, through this consultation:

- What other information should be considered in defining the areas where CEA policy applies?
- Are there other requirements that should be considered for each of the action levels?
- What should the ministry focus on as priorities for future steps?

With respect to the priorities for future steps, the ministry will consider the feedback received through the consultation on this Discussion Paper and will continue discussions with the External Working Group in spring 2018.