

Alt-FEMP Executive Summary

Company	Program start	Program end	# of sites
Canadian Natural Resources Limited	January 1, 2021	December 31, 2023	1000

Once an alternative fugitive emissions management program is approved, AER staff draft this executive summary. This is a summary only, published to help interested stakeholders understand what has been approved. These summaries are found on our website, www.aer.ca > Protecting What Matters > Holding Industry Accountable > Industry Performance > Methane Performance > [Alternative Fugitive Emission Management Program Approvals](#). For additional information on these approvals, contact methane.reduction@aer.ca.

Summary

Canadian Natural will use a combination of technologies to execute the approved alternative fugitive emissions management program (alt-FEMP) in the area of Lloydminster. Aerial methane detection technology will be coupled with ground-based, vehicle-mounted methane detection technology to achieve the planned outcomes under the pilot proposal. Canadian Natural intends to run its proposed pilot program in the Lloydminster area for two years. It is Canadian Natural's opinion that implementation of this program will enable Canadian Natural to validate the modelling of equivalent methane emissions reduction and ultimately lead to a viable long-term full-scale alt-FEMP in the future. Furthermore, these technologies will be using Alberta-based service providers.

Based on table 4 of *Directive 060*, section 8.10.2, in the Lloydminster area, there are 1032 facilities that are subject to annual surveys and 10 facilities that are subject to triannual surveys for the baseline *Directive 060* FEMP. Canadian Natural's pilot alt-FEMP proposes screening these facilities biannually—once per year using the aerial methane detection technology and once per year using ground-based, vehicle-mounted methane detection technology. Pad sites that do not fall under table 4 of *Directive 060* are not included in the pilot alt-FEMP and will receive annual screenings.

Canadian Natural will contract an aerial methane detection service provider early in each program year to complete the aerial surveys. The data will be provided back to Canadian Natural and analyzed for prioritization of ground-based surveys. Any location that is emitting over 500 m³/day will be scheduled for further investigation.

The ground-based, vehicle-mounted methane detection technology will be installed on equipment owned by Canadian Natural and will be operated by Canadian Natural employees. These employees will be field operations staff who are familiar with the sites, layouts, and venting equipment because of their experience in the industry and the area. The operator will navigate the site in accordance with the equipment provider's recommendations and obtain live indications and quantifications of emissions

during the survey. Emission detections can then be investigated on site, immediately following vehicle-mounted detection, using the optical gas imaging (OGI) camera in the event additional information is required. Any fugitive emissions measured over 100 m³/d and any higher-than-expected continuous vent volumes will be investigated. The operator can then immediately conduct repairs or prepare an action plan to address the methane emission sources in the event that the repair cannot be completed during the initial site visit. Any total site emissions found to be larger than 500 m³/d will be investigated (continuous vents combined with fugitives), as will any continuous vent under this threshold that seems uncharacteristic based on the operator's experience in the area.

Canadian Natural contracted an independent gas emissions research and analysis service provider to model the baseline fugitive emissions, the default OGI fugitive emissions and the alt-FEMP fugitive emissions based on the survey frequency of the pilot program. The results in the following table show that the alt-FEMP pilot program that Canadian Natural is proposing has the potential to result in lower annual fugitive emissions than the baseline *Directive 060* FEMP requirements.

Program	Estimated Annual Fugitive Emission Reductions (m³/year)
Baseline <i>Directive 060</i> FEMP (Default OGI)	805 850
Alt-FEMP pilot program	1 283 140

Not included in the estimates above, Canadian Natural intends to use the source detection data to reduce methane emissions overall. The technologies proposed will ensure that Canadian Natural can also detect sources of continuous venting in these areas and implement early action measures to reduce its overall gas limits and defined gas limits in advance of January 1, 2022, at which point additional requirements under *Directive 060* come into effect. As such, Canadian Natural's pilot alt-FEMP proposal is anticipated to reduce annual methane emissions in greater volumes than referenced in the above table, which already is expected to achieve greater fugitive emission reductions than current requirements.

The results of the alt-FEMP will be reviewed annually by the alt-FEMP management team to analyze for emerging patterns and incorporate any regulatory changes. The alt-FEMP is a dynamic tool that will continue to evolve as knowledge is gained, shared, and incorporated into application of the program.

The more understanding Canadian Natural gains on its fugitive emission profile, the more efficient the application of the FEMPs and alt-FEMPs will become. The FEMP management team has set the following key performance indicators to evaluate the performance of the FEMP over time:

- Quantified emissions reduction over time, corporate-wide and by operating area
- Cost of detection (\$/t methane detected)
- Volume of gas conserved by managing fugitive emissions
- Number of leaking components over time, corporate-wide and by operating area

- Specific component within facilities that are more prone to leaks
- Time between leak detection and repair

The continuous improvement indicators will be reviewed annually, and the FEMP management team will use the data to inform the annual update of the FEMP.