

**Project Information Form**

Project Title	Student Project: Oxidized biodiesel fuel composition and associated tailpipe ultrafine particle emissions
University	University of Vermont
Principal Investigator	Jack Reid Advisor: Britt Holmen
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Funding Source(s) and Amounts Provided (by each agency or organization)	National Center for Sustainable Transportation, \$98,000 University of Vermont, \$255,000
Total Project Cost	\$353,000
Agency ID or Contract Number	
Start and End Dates	July 1, 2015 through August 31, 2017
Brief Description of Research Project	<p>Master's Student: Jack Reid</p> <p>A number of basic chemical tests are currently used to quantify the oxidative stability of neat biodiesel fuel, but little information exists on how the organic chemical composition of biodiesel changes with oxidation of the fuel's fatty acid methyl esters. These changes in fuel composition are expected to have important effects on the tailpipe emissions associated with use of biodiesel in real-world fuel blends. This study will (1) determine the chemical composition of B100 and real-world Bxx biodiesel fuel blends by detailed organic GC-MS analysis at different stages of oxidation and compare the GC-MS results to the ASTM methods for acid value (AV) and peroxide value (PV) to gain better understanding of the oxidation pathways of FAMES; and (2) conduct emissions tests on oxidized and unoxidized biodiesel fuels and compare their particle-phase emissions. This study aims to identify the differential oxidation pathways for biodiesel prepared from virgin soybean feedstock to that of recycled waste vegetable oil given that feedstock choice and processing are significant parts of the fuel's lifecycle analysis.</p>
Describe Implementation of Research Outcomes (or why not implemented)	



# National Center for Sustainable Transportation

(Attach Any Photos)	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links <ul style="list-style-type: none"><li>• Reports</li><li>• Project website</li></ul>	<a href="https://ncst.ucdavis.edu/graduate-student-research/">https://ncst.ucdavis.edu/graduate-student-research/</a>