Oregon Department of Environmental Quality

Air Curtain Incinerator Emissions Test

Results Summary

Background

An Air Curtain Incinerator is a device that forcefully pushes a curtain of air across an open chamber in which burning occurs. The air curtain swirls in the firebox, increasing the heat and making it burn consistently across the area. Therefore, the ACI burns more efficiently and produces less particulate matter and harmful smoke. As a result, it is an alternative to traditional open burning.

ACIs don't have the smokestack traditionally used to measure and quantify emissions. Various techniques have been used in the past leading to limited criteria air pollutants emissions data and almost no air toxics data. With funding provided by Oregon SB-762, DEQ designed a system to capture ACI emissions and quantify them using EPA stack test methods.

The greatest challenge when testing an ACI is capturing emissions from the open combustion chamber, which requires continuous loading of materials. Emissions data must be obtained while also accounting for interferences, such as existing external emissions, ambient air, etc., and ensuring the collection method does not interfere with the air curtain.

DEQ worked with Montrose Environmental Services, known for its air measurement practices and laboratory services, to design and implement the ACI emissions testing and prepare the final report.

In collaboration with the Oregon Department of Forestry, Oregon Department of Agriculture and Clean Water Services, testing occurred on an Airburners BurnBoss T24 model ACI on May 23 - 25, 2023. It used ash wood removed as part of Oregon's emerald ash borer response efforts. The EAB is an exotic invasive forest pest recently discovered in the state.

Translation or other formats

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State of Oregon Department of Environmental Quality

Results

When compared to emission factors from various open burning studies, the ACI source test results show significant reductions in particulate matter and carbon monoxide emissions. Also, they demonstrate potential health risks from toxic air pollutant emissions are much lower than previous estimates used by the DEQ's Cleaner Air Oregon program for evaluating this risk from ACIs.

Table 1 – Particulate Matter and Carbon Monoxide

Scenario	**Emission Factors**				
	PM/PM2.5 (lbs./ton)	**Reduction**	CO (lbs./ton)	**Reduction**	Source
ACI Source Test	4.3 (total PM)	-	14.5	-	DEQ Source Test
Pile Burning	25.5 (PM2.5)	**83.3%**	179	**91.9%**	USFS Study
Broadcast Burning	36.0 (PM2.5)	**88.2%**	180	**91.9%**	USFS Study
Open Burning	17 (total PM)	**75%**	140	**89.6%**	AP 42
Hardwood Broadcast Burning	36 (total PM)	**88.2%**	224	**93.5%**	AP 42
Conifer Dozer Piled	12 (total PM)	**64.6 %**	74	**80.4%**	AP 42

Table 2 – Risk-Driving Air Toxics

Primary Risk-Driving Air Toxic	CAO Emission Factor (lbs./ton)	Source Test Results (lbs./ton)	**Reduction**
Arsenic	0.00012 (1.2E-04)	0.00005 (5.0E-05)	**58%**
Chromium VI	1.2E-04 (0.00012)	6.0E-05 (0.00006)	**50%**
Manganese	4.7E-02 (0.047)	1.8E-03 (0.0018)	**98%**

Conclusion

Emissions data results will be used to inform DEQ's programs and future practices and policies for ACIs. The agency remains dedicated to researching and developing creative solutions that contribute to a greener and more sustainable future. It continues to protect the environment and public health while also removing barriers to the use of emissions reduction technologies.

Contact

For more information, please visit DEQ's Air Curtain Incinerator Emission Testing web page or contact Smoke@deq.oregon.gov.

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