Emissions and Potential Impacts of Utah's Freight Switcher Locomotives

Operations and Emissions[1]:

• 45 of 63 freight switchers operating in Utah belong to Union Pacific Railroad (UPRR)

• Almost all switchers operate within Utah's $PM_{2.5}$ nonattainment counties

• UPRR switchers operate at one Weber County and two Salt Lake County railyards and represented about 75.2% of emitted NOx (306.7 tons) and direct $PM_{2.5}$ (6.6 tons) in 2014.

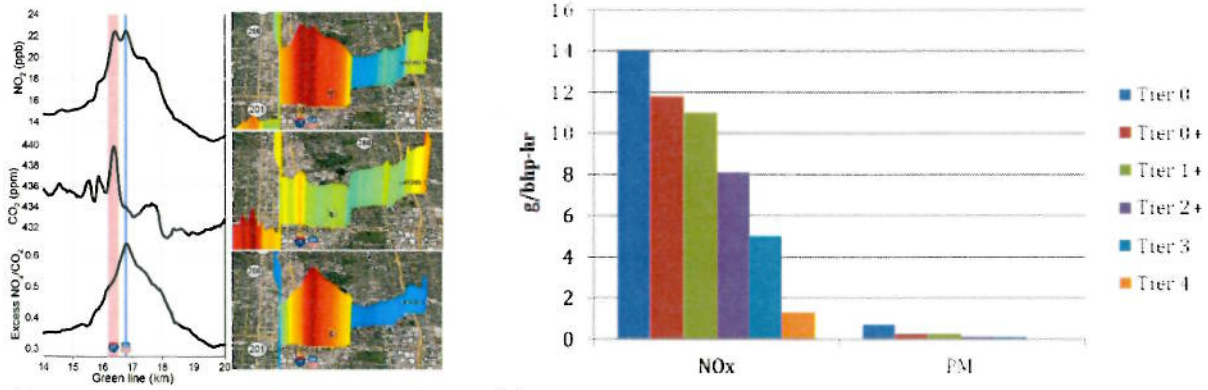
• NO_x emissions at the Roper yard in South Salt Lake are high enough to be detected as a distinct pollution peak by the University of Utah TRAX air quality study sensors (Figure 1.a)

Emission Standards[1]:

• EPA locomotive emissions standards for NO_x and PM are shown in Figure 1.b.

• In 2018, approximately 30% of UPRR's switchers met the Tier 0 standard, while the remaining 70% met the slightly cleaner Tier 0+ standard

• Replacing a Tier 0+ switcher with a Tier 4 switcher would result in an 89.0% reduction in NO_x and an 88.5% reduction in direct PM



a) b)

Figure 1. a) Nitrogen dioxide (NO_2) and carbon dioxide (CO_2) measurements from the University of Utah's TRAX Air Quality Observation Project of the Union Pacific Roper Railyard (vertical blue shading); for comparison I-15 (vertical red shading) and b) EPA locomotive emissions standards for NO_x and PM.

Public Health Considerations:

- 9 schools (8 elementary and 1 middle) are located within 2 miles of the Roper railyard
- 5 health care centers (urgent care) located within 3 miles of the Roper railyard
- Surrounding area is primarily composed of lower income, minority populations

[1]Freight Switcher Locomotives in Utah, Utah Division of Air Quality, 2020 https://le.utah.gov/interim/2020/pdf/00001391.pdf