



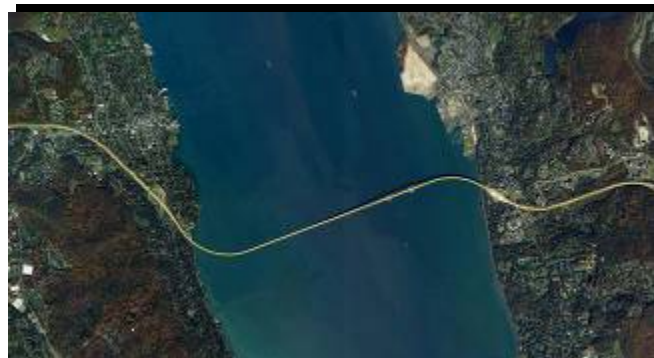
TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

**New York State Department of Transportation
Metropolitan Transportation Authority Metro-North Railroad
New York State Thruway Authority**

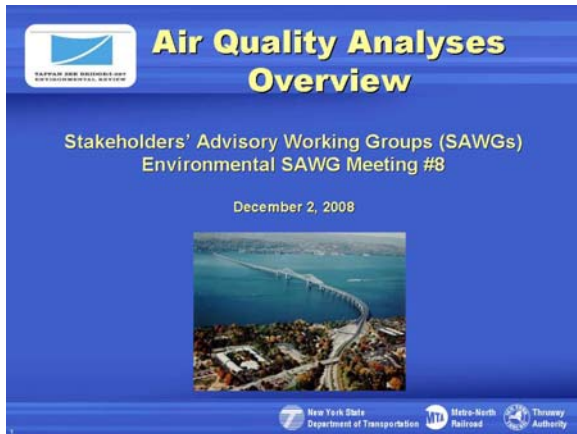
Presentation

***Stakeholders' Advisory Working Groups (SAWGs)
Environmental SAWG Meeting #8***

***Tappan Zee Bridge/I-287 Corridor
Environmental Review***



December 2, 2008



Slide 1

This presentation focuses on the availability air quality background information and impact analysis approaches to be used for the EIS study.



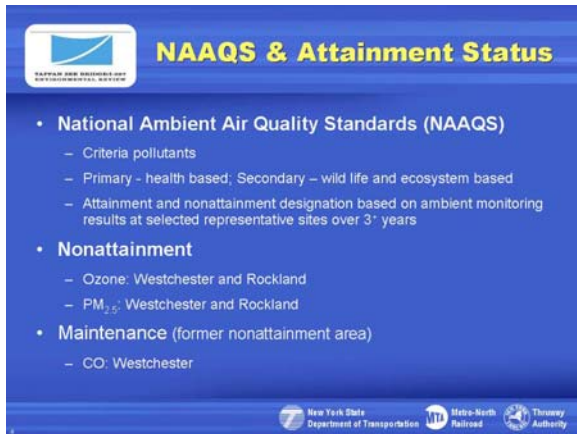
Slide 2

The topics to be covered include pollutants, existing background data, potential project-related emitting sources, general emissions trends, analysis requirement and approaches.



Slide 3

This first topic discusses the pollutants that will be addressed in the EIS.



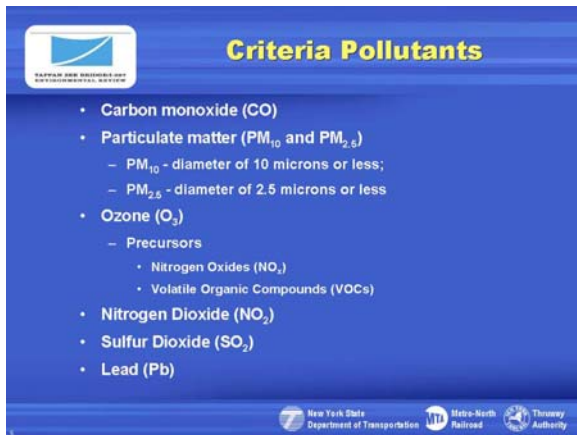
NAAQS & Attainment Status

- National Ambient Air Quality Standards (NAAQS)
 - Criteria pollutants
 - Primary – health based; Secondary – wild life and ecosystem based
 - Attainment and nonattainment designation based on ambient monitoring results at selected representative sites over 3+ years
- Nonattainment
 - Ozone: Westchester and Rockland
 - PM_{2.5}: Westchester and Rockland
- Maintenance (former nonattainment area)
 - CO: Westchester

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Slide 4

Clean Air Act established ambient standards for six criteria pollutants to protect human health, wild life, etc. The country has been broken down into various air quality control regions that are designated as either in attainment or nonattainment with respect to these standards. Some areas have been re-designated as attainment after being initially designated as nonattainment and are now called maintenance areas.



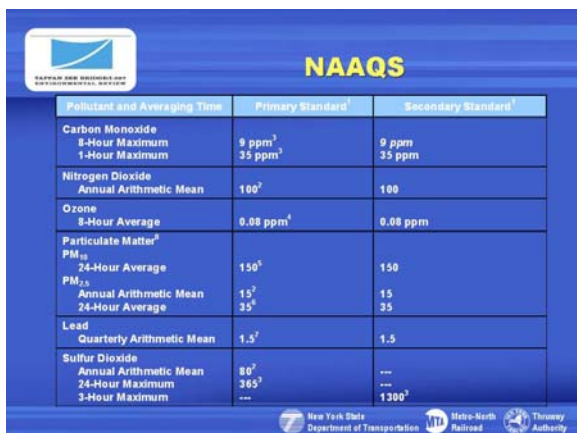
Criteria Pollutants

- Carbon monoxide (CO)
- Particulate matter (PM₁₀ and PM_{2.5})
 - PM₁₀ – diameter of 10 microns or less;
 - PM_{2.5} – diameter of 2.5 microns or less
- Ozone (O₃)
 - Precursors
 - Nitrogen Oxides (NO_x)
 - Volatile Organic Compounds (VOCs)
- Nitrogen Dioxide (NO₂)
- Sulfur Dioxide (SO₂)
- Lead (Pb)

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Slide 5

This slide provides the names of specific criteria pollutants and precursors of ozone.



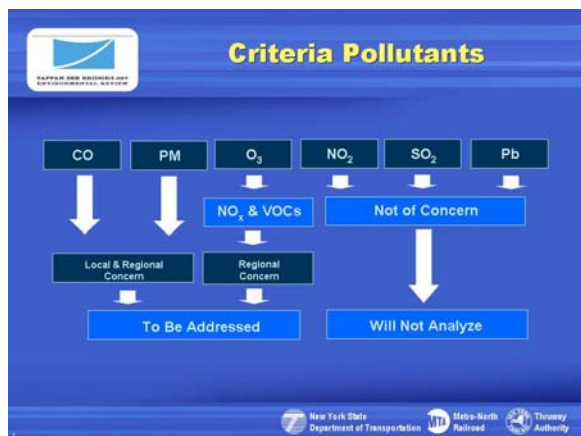
NAAQS

Pollutant and Averaging Time	Primary Standard ¹	Secondary Standard ¹
Carbon Monoxide		
8-Hour Maximum	9 ppm ²	9 ppm
1-Hour Maximum	35 ppm ³	35 ppm
Nitrogen Dioxide		
Annual Arithmetic Mean	100 ²	100
Ozone		
8-Hour Average	0.08 ppm ¹	0.08 ppm
Particulate Matter ⁴		
PM ₁₀		
24-Hour Average	150 ⁵	150
PM _{2.5}		
Annual Arithmetic Mean	15 ²	15
24-Hour Average	35 ⁶	35
Lead		
Quarterly Arithmetic Mean	1.5 ²	1.5
Sulfur Dioxide		
Annual Arithmetic Mean	80 ²	---
24-Hour Maximum	365 ³	---
3-Hour Maximum	---	1300 ³

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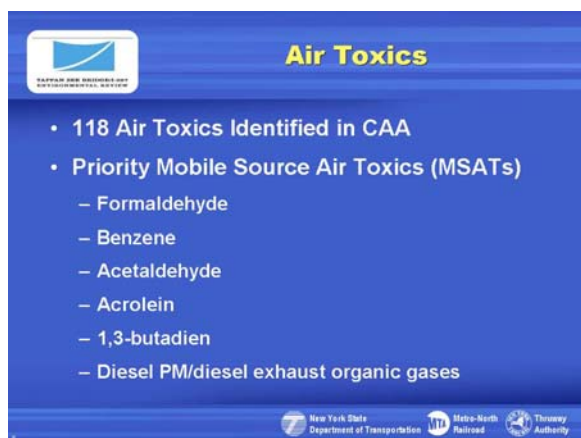
Slide 6

Specific ambient standards for criteria pollutants were established in two categories. Our focus in the study will be on the human health-based primary standards. But primary standards are mostly the same as the secondary standards. These standards were established over various time averaging periods.



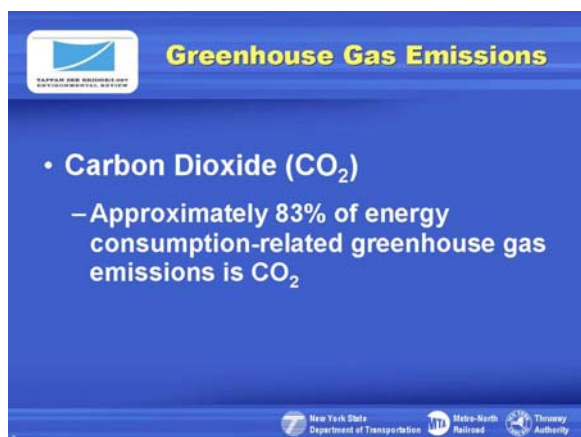
Slide 7

CO, PM, and O₃ precursors (NO_x and VOC) are of concern because they are released from mobile and construction sources. NO₂ and SO₂ are not of concern for the project because they are mainly released from stationary smoke stacks. Pb is not of concern because it has been eliminated through mandated use of unleaded fuels for mobile sources.



Slide 8

Clean Air Act also identifies 118 air toxic pollutants in addition to criteria pollutants. Among them, six pollutants are considered the main concerns associated with mobile sources.



Slide 9

The increasing concern about global warming results in a concern over greenhouse gas emissions. Although this is an evolving new issue and the EIS will address these emissions.

The next topic presented is air quality conditions.

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Permanent Monitoring Locations

The map displays the Hudson River and the Tappan Zee Bridge. Key locations marked include Suffern, Orange, Nyack, Newburgh, and New York City. The Tappan Zee Bridge is shown crossing the river. The New York State Thruway and Metro-North Railroad are also indicated. A legend at the bottom left shows a red dot for 'Ambient Monitoring Locations' and a black square for 'Center Study Sites'. The map is titled 'TAPPAN ZEE BRIDGE ENVIRONMENTAL MONITORING'.

The data from the closest permanent monitoring stations will be used as the background conditions for the project area. These stations include those in Westchester, Orange, and Bronx Counties.

Monitoring Levels at Permanent Locations

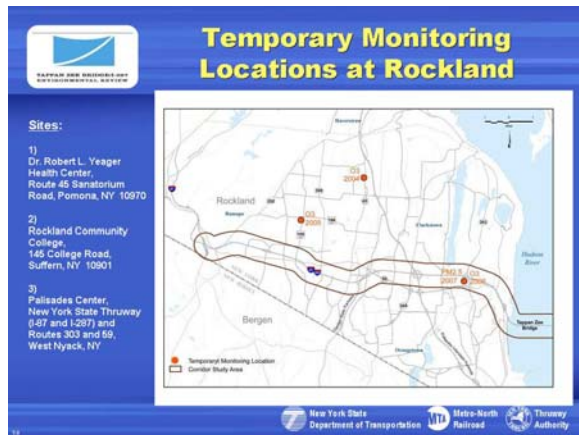
Pollutant and Averaging Time	Monitored Data			Primary Standard	Monitoring Site Location
	2006	2006	2007		
Carbon Monoxide (CO) 8-hour (ppm) 1-hour (ppm)	2.5 3.9	1.9 2.6	1.9 2.3	9 35	New York City (Bronx) 200 th St. & Southern Blvd.
Ozone (O ₃) 8-hour 4 th Maximum (ppm) Average 8-hour 4 th Maximum (ppm) over 3 years (2005-2007)	0.095 -	0.063 0.091	0.095 -	0.08	Westchester (White Plains) Pump Station Orchard St.
Ozone (O ₃) 8-hour 4 th Maximum (ppm) Average 8-hour 4 th Maximum (ppm) over 3 years (2005-2007)	0.087 -	0.077 0.063	0.084 -	0.08	Orange (Middletown) 1175 Route 17A
Particulate Matter PM ₁₀ 24-Hour Maximum (µg/m ³)	55	-	-	150	New York City (Bronx) E156th St. Monitor #4
Particulate Matter PM _{2.5} Annual Arithmetic Mean (µg/m ³) 24-Hour 98 th Percentile (µg/m ³)	12.4 32.8	11.0 34.4	11.7 30.6	15 35	Westchester (Mamaroneck) 8 th Ave. & Madison
Particulate Matter PM _{2.5} Annual Arithmetic Mean (µg/m ³) 24-Hour 98 th Percentile (µg/m ³)	12.1 29.6	9.74 27.6	10.6 30.4	15 35	Orange (Newburgh) 65 Broadway

Source: AIRDATA – Monitoring Values Report for New York, USEPA 2008.

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Slide 13

This table shows the monitored levels in past three years at those closest permanent stations. Ozone levels show some exceedances and PM2.5 levels are close the NAAQS. For analysis purposes, these levels can be used as the conservative background conditions for Rockland County.



Slide 14

Rockland does not have permanent monitoring stations with year long data. Since 2004, DEC has collected summer season ozone and PM2.5 data at several temporary stations in Rockland. These temporary data show a consistent pattern as compared to the levels collected at those permanent stations in the neighboring counties.

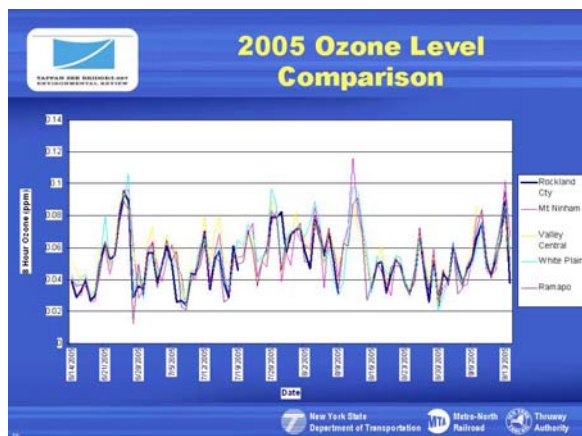
Monitoring Levels at Temporary Locations

- Summer season levels at Rockland since 2004
- Conditions in Rockland are similar to the levels collected in adjacent counties (Westchester and Orange)

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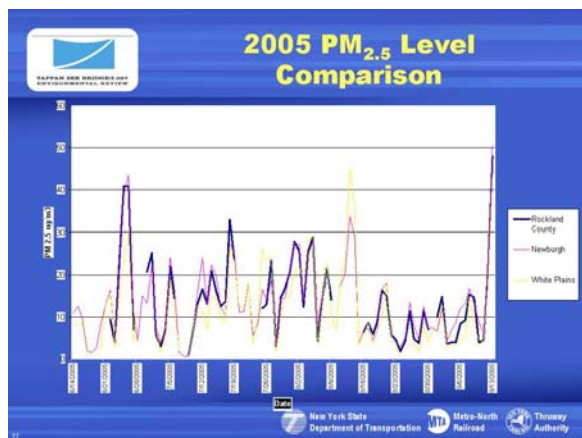
Slide 15

Based on these temporary summer season data, ozone and PM2.5 levels in Rockland are similar to the levels in the neighboring counties.



Slide 16

The chart developed by DEC shows 2005 ozone levels are consistent among various neighboring county sites.



Slide 17

2005 PM_{2.5} levels also show similar consistent patterns among various monitoring sites.

2005 - 2007 Ozone Level Comparison

Station	4 th Highest Daily Maximum 8-Hour Average			
	2005	2006	2007	Avg
White Plains	.095	.083	.095	.091
Valley Central	.087	.077	.084	.082
Millbrook	.082	.064	.078	.074
Mt. Ninham	.096	.074	.086	.085
Rockland (Palisades Ctr.) 06/01 – 09/30	N/A	.077	.082	N/A

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Slide 18

2006 and 2007 Palisades Mall ozone data show similar levels as collected at sites in neighboring counties.

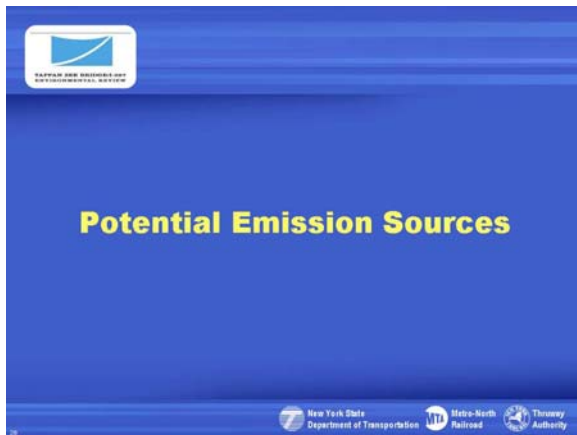
2006 – 2007 PM_{2.5} Level Comparison

Station	2006 Highest Values, ug/m ³			2007 Highest Values, ug/m ³		
	1 st	2 nd	3 rd	1 st	2 nd	3 rd
Newburgh	44.7	44.1	34.5	45.8	41.0	40.9
Mamaroneck	39.8	36.6	34.4	35.5	31.0	30.6
White Plains	43.0	39.0	38.5	48.3	42.7	36.6
Rockland (Palisades Ctr.) 06/01 – 09/30	47.8	42.0	41.4	46.9	40.5	39.4

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Slide 19

2006 and 2007 Palisades Mall PM_{2.5} monitoring data show similar levels as collected in the neighboring counties.



Slide 20

The next topic describes the emission sources associated with the project.

Project Potential Emission Sources

- Highway vehicles
- Non-road vehicles and equipment

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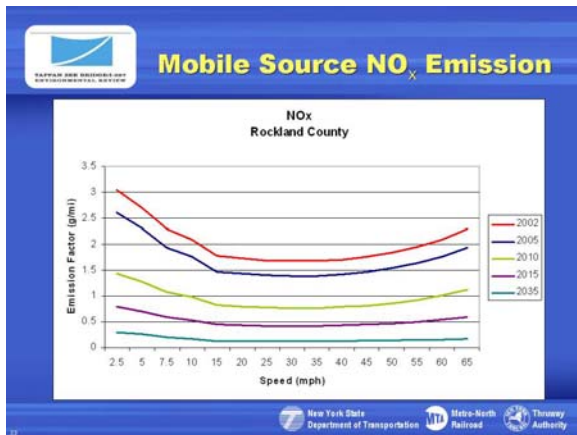
Slide 21

The project only involves mobile sources. No operations of stationary sources such as exhaust stacks will be associated with the project.



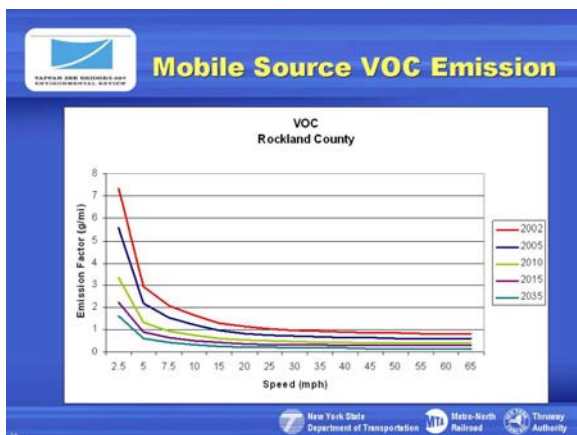
Slide 22

With regard to mobile source, what is the emission trend in emissions from these sources? Also, how do mobile source emissions change with vehicle speed?



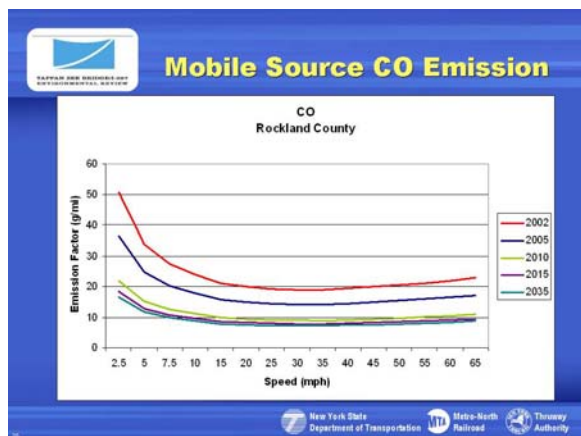
Slide 23

The mobile source emission factors as a function of speed in Rockland show that reducing congestion and improving travel speed will generally reduce emissions. This is one of the benefits to be achieved from the project. The slide also shows the trend of continuing emission reduction in the future due to federal/state emissions control programs.



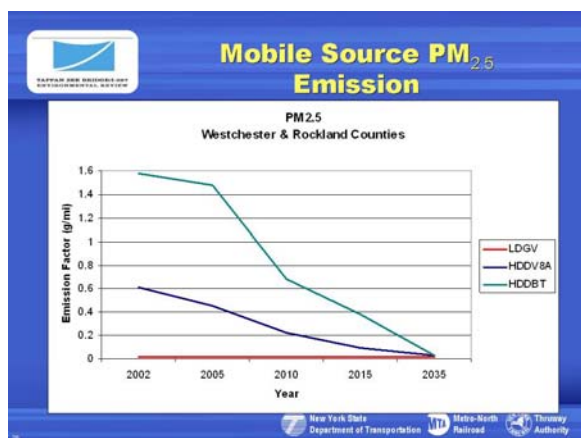
Slide 24

The reduction of VOC emissions due to an improvement in travel speed is obvious from this slide.



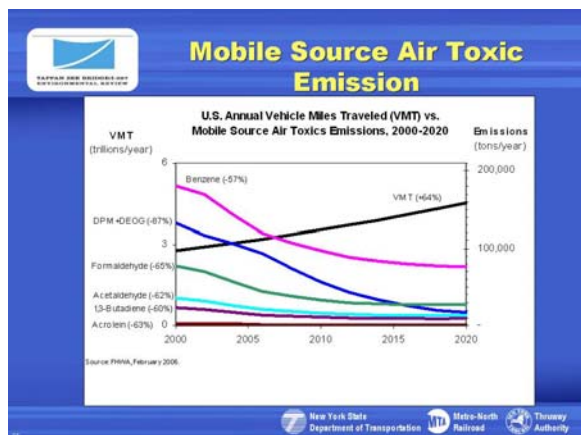
Slide 25

This slide shows the CO trend as a function of speed.



Slide 26

PM emission factors do not change with speed. This slide shows the future trend for several typical vehicles. It appears that PM emissions from heavy duty diesel vehicles including buses have been and will continue to be reduced in the future.



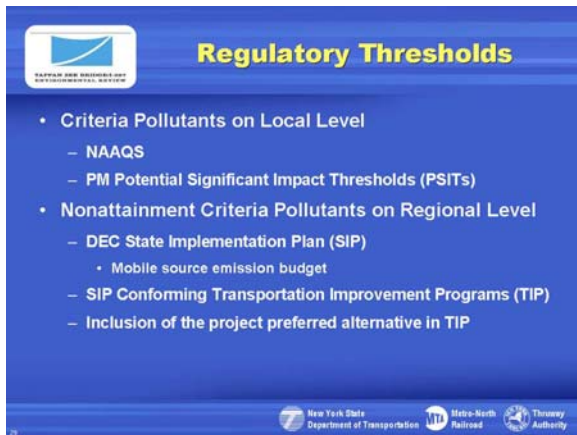
Slide 27

The previous slides covered criteria pollutants. This slide provides the national trend of mobile source air toxic emissions forecasted by FHWA. The trend as a function of time indicates that although the VMT in the future will increase, air toxic emissions will be reduced due to federal emissions control programs.



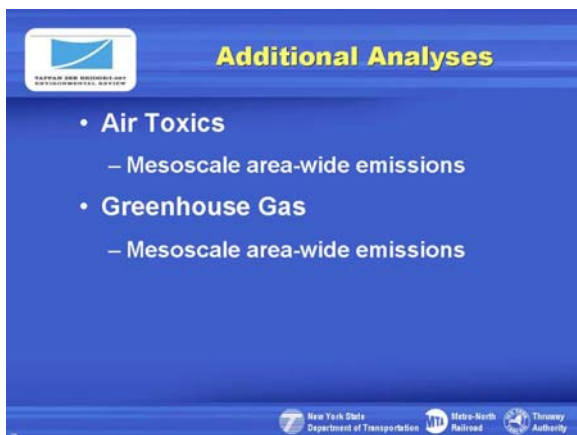
Slide 28

The next topic will address the applicable regulatory requirements for the project.



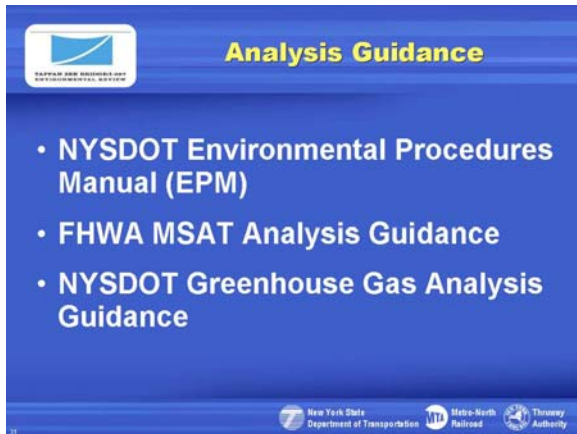
Slide 29

For criteria pollutants, the project needs to demonstrate compliance with the NAAQS on an absolute level and compliance with allowable PM increments locally. For nonattainment pollutants on regional level, the proposed action needs to be included in the TIP which has to conform with the SIP.



Slide 30

For non-criteria pollutants, mesoscale area-wide emissions estimates are required.



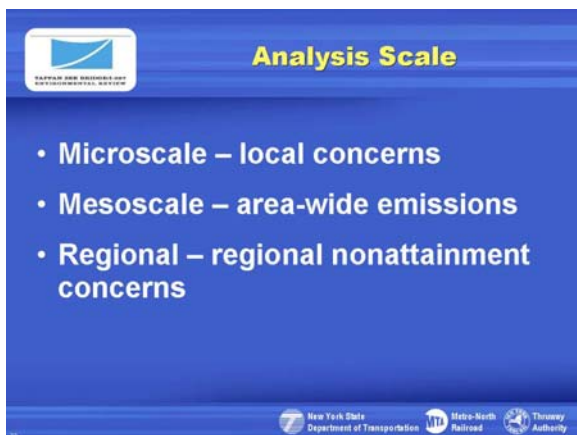
Slide 31

The slide provides the specific guidance that will be used in the air quality impact analyses. These guidance documents can be found on the agencies' websites.



Slide 32

The next topic is the analyses that will be presented in the EIS.



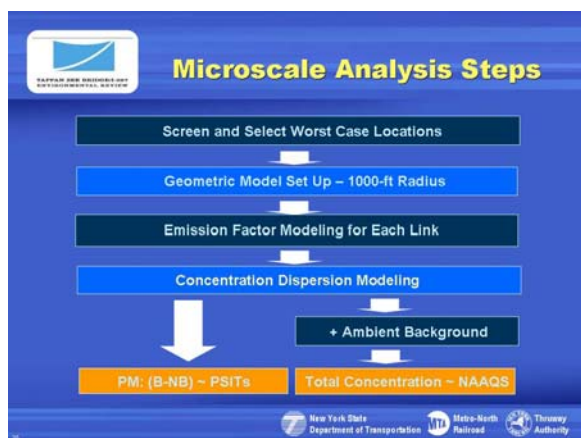
Slide 33

The microscale analysis addresses local concerns with respect to CO and PM concentrations in the air we breathe near traffic congested locations. The mesoscale and regional analyses focus on pollutant emissions over a much larger area particularly for ozone which is not released directly by emission sources.



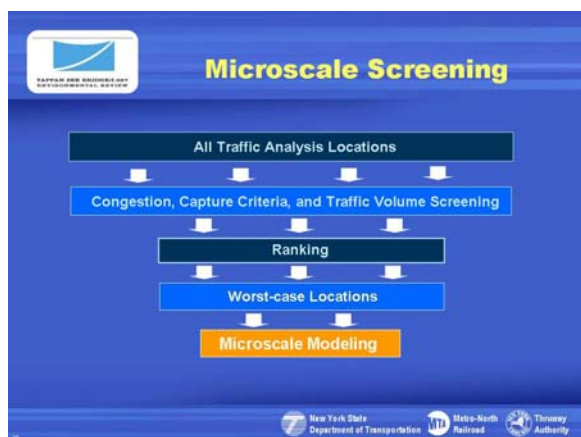
Slide 34

The Tier II Bridge and Highway analysis is presented first since it is a more refined analysis than that proposed for the Tier I Transit action



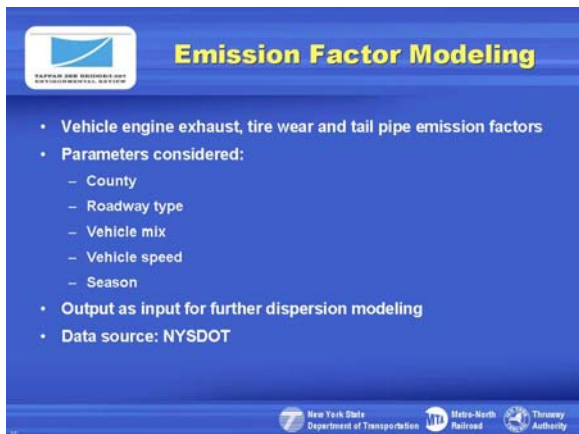
Slide 35

This slide shows the main steps to be taken for localized impact analyses. Suggestions on locations in the project area that are thought to be heavily polluted may be brought to the team's attention. The team expects that its analysis locations will overlap with those identified by the community.



Slide 36

This slide shows the screening process being followed to select the worst-case intersection locations for further microscale modeling analysis.



Emission Factor Modeling

- Vehicle engine exhaust, tire wear and tail pipe emission factors
- Parameters considered:
 - County
 - Roadway type
 - Vehicle mix
 - Vehicle speed
 - Season
- Output as input for further dispersion modeling
- Data source: NYSDOT

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Slide 37

This slide presents the factors being considered to model traffic link-specific emission factors. These emission factors will then be used in the next step of the analysis.



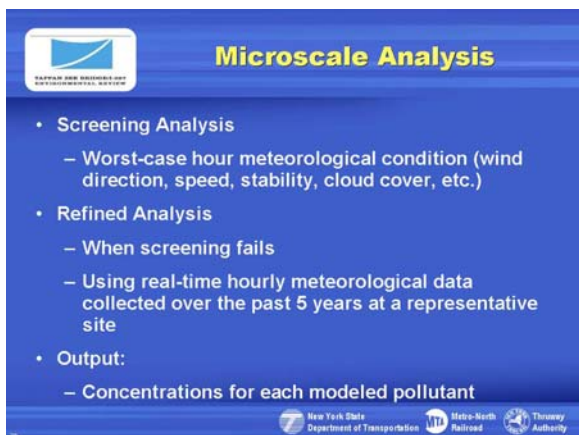
Microscale Analysis Sample Site

Diagram illustrating a typical modeling site. The site shows a complex intersection of traffic links, including a Signal, a Free Flow Link, a Departure Link, and an Approach Link. A Receptor is also indicated. The diagram is overlaid on an aerial photograph of the site.

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This is a typical modeling site. Traffic link geometry, signals, traffic data, and emissions will all need to be established as input to the dispersion model. The dispersion model will then predict downwind pollutant concentrations in publicly accessible areas.




Microscale Analysis

- Screening Analysis
 - Worst-case hour meteorological condition (wind direction, speed, stability, cloud cover, etc.)
- Refined Analysis
 - When screening fails
 - Using real-time hourly meteorological data collected over the past 5 years at a representative site
- Output:
 - Concentrations for each modeled pollutant

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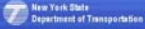
Slide 39

The model will be run in the screening mode first with worst-case meteorological data. Refined model runs will be conducted using real meteorological data if screening fails. If the refined runs fail, mitigation will be performed by changing modeling parameters such as site configuration, traffic data, etc.




Mesoscale Analysis

- Sub-region within five counties –
 - Westchester, Rockland, Orange, Bronx, Bergen
- Annual emissions (tons/year)
- Area-wide emissions for each alternative
- Alternative comparison



Slide 40


The mesoscale emissions analysis will be conducted to quantify on-road mobile source emissions over the traffic network of the five county sub-region that will be most impacted by the project. The analysis will be done for each alternative. The team expects that emissions conditions will be improved as was shown in the mode selection report.






Mesoscale Network Five County Sub-region

5-county areas -


- Westchester
- Rockland
- Orange
- Bronx
- Bergen








Slide 41

This slide shows the boundary of the mesoscale network.




Mesoscale Area-wide Emissions

- Criteria pollutants and 6 MSATs
- Sub-region (5-county area) network
- Rely on traffic forecasts along each link
 - Volume and speed
 - Link length and roadway type
- Predict emission factors for each link
- Calculate emissions
 - Tons per year pollutant for each alternative



Slide 42

This slide summarizes the steps to be taken to calculate mesoscale emissions.




Mesoscale Emissions Greenhouse Gas

- Determine energy consumed from highway operations and construction activities
- Calculate CO₂ emissions using energy indices

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Slide 43

This slide shows the method proposed to predict CO₂ mesoscale emissions.




Regional Impact

- State Implementation Plan (SIP)
 - Develop nonattainment pollutants emissions control plans
 - Establish milestone year emissions budget
- Transportation Improvement Program (TIP)
 - MPO – NY Metropolitan Transportation Council (NYMTC)
 - Develop TIP to conform SIP mobile sources emission budget
 - 9-County roadway network using Best Practice Model (BPM)
 - Projects included in TIP are exempt from regional emissions analysis
- TZ project preferred alternative will be included in the TIP

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Slide 44

Regional impacts will be addressed through the inclusion of the proposed action in the TIP for which NYMTC is responsible. Project emissions have to be in conformance with the SIP that covers all sources.



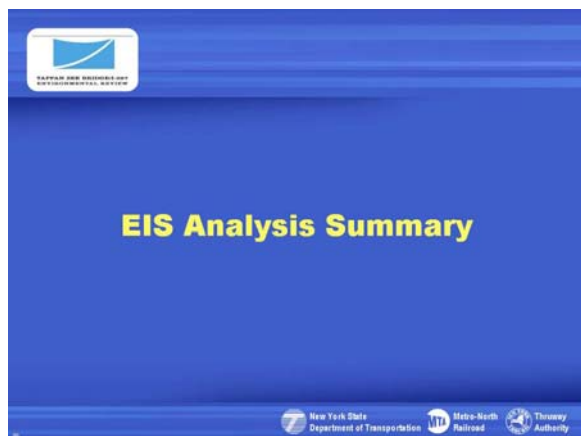
Construction Period Impact

- Microscale detour traffic CO Impact
 - Screening and refined if Maintenance and Protection of Traffic (MPT) detour last 2 consecutive CO seasons
- Mesoscale detour traffic emissions
 - Calculate if MPT detour last 5 years at one site (unlikely)
- Mesoscale area-wide equipment emissions for PM₁₀ and PM_{2.5}

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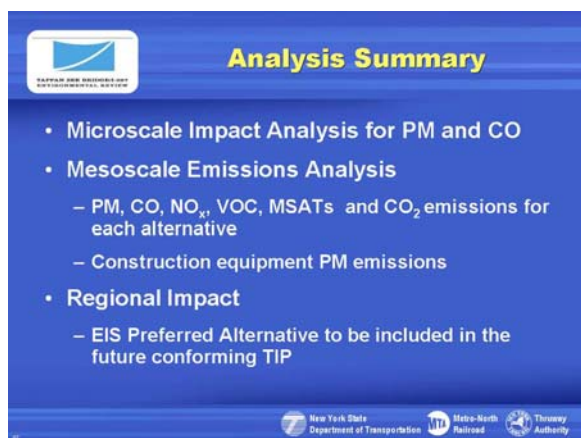
Slide 45

In addition to the operational mobile source impacts discussed above, the microscale air quality impacts of traffic detoured by construction will also be predicted using the same modeling approaches as for operations. Construction phase mesoscale emission analysis will focus on equipment-related PM emissions.



Slide 46

This completes the presentation.



Slide 47

A summary of the pollutants, scale, and issues to be addressed in the EIS is presented on this slide.



Slide 48

End slide.