As a function of distance r from the source, the sound field consists of three basic regions:

a.) The ***near field*** (when $r \le \sqrt{Q}D, \lambda$) depends on the detailed geometrical nature of the sound source, its diameter D and directivity factor Q, and wavelength λ of the sound. Some parts of the sound source may radiate more strongly/intensely than others.

b.) The ***free field*** (when $r \gg \sqrt{Q}D, \lambda$) is such that the sound pressure $p_{ff}(r)$ and sound intensity $I_{ff}(r)$ vary as $\sim 1/r$ and $\sim 1/r^2$, respectively, such that the free-field sound pressure level and/or sound intensity level $SPL_{ff}(r) = L_p^{ff}(r) = SIL_{ff}(r) = L_I^{ff}(r)$ decreases $-6\ dB$ for each doubling of r ($-20\ dB$ for each order-of-magnitude increase in r).

c.) The ***reverberant field*** (when $r >>> \sqrt{Q}D, \lambda$) is such that in the steady-state, the sound pressure $p_{rvb}(r)$, sound intensity $I_{rvb}(r)$ associated *solely* with the reverberant/reflected sound (*i.e.* excluding the direct sound from the sound source itself) are independent of position, *i.e.* $p_{\substack{rvb\\only}}(r) = p_{\substack{rvb\\only}} = constant$, $I_{rvb}(r) = I_{rvb} = constant$ and thus the corresponding reverberant-only sound pressure level/sound intensity level

$$SPL_{\substack{rvb\\only}}(r) = L_p^{\substack{rvb\\only}}(r) = SIL_{\substack{rvb\\only}}(r) = L_I^{\substack{rvb\\only}}(r) = constant\ .$$

In an enclosed space – *e.g.* some kind of room, auditorium, *etc.* in the ***steady-state***, these physical quantities associated with the ***reverberant-only*** sound field depend on the detailed nature of the ***absorption*** properties of the various surfaces in the room, as well as on the acoustic/sound power P of the sound source. If the total absorption of the room is characterized by an effective/equivalent hole in the room of area A (as in the Sabine formula), the sound pressure level/sound intensity level in the ***reverberant-only*** sound field is:

$$SPL_{\substack{rvb\\only}}(r) = L_p^{\substack{rvb\\only}}(r) = SIL_{\substack{rvb\\only}}(r) = L_I^{\substack{rvb\\only}}(r) = L_{Pwr} + 10\log_{10}\left(\frac{4}{A}\right)\ (dB)$$

Note that the in the ***steady-state***, the ***reverberant-only*** sound pressure level/sound intensity level in the reverberant field region is ***independent*** of listener location/position r in the room, and note also that it diverges logarithmically as the absorption, $A \to 0$.

Combining ***both*** the ***direct*** and ***reverberant-only*** sound fields (assuming ∃ no correlations between the two), the combined sound pressure level/sound intensity level in the reverberant-field region $\left(r >>> \sqrt{Q}D, \lambda\right)$ is:

$$SPL_{\substack{direct\\+rvb}}(r) = L_p^{rvb}(r) = SIL_{rvb}(r) = L_I^{rvb}(r) = L_{Pwr} + 10\log_{10}\left(\frac{Q}{4\pi r^2} + \frac{4}{A}\right)\ (dB)$$

Note again that the in the ***steady-state***, the combined ***direct*** + ***reverberant*** sound in the reverberant-field region is such that the associated sound pressure level/sound intensity level also diverges (logarithmically) as the absorption, $A \to 0$.

Note further that this acoustic situation has many similarities/parallels to that associated with a source emitting electromagnetic waves into a rectangular cavity with partially-absorbing walls.