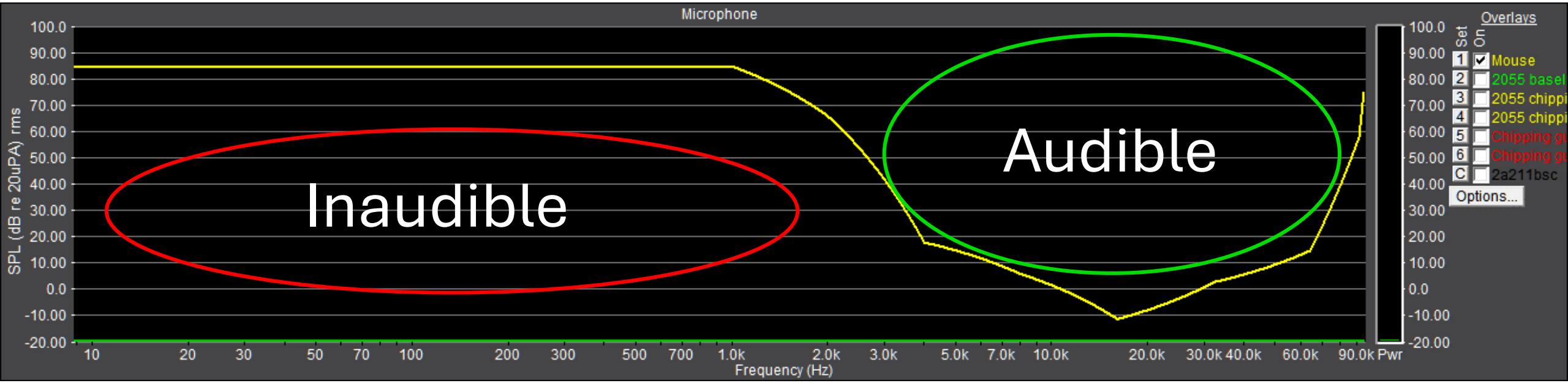
BioBUBBLE Cleanroom – Noise and USN Testing – Executive Summary

Turner Scientific performed measurements on a bioBUBBLE Cleanroom blower. Noise and ultrasonic noise (USN) measurements were taken in the center of a bioBUBBLE Cleanroom and at the source of blower unit (~1 foot from the filter where noise escapes at its highest level, unit outside bubble). Measurements were taken at airflow rates of 0 (baseline), 250, 500 and 705 (max possible airflow rate in the current setup). All measurements were taken within the mouse hearing range (1 kHz – 96 kHz). Measurements were taken in a positive pressure setting. In a state of constant exposure, chronic noise levels below 70 dB are considered to be safe. No USN signals were detected in any of the measurements taken. All measurements in the center of the room remained well below the 70 dB threshold of concern. When measured at the source, airflow rates above 500 exceeded the 70 dB threshold of concern.

If mice are not placed directly adjacent to the blower motor and airflow rates do not exceed the 705 airflow rate tested, there appear to be minimal to no USN or noise concerns.

Note: The blower was unable to operate at airflow rates above 705. Noise and USN levels are expected to be higher at levels between 706 and 999 (the systems max possible airflow rate).

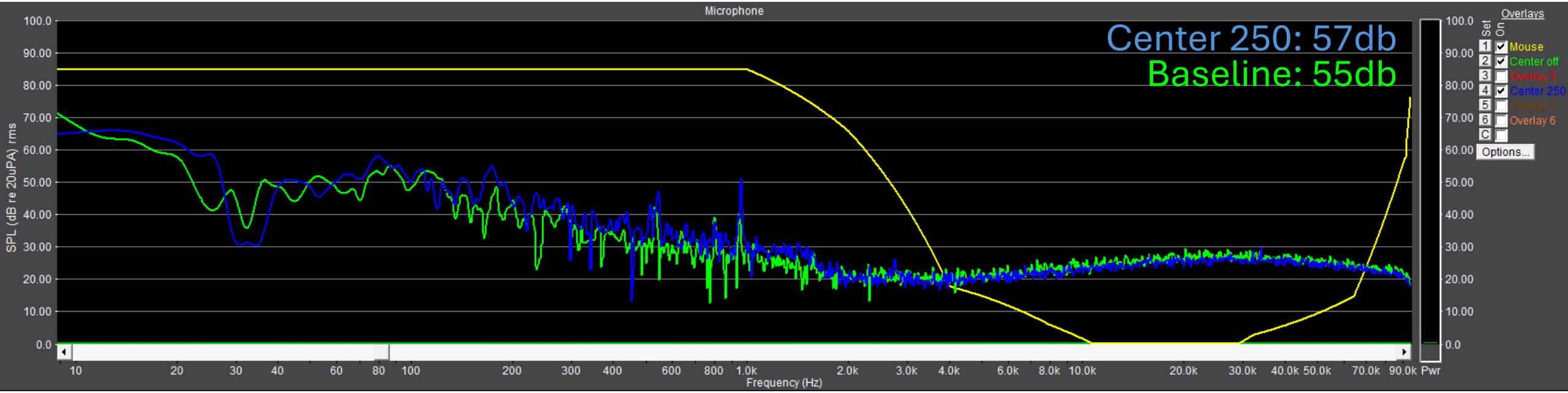
Graph of Audiogram, Noise, and Ultrasonic Noise



Mouse Audiogram

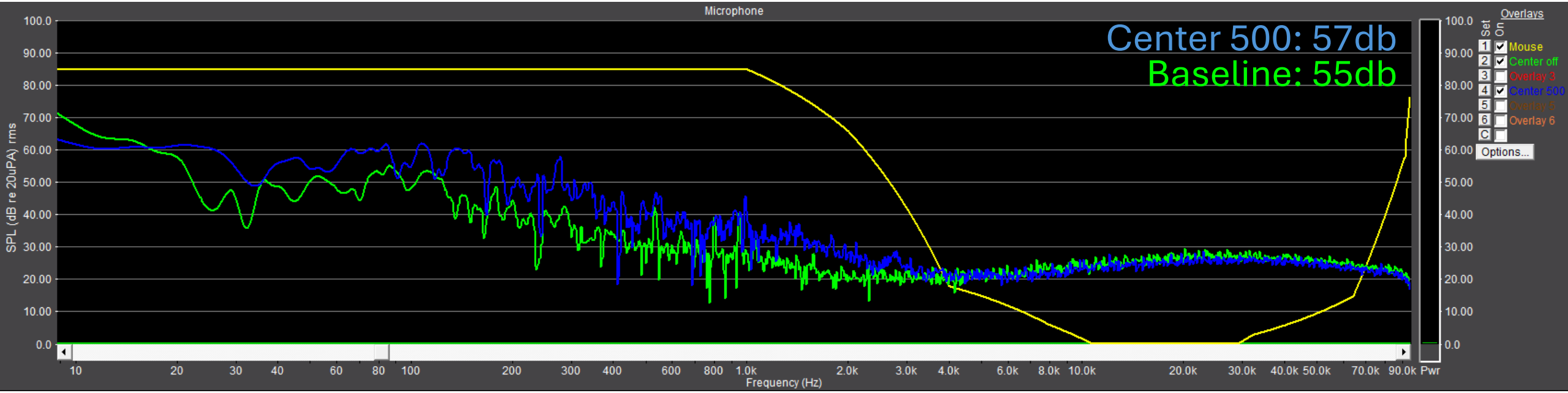
The yellow line in the above image represents the mouse audiogram. This allows us to visualize what noise and ultrasonic noise mice are capable of hearing. In the following slides, signals above the yellow line are considered to be audible to the animal, while signals below the yellow line are considered to be inaudible. The following green trace represents the spectrum at baseline when the system is off and the blue trace represents the spectrum when the system is on.

Noise and USN Measurements – Center of Room – Airflow at 250



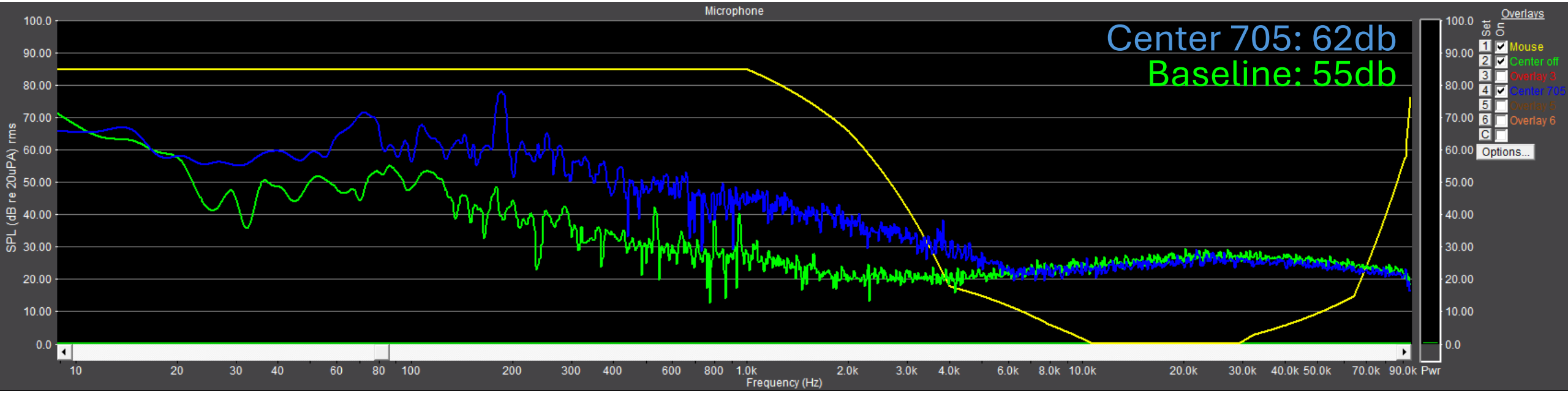
Spectrum of noise measurements taken at the center of the bioBUBBLE cleanroom with an airflow setting of 250. An increase of 2 dB was detected, but remained below the 70 dB threshold.

Noise and USN Measurements – Center of Room – Airflow at 500



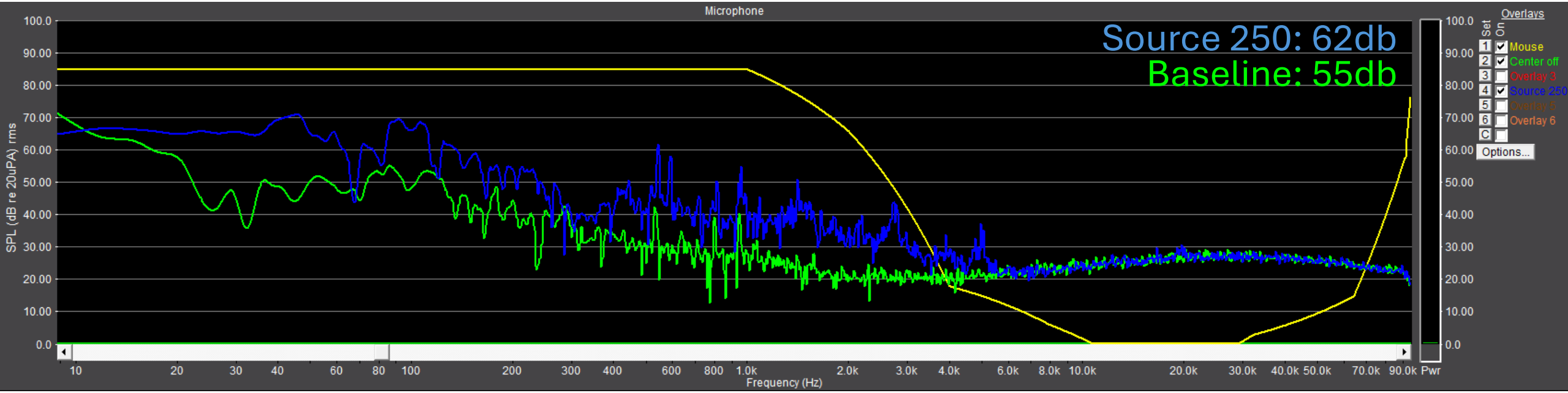
Spectrum of noise measurements taken at the center of the bioBUBBLE cleanroom with an airflow setting of 500. An increase of 2 dB was detected, but remained below the 70 dB threshold.

Noise and USN Measurements – Center of Room – Airflow at 705



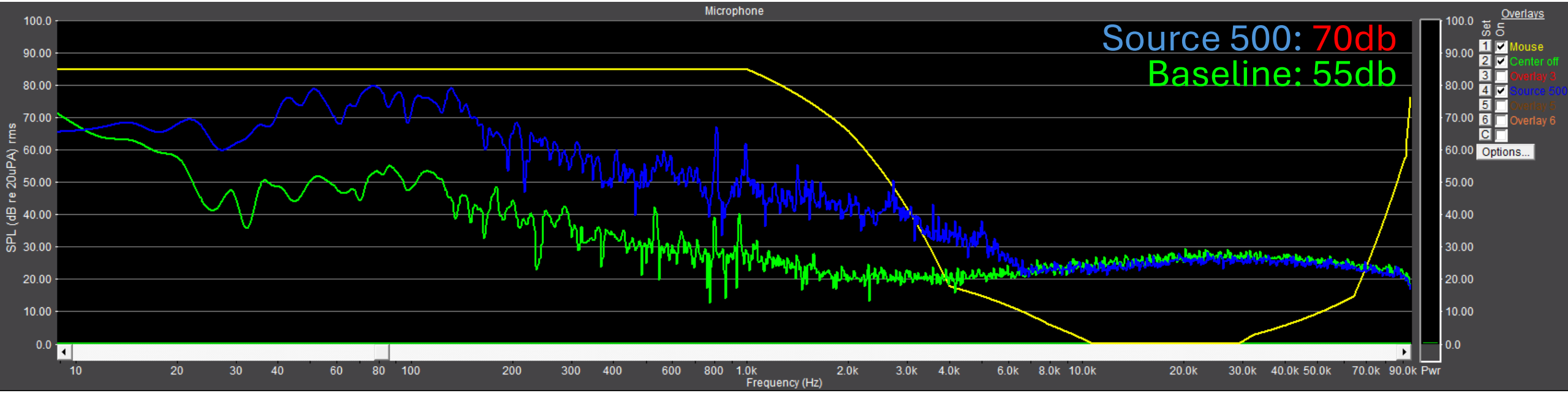
Spectrum of noise measurements taken at the center of the bioBUBBLE cleanroom with an airflow setting of 250. An increase of 7 dB was detected, but remained below the 70 dB threshold.

Noise and USN Measurements – At Source – Airflow at 250



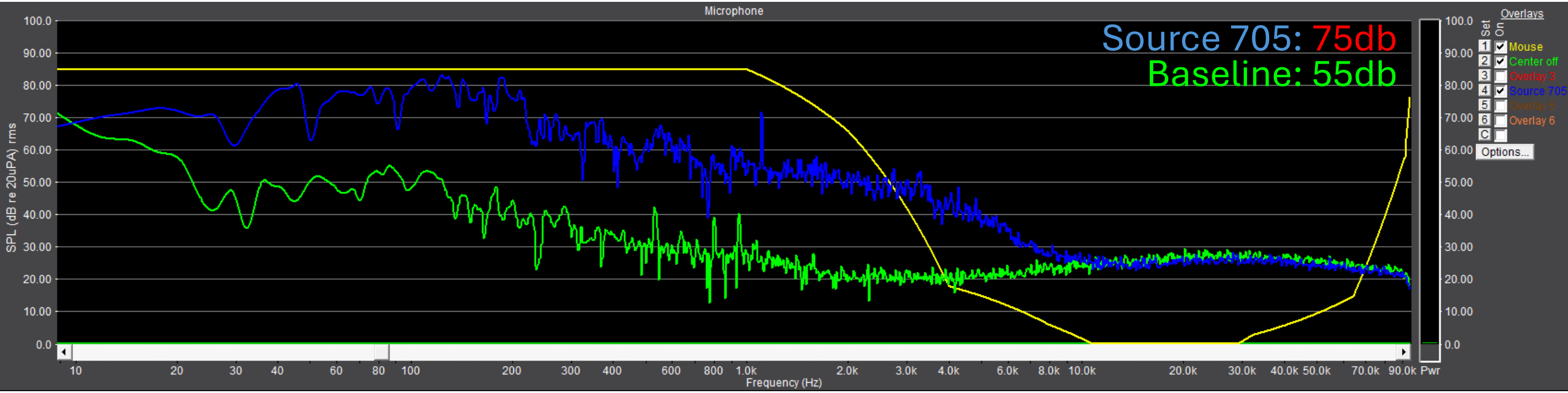
Spectrum of noise measurements taken at the source of noise with an airflow setting of 250.
An increase of 7 dB was detected, but remained below the 70 dB threshold.

Noise and USN Measurements – At Source – Airflow at 500



Spectrum of noise measurements taken at the source of noise with an airflow setting of 500.
An increase of 15 dB was detected, exceeding the 70 dB threshold.

Noise and USN Measurements – At Source – Airflow at 705



Spectrum of noise measurements taken at the source of noise with an airflow setting of 705.
An increase of 20 dB was detected, exceeding the 70 dB threshold.