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Port of Brisbane Amity and Brisbane Dredges Underwater Noise Levels

Prepared for:

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1.0 Introduction

Savery & Associates Pty Ltd conducted sampling of underwater noise levels generated by normal port dredging operations of the Amity and Brisbane dredges operated by the Port of Brisbane.

The purpose of sampling was to provide indicative underwater dredge noise levels to assess possible marine noise impacts associated with a proposed dredged coal seam gas (CSG) pipeline crossing between the Gladstone mainland and the site of a proposed LNG plant on Curtis Island.

The purpose of this report is to provide the Port of Brisbane with a record of the underwater noise levels that were obtained.

2.0 Dredge Noise Sampling

2.1 Instrumentation

The acoustic instrumentation used for testing is summarised in Table 1. The test system was calibrated immediately before commencement of measurements and immediately after measurements, with less than 0.2dB drift in system calibration recorded.

Full sound signals were recorded to enable replay of samples for post-analysis identification of noise sources.

A laser rangefinder was utilised to determine the pass-by distance of vessels, and to determine hydrophone separation distance from wharf structures and moored ships.

Table 1: Instrumentation and equipment

Item	Notes
Hydrophone	Single-ended Reson TC4032 low noise with 10dB preamp S/N4307048 Usable frequency range 5 Hz to 120 kHz Linear frequency range 15 Hz to 40 kHz ± 2 dB Receiving sensitivity -170 dB re 1 V/µPa (3mV/Pa)
Extension cable	Reson TL8058 10m extension cable and lemo cable junction box
Sound analyser and data storage	Panasonic CF19 Toughbook incorporating a SINUS Harmonie Type 1 sound analyser, hard-drive digital audio storage, and Samurai control software S/N06268 -40kHz 3201 line FFT, 1µPa reference pressure
Calibrator	Type 1 GRAS 42AA pistonphone S/N91003 with RESON TL8089 coupler S/N1108033

2.2 Measurement Methodology

Sampling was conducted in low-wind conditions with negligible noise from wave-action.

The hydrophone was suspended at approximately mid-depth, which was determined from depth-sounder records and depth markers on the hydrophone cable. Sampling was conducted with the boat motor off while drifting, with the start and finish points of the drift marked by a global positioning system.

2.3 Source underwater noise levels

Marine noise levels during dredging operations and a range of vessel pass-by events have been sampled to provide indicative noise levels associated with a dredged pipeline crossing methodology. Sampling was conducted whilst dredges and vessels were operating at the Port of Brisbane and the Port of Bundaberg.

A summary of the results of source noise sampling are collated in Table 2, and cross-referenced graphical sound spectral data for specific sources is provided in **Appendix A**.

Table 2: Sample marine dredging and vessel noise summary

Noise source	Measurement distance	Receiver water depth	Dominant noise sources	Peak pressure SPL Re: 1µPa (un-weighted Peak)	RMS pressure SPL Re: 1µPa (M_{mf}-weighted)
'Amity' cutter-suction dredge Figure 1 Figure 2	45m beam	14m	Hydraulic drive Suction noise	145dB	128-142 dB (refer Figure 10)
'Brisbane' 2900m^3 trailing-arm suction hopper dredge Figure 3 Figure 4	45m pass-by of stationary observer by traversing dredge	11m	Gravel noise in suction head Engine noise	176dB	147-158dB(M_{mf}) (refer Figure 11) 148-160dB(linear)
Sea-service freighter Figure 5	220m pass-by	7m (source depth ~14m)	Engine and drive noise	<140dB - Shrimp noise dominant	127-135dB (refer Figure 12)
Stolt tanker Figure 6	155m pass-by	3m (source depth ~14m)	Engine and drive noise	<140dB - Shrimp noise dominant	124-136dB (refer Figure 13)
Pilot boat Figure 7	150m pass-by	2m (source depth ~14m)	Engine and propeller cavitation noise	<140dB - Shrimp noise dominant	113-126dB (refer Figure 14)
Passenger ferry Figure 8	200m pass-by	2m (source depth ~14m)	Engine and propeller cavitation noise	<140dB - Shrimp noise dominant	120-133dB (refer Figure 16)
Tug and barge	200m pass-by	2m (source depth ~14m)	Engine and propeller cavitation noise	<140dB - Shrimp noise dominant	113-126dB (refer Figure 16)

Figures

Figure 1: 'Amity' cutter-suction dredge

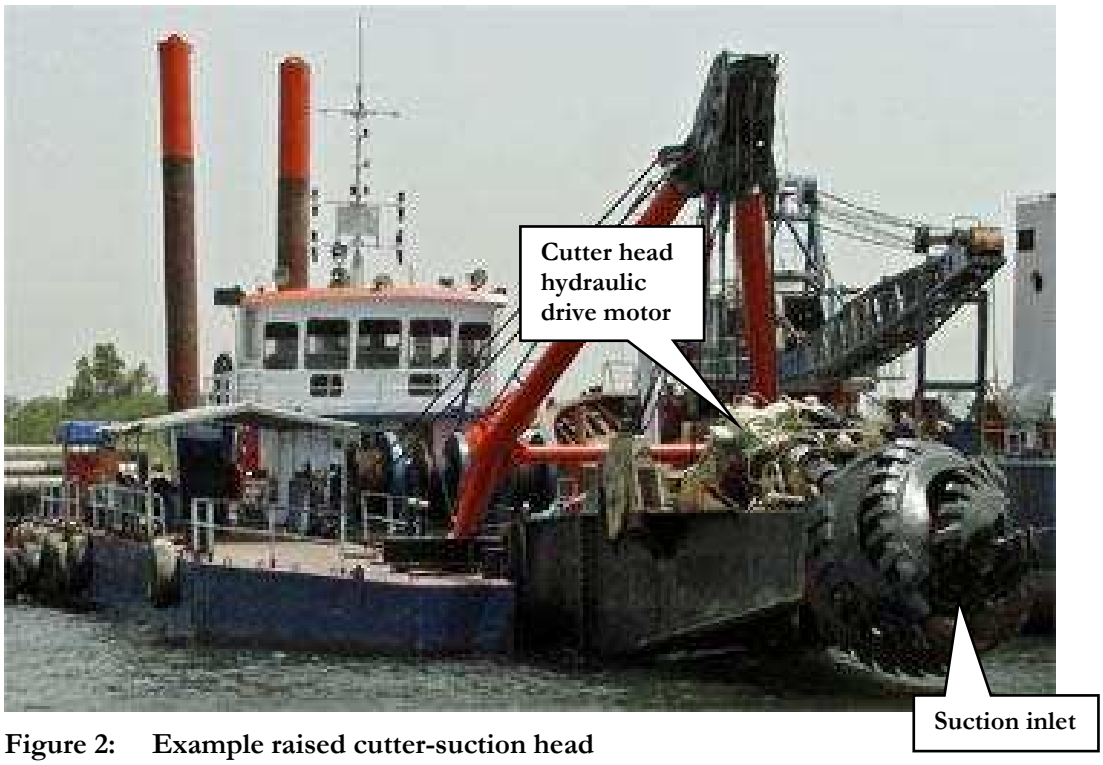

Figure 2: Example raised cutter-suction head

Figure 3: 'Brisbane' trailing-arm suction dredge

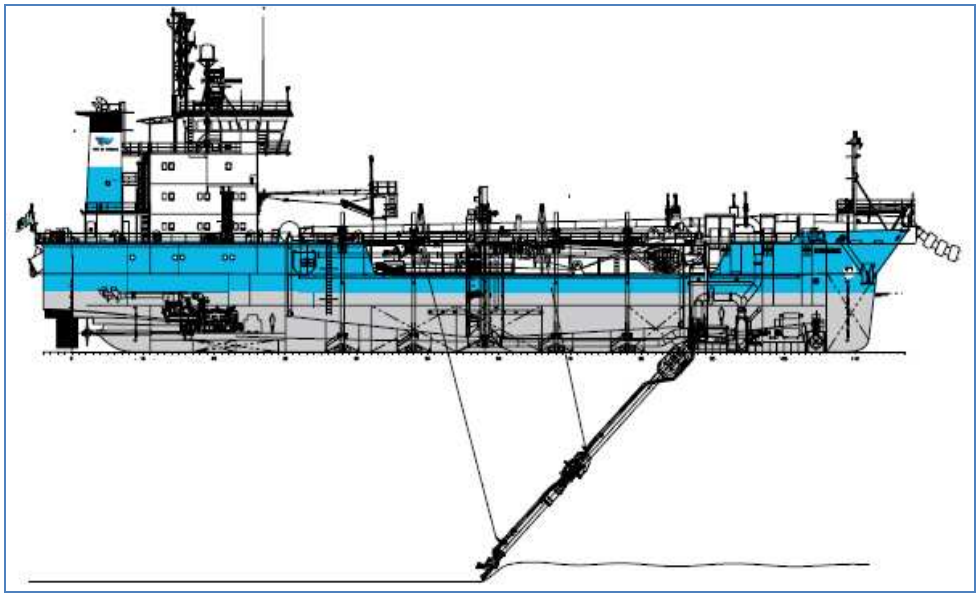

Figure 4: 'Brisbane' trailing-suction dredge schematic

Figure 5: Sea-service freighter (246m x 42m)

Figure 6: Stolt Tanker

Figure 7: Pilot boat

Figure 8: Tangalooma Flyer high speed passenger ferry

Figure 9: Riverside Marine tug and barge

.Appendix A –Dredge and vessel noise spectra

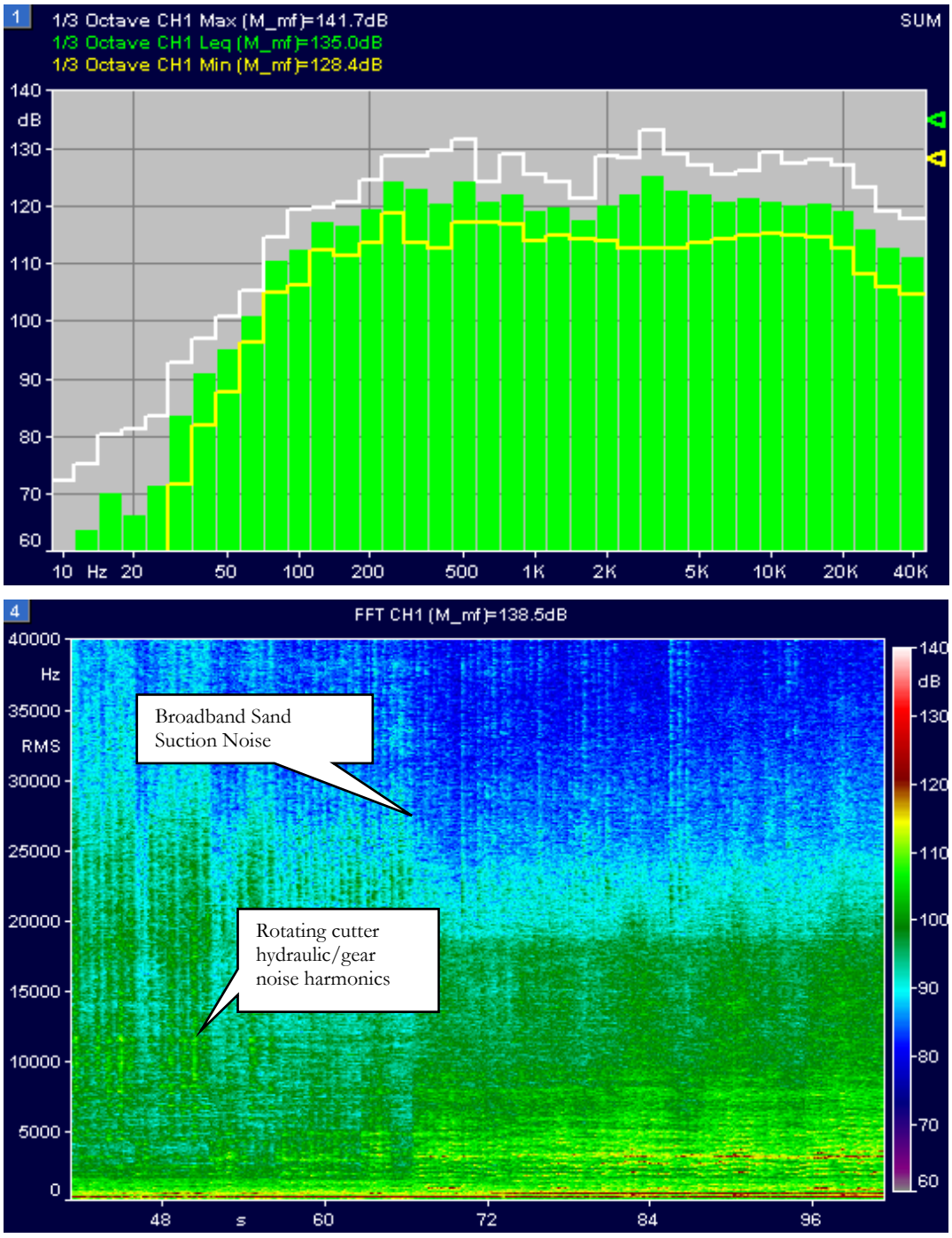

Figure 10: 'Amity' Cutter-suction dredge at 45m Beam – one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa

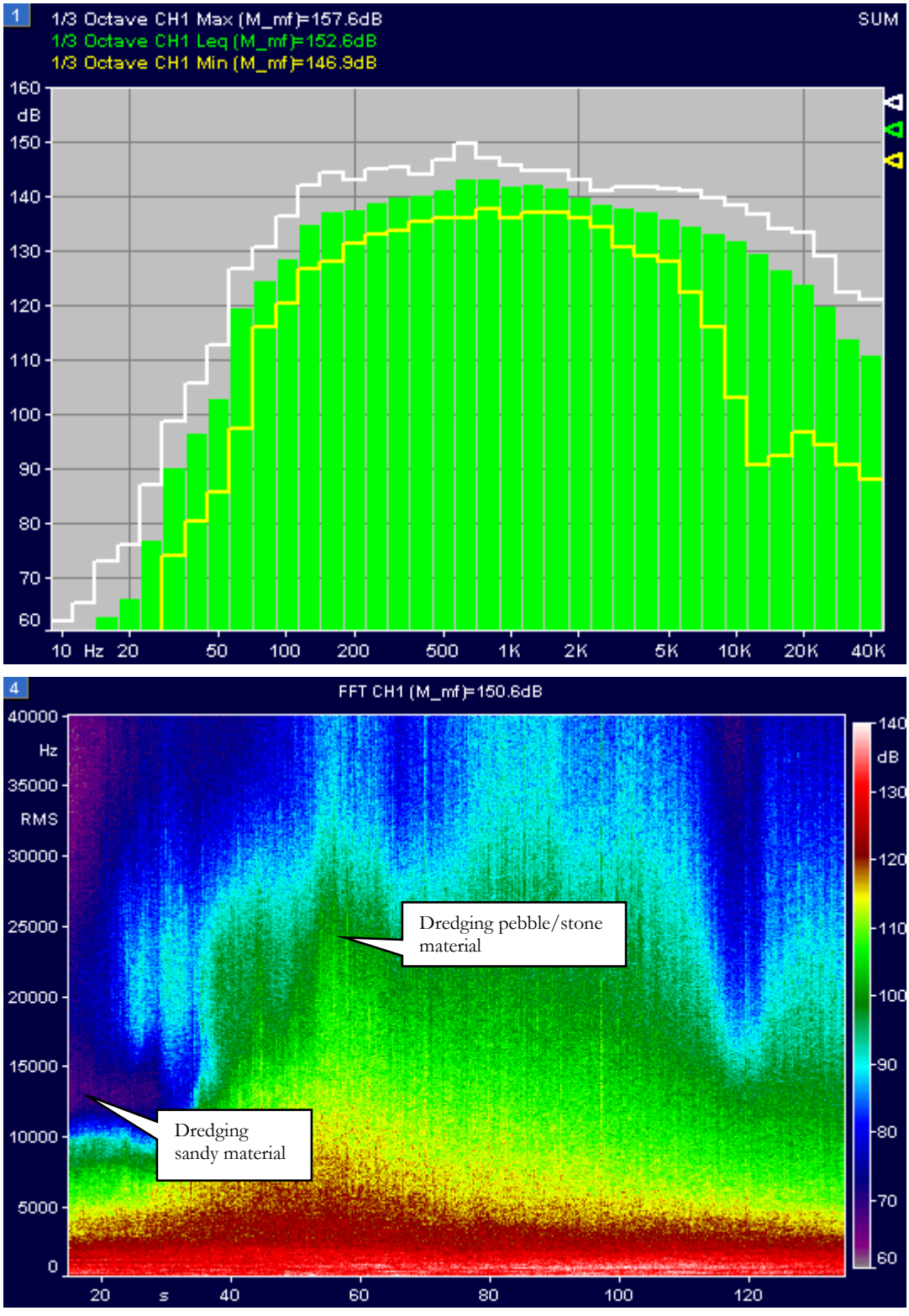

Figure 11: 'Brisbane' Trailing-arm Suction Dredge Passby at 45m – One-third-Octave Noise Spectrum(top graph) and FFT Spectral History(bottom graph) – RMS Re: 1µPa

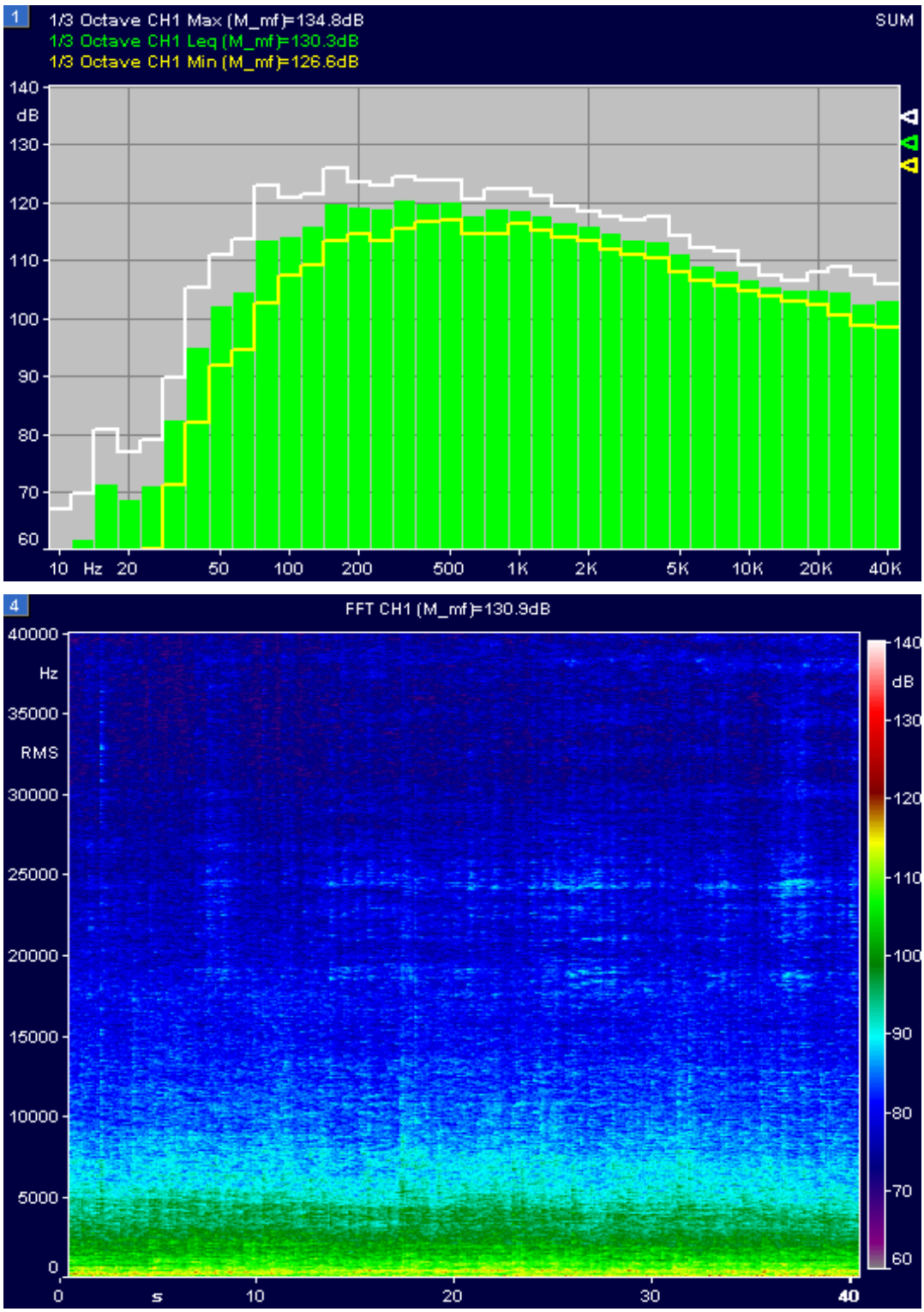

Figure 12: Seaservice freighter pass-by at 220m– one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa

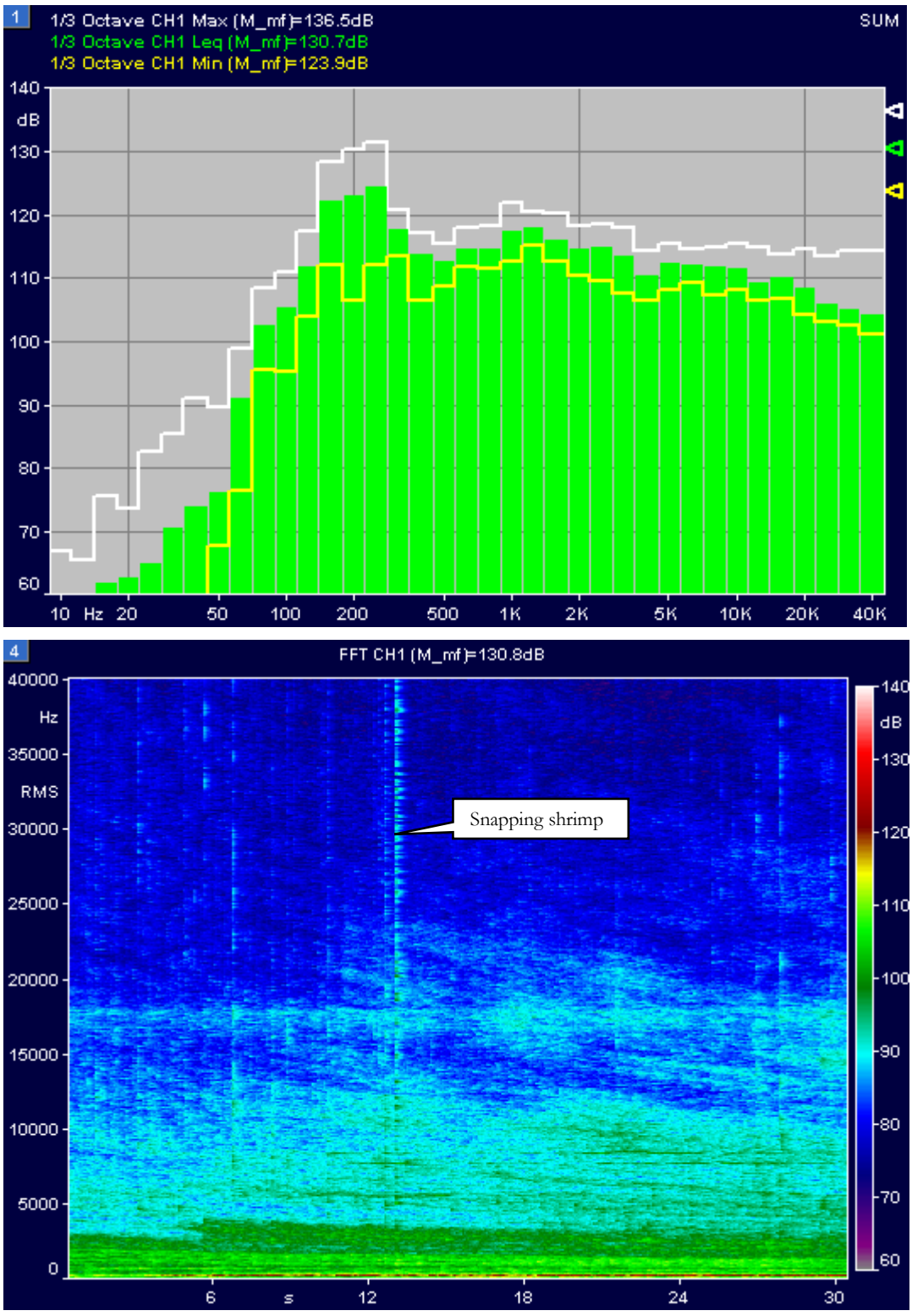

Figure 13: Stolt tanker pass-by approach at 155m– one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa

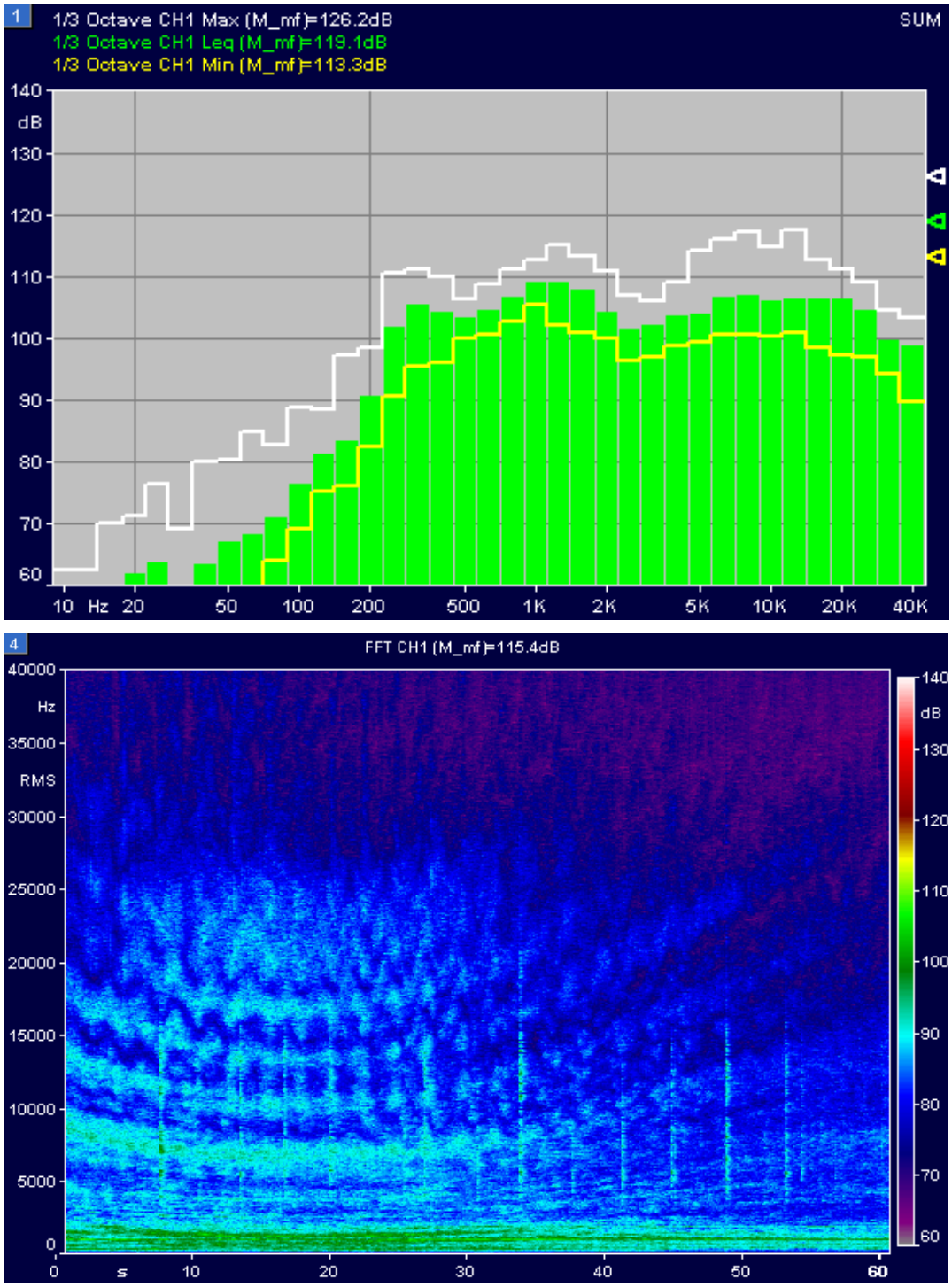

Figure 14: Pilot boat pass-by at 150m– one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa

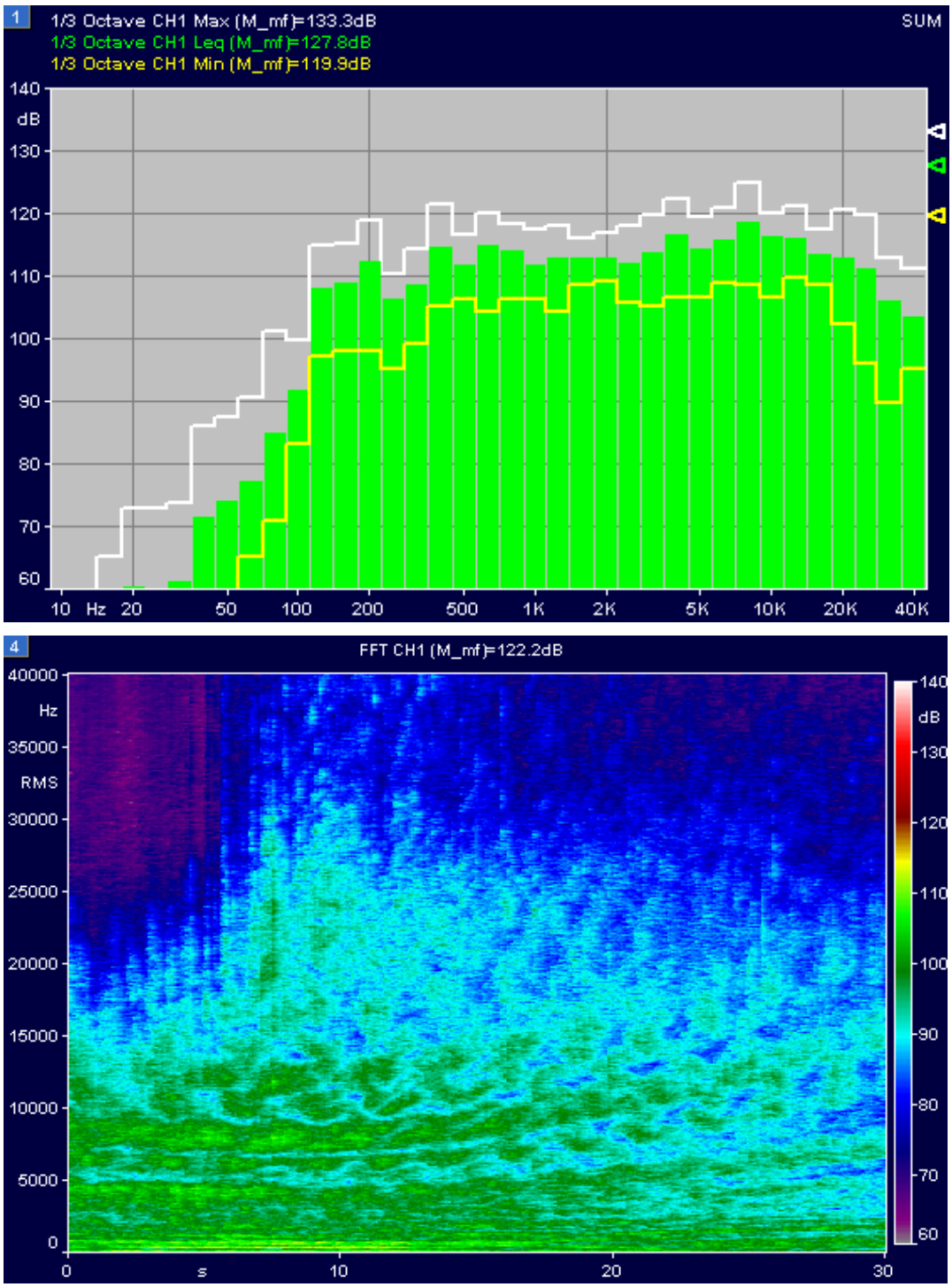

Figure 15: Tangalooma Flyer passenger ferry pass-by at 200m– one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa

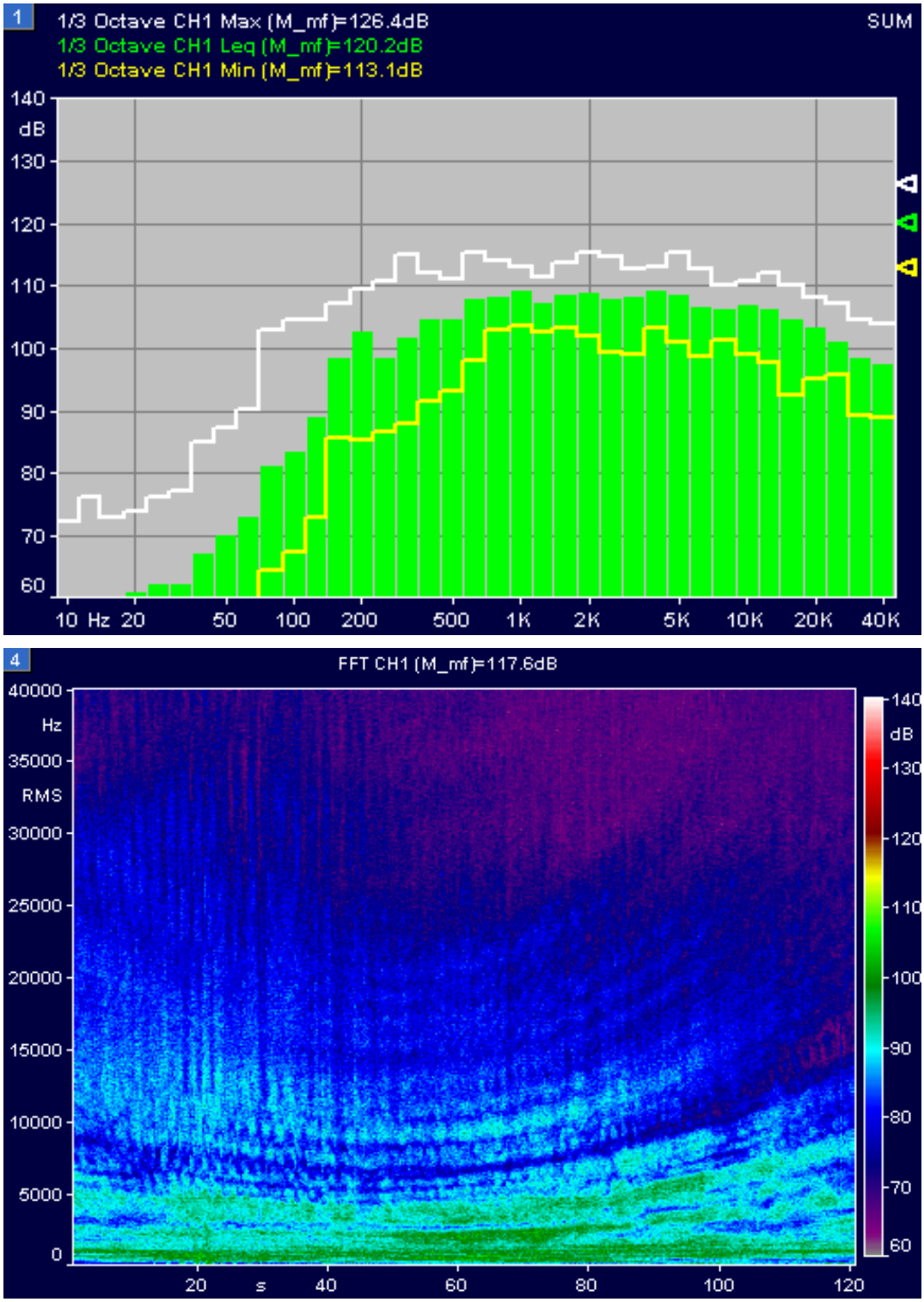

Figure 16: Riverside Marine tug & barge pass-by at 200m– one-third-octave noise spectrum(top graph) and FFT spectral history(bottom graph) – RMS Re: 1µPa