Shunt Truck Noise Impact Evaluation

Matthew Brenner| AWMA Nuisances Conference
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Presentation Outline

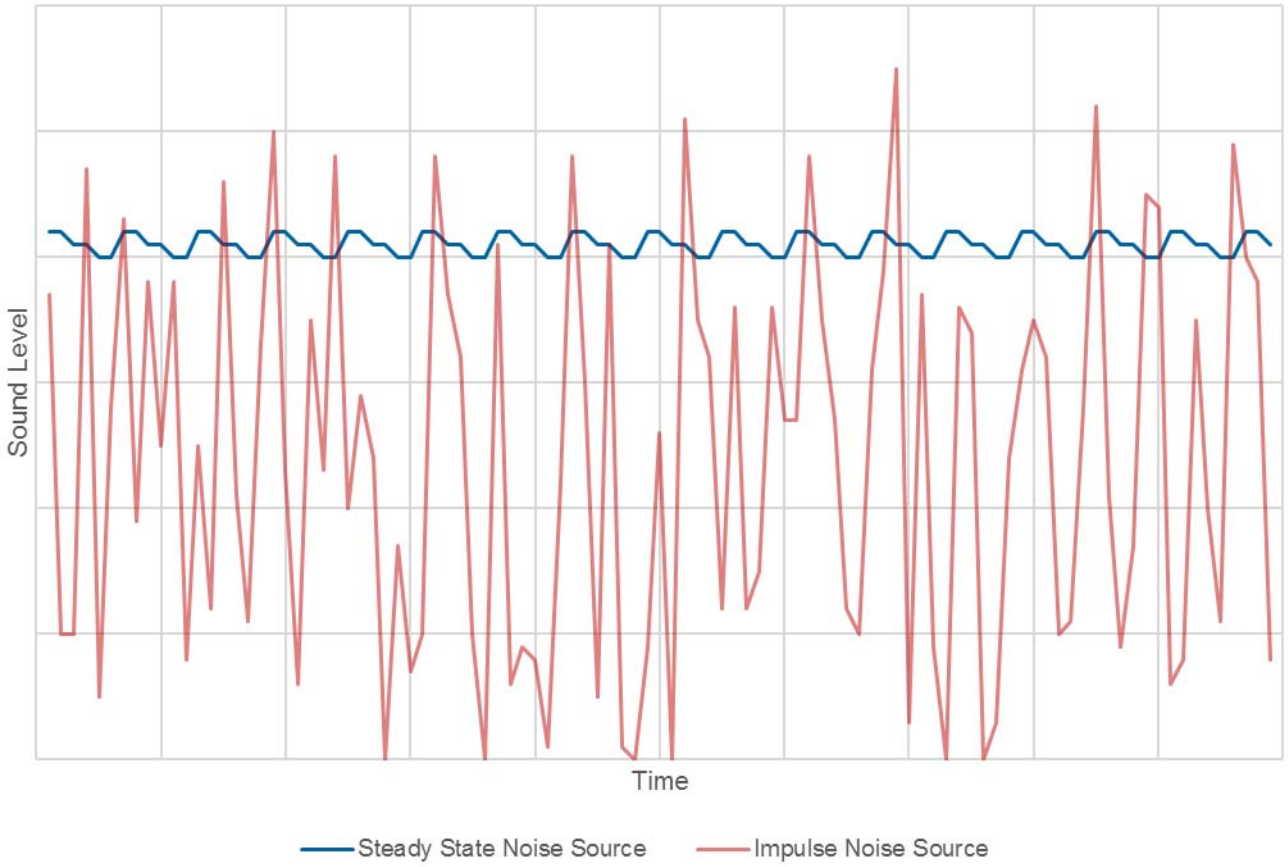
- Steady State Noise vs Impulse Noise
- Regulatory Requirements
- Truck Shunting Noise
- “Low Noise” Shunt Truck
- Measurement Campaign
- Results
- Conclusions

Steady State vs Impulse Noise
Common Examples

Steady State Noise
- Motors
- Pumps
- Fans

Impulse Noise
- Jack Hammer
- Dust Collectors
- Pneumatic Tools

Steady State vs Impulse Noise
Sound Type Comparison



Regulatory Requirements
NPC-300

Table B-1
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq}, dBA)
Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55

Table B-3
Exclusion Limit Values for Impulsive Sound Level (L_{LM}, dBAI)
Outdoor Points of Reception

Time of Day	Actual Number of Impulses in Period of One-Hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
	7 to 8	55	55	50	60
	5 to 6	60	60	55	65
	4	65	65	60	70
	3	70	70	65	75
	2	75	75	70	80
	1	80	80	75	85

Regulatory Requirements
Noise Complaints

- Compliance ≠ No Noise Complaints

- Quantitative Assessments

  Based on annoyance, nuisance, or likelihood to cause disturbance.

- Tonal Penalty (NPC-104)

  "If a sound has a pronounced audible tonal quality such as a whine, screech, buzz, or hum then the observed value shall be increased by 5."

Truck Shunting Noise Process

5th Wheel / Shoe

Kingpin

Truck Shunting Noise Process

Truck Shunting Noise
Additional Details

- Drivers are trained to hit the trailer hard to ensure a good connection.

- Significant variation due to:
  - Drivers
  - Trailers
  - Site Conditions
  - Connection Angle

“Low Noise” Shunting Truck
Noise Reduction Components

- **Low Profile 22.5” Tires**

  Lowers 5th wheel height to 44.2”. This will allow the truck to gently reverse under a standard 47” coupler height trailer to avoid impact with the trailer and truck frame.
- **Extended Rear Beavertail**

  Reduces rear frame angle so trailer slides up frame to couple with the 5th wheel.

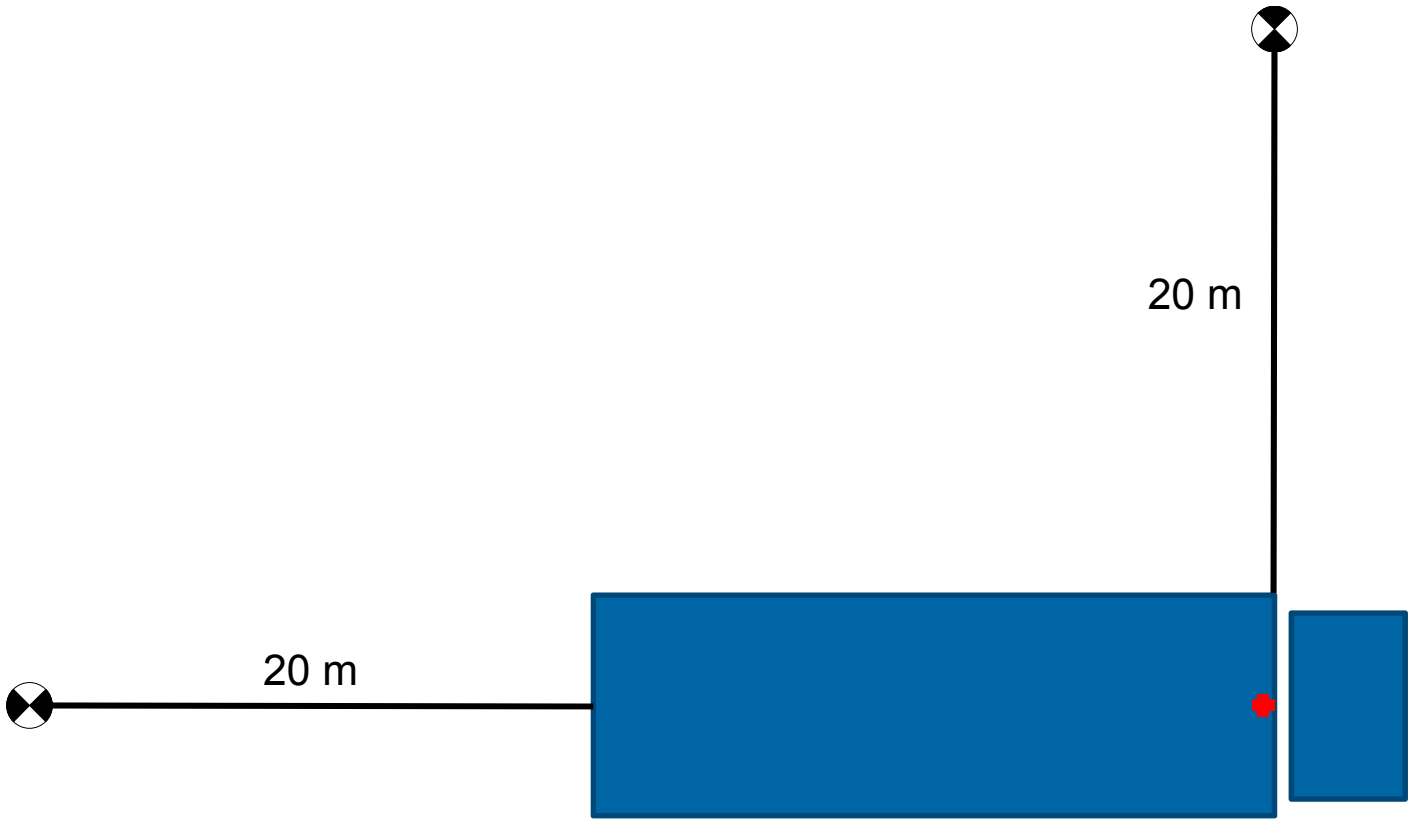
- **Reprogrammed Transmission Shift Points**

  Transmission is programmed to shift at lower engine RPM.
- ***2* Speed Engine Fan Clutch**

  When engine is at optimal temperature and fan clutch is off, the noise reduces 10 dB when measured outside of the truck

“Low Noise” Shunting Truck
5th Wheel Comparison

Measurement Campaign
Measurement Positions



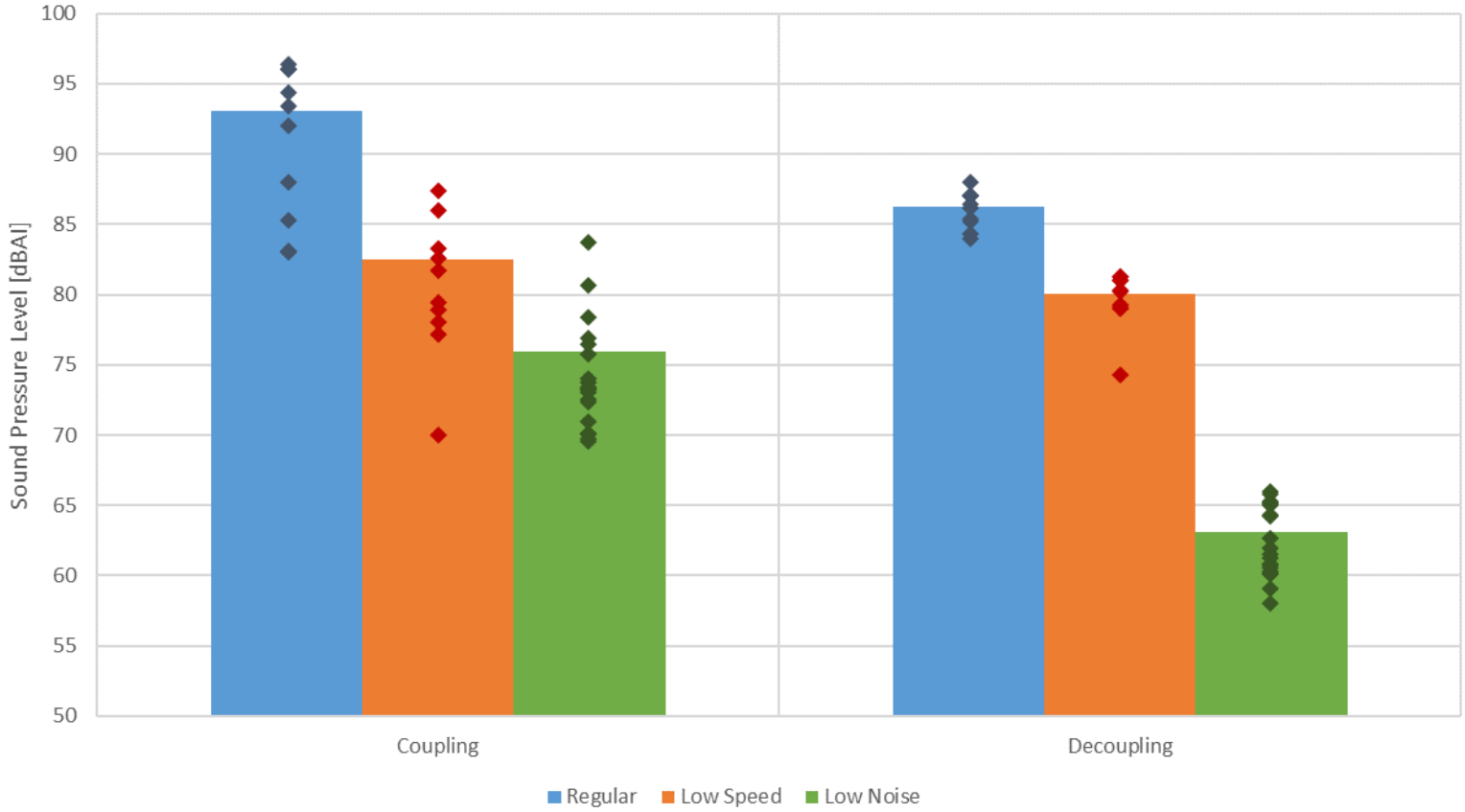
Measurement Campaign
Measurement Details

1. Measured at a height of 1.5 m
2. Minimum 20 impulses measured
3. Impulses measured simultaneously at both positions.
4. Sound level meters configure for impulse time weighting
5. All trailers were empty
6. Both trucks used diesel engines

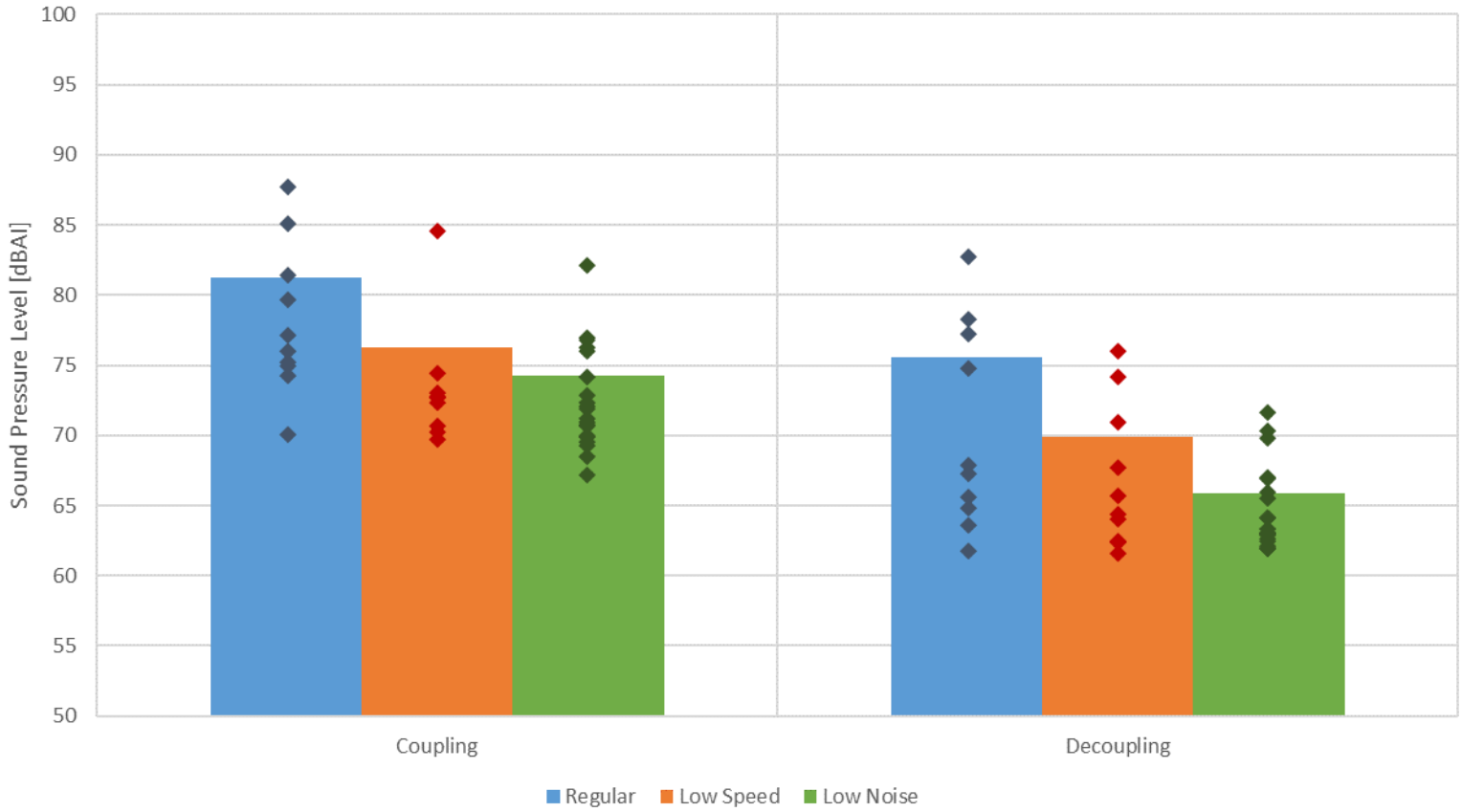
Measurement Campaign
Measurement Variants

1. Regular Shunt Truck Operations
2. Regular Shunt Truck, Restricted to <15 km/h
3. “Low Noise” Shunt Truck, Regular Operations

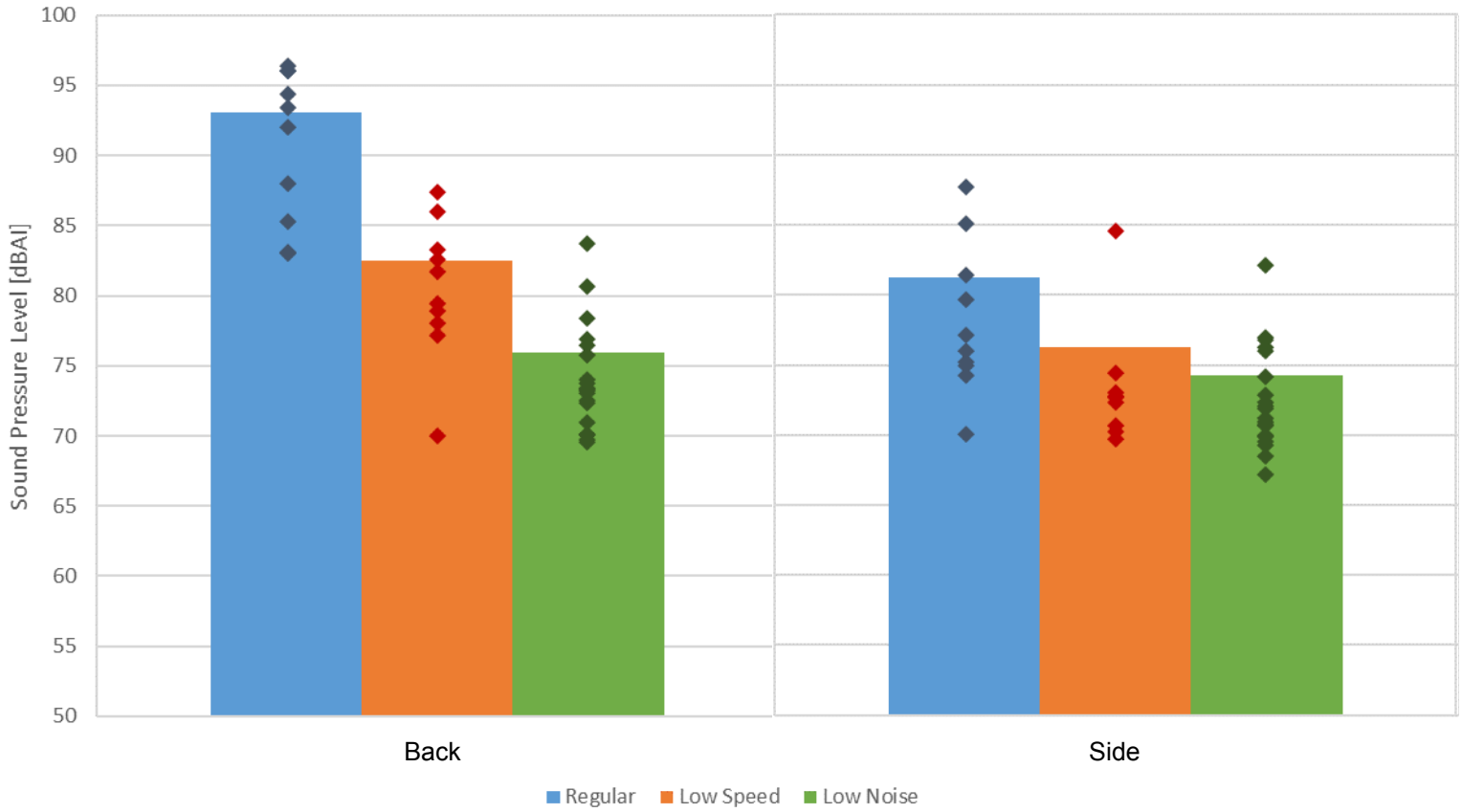
Results
Back Measurement Position



Results
Side Measurement Position



Results
Measurement Positions (Coupling Impacts)



Conclusions

- Regular Shunt Truck, Restricted to <15 km/h
  - Lower magnitude of noise impact
  - Audible “Screech” during connection, more likely to cause noise complaints
  - Harder to enforce
- Position of Trucks
  - Parking at a 90 degree angle to sensitive noise land uses could significantly reduced the noise impacts and potential complaints from regular shunt trucks.
- Low Noise Shunt Truck
  - Substantial noise reduction
  - Position still a factor

Questions?

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