**NOx Emissions from Switch Yard Locomotives Observed with the TRAX Air Quality Platform**

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The locomotive industry plays an important role in the transport of people and products nationwide. Within locomotive rail yards, switch yard locomotives (“switchers”) are used to move freight trains around to facilitate the loading and unloading of cargo. Switchers have large diesel engines that are built to last a long time, but that also means that older diesel engines currently in operation lack modern pollution control technologies. Along the Wasatch Front the switchers are primarily older models that operate within Tier 0 or 0+ EPA emission standards that have high NOx emissions.

The TRAX based air quality measurement platform measures a suite of air pollutants and greenhouse gases (CO2, CH4, O3, PM2.5) and from June 2016-June 2017 the project was loaned a NO2 analyzer to investigate the spatial patterns of NO2 across the metropolitan area. The TRAX Green and Red lines travel adjacent to the Union Pacific rail yard in the central Salt Lake Valley and were thus fortuitously able to monitor emissions in this area. Averaged over time we observed high NO2 concentrations, most likely due to emissions from switcher rail cars. Observations of co-located O3 depletions due to titration provide further support for the measurements. Finally, we were able to isolate the contributions from the rail yard and the nearby I-15/I-80 interstate interchange by pairing NO2 and CO2 measurements.

Upgrading switcher engines to modern Tier 4 pollution control technology would reduce NOx emissions by an estimated 90%, and would be within the range of emission reduction costs for area sources adopted by the Utah Air Quality Board. Should these upgrades occur, measurements from the TRAX air quality project could be used to observe emissions before and after these mitigation strategies to evaluate the real-world air quality improvements.