Description and Progress of ERTAC Rail

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GA EPD, ERTAC Rail Co-Chair

Matthew Harrell, IL EPA; Julie McDill, MARAMA;
Mark Janssen, LADCO; Laurel Driver, US EPA, OAQPS;
Robert Fronczak, Association of American Railroads;
Rick Nath, CSX Transportation; and David Seep, BNSF Railway

U.S. Environmental Protection Agency's
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ERTAC Rail Subcommittee

ERTAC Rail: A Collaborative Effort in Building a Railroad-Related Emissions Inventory between Eastern States' Air Protection Agencies and Participation with the Railroad Industry

ERTAC Rail Subcommittee

The ERTAC Rail Subcommittee

Name	Organization	Name	Organization
Allan Ostrander	MI Dept. of Environ. Quality	Kevin McGarry	NY Dept. of Environ. Conserv.
Amanda Carter	AL Dept. of Environ. Manag.	Laurel Driver	US EPA OAQPS
Ashley Mixon	SC Dept. of Health and Environ. Control (SC DHEC)	Lisa Higgins	ME Dept. of Environ. Protection
Bob Wooten	NC Dept. of Environ. and Natural Resources	Mark Janssen	ERTAC/ Lake Michigan AirDirectors Consortium (LADCO)
Carla Bedenbaugh	SC DHEC	Matthew Harrell	IL Environ. Protection Agency
Chad Wilbanks	SC DHEC	Michelle Bergin	GA Environ. Protection Division
Dennis McGeen	MI Dept. of Environ. Quality	Mike Koerber	LADCO
Douglas Malchenson	PA Dept. of Environ. Protection	Pat Brewer	Visibility Improvement State and Tribal Association of the Southeast (VISTAS)/ASIP
Eric Zalewsky	NY Dept. of Environ. Conserv.	Richard Dalebout	MI Dept. of Environ. Quality
Grant Hetherington	WI Dept. of Natural Resources	Sam Long	IL Environ. Protection Agency
Jim Boylan	GA Environ. Protection Div.	Stacy Allen	MO Dept. of Natural Resources
Julie McDill	Mid-Atlantic Regional Air Manag. Assoc. (MARAMA)	Tracy Anderson	AL Dept. of Environ. Manag.
Kelley Matty	PA Dept. of Environ. Protection	William Nichols	OH Environ. Protection Agency

Current ERTAC GIS and Data Workgroup

Members	Organization	Members	Organization
Matt Harrell	IL EPA	David Seep and William Watson	BNSF
Michelle Bergin	GA EPD	Ken Roberge	Canadian Pacific Railway
Mark Janssen	LADCO	Carl Akins	Kansas City Southern
Julie McDill and Patrick Davis	MARAMA	Erika Akkerman	Canadian National Railway
Laurel Driver	US EPA OAQPS	M. John Germer, Lanny Schmid, and Paul Steege,	Union Pacific Railroad
Robert Fronczak	AAR	Brent Mason	Norfolk Southern Corp.
Rick Nath, Abby Clark, and Kelley Slettebo	CSX Transportation	Joanne Maxwell	Amtrak

What is ERTAC?

Eastern Regional Technical Advisory Committee

- Voluntary, technical organization comprised of state air quality agencies and RPOs east of the Mississippi.
- Coordinated by LADCO and executed by motivated state staff.

Goals and Principles

- Achieve consensus on preferred data sources and inventory methodologies.
- Promote consistency while respecting state-specific approaches.
- Focus on issues likely to have the biggest impact in air quality modeling.

⇒ Coordinate 2008 inventory development …

Priority ERTAC Projects

- Agricultural Ammonia
- Area Source Comparability
- Rail
- Marine
- Primary OC from Onroad

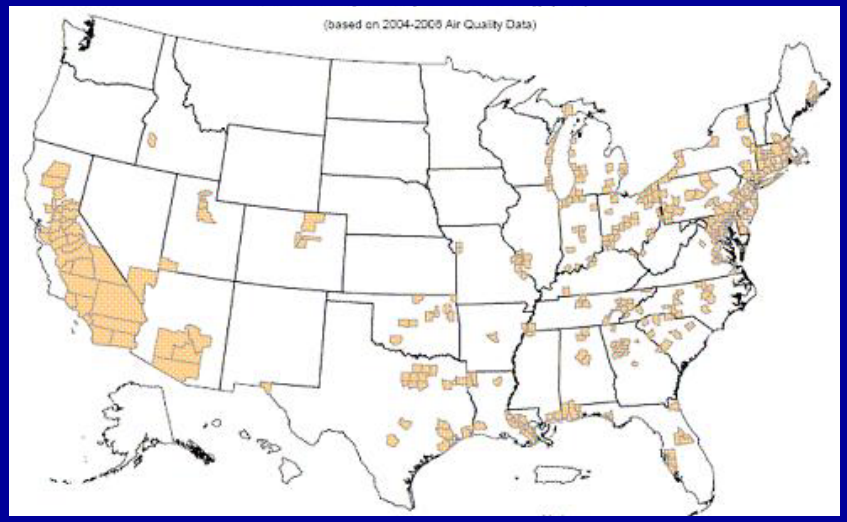
Railroad Emissions of Interest

Largely from diesel combustion …

Species	**Resulting Pollutant(s)**
NO_x	Ozone, $PM_{2.5}$ (nitrate, OC), NO_x
$PM_{2.5}$	$PM_{2.5}$ (as elemental carbon)
SO_2	$PM_{2.5}$ (to sulfate)
VOCs	Ozone, $PM_{2.5}$ (to organic carbon), Greenhouse Gases
CO, CO_2	CO, Greenhouse Gases
Toxics	HAPs and Mobile Source Air Toxics (gas and particle phases)
Soil dust and metals	$PM_{2.5}$, toxics

Air Quality Issues of Concern

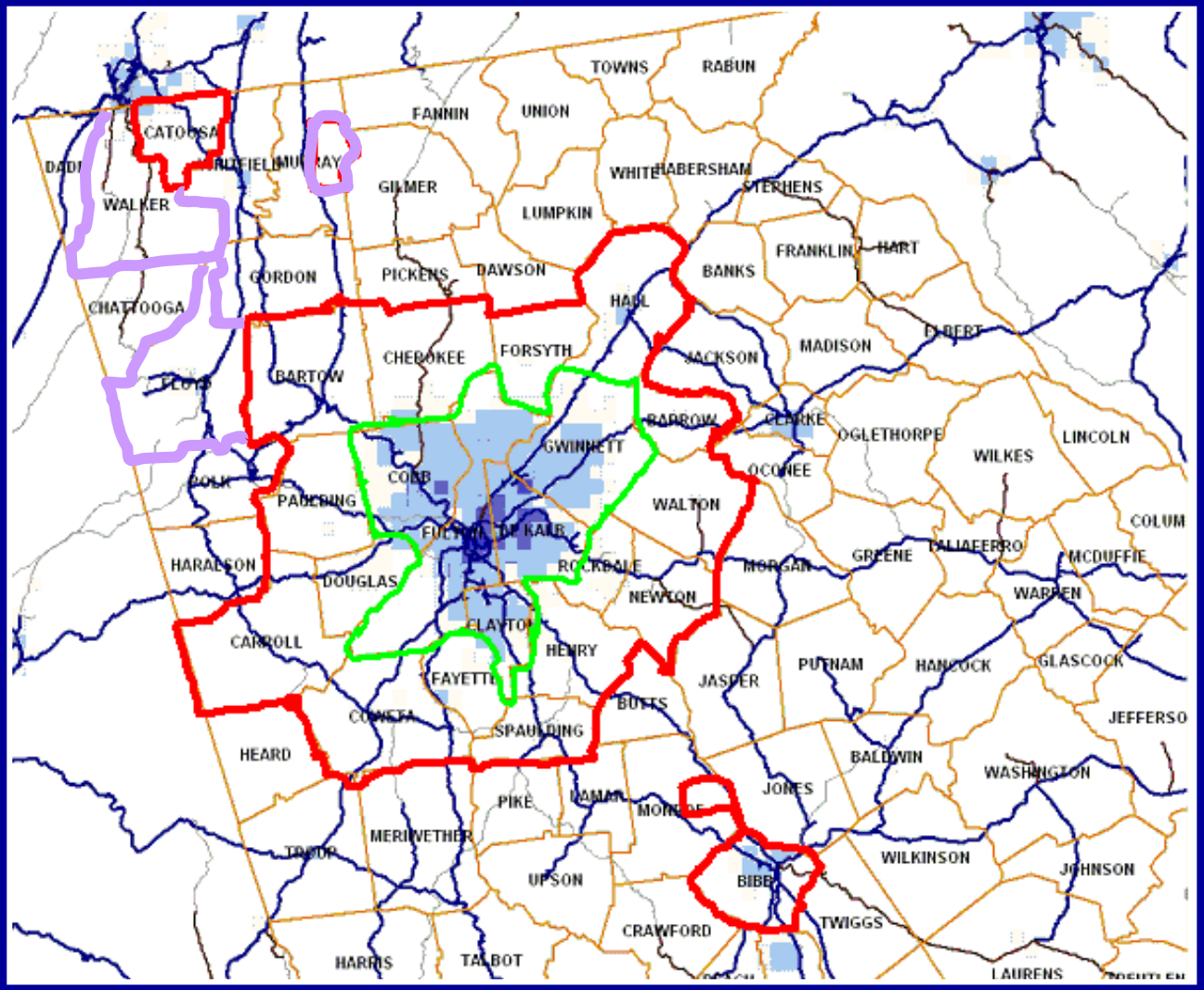
Counties exceeding an O_3 standard



Counties exceeding a $PM_{2.5}$ standard

Emerging Issues: Toxics and Greenhouse Gases

Ex. GA Air Quality, Population, and Railroads



Red: $PM_{2.5}$ and ozone nonattainment

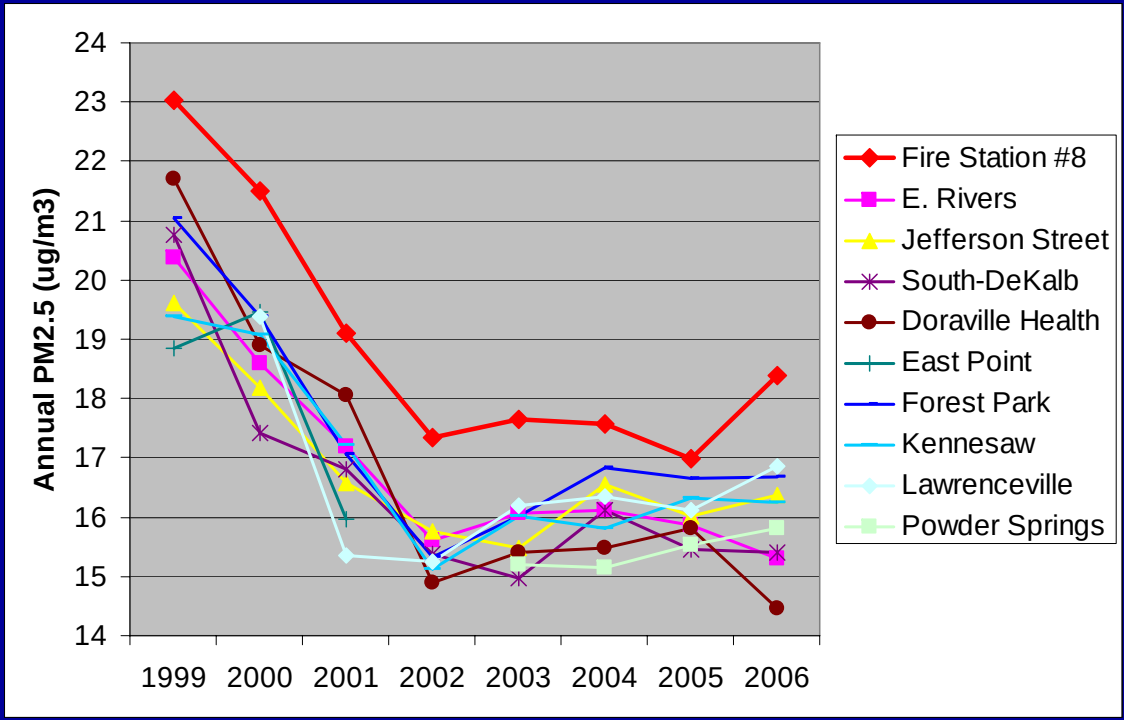
Purple: Ozone nonattainment

Green: 5 Urban Core Counties (Cobb, Fulton, Gwinnett, Dekalb, Clayton)

Dark Blue lines: Railroad tracks

Blue squares: population density

Urban Core Monitors and Annual Average PM2.5



The Fire Station 8 monitor is located near the Inman and Tilford Railyards near downtown Atlanta, GA and consistently measures concentrations of PM2.5 approximately 2 μg/m^3 above other monitors in the urban core.

Benefits of Rail

Railroads: The Vital Link to North America's Economic Future

Railroads: Building a Cleaner Environment

ASSOCIATION OF AMERICAN RAILROADS — MARCH 2008

http://www.aar.org/getFile.asp?File_id=364

- Cost effective freight services.
- Increased safety compared with trucks.
- Reduce highway congestion (a typical train is equivalent to approximately 280 trucks).
- Three or more times more fuel efficient than trucks.
- Currently produces less emissions compared with moving similar tons of freight by truck.

Railroads: The Best Choice for the Environment (Emissions Per Ton-Mile)

Rank (1= Most Desirable)	Oxides of Nitrogen	Volatile Organic Compounds	Particulate Matter	Carbon Monoxide	Carbon Dioxide
1	**Rail**	**Rail**	Air	**Rail**	**Rail**
2	Water	Water	**Rail**	Water	Water
3	Truck	Air	Water	Air	Truck
4	Air	Truck	Truck	Truck	Air

Source: Envirotrans

Need for Better Information

Air quality management tools such as photochemical, dispersion, and receptor modeling rely heavily on emissions estimates. Railroad-related emissions estimates are highly uncertain. While considered to be only about 1-2% of total emissions, estimates indicate that the levels are significant in certain areas. Emissions can be over- or under-estimated.

Table 3-5. Comparison of 2002 NYS NEI with NYS Survey-Based NO_x Emissions (tpy)

Description	NEI	Survey	Difference	Percent Difference
Class I Line Haul	10,520	17,939	7,419	70.5%
Class II/III Line Haul	9	1,046	1,037	11522.2%
Line Haul Passenger (Amtrak)	521	1,914	1,393	267.4%
Line Haul Commuter	85	4,055	3,970	4670.6%
Yard Locomotive[a]	2,979	102	(2,877)	(96.6%)
Total	14,115	25,055	10,942	77.5%

[a]In many cases data was not provided on yard locomotives especially for Class I Line Haul rail lines, and as a result these emissions are included in the estimate of total class I line Haul emissions

Development of the 2002 Locomotive Survey for New York State (NYSERDA, Feb 2007)

ERTAC Rail Kick-off

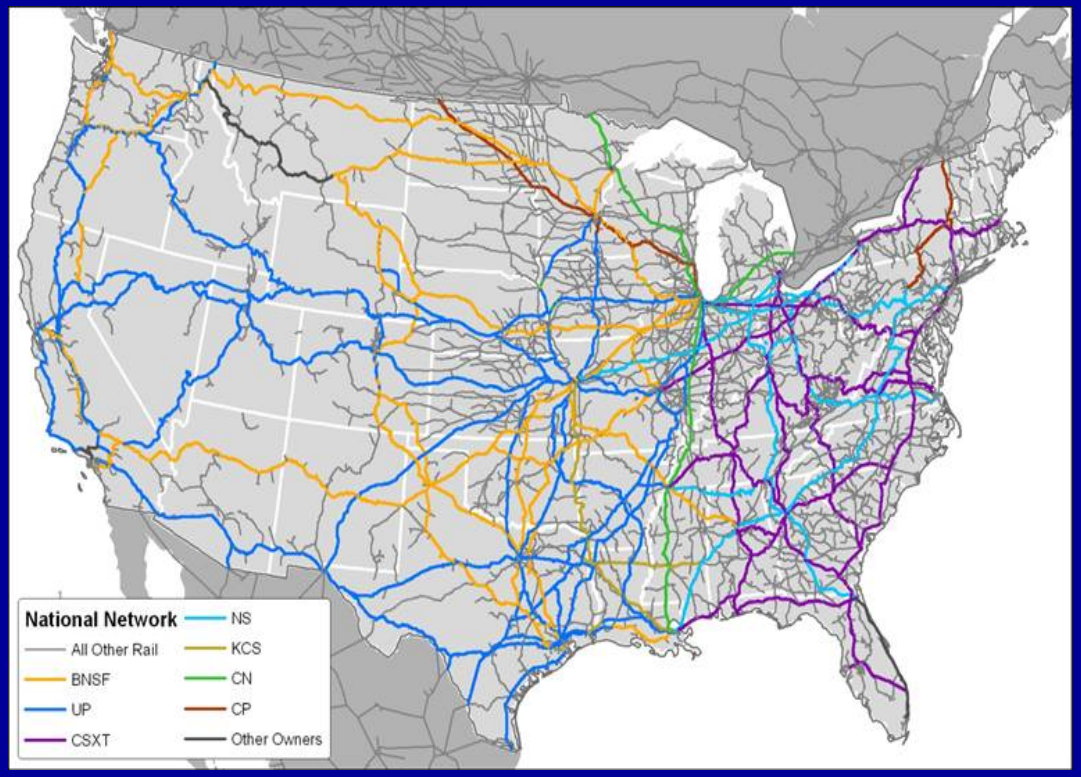
- **Established objectives.**
- **Inventoried skills and in-kind resources.**
- **Established websites and data transfer paths.**
- **Reviewed current state rail inventories , inventory development techniques, and available data.**
- **Determined desired methodologies and data (and backup plans).**
- **Established workgroups and team leaders.**
- **Contacted railroad industry representatives.**

ERTAC Rail Objectives

1. Build link-level, spatially and temporally allocated consolidated emission inventory of railroad-related sources for the year 2008.
2. Develop a projection methodology to estimate future year emissions.

Secondary objective: Develop a longer-term methodology in cooperation with the railroad community so that future inventories will require less effort for both agencies and railroad companies and will be more accurate where needed.

Railroad Operations and Data Sources



Railroad Category	Definition by Revenue
Class I (7 in US + Amtrak)	$346.8M +
Class II (Regional)	$346.8M to $40M
Class III (Shortline)	less than $40M

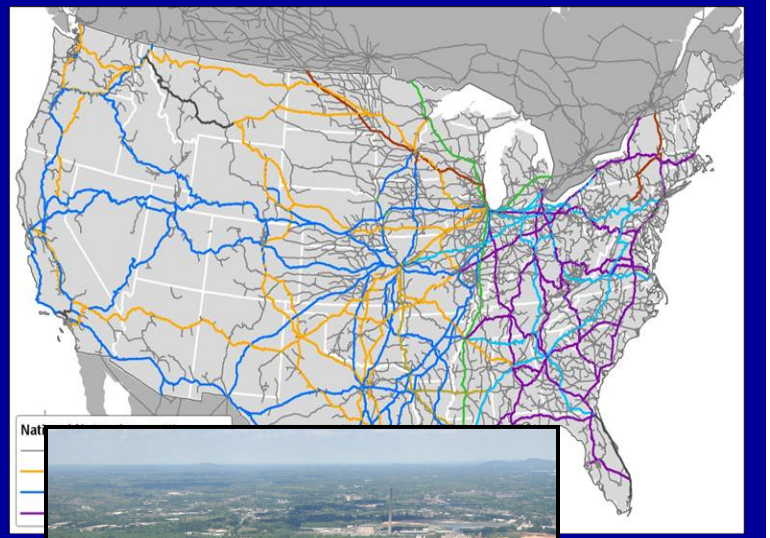
http://www.aslrra.org/about_aslrra/faqs/

- Class I rail accounts for ~80% of total fuel use and 70% of miles operated.
- There are about 550 Class II and III Railroads combined.

Locomotives

- Line-Haul ~ 4500+ HP, 40+ years, between cities and states.
- Switchers up to ~3000 HP for use in railyards (higher for ‘road’ units used for short distances), generally retired line-haul locomotives, older and high emitting.

Each of these categories are represented by a single duty-cycle and corresponding set of emission factors averaged over the fleets of all carriers nationwide.



Current Inventory Methods and Data

Class I Line-haul

- Systemwide annual fuel use and tonnage by carrier.
- Single national industry-averaged set of emission factors.
- Little to no spatial or temporal apportionment of activity.

Class I Switchers

- Single national industry-averaged set of emission factors and annual fuel use per switcher (82k gal/year).
- No consistent data source for location of railyards or number of switchers in general use.

Class II/III, Commuter, and Passenger Rail generally neglected.

ERTAC Rail Workgroups and Leads

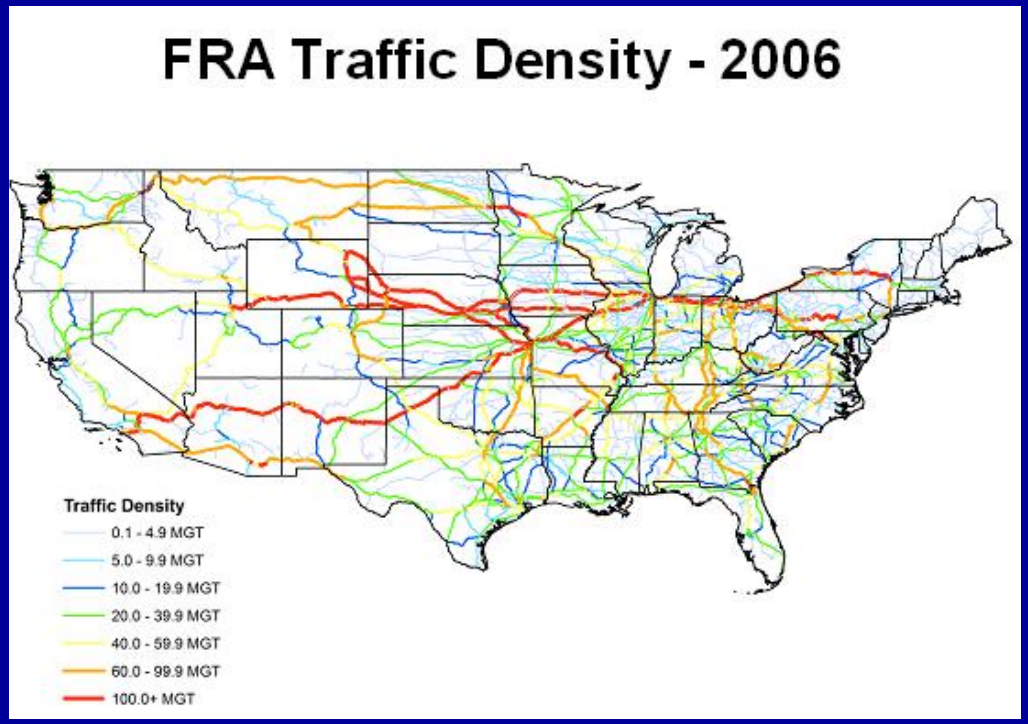
ERTAC Technical Lead	Mark Janssen	LADCO
ERTAC Rail Co-Chairs	Michelle Bergin	GA EPD
	Julie McDill	MARAMA
Class I Line-Haul and GIS	Matthew Harrell	IL EPA
Railyards	Michelle Bergin	GA EPD
	Julie McDill	MARAMA
Class II/III	Dennis McGeen	MI DEQ
	Lisa Higgins	ME DEP
Commuter and Passenger Rail	Open	
Fuel Use and Emission Factors	Richard Dalebout	MI DEQ
	Kelley Matty	PA DEP
National Rail Inventory Coordination	Laurel Driver	US EPA OAQPS
	Stacy Allen	MO DNR
GIS/Data Collaborative Workgroup	Matt, Michelle, Julie, Mark, and Laurel	
Websites	William Nichols	OH EPA

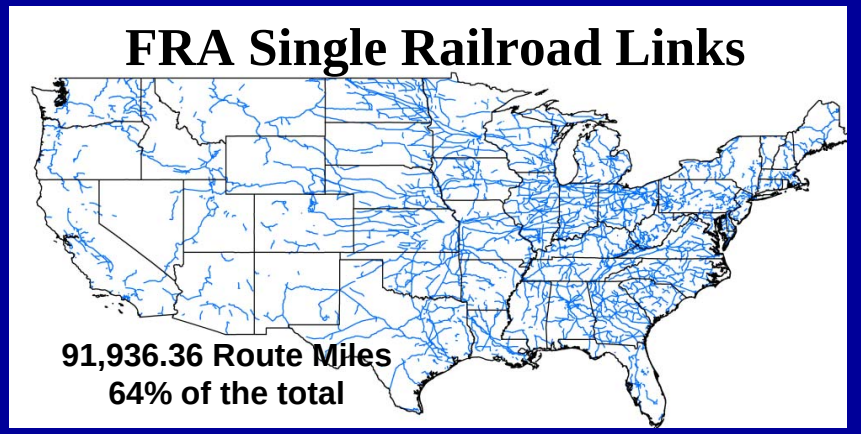
Class 1 Line-Haul Information

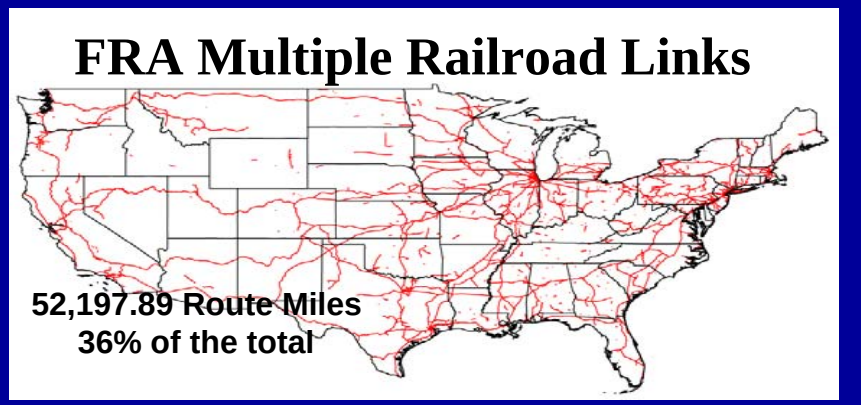
- Need link-level tonnage
- At least per carrier Emission Factors
- Fuel Use – better spatial/temporal allocation?
- Consider temporal patterns
  (e.g. 12 vs. 24 hr activity, week, seasonal)
- Neglect grade, speeds, duty-cycles

(Calculations are available in this presentation's associated conference proceedings paper.)

Line-Haul Characterization







Seeking access to business-confidential data set compiled by the Federal Railroad Administration and Class I Railroads with link-level Gross Tons carried. The approximately 30% of shared track will be apportioned equally between carriers.

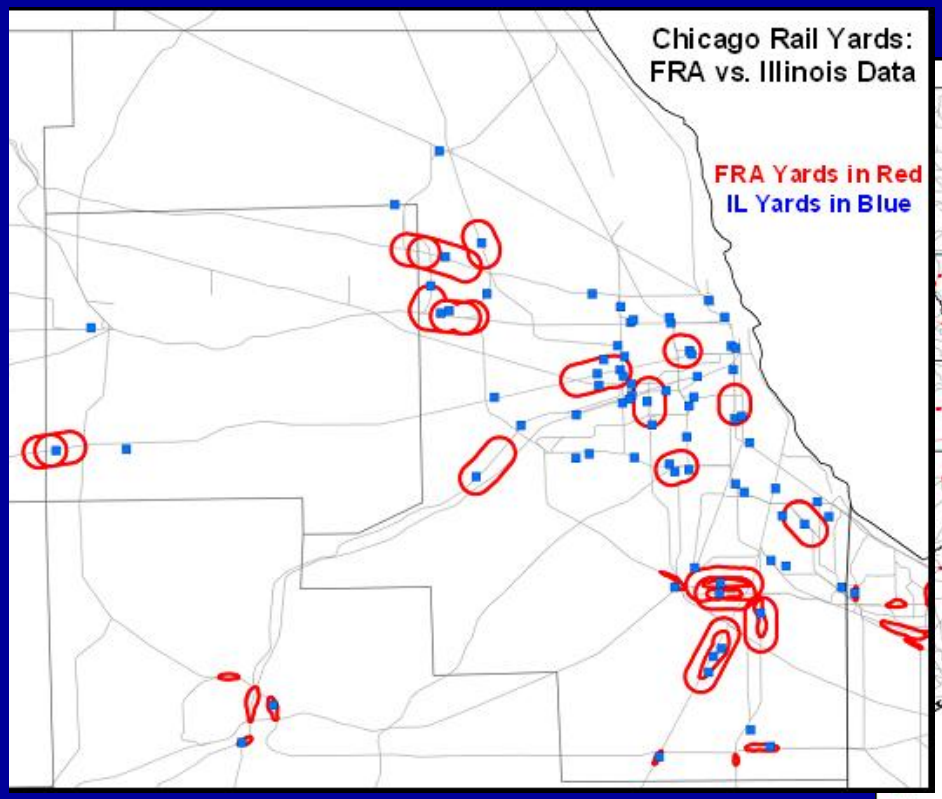
Rail Yard Information

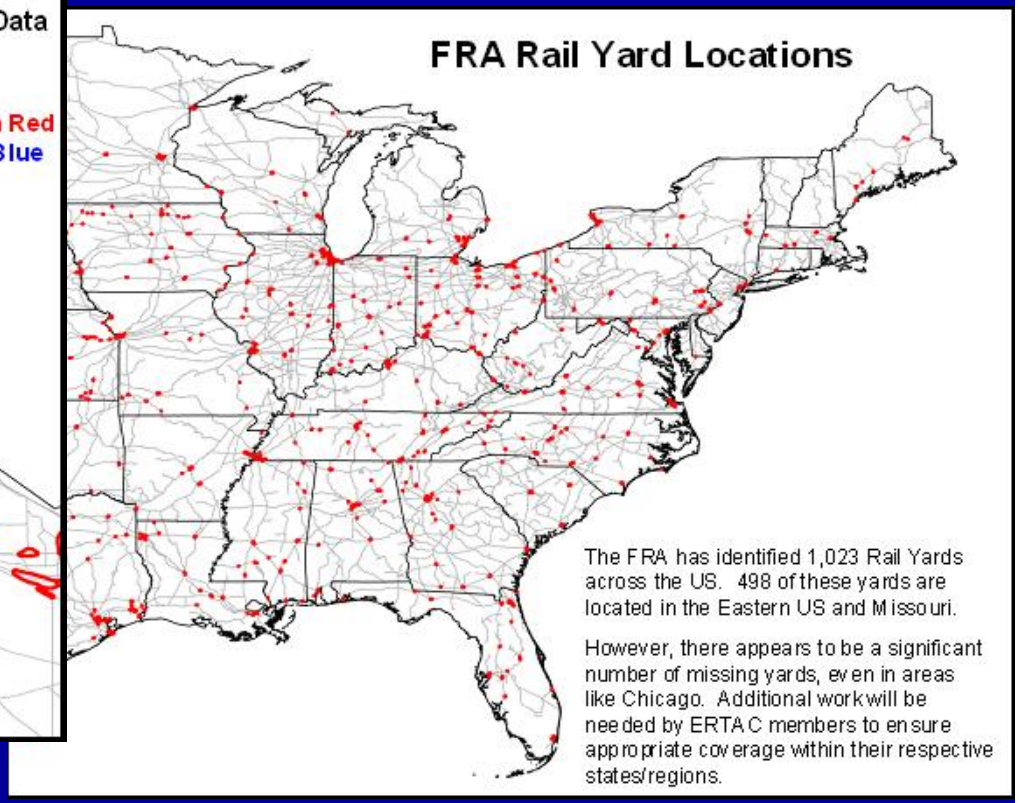
- Location and extent of yards.
- Number and mix of the normal operating switcher fleet (for more representative emission factors and fuel use estimates).
- Fuel consumption estimates (either per fleet-avg switcher (most likely) or for specific large yards).
- Normal/average schedules of operation.
- Other possibilities: GTM throughput, main yard activities such as classification, intermodal transfers, maintenance, and repair.

We will first focus on yards in nonattainment areas with more than about 5-10 switchers (threshold to be determined).

Rail Yards

There are significant gaps in the areas we have been able to evaluate. (FRA Draft Rail Yard Location Dataset)





Early ERTAC/Class I discussion points …

- Are the methodologies we are pursuing reasonable?
- Can datasets be made available to ERTAC in support inventory development? Or, can ERTAC support inventory development headed by the railroad community?
- Is the collaborative development of a regional/national level emissions inventory a reasonable goal?
- What are the major concerns/barriers regarding potential collaboration on this effort? How can we address them?
- Is there a point of contact or resource we can reach for questions/interpretations/etc.?

Specific

- Please consider allowing ERTAC access to the FRM GTM Dataset and providing information on yard locations and number of switchers.

Benefits of an improved rail inventory in addition to support of public health protection

- Reduce the burden of responding to disparate emissions information requests and support better inventories.
- Support the SmartWay Transport Partnership goals and demonstrate progress.
- Establish credibility in comparisons of greenhouse gas impacts and other ‘green’ endeavors.
- Quantification of potential emissions reductions for cooperative funding of advanced technologies (e.g. Genset switchers under the CMAQ or DERA programs) and of reductions due to ongoing improvements.
- Identification of potential efficiency gains in operations.

AAR/Class I participation to date …

- Voiced support for the effort and participated in discussions to solidify methodologies and explore data availability.
- Requested a national rather than regional scale approach.
- Largely permitting access to the FRA link-level activity data set (not completed yet).
- Appointed representatives to a GIS/Data workgroup tasked with collection and compilation of line-haul and railyard data.
- Aiding in determining if temporal variation is significant enough to warrant quantification.
- Collaboratively developed alternative to exact allocation of shared track emissions.
- Discussing threshold # of switchers/characteristics of railyards for inclusion in the 2008 inventory.

Other Inventory Categories

- **Class II/III Railroads**
  - **Drafted data needs and potential inventory development methods.**
  - **Contacted and 'met' with Class II/III industry organization (ASLRRA).**
  - **Will contact larger Class II/III companies to discuss approaches and data needs.**
  - **No consistent data set appears available, may use combination of solicitation and surrogates.**
- **Commuter/Passenger Rail**
  - **No progress to date (small component for most states, may neglect).**

We welcome any input and participation …
Thank you!

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