Study Session #2
Air Quality, Health Risk & Greenhouse Gas Technical Studies

August 2, 2012
1. Improve air quality and public health
2. Improve traffic safety
3. Provide a modern design for the I-710
4. Address projected traffic volume increase
5. Address projected growth in population, employment and economic activity related to goods movement
Project Alternatives Review

No Build Improvements
- Planned and Committed Projects in 2008 RTIP
- Enhanced Goods Movement by Rail
- Clean Trucks Program
- Expanded Night Gate Ops at Ports
- I-710 Pavement Rehabilitation
- Traffic Signal coordination

TSM/TDM and ITS
- Ramp Metering
- Improved Arterial Signage
- Peak Period Parking Restrictions
- Increased Transit Service
- Upgraded Traffic Signals (ITS)

Arterial System Improvements
- Signal Timing Improvements
- Local Arterial Intersection Improvements at 42 Locations

I-710 Widening
- Widen the I-710 up to 10 Lanes
- Modernize Geometric Design of all of the Local I-710 Interchanges

Freight Corridor
- Separate Four-Lane Freight Corridor

Alternative 1
- No Build Improvements

Alternative 6B
- Zero Emissions
- Automated Guidance
- Freight Corridor
- I-710 Widening
- Modernize I-710 Geometrics
- Arterial System Improvements
- TSM/TDM & ITS
- No Build Improvements

Alternative 5A
- I-710 Widening
- Modernize I-710 Geometrics
- Arterial System Improvements
- TSM/TDM & ITS
- No Build Improvements

Alternative 6A
- Freight Corridor
- I-710 Widening
- Modernize I-710 Geometrics
- Arterial System Improvements
- TSM/TDM & ITS
- No Build Improvements

Alternative 6C
- Tolling Feature
- Zero Emissions
- Automated Guidance
- Freight Corridor
- I-710 Widening
- Modernize I-710 Geometrics
- Arterial System Improvements
- TSM/TDM & ITS
- No Build Improvements
Air Quality and Health Risk Background

- **SCAQMD Air Quality Management Plan**
  - Air quality will improve as Plan is implemented
  - New standards will require new plans

- **SCAQMD MATES III**
  - Highest risk areas in port areas, goods movement corridors

- **San Pedro Bay Ports’ Clean Air Action Plan (CAAP)**
  - Goal: 85% reduction in risk by 2020 (forecast: 74% reduction)
I-710 Air Quality Study Areas

1. South Coast Air Basin Study Area
2. I-710 Area of Interest
3. Near Roadway Study Area
Key Analyses

Air Quality and Health Risk: Putting It All Together
Project Alternative Incremental Impact Changes for all Analyses

- **Emissions**
  - NOx
  - CO
  - PM$_{2.5}$
  - PM$_{10}$
  - VOCs
  - SO$_x$
  - Air Toxics

- **Pollutant Concentrations**
  - NO$_2$
  - CO
  - PM$_{2.5}$
  - PM$_{10}$

- **Health Risk**
  - Cancer Risk
  - Hazard Indices (Acute, Chronic)

- qualitative in italics
**Brief Review of AQ/HRA Analyses**

<table>
<thead>
<tr>
<th>Typical EIR/EIS</th>
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<tbody>
<tr>
<td>✓ Carbon Monoxide (CO) quantitative assessment and local “hotspot” dispersion modeling of CO concentrations for conformity analysis</td>
</tr>
<tr>
<td>✓ PM2.5/PM10 (particulate matter/dust) <em>qualitative</em> assessment for conformity analysis</td>
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<tr>
<td>✓ Diesel Exhaust qualitative assessment (identify sensitive receptors)</td>
</tr>
<tr>
<td>✓ Mobile Source Air Toxics (MSAT) qualitative assessment</td>
</tr>
<tr>
<td>✓ Construction impacts (identify standard emission/dust control measures)</td>
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<tr>
<td>✓ Greenhouse Gases quantitative assessment</td>
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<tr>
<td>✓ Construction emissions quantification (total project)</td>
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<tr>
<td>✓ Full dispersion modeling of ambient concentrations of criteria pollutants near the I-710</td>
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<tr>
<td>✓ Full dispersion modeling health risk assessment for six Priority MSATs near the I-710</td>
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<tr>
<td>✓ Qualitative Ultrafine Particulate incremental impact analysis</td>
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<tr>
<td>✓ Qualitative PM2.5 Mortality incremental impact analysis</td>
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Air Quality Key Findings

In the Project Study Area

• Emissions generally ↓ in 2035 (all alternatives) compared to 2008

• Emissions generally ↓ for the Build Alternatives compared to the 2035 No-Build Alternative (particularly away from the I-710)
NOx Emissions Changes

Relative Comparison of Project Alternatives to 2008 Baseline NOx Emissions
Diesel Particulate Matter (DPM) Changes

Relative Comparison of Project Alternatives to 2008 Baseline DPM Emissions

![Bar chart showing relative comparison of DPM emissions for different analysis years and alternatives.](chart_image)

Legend:
- Green square: DPM Emissions in I-710 Area of Interest
- Black square: DPM Emissions in I-710 Near Roadway Study Area

- 2008
- 2035 Alt 1
- 2035 Alt 5A
- 2035 Alt 6A
- 2035 Alt 6B
- 2035 Alt 6C

Analysis Year/Alternative
I-710 Near-Roadway Modeling

• Compared to 2008
  – Health risks and NO$_2$ ↓
  – Exhaust particulate matter ↓

• Compared to 2035 No-Build (Alt. 1)
  – Alts 6B & 6C: cancer risk less than Alt. 1 (except at north end)
  – Alts 5A & 6A: cancer risk greater than Alt. 1
  – Some near-freeway concentration impacts
  – Alternatives 6B and 6C generally have lowest impacts

• Zero Emissions Extension Design Option provides similar air quality benefits between I-5 and SR 60
Identifying Benefits and Impacts: Figures

- Air Quality and Health Risk Parameters
  - Emissions
  - Concentrations
  - Cancer Risk
- Comparisons of Project Alternatives with the 2008 Baseline and 2035 No-Build Scenario (Alternative 1)
Emissions

- Based on traffic analysis, emission regulations
- Criteria and air toxic pollutants
- Appendix R and the AQ/HRA Report figures

Diesel Particulate Matter (DPM) Example (Alternative 6A)
Exhaust Emissions and Mobility

NOx Emission Factor Comparison (All Diesel Vehicles)

Emissions per mile ↓ as mph ↑

Emissions per mile ↓ as mph ↑ 2008 to 2035
What the Heck is an Isopleth?

- I-710 near-roadway concentration, cancer risk impacts are plotted as isopleths of constant concentration/cancer risk
- Based on worst-case emission and computer dispersion modeling assumptions
- Appendix R and the AQ/HRA Technical Report figures

Cancer risk example (Alternative 5A)
Poster 2: Zero Emission Extension (ZEE) Option Results (Cancer Risk Comparison Example)

- Extending zero-emission truck lanes to reduce air quality and health risk impact north of the zero-emission freight corridor
- See AQ/HRA Addendum for ZEE analyses
Poster 3: Incremental PM2.5 Concentration Impacts (Alternatives Comparison Example)

1-710 Corridor Project Air Quality and Health Risk Assessment

EXHAUST Emissions (all) Regulatory model (California Air Resources Board or CARB)
- Includes tire and brake wear emissions (particulate matter (PM10 and PM2.5) emissions only)
- Analysis accounts for recent regulations (vehicles in 2035 will have lower emissions than vehicles in 2008)
- Emissions proportional to vehicle miles traveled

ENTRAIN Emissions (PM10, PM2.5 only): Dust on the roadway lifted into the air by the passage of vehicles
- EPA approach (AP-42): assumes infinite amount of roadway dust; emissions proportional to vehicle miles travelled
- CARB/SCAQMD approach (original: 1997; latest revision: 2012): finite amount of roadway dust; no increase in emissions unless length of roadway increases

*Although results using the “infinite road dust” approach are presented (“Total”), “exhaust” PM emission results likely reflect realistic total incremental PM emissions because they are the most consistent with latest CARB/SCAQMD regional method

Near I-710 Freeway Incremental PM2.5 Concentrations* (vs. 2008 Examples)

Near I-710 Freeway Incremental PM2.5 Concentrations* (vs. 2035 No-Build Examples)
Ultrafines and PM Premature Mortality*

- **Ultrafine Particulates (UFP)**
  - Exhaust PM$_{2.5}$ used in qualitative analysis
  - 2035 emissions less than 2008 (Basin, Study Area, I-710)
  - Only Alternative 6A has impacts at some modeling grid receptors (all less than 100m from I-710)

- **Premature Mortality**
  - Total PM$_{2.5}$ used in qualitative analysis
  - 2035 emissions less than 2008 except for Alt 6A near I-710
  - Potential impacts** at some modeling grid receptors less than 300m from I-710; decreases at other grid receptors

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* Analysis assumes weekday emissions for 365 days/year
** Impacts essentially the same as ultrafines if CARB/SCAQMD method used for entrained road dust
Construction Impacts: Key Findings

• Construction impacts (worst-case schedule)
  – Greatest peak-day emissions during mainline widening/shifting
  – All segment emissions, except NO\textsubscript{x}, lower than SCAQMD significance thresholds

• Mitigations: Mitigation Measures CON-16 through CON-29, including SCAQMD Fugitive Dust Rule 403

• Phasing and scheduling could further reduce peak emissions
Questions and Answers