

Background: Vehicle Noise

Decibels, logarithmic vs. linear: At its most basic level noise is measured in decibels (dB), and decibels are measured on a logarithmic scale, not a linear one. As an example, a 20dB sound is 10 times louder than a 10db sound¹, not 2 times louder which is what you might expect if the scale was linear. In general, an increase of 10dB roughly corresponds to a perceived volume doubling in intensity.²

6 dB Rule: Sound dissipates as you move further away from the noise source. This can be calculated with the 6 dB Rule³. This rule states that as the distance from the noise source doubles, the decibel level declines by 6dB. For example, a UTV that emits 85dB 10 feet from the vehicle will be 79dB 20 feet away, and 73dB at 40 feet.

Other Noise Impacts: Vehicle noise can be further impacted by the type of vehicle (e.g., UTV vs. Jeep), the direction it is travelling (e.g., if the vehicle is approaching vs. passing by) as well as its speed, type of muffler, and whether vehicles are travelling individually or in groups. For example, increasing vehicle speed by 10mph will increase noise by 3dB⁴ and sound levels from two equal sources will result in a total overall increase of 3dB.⁵

EPA Study: According to the EPA⁶, outdoor noise greater than 55 dB can interfere with spoken conversation and recreation. Indoors that level is 45dB. And significant health impacts can emerge when a person is exposed to levels above 70-75 dB for an extended period.

For motorized recreation, noise is typically experienced in short bursts throughout the day as vehicles go by, which can interfere with human daily activities.

¹ Science News Explores by Carolyn Wilke, February 3, 2020

² Connecthearing.com, Hearing Protection: Volume and Decibels

³ Wkcgroupp.com, Sound Attenuation – Inverse Square Law

⁴ Nonoise.org, Noise Increases with Vehicle Speed

⁵ The EngineeringToolBox.com, Signal – Adding Decibels

⁶ EPA, March 1974, "[Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety \(PDF\)](#)."

Data Gathering: 1st Noise Testing

On Wed. 9/6/23 from 8am – 12pm we conducted vehicle noise testing in Bear Mountain & Broken Arrow.

Methodology: We used a calibrated Reed 8080 decibel meter to measure noise levels at various speeds 15mph/25mph/35mph for seven vehicle types: 1) passenger, 2) SUV/Truck, 3) Private Jeep, 4) UTV (single), 5) UTV (turbo), 6) UTV (noise dampening muffler), and 7) Pink Jeep (outfitter guide).

We set up orange cones at 150 ft., 100 ft., 50ft. and 0 ft. intervals to measure the impact of the noise source at various distances. We measured the decibel level of an approaching vehicle and another decibel measurement offset 45-50 ft. from the road.

Results: Noise results were similar in both locations as follows:

Speed Limit: A 10mph reduction in the speed limit from 25mph to 15mph resulted in a 4-5dB reduction in noise. A 20mph reduction in the speed limit from 35mph to 15mph resulted in an 8dB reduction in noise.

Muffler: A noise dampening UTV muffler reduced noise 5dB on average, and 2db-8dB depending on speed.

Vehicle Type: UTVs had the biggest impact on noise, maxing out at 86 decibels.

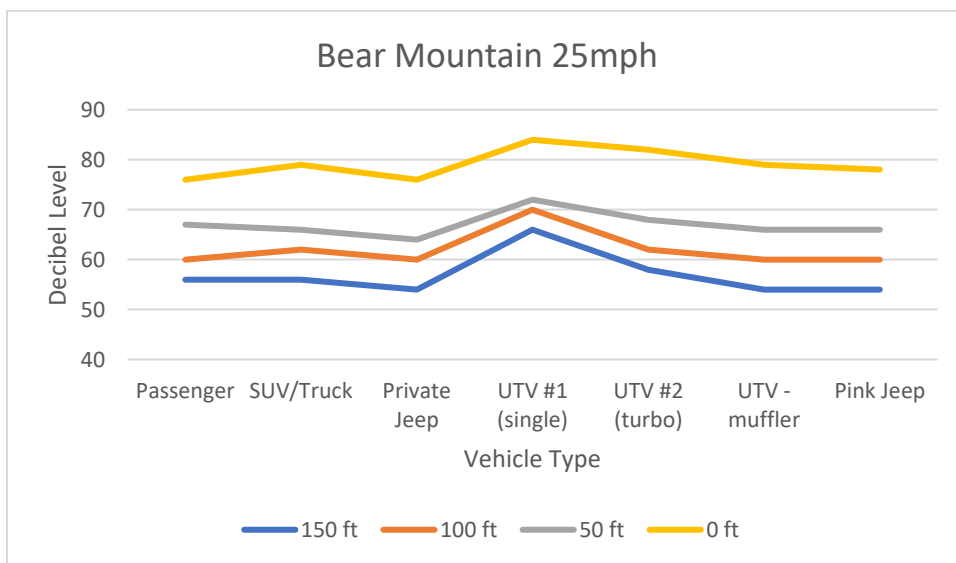
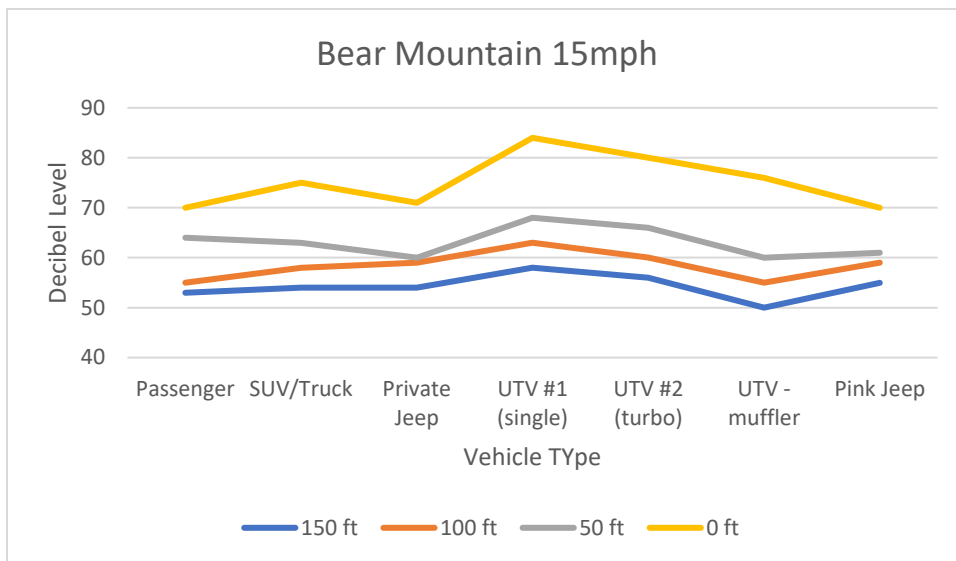
Broken Arrow: Vehicles Approaching at 25 MPH

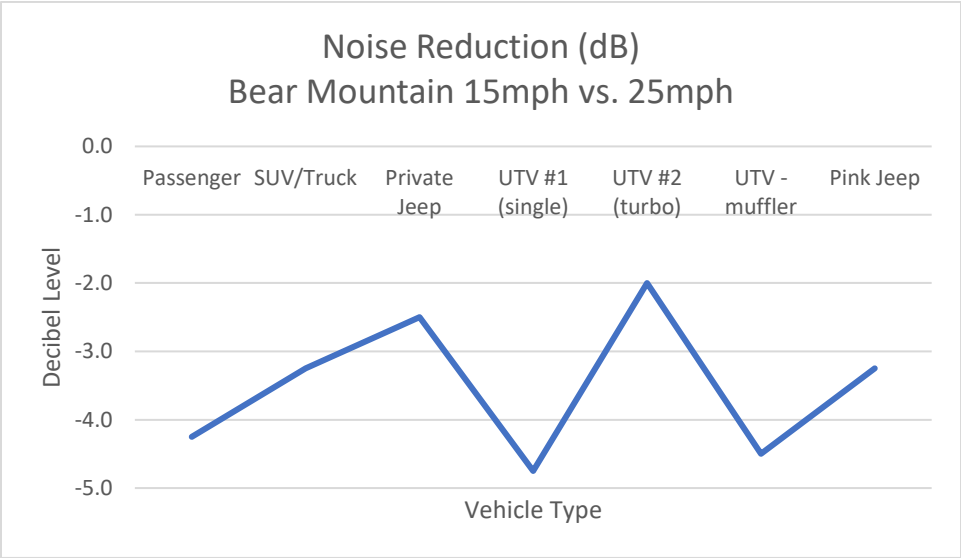
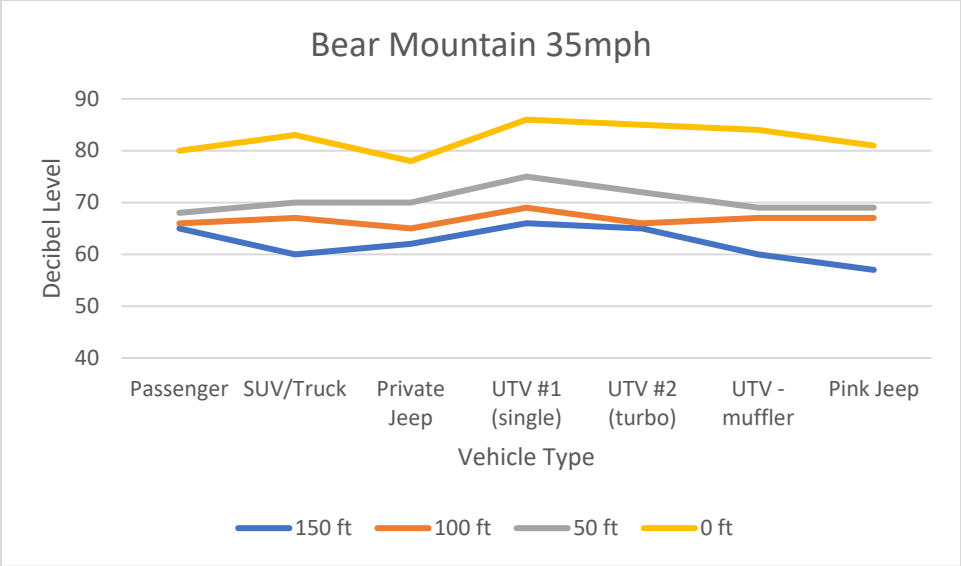
Vehicle Type	150 ft	100 ft	50 ft	0 ft	Average
Passenger	54	59	62	75	63
SUV/Truck	55	57	63	78	63
Private Jeep	55	60	63	74	63
UTV #1 (single)	63	67	71	86	72
UTV #2 (turbo)	60	63	69	83	69
UTV - muffler	59	62	66	81	67
Pink Jeep	53	55	61	75	61

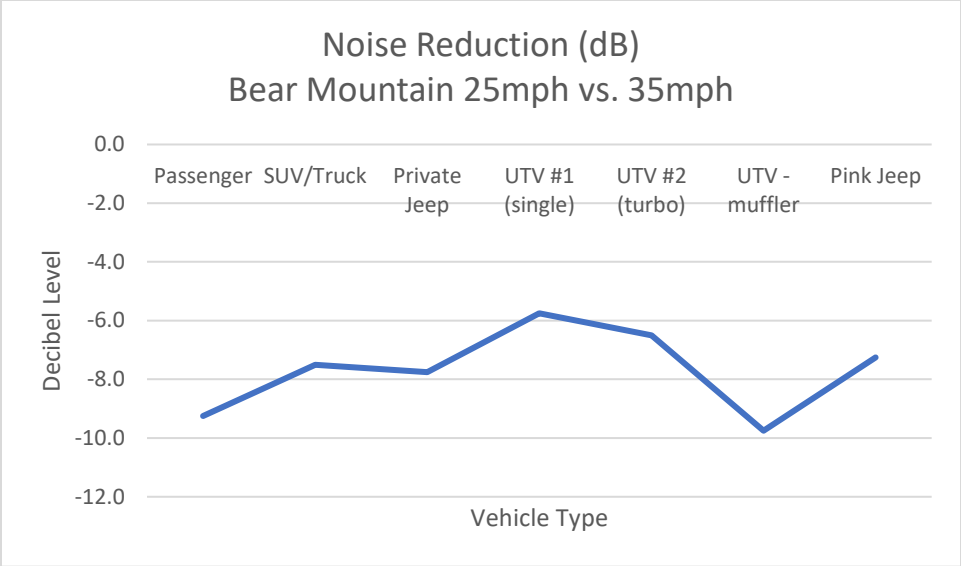
Bear Mountain: Vehicles Approaching at 25 MPH

Vehicle Type	150 ft	100 ft	50 ft	0 ft	Average
Passenger	56	60	67	76	65
SUV/Truck	56	62	66	79	66
Private Jeep	54	60	64	76	64
UTV #1 (single)	66	70	72	84	73
UTV #2 (turbo)	58	62	68	82	68
UTV - muffler	54	60	66	79	65
Pink Jeep	54	60	66	78	65

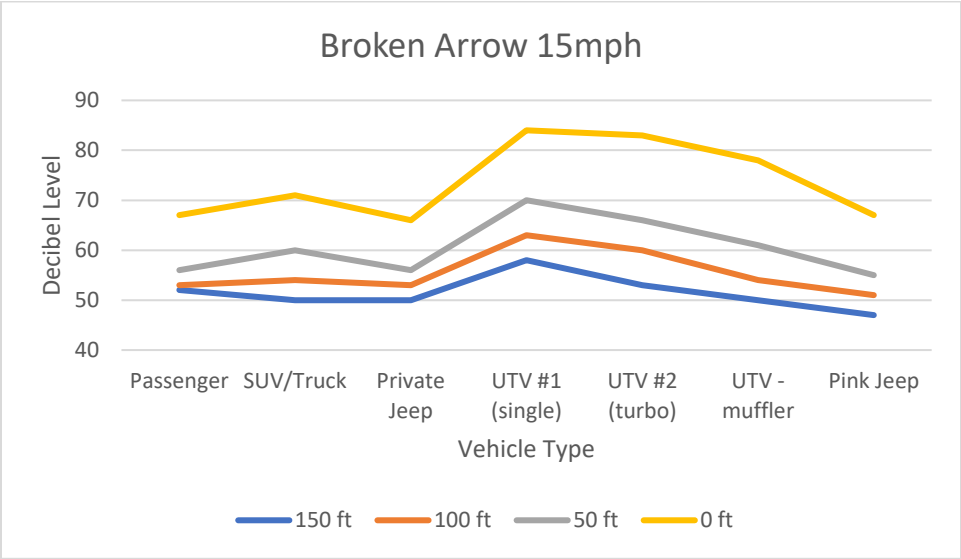
Bear Mountain

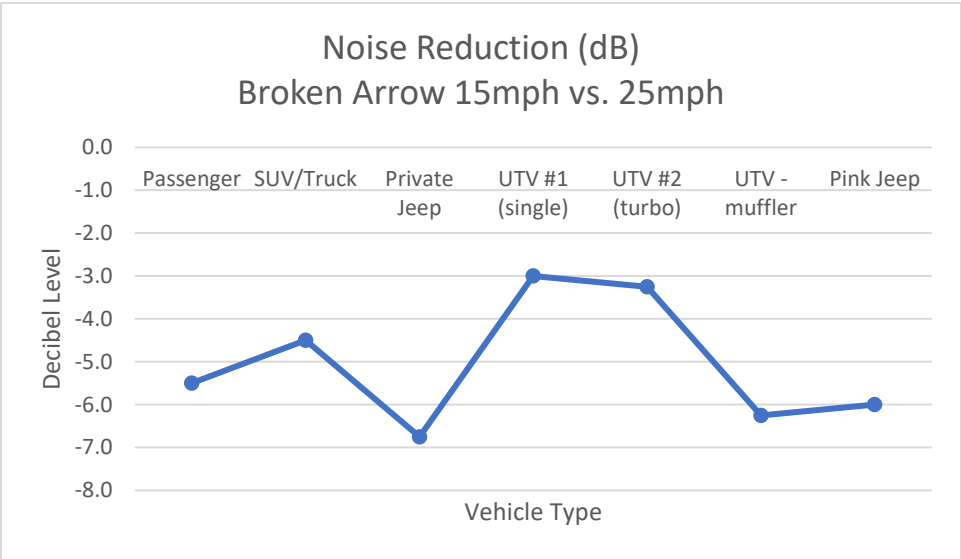
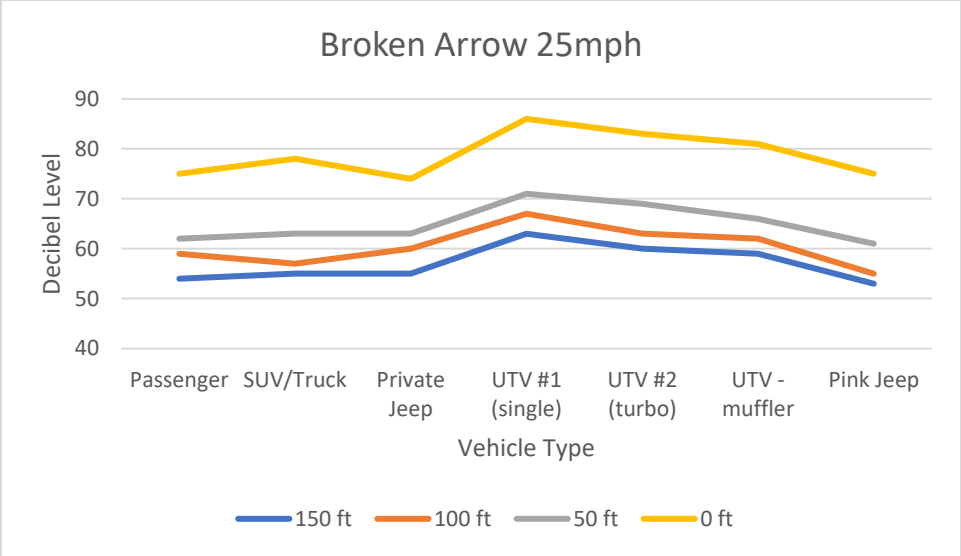






Broken Arrow





Data Gathering: 2nd Noise Testing

On Wed. 11/8/23 from 8am – 12pm we conducted a second round of noise testing in Bear Mountain. We tested in the same location, with the same number & types of vehicles, and at the same varying speed limits as the first time. As prior noise testing results between Bear Mountain and Broken Arrow were highly correlated, no 2nd test was conducted at Broken Arrow.

The purpose of the 2nd noise testing was to 1) revalidate the prior testing results; 2) compare decibel levels for a group of 3 UTVs traveling together vs. 1 UTV and 3) compare noise differentials at the same distances (50ft, 100ft) when a vehicle is approaching vs. when an individual is standing 50ft or 100ft off the side of the road and the vehicle passes by.

2nd Noise Testing Results: The testing revalidated the prior results, determined that a group of 3 UTVs is 5db louder than a single UTV, and concluded that a vehicle approaching is 6.5db louder, on average across all vehicle types, than when it passes by.

Bear Mountain: Vehicles Passing By at 25 MPH

Vehicle Type	50ft (center)	100ft (center)	Average
Passenger	56	49	52
SUV/Truck	62	58	60
Private Jeep	57	50	54
UTV #1 (single)	67	63	65
UTV #2 (turbo)	63	60	62
UTV - muffler	62	56	59
Pink Jeep	57	50	54
Average	61	55	