

Preliminary Procedures to Minimize Impact on Marine Mammals

Note: Preliminary Procedures have been developed by ODP to minimize the impact of seismic activity on marine mammals. These procedures were used on Leg 206. Procedures for subsequent legs (207-210) are under development as of January 2003.

1) Shipboard seismic sources: The characteristics of sources presently available on the *JOIDES Resolution* are as follows,

Seismic Source	Vol (in ³)	*Dist(m) @ 120 dB (SPL)	*dB (SPL) @ 150 m	Notch Freq.	Tow Depth (m)	Source P-P Press (bar-m)	Comments
SSI Airgun	80	367	136	125	6	1.5	Surveys and VSP logging.
G.I. Airgun	105	728	149	125	6	6.6**	Surveys and VSP logging.
PAR Airgun	1000	740	149	105	7	6.9	VSP logging.
SSI Airgun	400	805	151	105	7	8.3	VSP logging.

Note:

a) Working pressure for all sources is 2000 psi

b) *Calculations of Sound Pressure Levels (SPL):

$dB = 20 * \text{LOG}_{10} (P_m / P_r)$, where:

$P_r = 1 \mu\text{Pa} = 1 \times 10^{-11} \text{ bar}$ (reference)

$P_m = P_s / \text{Distance}$; where P_s is the vendor published values of the peak-peak pressure measured at 1 meter from the source (in bar-meter).

SPL at a distant receiver (dB_r) corrected for transmission loss, is estimated by adding the effects of spherical spreading (TL_s) and attenuation (TL_a) for a given frequency, and subtracting from the intensity at the source (dB_s):

$$dB_r = dB_s - [TL_s + TL_a]$$

$$TL_s = 20 * \text{LOG}_{10} [\text{distance}]$$

$$TL_a = \text{attenuation} * \text{distance} \quad (\text{attenuation is approx. .003})$$

c)** Conservative estimate, true value should be lower

2) Future seismic activity

Leg 206: Seismic work will be limited. No seismic surveying is presently planned. The

new generator-injector (GI) gun along with the LDEO Well Seismic Tool (WST-3) logging tool will be used for a zero-offset vertical seismic profile (VSP). This VSP is planned for the reentry hole of the only site to be drilled during Leg 206, which should be Site 1256. The GI gun will be used for ~4-8 hrs and the logging is scheduled to be the last operation at the site. Current estimates suggest that we will likely use the GI guns sometime between 30 December 2002 and 1 January 2003.

Leg 207: A seismic survey is planned to provide a crossing line to proposed Site DR-3C (9° 26' N; 54° 44' W). This survey is estimated to take about 0.3 days and will commence about 1.5 days after leaving port. Also planned are at least two check shot surveys. One at Site DR-8B (9° 27.23' N; 54° 20.52' W) and a second at Site DR-2 (9° 5' N; 54° 1' W). LDEO estimates logging time at 32 hours at 8B and 46 hrs at 2.

Leg 208: No seismic surveys planned; Well Seismic Tool check shots are planned for 2-5 sites.

Leg 209: No seismic work scheduled

Leg 210: A VSP is planned for the reentry site. Specifics will be determined at the precruise meeting in December.

3) Shipboard procedures to minimize risks to marine life: A preliminary procedure has been established for Leg 206 to minimize potential impact of seismic activity to marine mammals. These measures will be revised with a final policy and procedures adopted for subsequent ODP cruises. For ODP Leg 206 the follow procedures will be implemented.

1. Marine mammal observer(s) will be appointed for the cruise
2. Marine mammal observers will document marine mammal observations 4 hours prior to and during seismic activity
3. All marine mammal sightings will be recorded on the Marine Mammal reporting Form (see attached)
4. A report of marine mammal sightings and encounters shall be submitted to ODP/TAMU at completion of each seismic cruise.
5. The report shall include copies of all completed Marine Mammal Sighting Reports
6. Seismic source(s) will be ramped up with a ten minute waiting period prior to full pressure shots
7. Marine mammals encountered during seismic activity will be monitored for proximity to sound source.
8. Seismic activity will be stopped, if the mammals encroach within a safety radius of 800 m

Amendments