2020 National Emissions Inventory Technical Support Document: Locomotives

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U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Assessment Division
Research Triangle Park, NC

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12 Locomotives

This section documents (rail) emissions in the nonpoint data category. Refer to Section 3.3 for information on rail yard emissions in the point data category.

12.1 Sector Descriptions and Overview

The locomotive sector includes railroad locomotives powered by diesel-electric engines. A diesel-electric locomotive uses 2-stroke or 4-stroke diesel engines and an alternator or a generator to produce the electricity required to power its traction motors. The locomotive source category is further divided up into categories: Class I line haul, Class II/III line haul, Passenger, Commuter, and Yard. Table 12-1 below indicates locomotive SCCs and whether they are included in EPA estimated emissions. If not in EPA estimates, then all emissions from that SCC that appear in the inventory are from S/L/T agencies.

Table 12-1: Locomotive SCCs, descriptions, and EPA estimation status

SCC	Description	EPA Estimated?	Data Category
2285002006	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class I Operations	Yes – at county-level	Nonpoint
2285002007	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class II / III Operations	Yes – at county-level	Nonpoint
2285002008	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Passenger Trains (Amtrak)	Yes – at county-level	Nonpoint
2285002009	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Commuter Lines	Yes – at county-level	Nonpoint
2285002010	Railroad Equipment Diesel Yard Locomotives	No	Nonpoint
28500201	Internal Combustion Engines Railroad Equipment Diesel Yard	Yes – as point sources	Point

12.2 Sources of data

The locomotives sector includes data from SLT agency-provided emissions data, and an EPA dataset of locomotive emissions. EPA-estimated emissions from select locomotive SCCs as indicated in Table above. The agencies listed in Table 12-2 also submitted emissions to locomotive SCCs.

Table 12-2: Submitting SLT agencies with number of pollutants reported for each SCC

SLT dataset	Agency	2285002006	2285002007	2285002008	2285002009	2285002010	28500201
2020AKDEC	Alaska Department of Environmental Conservation		7				
2020CARB	California	6	6	6		6	18

SLT dataset	Agency	2285002006	2285002007	2285002008	2285002009	2285002010	28500201
CTBAM	Connecticut			10	7		
2020DDOE	District of Columbia						6
2020Maricopa	Maricopa County, AZ					7	
2020MNPCA	Minnesota						44
2020NCDAQ	North Carolina			10			
2020TXCEQ	Texas	54	54	54	54	54	54
2020VADEQ	Virginia			43	43		
2020WADOE	Washington					10	
2020WashoeCty	Washoe County, NV	7		7			7

12.3 EPA-developed estimates

EPA's 2020 rail emissions were developed with the support of the Lake Michigan Air Directors Consortium (LADCO) and the State of Illinois. The EPA used confidential line-haul activity data, in millions of gross ton (MGT) route miles per link, from the Federal Railroad Administration (FRA) for 2019. 2020 rail fuel consumption index values were used to allocate each Class 1 railroad's fuel use to links based on MGT. The Association of American Railroads (AAR) provided EPA with locomotive fleet mix information for 2020 for emission factor application. EPA then developed county-level emission summaries.

Rail yard emissions were calculated based on supply fuel use and/or yard switcher counts provided by rail companies. For Class II and III rail lines, location data is available online as part of Bureau of Transportation Statistics' National Transportation Atlas Database (NTAD). Detailed documentation methodology for this work is available in the 2020_NEI_Rail_062722 document on the 2020 Supplemental data FTP site.

The EPA effort developed emissions for criteria pollutants and greenhouse gases. The GHG emissions included in the NEI for this category are calculated using confidential link-level line-haul activity data from the Federal Railroad Administration combined with emission tier fleet mix information from the Association of American Railroad and fuel use data from the Surface Transportation Board. While the NEI calculates locomotive emissions per railway segment link and aggregated those results to the county level, rail CO_2 emissions reported in the US GHGI are based on top-down national-level fuel consumption data. The bottom-up NEI approach applied nationally may not be comparable with national or state level totals in the US GHGI given the difference in approaches.

12.3.1.1 *Hazardous Air Pollutant Emissions Estimates*

HAP emissions were estimated by applying speciation profiles to the VOC or PM estimates. These "HAP fractions" were updated for 2017 NEI. These profiles are posted in the workbook "2017Rail_HAP_AugmentationProfileAssignmentFactors_20200128.xlsx" on the 2017 Supplemental data FTP site.

HAP estimates were calculated at the yard and link level, after the criteria emissions had been allocated. Where submitting agencies did not supply HAPs, those estimates were also derived via this VOC/PM speciation method.

12.3.2 Quality assurance

EPA and agency-submitted values were compared to find instances where point and nonpoint rail yard SCCs may duplicate. This occurs when agencies submitted nonpoint in the same counties where EPA had point yards. In this case, where rail yard point locations existed within the county, SLT county-level emissions were reassigned to yards to avoid double counting point and county emissions estimates.

12.3.3 Improvements/Changes in the 2020 NEI

There were no NEI methodology changes for locomotives from 2017 to 2020.

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