Understanding Vehicle Emission Control System Tampering in Alberta Project Team
Terms of Reference

Approved by the Clean Air Strategic Alliance on: **April 3, 2025**

CONTEXT

Alberta strives to manage air emissions to achieve air quality standards and objectives. Alberta's Renewed Clean Air Strategy (2012) recognizes the need for management actions on non-point sources of air emissions, such as transportation. The transportation sector is one of the largest sources of nitrogen oxide emissions in the province. In addition to emitting nitrogen oxides, vehicle emissions also contain other air contaminants that can be associated with health impacts, such as particulate matter and volatile organic compounds.

While there is no explicit prohibition of vehicle emission control system tampering at a federal level in Canada, it is prohibited in most Canadian provinces. The Government of Alberta does not currently have legislation, regulations, or policies aimed at preventing tampering or prohibiting the manufacture, sale, or installation of emission control defeat devices. While Alberta's Commercial Vehicle Inspection program requires safety inspections for vehicles exceeding 11,794 kilograms, this inspection does not include emission control equipment. Alberta's *Traffic Safety Act* also does not prohibit tampering with vehicle emission control systems. Vehicles that do not have functioning emission control systems may emit many times the emissions of vehicles that do.

CASA has made several recommendations related to vehicle emission control system tampering. The ROVER I (1998) and Non-Point Source (2017) projects both recommended the Government of Alberta establish or amend provincial legislation to prohibit tampering. The Non-Point Source project also recommended that emission control systems be included in the annual safety inspections required by the Commercial Vehicle Inspection Program. While there many have been discussions on the issues related to these recommendations within the Government of Alberta, CASA has not received any formal update on the status of these recommendations or their implementation.

In September 2024, the CASA board approved the final report and recommendations from the Roadside Optical Vehicle Emissions Reporter (ROVER) III project. The ROVER III project involved the collection of emissions data from 49,747 light-duty vehicles and 6,339 heavy-duty vehicles in Alberta. The data showed that up to 30% of the heavy-duty diesel-fuelled vehicles and 10% of light-duty gasoline-fuelled vehicles measured had emissions that were at least 10 times higher than emissions benchmarks. Emissions that are much higher than expected indicate the vehicle's emission control system is malfunctioning or has been tampered[1] with. As the ROVER III project did not include vehicle inspections, the project team identified the magnitude and sources of vehicle emission control system tampering and the reliability of emission control technology in Alberta's climate as data gaps. They made the following recommendation three in their report to help address those gaps:

"CASA to establish an expedited project team to undertake a comprehensive study to a) identify the magnitude and sources of vehicle tampering, including gathering information about manufacturers, sellers, and installers of defeat devices, and b) understand the reliability of installed emissions control devices."

This project intends to fulfill this recommendation, and its outcome is intended to support recommendation four from the ROVER III project report:

"The Government of Alberta, upon receipt of the comprehensive study report on emissions controls and tampering in Alberta (recommendation 3), should identify actions or initiatives as needed to address the findings of the study, and assess how their implementation could support and further any existing work in this area. This assessment would include determining the key measures and corresponding monitoring and reporting mechanisms required to track the progress and validate the success of identified actions and initiatives."

The ROVER III project did not include a feasibility assessment for which programs or actions would be appropriate for implementation in Alberta, and CASA recognizes that measures aimed at reducing rates of tampering with vehicle emission control systems can have varying structures or supports needed for implementation. However, actions undertaken in other jurisdictions could provide guidance for how programs could be implemented in Alberta.

The project team will operate in a manner that is consistent with the rules, policies and procedures adopted by the CASA, including the use of consensus to make decisions in a multi-stakeholder process.

[1] ROVER III data was used by the International Council on Clean Transportation to calculate an estimated tampering prevalence for heavy-duty diesel vehicles. The estimated prevalence was 38.5% and will be used to update modelling inputs for their work on the impacts of vehicle emission tampering in Canada.

STRATEGIC INTENT (GOAL)

The project's strategic intent is to complete a comprehensive study that:

- identifies the magnitude and sources of vehicle emission control system tampering, including information gathered about manufacturers, sellers, and installers of defeat devices
- includes an assessment of the economic impact of vehicle emission control system tampering
- improves understanding of the reliability of factory-installed emissions control devices

PROJECT SCOPE

The scope of this work includes:

- both light- and heavy-duty vehicles
- compilation of data and information from existing sources on vehicle emission control system tampering and its economic impacts (e.g., operational cost savings for vehicle fleet owners, increased healthcare costs due to excess emissions, and others), and reliability of factory-installed emission control systems that are applicable to Alberta's environmental, economic, and political contexts
- collection of new data and information on vehicle emission control system tampering, economic impacts, and reliability via stakeholder engagement (e.g., surveys, interviews)
- advice on future data collection to address data gaps that could not be addressed through this project due to time or resource constraints
- advice to support the Government of Alberta in their identification of actions or programs to reduce vehicle emission control system tampering that take Alberta's context into consideration

Direct collection of vehicle emissions data or conducting vehicle inspections are outside the scope of this project.

This project aims to provide advice to support air quality management in Alberta but will not make formal regulatory or policy recommendations.

OBJECTIVES AND KEY TASKS

Project objectives and their supporting key tasks are described below.

Objective 1: A Common Understanding of Vehicle Emission Control Systems, Tampering, and Maintenance Requirements

The project team will gain a common understanding of the types of vehicle emission control systems for light- and heavy-duty vehicles, methods of tampering with those emission controls, and the maintenance practices required to maintain their function.

Key Task 1: Define key terms and concepts and how they will be used throughout the project, including but not limited to:

- Heavy-duty vehicles vs. light-duty vehicles and regulatory requirements that impact each (e.g., weight thresholds for commercial vehicle inspections)
- Vehicle emission control system tampering
- Vehicle emission control system malfunction
- Vehicle emission control system manufacturer defect

Key Task 2: Review existing reference material on the following topics, and others as appropriate:

- Types of vehicle emission control systems and their functions
- Common methods of defeating or tampering with vehicle emission control systems
- Methods and tools used to detect vehicle emission control system tampering in Alberta and other jurisdictions
- Manufacturer recommended maintenance schedules for vehicle emission control systems

Objective 2: Compilation of Information on Vehicle Emission Control System Tampering and Reliability in Alberta

Review existing sources of information on the prevalence and sources of emission control system tampering, including sellers and manufacturers of defeat devices, and the reliability of factory-installed vehicle emission control systems in Alberta's climate.

Key Task 1: Complete a literature review on vehicle emission control system tampering that includes but is not limited to the following topics:

- Legislation or regulations in other jurisdictions that prohibit vehicle emission control system tampering, and maintenance and inspection programs that include vehicle emission control systems.
- Costs associated with maintenance and repairs of vehicle emission control systems, and the perceived and real economic impacts of tampering.
- Availability of vehicle emission control system tampering services in Alberta and the frequency that those services are performed.
- Manufacturers and sellers of defeat devices that are available in Alberta.
- Enforcement measures taken by the US EPA against Alberta-based companies for providing defeat devices or services, and a comparison of the US and Alberta regulatory environments related to vehicle emission control system tampering.
- The extent of vehicle emission control system tampering in light-duty vs. heavy-duty sectors, and the rates of tampering for generally higher-emitting vehicle fleets or sectors (e.g., dump trucks).
- Emissions information for Alberta-registered vehicles travelling to other jurisdictions (e.g., other provinces or countries which have regulations prohibiting tampering).

- Rates of catalytic converter theft in Alberta and statistics on their replacement (e.g., insurance claims for catalytic converter replacement)

Key Task 2: Complete a literature review on the reliability of factory-installed vehicle emission controls that includes but is not limited to the following topics:

- Rates of manufacturer defects in factory-installed vehicle emission control systems
- Impacts of Alberta's climate on the performance of vehicle emission control systems
- Comparison of ambient air monitoring data near roadways in Alberta or other jurisdictions under different temperature and weather conditions, for example:
    - ***Near Road Monitoring Study (Winter 2020)*:** EPA completed a near-road ambient air quality monitoring-focused study in winter 2020 at a central location in Edmonton.
    - ***Near Road Air Monitoring Station (in progress, 2024)*:** EPA is working with Environment and Climate Change Canada to plan for a near-road ambient air monitoring station in Calgary as part of the National Atmospheric Pollutant Surveillance (NAPS) Program to further understand the impact of vehicle emissions on ambient air quality near roadways.

Objective 3: Identification of Remaining Information Gaps and Methods to Address Them

After completion of objectives 1 and 2, assess the information that has been collected and determine any remaining information gaps and how those information gaps might be addressed.

Key Task 1A: Develop a scope of work for project team members or a consultant to gather additional information to help address any identified information gaps related to vehicle emission control system tampering based on available resources and information sources. Data gathering could include:

- Online, phone, or in-person surveys of mechanics who provide vehicle emission control system tampering services to determine the services they offer the frequency they perform those services, and repairs for vehicles after catalytic converter theft.
- Surveys of vehicle owners and operators on maintenance, reliability, and tampering of emission control systems administered through transportation associations (e.g., Alberta Motor Transport Association, Alberta Motor Association)
- Information on statistics of tampered vehicles in the market (e.g., information from vehicle sellers such as auction companies or dealerships on inspections completed before sale and whether emissions control systems are noted as part of that process).
- Workshops or other engagement with people in the trucking industry who are willing to speak about their motivations for vehicle emission control system tampering and the impact it has on their operations.

- Workshops or other engagement with subject matter experts and researchers in Alberta and other jurisdictions who have information on the sources, impacts, and motivations for vehicle emission control tampering.
- Information from provincial police services on rates of catalytic converter theft and from insurance companies on claims to replace stolen catalytic converters.

Key Task 1B: Develop a scope of work for project team members or a consultant to gather additional information to help address any identified information gaps on the reliability of factory-installed vehicle emission control systems based on available resources and information sources. Data gathering could include:

- Online, phone, or in-person surveys of mechanics about vehicle emission control system reliability and repair options.
- Information from ongoing studies assessing the performance of vehicle emission control systems under different weather conditions, for example.
    - ***Future of Transportation in Cold Climate Cities (in progress):*** A project being completed through a collaboration between the University of Alberta and Simon Fraser University to develop necessary tools and methodologies for analyzing, understanding, and developing transportation decarbonization pathways in cold climate cities. Project leads are Professor Bob Koch and Professor Mahdi Shahbakhti, University of Alberta, and Professor Vahid Hosseini, Simon Fraser University.
    - ***Reduction of Emissions from In-Service Medium- and Heavy-Duty Vehicles in British Columbia (future project):*** A project awarded by Metro Vancouver to Ramboll Canada. Details on the project scope has not yet been released but may be relevant for this work.

Specific data-gathering actions will depend on which gaps have been identified.

Objective 4: Collect Additional Information as Identified in Objective 3

Undertake the scope of work identified in objective 3, either through the resources available through the project team members and their organizations, or through a contract with a consultant.

Key Task 1A: Complete a Request for Proposal process to identify an appropriate consultant to complete the scope of work developed in objective 3, with the following potential deliverables:

- Survey or engagement session results
- A report detailing the information gathered by the consultant and any advice they have for information gaps they could not address, or longer-term information gathering methods that would yield more robust data.

Key Task 1B: If the project team decides to proceed without a consultant, project team members will work with CASA staff to implement as much of the scope of work as

possible, document the process and results, and provide advice for filling data gaps that could not be addressed with the resources of the project team.

Objective 5: Summary of Results and Advice for Transportation Emission Management

Information from all other objectives should be compiled into a final project team report for consideration by the CASA board.

Key Task 1: Write a final report that contains the following information:

- Background information on vehicle emission control systems, types and methods of tampering, and tampering detection methods (objective 1)
- Information on the reliability of factory-installed emission control systems (objective 2 and 3)
- Information on the prevalence and sources of vehicle emission control system tampering in Alberta (objective 2 and 3)
- The information gaps identified, methods used to gather additional information, and the results of that process (objective 3 and 4)

Key Task 2: From the information gathered, provide advice on what actions or programs could be implemented to manage emissions from the transportation sector in Alberta.

Key Task 3: From the information gathered, provide advice on methods of gathering additional relevant information that could not be obtained during the project due to time or resource constraints.

Objective 6: Communications Plan

Develop and implement a strategy and action plan for communicating the work of the project team. This objective will need to be considered at project outset and on an ongoing basis as the work progresses.

Key Task 1: Develop a communication plan that includes the following elements:

- The information to be communicated, including key messages on vehicle emission control system tampering and reliability in Alberta.
- The appropriate audience, how it will be communicated, and when.
- Existing communication channels that can be leveraged to share project information.
- Communication tools such as message maps, factsheets, or presentations.
- Messaging on the outcomes of each project objective for project team members to communicate relevant information to their constituents.

DELIVERABLES

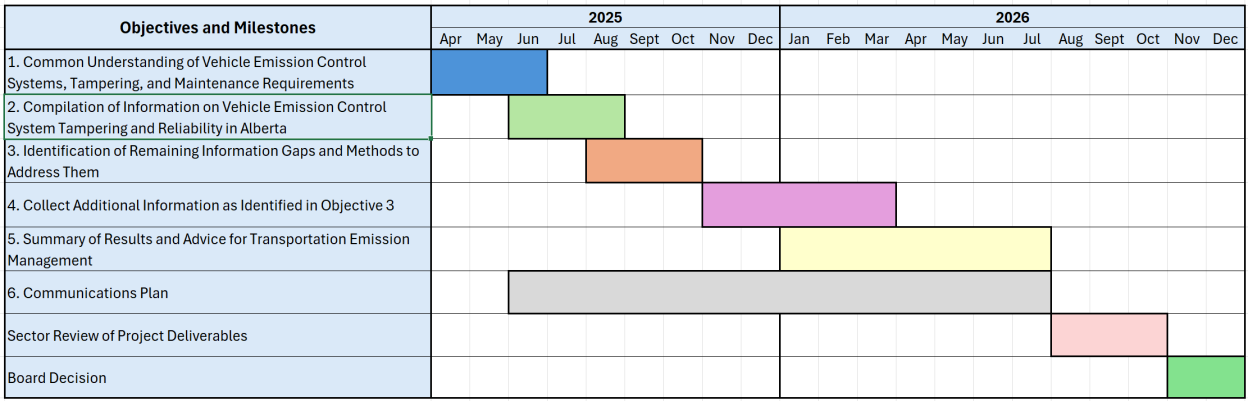
The project deliverables are:

- A consultant report detailing the results of their jurisdictional scan and data collection, if applicable.

    - Any collected data sets, including survey results, should be provided to CASA by the consultant
- A project team report summarizing the information collected and containing advice to support air quality management in Alberta.
- A communications plan outlining the project team's approach to communicating about the work and its outcomes.

PROJECT SCHEDULE

The project is expected to start in April 2025 and be complete by December 2026. The Gantt chart below shows the timeline broken down by objective.



PROJECTED RESOURCES AND COSTS

The project budget is estimated at $31,500 in core funding and $60,000 of project costs for a total project budget of $91,500. The table below includes a breakdown of the estimated costs.

Item	Estimated Cost
Core Funds	
Stakeholder Support & Travel/Accommodation*	$25,000
Hosting	$1,500
Communications (final report preparation)	$5,000
Total Estimated Core Funds	**$31,500**
Project Costs	
Consultant to complete objective 4 (address data gaps)**	$50,000
Stakeholder engagement for objective 4 (workshop, surveys, interviews)	$5,000
Communication tools	$5,000
Total Estimated Project Costs	**$60,000**

*Based on ten meetings per year for two years, where 80% are held remotely and 20% are in person, and four team members are eligible for stakeholder support.

**Optional cost dependent on whether the project team members decide they can complete this task without consultant support.

MEMBERSHIP

The working group has identified the following individuals or organizations who should be engaged in the project in some manner, either as project team members or through targeted engagement.

Individual or Organization	Possible Interests, Concerns, or Involvement
Provincial Regulators (e.g., Environment and Protected Areas, Transportation and Economic Corridors, Service Alberta)	• Responsible for ensuring achievement of air quality objectives and standards and provincial policy. • Interested in environmental protection and the health of Albertans as well as ensuring sustainable economic prosperity. • Involved in education/awareness initiatives.
Federal Government (e.g., Environment and Climate Change Canada, Transport Canada)	• Interested in ensuring achievement of Canadian Ambient Air Quality Standards and effectiveness of and alignment with federal policies.
Municipalities	• Involved in education and awareness initiatives. • Interested in the health of their constituents which is impacted by the concentration of transportation emissions in urban areas.
First Nations and Metis	• Interested in ensuring the health of communities. • Interested in protecting the environment.
Trucking Companies or Associations (e.g., Alberta Motor Transport Association, Independent Trucking Association)	• Interested in fairness across the sector. • Concerns regarding possible impacts of potential actions related to transportation emissions management. • Concerns on how actions to reduce transportation sector emissions relate to current regulation or policies
Industry	• Interested in management actions to reduce nitrogen oxide emissions that include both industrial and non-industrial emission sources.
Health, Environmental, and Transportation-Related Non-Government Organizations	• Interested in ensuring the health of Albertans. • Interested in protecting the environment.
Airshed Organizations	• Involved in education and awareness initiatives. • May be involved in implementation of actions to manage transportation emissions.
Agriculture Organizations (e.g., Alberta Canola Producers, Alberta Beef Producers)	• Interested in fairness across the sector. • Concerns regarding possible impacts of potential management actions. • Concerns on how actions to reduce transportation sector emissions relate to current regulations or policies (e.g., AOPA)
Academia or Research Councils (e.g., Simon Fraser University, University of Alberta Centre of Smart Transportation)	• Interested in data collection and potential research implication of project results, or possible concurrent studies.

Other stakeholders may become apparent as the work progresses. The project team will need to regularly evaluate whether the appropriate stakeholders are engaged.

Appendix A: Working Group Membership

Name	Role	Organization
Members		
Ann Baran	Co-Chair	Southern Alberta Group for the Environment
Rob Hoffman	Co-Chair	Canadian Fuels Association
Andrew Barnes	Member	Alberta Motor Transport Association
Bailey Doepker	Member	Environment and Protected Areas
Chris Yanitski	Member	Transportation and Economic Corridors
Kamran Faisal	Member	City of Calgary
Mandeep Dhaliwal	Member	Peace Airshed Zone Association
Melissa Brown	Member	City of Calgary
Michael Spiess	Member	Environment and Climate Change Canada
Ruth Yanor	Member	Mewassin Community Council
Vahid Hosseini	Member	Simon Fraser University
Yoann Bernard	Member	International Council on Clean Transportation
Héline Chow	Alternate	Environment and Climate Change Canada
Michelle Meyer	Alternate	International Council on Clean Transportation
Geoff Johnson	Observer	Environment and Climate Change Canada
Curt Horning	Corresponding Member	Environment and Protected Areas
Douglas Thrussell	Corresponding Member	Environment and Protected Areas
Sharon Willianen	Corresponding Member	Environment and Protected Areas
CASA Staff		
Katie Duffett	Project Manager	Clean Air Strategic Alliance
Alec Carrigy	Project Manager	Clean Air Strategic Alliance
Claire Poirier	Project Manager	Clean Air Strategic Alliance

Appendix B: Reference Materials

The project team should review the following materials in preparation for project initiation:

- Recommendations to Reduce Non-Point Source Air Emissions in Alberta (CASA, 2018)
- Roadside Optical Vehicle Emissions Reporter (ROVER) III Project Report for the CASA Board (CASA, 2024)
- Roadside Optical Vehicle Emissions Reporter III: A Survey of On-Road Light and Heavy-Duty Vehicle Emissions (Opus, 2023)
- Heavy-Duty Emissions Control Tampering in Canada (International Council on Clean Transportation, 2022)