Comparison of Seismic Sounds with examples of Typical Sounds in Air and Water

NB. *Figures in italics are simply equivalent sound levels in water incorporated for comparison to sound levels in air and do not necessarily represent equivalent sensitivities. Hearing sensitivity in air and water is quite different due to the degree of displacement (amplitude) involved in generating/receiving the sound in the two mediums. For example, a speaker (or receiver) in air is made of flexible material (eg membrane or diaphragm) whereas in water it is significantly less flexible (eg ceramic).*

Sound type	In Air (dB re 20µPa @ 1m unless stated)	In Water (dB re 1µPa @ 1m unless stated)	Comment
Threshold of hearing (in air)	0	*62*	
Breathing (in air)	10	*72*	Barely audible
Whisper (in air)	30	*92*	
Normal conversation at home	60	*122*	
Inside a car/ radio-TV-audio	70	*132*	Twice as loud as normal conversation (ie +10dB)
Ringing telephone, City noise	80	*142*	4 times louder than normal conversation
Motor cycle, shouting	90	*152*	8 times louder than normal conversation
Jet take-off at 305m	100 (at 305m)	*162*	16 times louder than normal conversation
Motor cycle	100	*162*	16 times louder than normal conversation
Car stereo: two speakers 100w	110	*172*	32 times louder than normal conversation
Front row at rock concert	120	*182*	64 times louder than normal conversation
Loudest human scream	128	*190*	
Typical professional DJ system	130	*192*	128 times louder than normal conversation
Jet take-off at 100m	130 (at 100m)	*192*	
Aircraft carrier deck/Jet take-off at 50m	140	*202*	256 times louder than normal conversation 16 times louder than a motor cycle
Jet take-off at 25m	150 (at 25m)	*212*	512 times louder than normal conversation
Rifle/Shotgun/handgun	160	*222*	1024 times louder than normal conversation
Quarter pound of dynamite	175	*237*	
Jet take-off at 1m	180	*242*	4096 times louder than normal conversation 16 times louder than professional DJ system 256 times louder than a motor cycle **Slightly louder than actual seismic pulse**
2.0 Richter Earthquake	210	*272*	32768 times louder than normal conversation
5.0 Richter Earthquake	235	*297*	
Atomic bombs	248	*310*	8192 times louder than 232dB seismic source
Krakatoa volcanic eruption	310	*372*	33,554,432 times louder than normal conversation. 8192 times louder than jet take-off. Heard up to 4700km.
Sound that would be equivalent to Oceana claim	**347**	**409**	**100,000 times louder than jet taking off**
Seismic array (theoretical)	*188 (not actual)*	250 (not actual)	Theoretical seismic pulse, assuming all elements in the array at the same point, which is not possible.
Single 30 in^3 seismic "airgun"	*159*	221	
Seismic array (actual). Sum of 20-40 elements over 10 x 15m area.	*158-178*	220-240	Sound level dependent on number of elements and individual/total volumes.
10 lbs of TNT		279	
Undersea Earthquakes		272	
Volcanic Eruption		255	
Lightning Strike		260	
Calving/Colliding icebergs		220/250	rms/peak: Similar amplitude, frequency & periodicity to seismic pulses
Sperm Whale Click		236	Similar amplitude to seismic sounds
Bottlenose Dolphin		225	
Killer Whale		224	
Sound of a breaching whale		200	Similar to 242dB seismic source at 128m
Blue whale		190	Similar to 242dB seismic source at 450m.
Snapping Shrimp (Individual)		189	
Ambient sea noise (sea state 4)		100	
Ambient sea noise (sea state 0)		60	
Echosounders		235	
Large Ship		200	Similar to 242dB seismic source at 128m, but continuous

Source: Compilation of various sources including: http://www.gcaudio.com/resources/howtos/loudness.html; http://decibelcar.com/menugeneric/87.html; http://airportnoiselaw.org/dblevels.html; http://www.chem.purdue.edu/chemsafety/Training/PPETrain/dblevels.htm; http://www.arc.id.au/SoundLevels.html; http://www.appea.com.au/wp-content/uploads/2013/05/Seismic_and_the_Marine_Environment.pdf (table on p4); and http://www.ogp.org.uk/pubs/358.pdf (appendix 1)