



APPENDIX 07

Surficial sediment survey

07 SURFICIAL SEDIMENT SURVEY

07.1 INTRODUCTION

A coastal desalination plant at Point Lowly would meet the additional requirements for process water for the proposed Olympic Dam expansion. Construction works would include installing an intake structure and associated pipe and an outfall diffuser and associated pipe. The area in which the outfall diffuser may be located, and options for the intake and outfall pipes, are shown in Figure 07.1. There would be some level of bed disturbance as a result of installing this infrastructure.

This appendix documents a sediment investigation undertaken in the vicinity of Point Lowly and also from Upper Spencer Gulf in the vicinity of the proposed landing facility. The investigation was undertaken to ascertain whether trace contaminants are present in the sediment, and if so, the environmental risk associated with their disturbance.

07.2 SCOPE

The scope of the sediment investigation involved:

- sampling and characterisation of bed sediments
- laboratory analysis of selected samples for trace contaminants and particle size distribution
- comparison of contaminant concentrations to relevant guidelines to assess environmental risk.

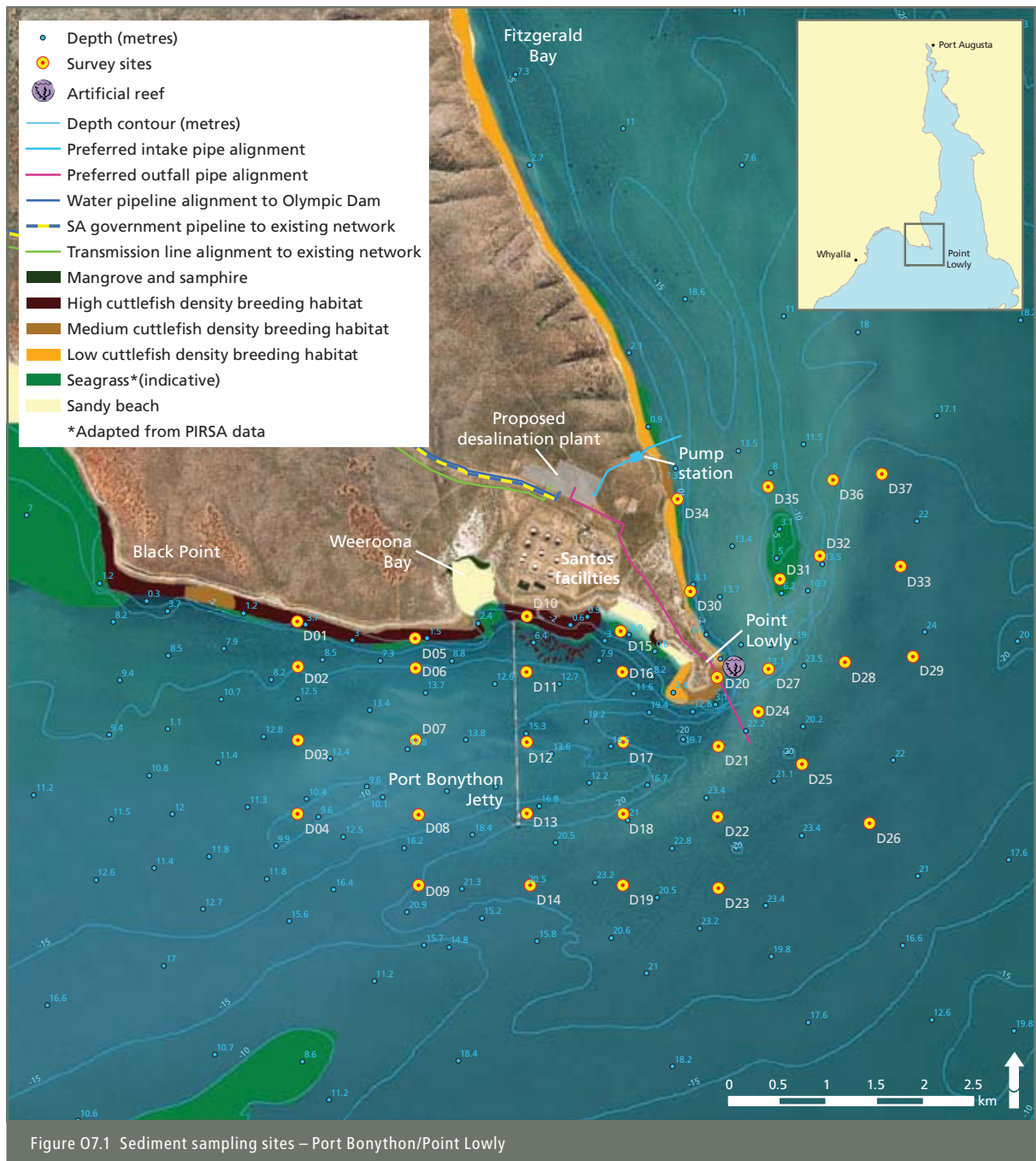
07.3 METHODS

07.3.1 Guidelines

The most relevant guidelines to this study are the 'National Ocean Disposal Guidelines for Dredged Material' (Environment Australia 2002). These guidelines provide a framework for assessing the likely environmental impacts associated with the unconfined disposal of dredged material. Although unconfined disposal of dredged material is not being contemplated for this project, the construction methodology may result in the generation of localised plumes that can be assessed in a similar manner to plumes associated with unconfined disposal. Sample frequency and laboratory analysis suites have been selected after consideration of the guidelines. Turbidity and smothering effects associated with sediment mobilisation and settlement have been assessed and reported elsewhere (see Chapter 16, Marine Environment, Section 16.6.11 and Appendix O12).

07.3.2 Sample locations

Sediment sampling locations were selected using an approximate 800 m (north-south) x 1,000 m (east-west) grid covering the possible area of sediment disturbance. Sampling locations are presented in Figure 07.1 (Port Bonython) and Figure 07.2 (Upper Spencer Gulf).





07.3.3 Sediment sampling methodology

Samples were collected on 10 April, 15 May (samples D1 to D22) and 29/30 November 2006 (samples D23 to D37). Additional sampling was carried out on 3 and 5 August 2007 (samples L1 to L9). Scuba diver teams collected surficial sediment samples and described bed condition. Samples were collected using a plastic scoop to obtain the upper few centimetres of sediment. Two 50 g sediment samples were placed in acid-washed jars and approximately 1 kg of sediment was collected and placed in a plastic bag for contaminant and grain size analysis respectively. Sample locations were recorded in the field using a handheld GPS (with accuracy of approximately ± 4 m).

Physical sediment characteristics such as colour, texture, and the presence of shell, particle size and grading were recorded in the field as each sample was recovered. Surficial sediment samples were collected on the basis that these are the most recently deposited sediments and are therefore most likely to exhibit anthropogenic contamination.

Sample identifications were labelled directly onto soil bags with a waterproof marker pen and chain of custody forms were completed to document the transit of samples and provide traceability from the collection of samples to the production of the analytical results.

The sampling methods complied with the requirements of the 'National Ocean Disposal Guidelines for Dredged Material' (Environment Australia 2002). All samples were collected, stored, preserved, handled and held in accordance with these guidelines.

07.3.4 Laboratory analyses

Sediment grain size analysis was undertaken by Australian Geomechanical Laboratories Pty Ltd and contaminant analysis by ALS Environmental (Sydney). Both are NATA accredited laboratories.

All samples were analysed for heavy metals, and representative samples were analysed for trace chemical contaminants and particle size distribution (PSD) by sieve analysis (Table O7.1).

Table O7.1 Summary of laboratory analysis for sediment samples

Description	Australian Laboratory method code	Limit of reporting (LOR)
PSD (sieves: 0.075, 0.15, 0.30, 0.425, 0.60, 1.18, 2.36, 4.75, 9.50, 19.00 mm)	n.a.	n.a.
Moisture content	EA055-103	1 %
Total metals by ICP–AES (arsenic, cadmium, chromium, copper, lead, nickel, zinc)	EG005T	1-5 mg/kg
Total Mercury by FIMS	EG035T	0.1 mg/kg
Organic matter	EP004	
Total petroleum hydrocarbons (TPH) – semivolatiles fraction	EP071	2-100 mg/kg
PAH/Phenols (SIM)	EP075(SIM)	0.5 mg/kg
TPH Volatiles/BTEX	EP080	0.2 mg/kg
Organotin analysis	EP090	0.5-1.0 µgSn/kg
Organophosphorus pesticides (ultra-trace)	EP130	10 µg/kg
Organochlorine pesticides (ultra-trace)	EP131A	0.5 µg/kg
Polychlorinated biphenyls (PCB) (ultra-trace)	EP131B	5 µg/kg
Semivolatiles compounds by GCMS (SIM – ultra-trace)	EP132	10 µg/kg

Abbreviations:

ICP-AES = inductively coupled plasma-atomic emission spectroscopy

FIMS = flow injection mercury system

PAH = polycyclic aromatic hydrocarbons

SIM = select ion monitoring

TPH = total petroleum hydrocarbons

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

GCMS = gas chromatograph/mass spectrometer

07.4 SEDIMENT CHARACTERISTICS

07.4.1 Sediment composition

Port Bonython/Point Lowly

The surficial sedimentary material at Port Bonython/Point Lowly is generally coarse silty or slightly clayey sand, with numerous angular shell fragments (Table 07.2).

Table 07.2 Description of sediment characteristics

Sample number	Water depth ¹ (m below MSL)	Description
D1	7.0	Shelly sand (~ 85% angular shell fragments), light brown, high energy environment
D2	10.0	Shelly silty sand (~ 50% angular shell fragments, some very large), light brown with black organic layers
D3	13.0	Clayey silt, no shell fragments, light brown, low energy environment
D4	11.0	Shelly sand (~ 80% angular shell fragments), light brown-grey, high energy environment
D5	5.0	Shelly sand (~ 90% small shell fragments), light brown
D6	14.9	Silty sand, occasional shell fragments (~ 5%), light brown-grey
D7	15.9	Clayey silt, no shell fragments, light brown, low energy environment
D8	15.0	Silty sand, numerous shell fragments (~ 30%), light brown with black layers
D9	22.0	Shelly clayey silt (~ 80% small angular shell fragments), light brown
D10	5.0	Coarse sand, mostly shelly, no visible large fragments, light brown with black layers
D11	11.0	Silty sand, occasional shell fragments, light brown with black organic layers
D12	17.8	Silty sand, shell fragments, light brown with black organic layers
D13	20.4	Shelly sand (~ 80% angular shell fragments), light brown
D14	24.0	Shelly slightly clayey sand (~ 80% angular shell fragments), light brown
D15	2.0	Shelly sand (~ 85% angular shell fragments), light brown
D16	11.5	Silty sand, coarse grained with shell fragments
D17	21.0	Silty sand, coarse grained with shell fragments
D19	26.0	Shelly silty sand (~ 90% angular shell fragments, some very large) light brown, very high energy environment
D20	5.0	Shelly sand (~ 85% angular shell fragments), light brown, high energy environment
D22	27.0	Shelly sand (~ 90% angular shell fragments), light brown, high energy environment
D23	25.9	Shelly sand (~ 90% medium to coarse shell debris), light grey to greenish, high energy environment
D24	27.5	Sandy silt (<10% shell fragments), grey with black layers, low energy environment
D25	25.1	Shelly silty sand (>95% shell fragments, many large to 5 cm and very angular), grey/greenish, high energy environment
D26	25.9	Shelly silty sand (almost 100% shell fragments), grey/light brown, high energy environment
D27	20.9	Shelly silty sand (>95% shell fragments), grey/greenish/pink, high energy environment, similar to D25
D28	29.0	Shelly silty sand (~80% shell debris), grey/black, high energy environment. Bottom covered with shell fragments, needed to dig to expose sediment
D29	26.5	Shelly silty sand (almost 100% shell fragments), grey/light brown, high energy environment, similar to D26
D30	4.0	Silty sand, occasional shell fragments (~ 5%), light brown-grey
D31	9.0	Shelly silty sand (~90% shell fragments), grey/light brown, high energy environment, similar to D26 and D29
D32	20.5	Clayey silt, occasional large 5-7 cm shells, grey with black horizons, low energy environment, reducing conditions
D33	26.0	Shelly silty sand (>95% shell debris), grey/light brown, high energy environment, similar to D26
D34	12.0	Silty sand (~50% shell grit), grey with black layers from decomposing organic matter, low energy environment, reducing conditions
D35	12.0	Silty sand (~25% shell grit), grey with black layers from decomposing organic matter, low energy environment, reducing conditions
D36	22	Silty sand (~70% shell grit), grey, low energy environment, reducing conditions
D37	25.1	Silty sand (~50% shell grit), grey, low energy environment, reducing conditions

¹ depth measurements taken from diver submersible pressure gauges and are approximate only. MSL = mean sea level

Upper Spencer Gulf

The surficial sedimentary material collected from Upper Spencer Gulf in the vicinity of the proposed landing facility is similar to that found at Port Bonython, but it contains less shell debris (Table 07.3). Of note is that L1 and L5 are fine-grained material with black organic layers and no shell fragments. This suggests that the south-western corner of the site is a low energy, occasionally reducing environment.

Table 07.3 Description of sediment characteristics

Sample ID	Water depth ¹ (m below MSL)	Description
L1	3	Silty fine sand, light brown with black organic layers
L2	5–6.5	Silty fine sand, light brown
L3	10.5	Sandy silt, coarse grained with shell grit, brown
L4	1.5	Fine to coarse grained sand with shell grit, grey brown.
L5	3.5	Clayey silt, light brown with black organic layers.
L6	8.5	Clayey silt, light brown.
L7	2	Poorly sorted fine to coarse-grained sand with shell grit, brown
L8	4	Silty fine sand, coarse grained with shell grit, light brown
L9	9	Silty fine to coarse-grained sand, with shell grit, light brown

¹ Depth measurements taken from diver submersible pressure gauges and are approximate only. MSL = mean sea level.

07.4.2 Texture

Port Bonython/Point Lowly

The grain size analysis of selected samples provided further detail on the character of the surficial material (Table 07.4). Samples D2 and D4 are located west of the jetty and, although almost 2 km apart, they both represent sediment at a depth of around 10 m. The samples are similar with most material ranging in size between 0.3 and 0.4 mm (Figure 07.3). Of note is that the material at D4 is much coarser, with the fractions greater than 1.2 mm, being predominantly shell fragments (see also description in Table 07.2).

Table 07.4 Grain size analysis (%) of selected sediments samples

Sample	Grain size (mm)									
	0.075	0.15	0.30	0.425	0.60	1.18	2.36	4.75	9.5	19.0
Port Bonython										
D2	11	10	31	14	11	13	3	2	3	2
D4	6	5	24	10	9	19	12	5	5	5
D5	2	0	1	18	24	40	11	1	2	1
D6	11	8	28	17	13	16	5	1	1	
D7	41	18	26	7	3	3	1	1		
D8	12	5	14	9	10	25	19	4	2	
Point Lowly										
D20	37	1	1	4	5	24	23	3	1	1
D22	6	1	1	4	8	28	30	14	6	2
D24	31	13	14	6	4	10	9	6	2	5
D28	16	6	8	6	8	20	15	10	7	4
D30	2	1	50	37	8	1	1			
D31	3	1	4	7	12	43	25	4	1	
D32	31	10	13	6	7	12	9	5	4	3
D35	11	10	31	13	10	17	6	1	1	
D36	15	6	10	9	9	18	15	8	6	4

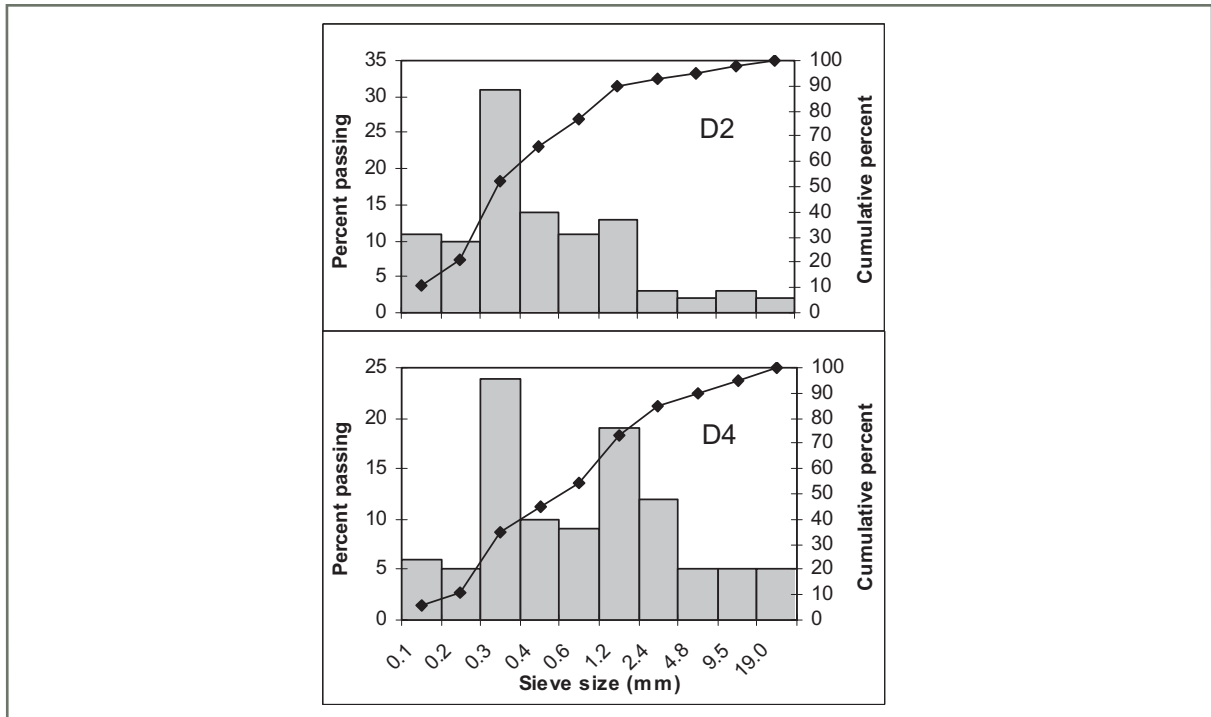


Figure 07.3 Grain size distribution for sample D2 and D4

Samples D5 to D9 are located west of the jetty and water covers depths ranging between 5 and 22 m. Sample D5 is from shallow waters and consists of shelly sand with 90% of the material being 0.4 to 2 mm. The grain size is approximately normally distributed, with little concentrations of fine or coarse material (Figure 07.4).

Sample D6 was collected from waters deeper than 10 m below MSL and consisted of silty sand with about 20% clays and very little shell fragments. As shown in Figure 07.4, the grain size distribution is skewed towards the finer fractions as the percentage of fine-grained material increased substantially in comparison with sample D5.

Sample D7 is very finely-grained with 60% clay fractions while D8 is highly heterogeneous with a bimodal distribution (about 10% clays and more than 50% of particles ranging between 1 and 5 mm).

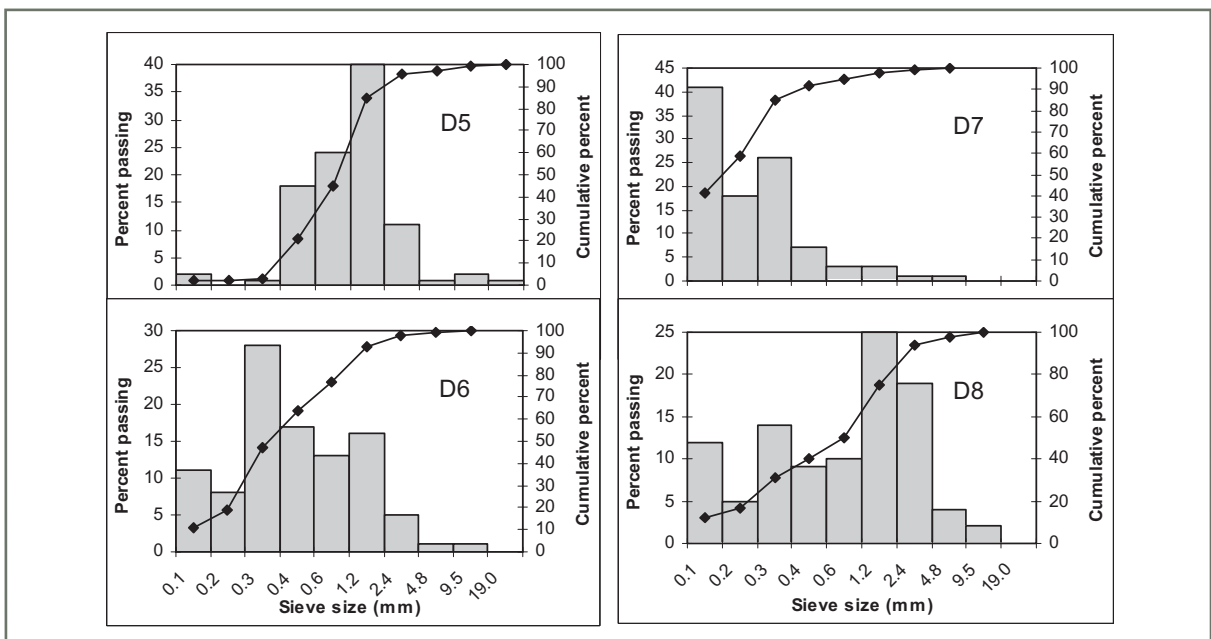


Figure 07.4 Grain size distribution for samples D5–D8

Samples D20 and D22 are located offshore of Point Lowly and at depths of approximately 5 and 27 m, respectively (Figure O7.5). D20 is strongly bimodal with more than 35% clays and about 50% of particles being shells of 1 to 4 mm in size. By comparison, D22 is dominantly coarse.

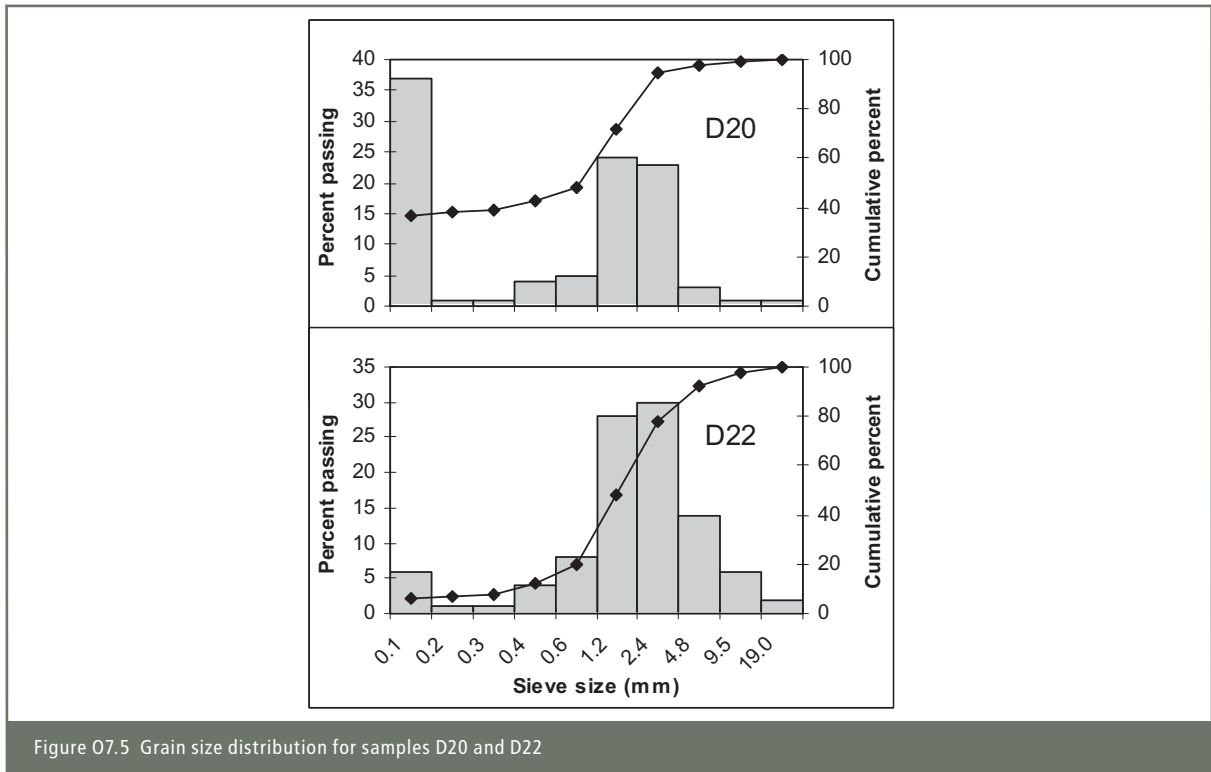


Figure O7.5 Grain size distribution for samples D20 and D22

Although located far apart, D24 and D32 are quite similar in terms of grain size distribution and contain more than 30% silts and clays (<0.1 mm) (Figure O7.6).

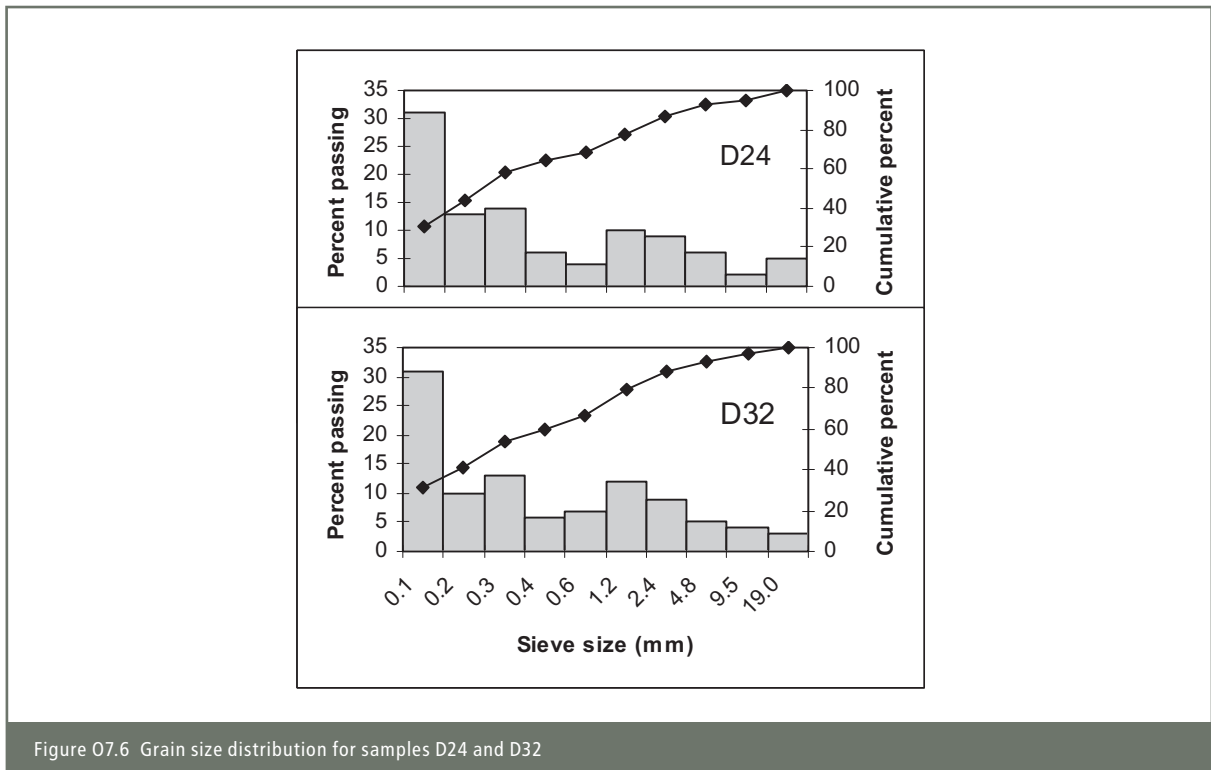


Figure O7.6 Grain size distribution for samples D24 and D32

Similarly, D28 and D36 are far apart spatially but similar as they are both bimodal with 15% fine material and more than 30% shell debris of 2–4 mm in size (Figure O7.7).

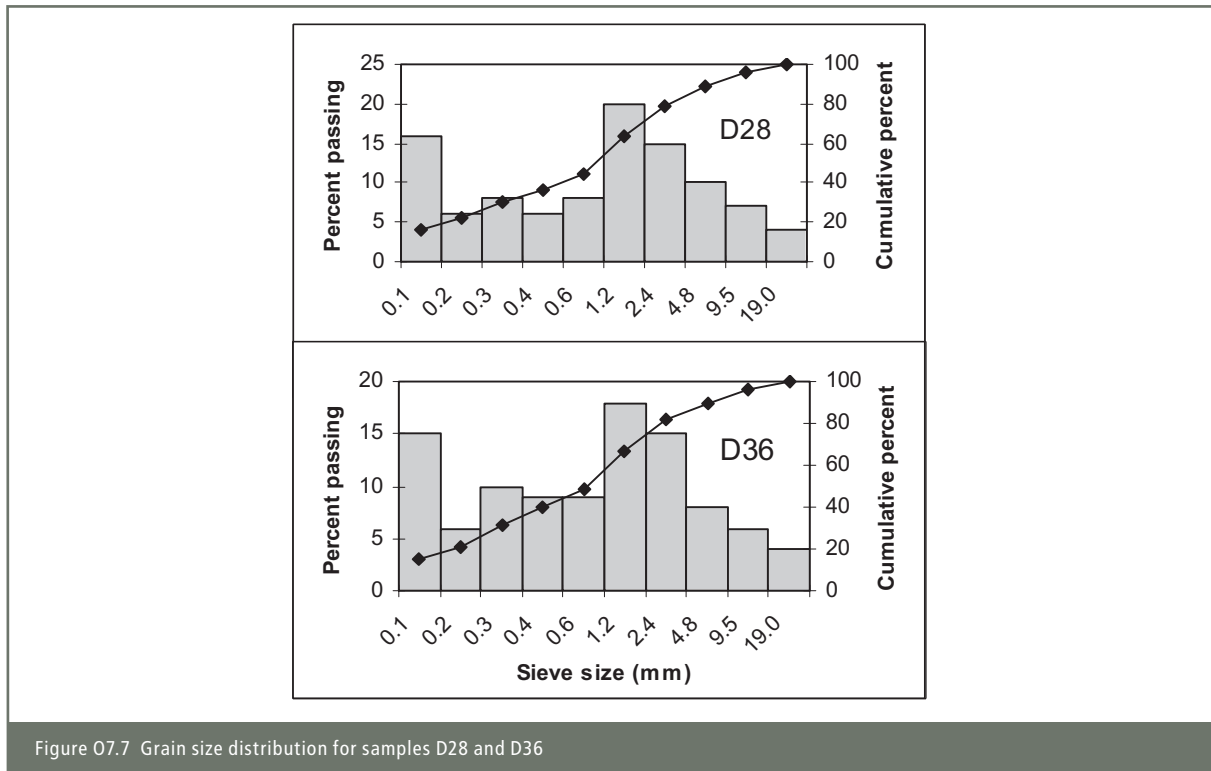


Figure O7.7 Grain size distribution for samples D28 and D36

Samples D30, D31 and D35 are collected from shallow depths; they are quite close spatially but texturally different. D30 is fine and homogeneous with almost 90% of material ranging between 0.3 and 0.4 mm; it reflects a low energy environment and it is highly atypical considering that samples collected from similar water depths are coarse and shelly (Figure O7.8). An example is D31, which is located along the same transect and contains more than 70% shell fragments of 2 to 5 mm. D35 is bimodal with a fine grained population around 0.3 mm (30%) and about 20% shell debris about 1 mm in size (Figure O7.8).

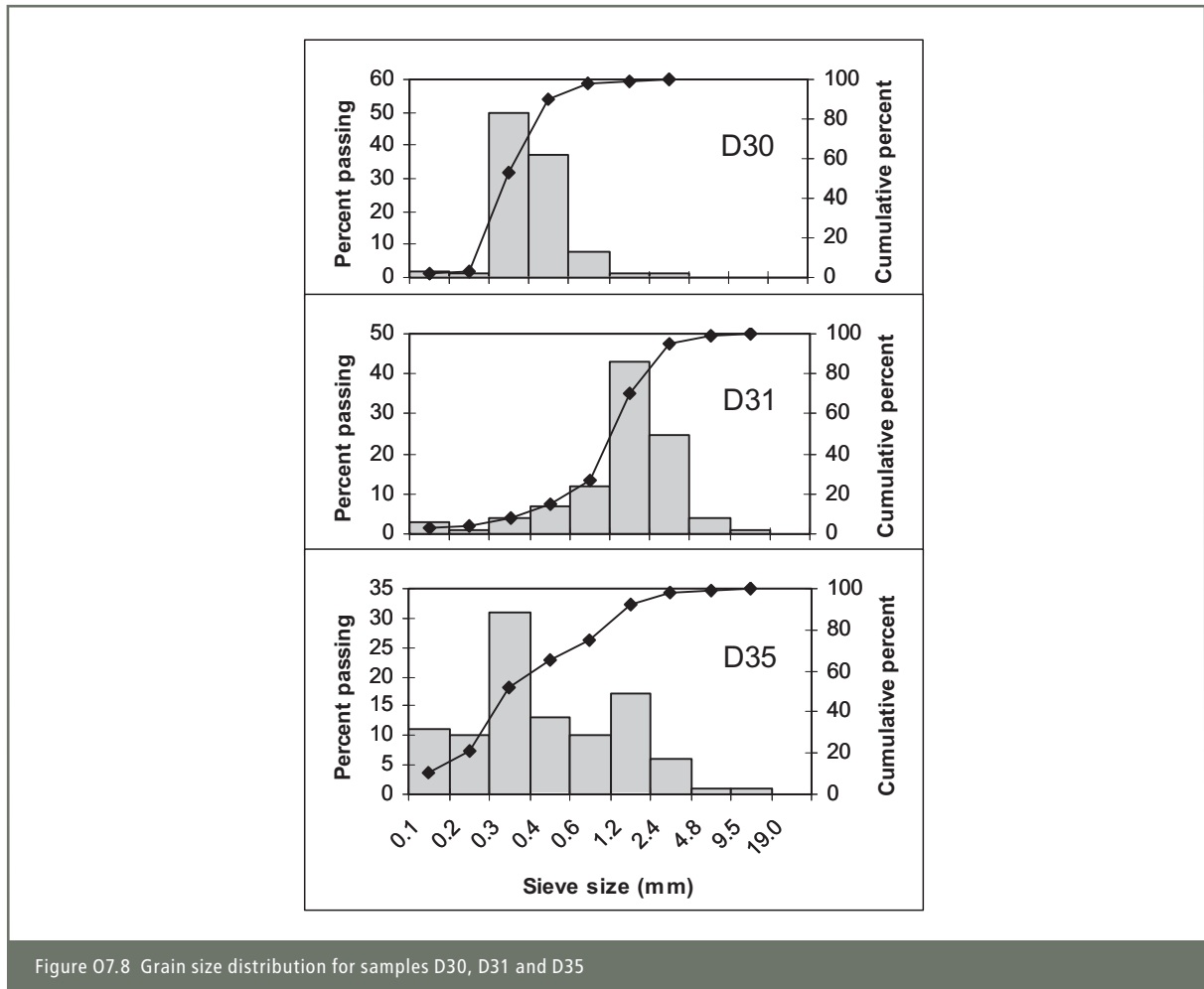


Figure 07.8 Grain size distribution for samples D30, D31 and D35

Upper Spencer Gulf

The grain size analysis of the Spencer Gulf samples is presented in Table 07.5 and displayed in Figures 07.9, 07.10 and 07.11. The sediment ranges between very fine sand to medium and coarse gravelly sediment. The coarse fraction is exclusively shell debris. The total inorganic carbon (TIC) varies between 2–9%. Considering that TIC represents approximately 12% of the total carbonaceous material (CaCO₃), the shell content therefore varies between 15–75% (Table 07.5).

The south-western section of the study area (sites L1, L2, L4 and L5) is shallow (< 5m water depth) and characterised by silty fine to very fine sands (Figure 07.9). The material finer than 0.1 mm ranges between 26–38%, while the fine sand fraction (0.15 to 0.3 mm) is 20–50%. This low energy of the setting may be due to the presence of a seagrass bed, which could cause the dissipation of wave energy in the area. Samples L1 and L2 have 10–16% coarser fractions, while L4 and L5 are more poorly sorted with 36–40% medium to coarse sand.

Table 07.5 Grain size analysis (%) of selected sediments samples from Upper Spencer Gulf

Sample	Shell	Grain size (mm)										
		0.075	0.15	0.30	0.425	0.60	1.18	2.36	4.75	9.5	19.0	26.5
L1	36.1	29.1	39.8	11	3.2	2.3	4.5	4.4	2.3	3.4		
L2	42.6	33.6	31.7	19	5.2	3.7	4.8	1.4	0.4	0.2		
L3	14.9	2.7	3.0	32.1	22.5	17.5	16.2	4.1	0.9	0.5	0.5	
L4	63.2	26.2	19.9	8.7	5.4	6.0	8.8	8.8	4.6	6.3	4.0	1.3
L5	41.3	37.6	9.4	11.1	5.6	4.8	5.6	8.1	5.2	7.2	5.4	
L6	25.3	17.9	5.5	30.1	19.8	10.7	7.9	3.1	1.5	2.0	1.5	
L7	75.0	7.3	12.7	14.7	8.5	8.7	12.1	13.5	8.7	6.7	5.3	1.8
L8	49.6	15.4	20.8	24.7	9.6	7.8	7.4	7.0	2.0	2.7	2.6	
L9	46.2	10.5	5.5	32.9	20.7	13.7	12.2	2.7	0.5	1.3		

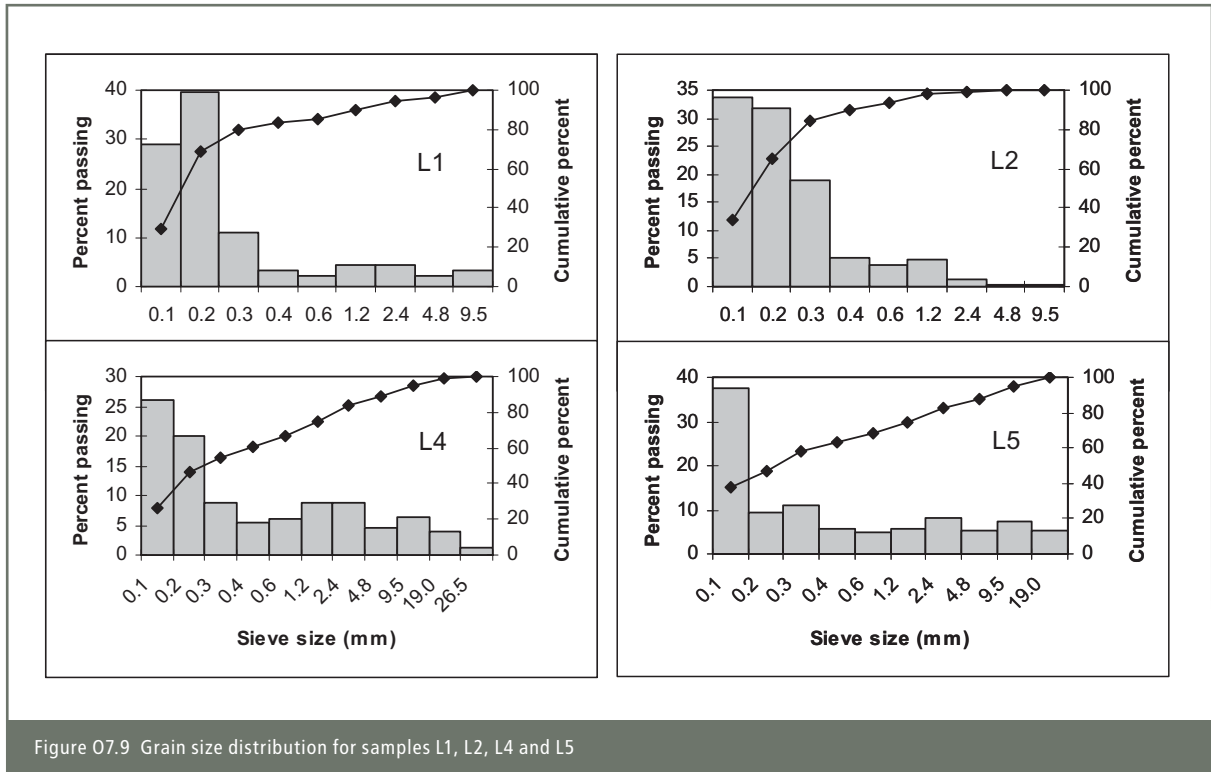


Figure 07.9 Grain size distribution for samples L1, L2, L4 and L5

Samples L3, L6 and L9 were collected furthest from the shoreline and represent depths of around 10 m. The dominant particle size is 0.3 mm (30–33%), which is indicative of fine sands. However, the presence of significant concentrations of medium (0.4 mm–20%) and coarse sand (0.6 mm–15%) suggests poorly sorted sediment, presumably caused by a high energy environment (Figure 07.10).

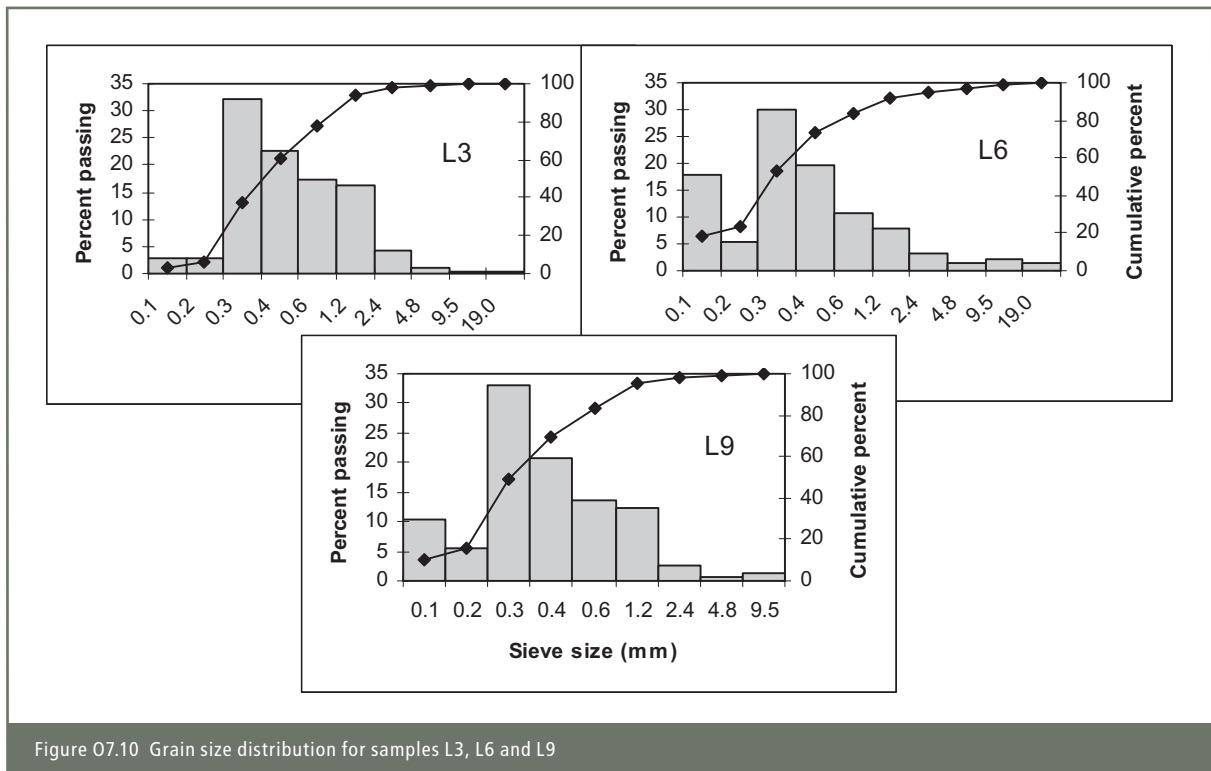


Figure 07.10 Grain size distribution for samples L3, L6 and L9

Although geographically close, samples L7 and L8 are quite different from each other and from the other samples in the area (Figure 07.11). They represent the shallow waters of the north-west section of the study area (2–4 m water depths) and are generally poorly sorted. Sample L7 is bimodal and particularly heterogeneous with about 5–10% of each particle size, except the gravel fraction (26.5 mm) which is limited. Sample L8 is similar to some of the deep samples as it contains about 25% fine sand (0.3 mm). However, the coarse fraction exceeds the silty and fine fractions. Overall, this area is characterised by high energy.

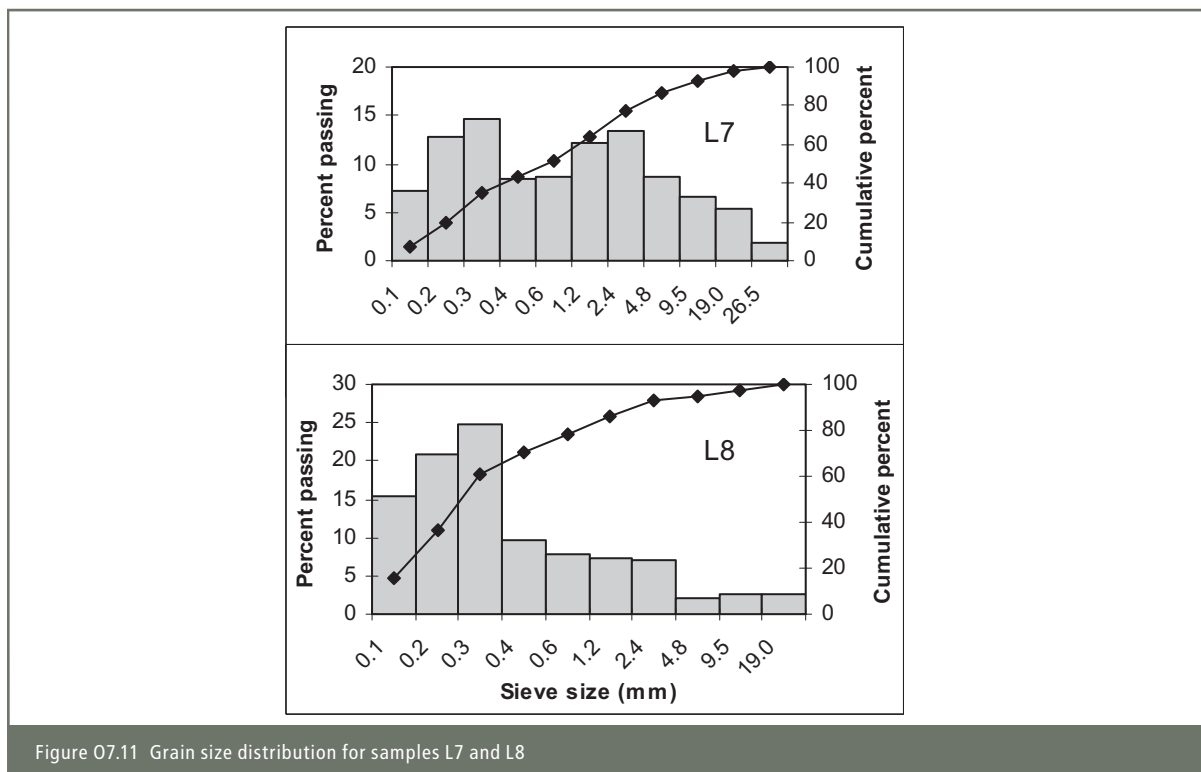


Figure 07.11 Grain size distribution for samples L7 and L8

When comparing the two sites, it can be seen that Port Bonython is much coarser with bimodal sediments that are largely shelly. Both sites have low energy areas that tend to accumulate fine-grained sediments that have poor oxygen exchange, and therefore develop reducing conditions.

07.4.3 Trace contaminants

The 'National Ocean Disposal Guidelines for Dredged Material' (Environment Australia 2002) recommend 'screening' and 'maximum' level contaminant thresholds for a wide range of potential contaminants. The screening level is generally considered to be the concentration below which there is minimal environmental risk. The maximum level is the level above which the material is considered to be potentially unsuitable for ocean disposal, and additional analyses are required.

A brief description of the results is provided below, and chemical composition results are detailed in Attachments 07.1 (Port Bonython/Point Lowly) and 07.2 (Upper Spencer Gulf landing facility).

Heavy metals

All samples analysed for heavy metals returned concentrations below EA screening levels and therefore disturbance to these sediments is considered to present negligible environmental risk.

Mercury and cadmium concentrations were below Limit of Reporting (LOR) in all samples, while concentrations of other heavy metals were low (see Attachments 07.1 and 07.2). This is likely to be attributed to the relatively coarse shelly sediment texture, whereby there are less exchange sites available to hold metals.

Organic and inorganic contaminants

As the bioavailability, and hence toxicity, of organic contaminants is affected by the total organic carbon (TOC) content, it is necessary to normalise the laboratory measured contaminant concentrations to 1% TOC when comparing these values to the Environment Australia Guidelines. All the normalised values of organic contaminants were found to be below LOR in the surficial materials analysed.

Similarly, the inorganic contaminants analysed were found to be below the detection limit of the chemical method employed for analysis.

07.5 DISCUSSION

Sediments in the vicinity of Port Bonython/Point Lowly are relatively coarse, while those from Upper Spencer Gulf are much finer with less shell material. The analysis of selected samples indicates that there are no chemical constituents of concern for aquatic ecosystems. The absence of such chemicals may be because there have been no releases into the environment, or the sediment composition is such that contaminants are not accumulating in the sediments and are dispersed into the environment by hydrodynamic processes.

Plume generation as a result of the construction works would not therefore have a toxic effect on marine life due to mobilisation of contaminants. Control of turbidity will however be important, as discussed in Chapter 16, Marine Environment. Turbidity control will be enhanced by the relatively coarse nature of the sediments that will tend to settle near the disturbance source.

As the surficial sediments have the highest risk of anthropogenic contamination, and these investigations have found negligible environmental risk associated with this horizon, further contaminant studies are not warranted.

07.6 CONCLUSIONS

This sediment investigation provided a basis for characterising surficial marine material in terms of composition, texture and chemical character.

The marine sediment comprises silty to clayey fine to coarse sand with numerous shell fragments or debris. With the exception of an area in central bay (around D7) and east of Point Lowly (around D32, Port Bonython) and a few sites in Upper Spencer Gulf (L1, L5, K2 and K3), the region investigated is of high energy as suggested by the presence of large particles. The angularity of the shell fragments also suggests that the carbonate material is quite fresh and has been exposed to only limited reworking. Most samples in the Port Bonython area present a bimodal grain size distribution, with a fine-grained population, as well as significant amounts of coarse (1–4 mm) material which is mostly biogenic. The samples in Upper Spencer Gulf are much finer grained with limited shell debris.

No contaminants (heavy metals, organic or inorganic phases) were detected above Environment Australia (2002) screening levels in the surficial sediments of the area investigated. The environmental risk associated with disturbing these sediments is therefore considered to be negligible.

07.7 REFERENCES

Environment Australia 2002, *National Ocean Disposal Guidelines for Dredged Material*, Department of Environment and Heritage, Canberra.

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly

Analyte grouping/Analyte	Units	LOR	Screening level	Maximum level	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
EA055: Moisture content																			
Moisture content (dried @103 °C)	%	1			22.9	37.4	30.5	31.1	30	40	38.8	34.9	35.1	30.1	32.2	30.5	30.4	34.8	38.9
EG005T: Total metals by ICP-AES																			
Arsenic	mg/kg	5	20	70	<5	5	<5	6	<5	6	5	13	7	<5	6	10	10	5	<5
Cadmium	mg/kg	1	1.5	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	2	80	370	<2	5	7	4	<2	8	8	5	7	<2	6	5	3	5	3
Copper	mg/kg	5	65	270	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Lead	mg/kg	5	50	220	5	12	15	7	5	19	15	10	10	<5	15	11	9	11	<5
Nickel	mg/kg	2	21	52	<2	<2	2	<2	<2	3	2	<2	<2	<2	<2	<2	<2	<2	<2
Zinc	mg/kg	5	200	410	13	34	29	12	9	58	31	22	22	21	47	22	22	22	8
EG035T: Total mercury by FIMS																			
Mercury	mg/kg	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EP004: Organic matter																			
Organic matter	%	0.5			---	---	1.2	---	---	---	---	---	---	0.6	---	0.8	---	---	---
Total organic carbon	%	0.5			---	---	0.7	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
EP075(SIM)B: Polynuclear aromatic hydrocarbons																			
Acenaphthene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Acenaphthylene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Anthracene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Benz(a)anthracene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Benzo(a)pyrene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Benzo(b)fluoranthene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Benzo(g,h,i)perylene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Benzo(k)fluoranthene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Chrysene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Dibenz(a,h)anthracene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Fluoranthene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Fluorene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Indeno(1,2,3-cd)pyrene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Naphthalene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Maximum level	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
Phenanthrene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Pyrene	mg/kg	0.5			---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
EP080/071: Total petroleum hydrocarbons																			
C6–C9 Fraction	mg/kg	2			---	---	<2	---	---	---	---	---	---	<2	---	<2	---	---	---
C10–C14 Fraction	mg/kg	50			---	---	<50	---	---	---	---	---	---	<50	---	<50	---	---	---
C15–C28 Fraction	mg/kg	100			---	---	<100	---	---	---	---	---	---	<100	---	100	---	---	---
C29–C36 Fraction	mg/kg	100			---	---	<100	---	---	---	---	---	---	<100	---	<100	---	---	---
EP080: BTEX																			
Benzene	mg/kg	0.2			---	---	<0.2	---	---	---	---	---	---	<0.2	---	<0.2	---	---	---
Toluene	mg/kg	0.5			---	---	<0.2	---	---	---	---	---	---	<0.2	---	<0.2	---	---	---
Ethylbenzene	mg/kg	0.5			---	---	<0.2	---	---	---	---	---	---	<0.2	---	<0.2	---	---	---
meta- and para-Xylene	mg/kg	0.5			---	---	<0.2	---	---	---	---	---	---	<0.2	---	<0.2	---	---	---
ortho-Xylene	mg/kg	0.5			---	---	<0.2	---	---	---	---	---	---	<0.2	---	<0.2	---	---	---
EP090: Organotin compounds																			
Monobutyltin	µgSn/kg	1			---	---	<1	---	---	---	---	---	---	<1	---	<1	---	---	---
Dibutyltin	µgSn/kg	1			---	---	<1	---	---	---	---	---	---	<1	---	<1	---	---	---
Tributyltin	µgSn/kg	0.5	5	70	---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
EP130A: Organophosphorus pesticides (Ultra-trace)																			
Bromophos-ethyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Carbophenothion	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Chlorfenvinphos (E)	µg/kg	10			---	---	<10.0	---	---	---	---	---	---	<10.0	---	<10.0	---	---	---
Chlorfenvinphos (Z)	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Chlorpyrifos	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Chlorpyrifos-methyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Demeton-S-methyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Diazinon	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Dichlorvos	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Dimethoate	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Ethion	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Fenamiphos	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Maximum level	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
Fenthion	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Malathion	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Azinphos Methyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Monocrotophos	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Parathion	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Parathion-methyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Pirimphos-ethyl	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Prothiofos	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
EP131A: Organochlorine pesticides																			
Aldrin	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
alpha-BHC	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
beta-BHC	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
delta-BHC	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
4.4'-DDD	µg/kg	0.5	2	20	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
4.4'-DDE	µg/kg	0.5	2.2	27	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
4.4'-DDT	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
DDT (total)	µg/kg	0.5	1.6	46	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Dieldrin	µg/kg	0.5	0.02	8	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
alpha-Endosulfan	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
beta-Endosulfan	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Endosulfan sulfate	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Endosulfan	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Endrin	µg/kg	0.5	0.02	8	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Endrin aldehyde	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Endrin ketone	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Heptachlor	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Heptachlor epoxide	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Hexachlorobenzene (HCB)	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
gamma-BHC	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Methoxychlor	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Maximum level	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
cis-Chlordane	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
trans-Chlordane	µg/kg	0.5			---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
Total Chlordane	µg/kg	0.5	0.5	6	---	---	<0.50	---	---	---	---	---	---	<0.50	---	<0.50	---	---	---
EP131B: Polychlorinated biphenyls (as aroclors)																			
Total polychlorinated biphenyls	µg/kg	5	23		---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1016	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1221	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1232	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1242	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1248	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1254	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
Aroclor 1260	µg/kg	5			---	---	<10.0	---	---	---	---	---	---	<5.0	---	<5.0	---	---	---
EP132B: Polynuclear aromatic hydrocarbons																			
3-Methylcholanthrene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
2-Methylnaphthalene	µg/kg	10	70	670	---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
7.12-Dimethylbenz(a)anthracene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Acenaphthene	µg/kg	10	16	500	---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Acenaphthylene	µg/kg	10	44	640	---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Anthracene	µg/kg	10	85	1100	---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benz(a)anthracene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benz(a)anthracene – normalised to 1% TOC			261	1600															
Benzo(a)pyrene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benzo(a)pyrene – normalised to 1% TOC			430	1600															
Benzo(b)fluoranthene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benzo(e)pyrene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benzo(g,h,i)perylene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Benzo(k)fluoranthene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Chrysene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Chrysene – normalised to 1% TOC			384	2800															
Dibenz(a,h)anthracene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Maximum level	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
Dibenz(a,h)anthracene – normalised to 1% TOC			63	260															
Fluoranthene	µg/kg	10			---	---	10	---	---	---	---	---	---	<10	---	<10	---	---	---
Fluoranthene – normalised to 1% TOC			600	5100															
Fluorene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Indeno(1.2.3.cd)pyrene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
N-2-Fluorenyl Acetamide	µg/kg	100			---	---	<100	---	---	---	---	---	---	<100	---	<100	---	---	---
Naphthalene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Perylene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Phenanthrene	µg/kg	10			---	---	<10	---	---	---	---	---	---	<10	---	<10	---	---	---
Pyrene	µg/kg	10			---	---	10	---	---	---	---	---	---	<10	---	<10	---	---	---
Pyrene – normalised to 1% TOC			665	2600	---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---
Total PAH – normalised to 1% TOC			4000	45000	---	---	<0.5	---	---	---	---	---	---	<0.5	---	<0.5	---	---	---

Analyte grouping/ Analyte	Units	LOR	Screening level	Maximum level	D16	D17	D19	D20	D22	D22 (dup)	D24	D28	D30	D31	D32	D34	D35	D36
EA055: Moisture content																		
Moisture content (dried @103 °C)	%	1			31.5	31.9	35.9	42.3	35.8	43.9	1.9	<1.0	2.6	<1.0	2	1.8	6.9	5.4
EG005T: Total metals by ICP-AES																		
Arsenic	mg/kg	5	20	70	<5	10	16	<5	5	6	<5	<5	<5	<5	<5	<5	5	<5
Cadmium	mg/kg	1	1.5	10	<1	<1	<1	<1	<1	<1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Chromium	mg/kg	2	80	370	5	5	4	<2	4	2	4	5	2	2	6	3	4	4
Copper	mg/kg	5	65	270	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Lead	mg/kg	5	50	220	12	10	10	6	12	8	<5	<5	<5	<5	<5	<5	<5	<5
Nickel	mg/kg	2	21	52	<2	<2	<2	<2	<2	<2	15	19	2	5	20	9	12	14
Zinc	mg/kg	5	200	410	35	22	22	11	24	12	21	28	2	6	29	12	17	20
EG035T: Total mercury by FIMS																		
Mercury	mg/kg	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/ Analyte	Units	LOR	Screening level	Maximum level	D16	D17	D19	D20	D22	D22 (dup)	D24	D28	D30	D31	D32	D34	D35	D36
EP004: Organic Matter																		
Organic Matter	%	0.5			---	---	---	---	---	---	1	-	-	-	1.5	-	1	-
Total Organic Carbon	%	0.5			---	---	---	---	---	---	0.6	-	-	-	0.9	-	0.6	-
EP075(SIM)B: Polynuclear aromatic hydrocarbons																		
Acenaphthene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Acenaphthylene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Anthracene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benz(a)anthracene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benzo(a)pyrene	mg/kg	0.5									<10	-	-	-	<10	-	<10	-
Benzo(b)fluoranthene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	10	-
Benzo(g,h,i)perylene	mg/kg	0.5									<10	-	-	-	<10	-	<10	-
Benzo(k)fluoranthene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chrysene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Dibenz(a,h)anthracene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Fluoranthene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	10	-	20	-
Fluorene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.5																
Naphthalene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Phenanthrene	mg/kg	0.5			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Pyrene	mg/kg	0.5			---	---	---	---	---	---	10	-	-	-	10	-	20	-
EP080/071: Total petroleum hydrocarbons																		
C6–C9 Fraction	mg/kg	2			---	---	---	---	---	---								
C10–C14 Fraction	mg/kg	50			---	---	---	---	---	---	<50				<50		<50	
C15–C28 Fraction	mg/kg	100			---	---	---	---	---	---	<100				<100		<100	
C29–C36 Fraction	mg/kg	100			---	---	---	---	---	---	<100				<100		<100	
EP080: BTEX																		
Benzene	mg/kg	0.2			---	---	---	---	---	---	<0.2				<0.2		<0.2	
Toluene	mg/kg	0.5			---	---	---	---	---	---	<0.5				<0.5		<0.5	
Ethylbenzene	mg/kg	0.5			---	---	---	---	---	---	<0.5				<0.5		<0.5	
meta- and para-Xylene	mg/kg	0.5			---	---	---	---	---	---	<0.5				<0.5		<0.5	

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/ Analyte	Units	LOR	Screening level	Maximum level	D16	D17	D19	D20	D22	D22 (dup)	D24	D28	D30	D31	D32	D34	D35	D36
ortho-Xylene	mg/kg	0.5			---	---	---	---	---	---	<0.5				<0.5		<0.5	
EP090: Organotin compounds																		
Monobutyltin	µgSn/kg	1			---	---	---	---	---	---	<1	-	-	-	<1	-	<1	-
Dibutyltin	µgSn/kg	1			---	---	---	---	---	---	<1	-	-	-	<1	-	<1	-
Tributyltin	µgSn/kg	0.5	5	70	---	---	---	---	---	---	<0.5	-	-	-	<0.5	-	<0.5	-
EP130A: Organophosphorus pesticides (Ultra-trace)																		
Bromophos-ethyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Carbophenothion	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chlorfenvinphos (E)	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chlorfenvinphos (Z)	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chlorpyrifos	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chlorpyrifos-methyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Demeton-S-methyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Diazinon	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Dichlorvos	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Dimethoate	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Ethion	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Fenamiphos	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Fenthion	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Malathion	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Azinphos Methyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Monocrotophos	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Parathion	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Parathion-methyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Pirimphos-ethyl	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Prothiofos	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
EP131A: Organochlorine pesticides																		
Aldrin	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
alpha-BHC	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
beta-BHC	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/ Analyte	Units	LOR	Screening level	Maximum level	D16	D17	D19	D20	D22	D22 (dup)	D24	D28	D30	D31	D32	D34	D35	D36
delta-BHC	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
4.4'-DDD	µg/kg	0.5	2	20	---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
4.4'-DDE	µg/kg	0.5	2.2	27	---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
4.4'-DDT	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
DDT (total)	µg/kg	0.5	1.6	46	---	---	---	---	---	---								
Dieldrin	µg/kg	0.5	0.02	8	---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
alpha-Endosulfan	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
beta-Endosulfan	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Endosulfan sulfate	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Endosulfan	µg/kg	0.5			---	---	---	---	---	---								
Endrin	µg/kg	0.5	0.02	8	---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Endrin aldehyde	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Endrin ketone	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Heptachlor	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Heptachlor epoxide	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Hexachlorobenzene (HCB)	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
gamma-BHC	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Methoxychlor	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
cis-Chlordane	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
trans-Chlordane	µg/kg	0.5			---	---	---	---	---	---	<0.50	-	-	-	<0.50	-	<0.50	-
Total Chlordane	µg/kg	0.5	0.5	6	---	---	---	---	---	---								
EP131B: Polychlorinated biphenyls (as Aroclors)																		
Total Polychlorinated biphenyls	µg/kg	5	23		---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1016	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1221	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1232	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1242	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1248	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1254	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-
Aroclor 1260	µg/kg	5			---	---	---	---	---	---	<10.0	-	-	-	<10.0	-	<10.0	-

Attachment O7.1 Trace contaminant summary – Port Bonython/Point Lowly (cont'd)

Analyte grouping/ Analyte	Units	LOR	Screening level	Maximum level	D16	D17	D19	D20	D22	D22 (dup)	D24	D28	D30	D31	D32	D34	D35	D36
EP132B: Polynuclear aromatic hydrocarbons																		
3-Methylcholanthrene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
2-Methylnaphthalene	µg/kg	10	70	670	---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
7.12-Dimethylbenz(a)anthracene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Acenaphthene	µg/kg	10	16	500	---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Acenaphthylene	µg/kg	10	44	640	---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Anthracene	µg/kg	10	85	1,100	---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benz(a)anthracene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benz(a)anthracene – normalised to 1% TOC			261	1,600														
Benzo(a)pyrene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benzo(a)pyrene – normalised to 1% TOC			430	1,600														
Benzo(b)fluoranthene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	10	-
Benzo(e)pyrene	µg/kg	10			---	---	---	---	---	---	10	-	-	-	10	-	20	-
Benzo(g,h,i)perylene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Benzo(k)fluoranthene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chrysene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Chrysene – normalised to 1% TOC			384	2,800														
Dibenz(a,h)anthracene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Dibenz(a,h)anthracene – normalised to 1% TOC			63	260														
Fluoranthene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	10	-	20	-
Fluoranthene – normalised to 1% TOC			600	5,100														
Fluorene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Indeno(1,2,3.cd)pyrene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
N-2-Fluorenyl Acetamide	µg/kg	100			---	---	---	---	---	---	<100	-	-	-	<100	-	<100	-
Naphthalene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Perylene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Phenanthrene	µg/kg	10			---	---	---	---	---	---	<10	-	-	-	<10	-	<10	-
Pyrene	µg/kg	10			---	---	---	---	---	---	10	-	-	-	10	-	20	-
Pyrene – normalised to 1% TOC			665	2,600	---	---	---	---	---	---								
Total PAH – normalised to 1% TOC			4,000	450,00	---	---	---	---	---	---								

Attachment O7.2 Trace contaminant summary – Upper Spencer Gulf (landing facility)

Analyte grouping/Analyte	Units	LOR	Screening level	Max. level	L1	L2	L3	L4	L5	L6	L7	L8	L9
EA055: Moisture content													
Moisture content (dried @ 103 °C)	%	1			38.4	38.4	20.8	44.7	35.1	25.2	44.1	40.7	32
EG020T: Total metals by ICP-MS													
Arsenic	mg/kg	0.1	20	70	3.4	4.3	12.3	3.7	4.2	10.7	4.3	5.4	11
Cadmium	mg/kg	0.1	1.5	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Chromium	mg/kg	0.1	80	370	3.5	6.1	3.6	3.1	6.4	5.4	2.6	3.8	4.3
Copper	mg/kg	0.1	65	270	2.6	3.5	1.1	1.9	3.6	2.7	1.6	2.3	1.9
Nickel	mg/kg	0.1	50	220	2.2	3.1	1.3	1.6	3.1	2.9	1.6	2	1.8
Lead	mg/kg	0.1	21	52	5.3	9	3.8	5.3	10.2	7.1	4.9	6.5	8.5
Zinc	mg/kg	0.1	200	410	10	15	8	8.4	17.5	13.4	7.1	10.6	10.7
EG035T: Total mercury by FIMS													
Mercury	mg/kg	0.01			0.01	0.02	<0.01	<0.01	0.02	0.01	<0.01	0.01	0.01
EP005: Total organic carbon (TOC)													
Total organic carbon	%	0.02			0.5	0.68	---	---	0.47	0.33	---	---	---
EP080: BTEX													
Benzene	mg/kg	0.2			<0.2	<0.2	---	---	<0.2	<0.2	---	---	---
Toluene	mg/kg	0.5			<0.5	<0.5	---	---	<0.5	<0.5	---	---	---
Ethylbenzene	mg/kg	0.5			<0.5	<0.5	---	---	<0.5	<0.5	---	---	---
meta- and para-Xylene	mg/kg	0.5			<0.5	<0.5	---	---	<0.5	<0.5	---	---	---
ortho-Xylene	mg/kg	0.5			<0.5	<0.5	---	---	<0.5	<0.5	---	---	---
EP080/071: Total petroleum hydrocarbons													
C6–C9 Fraction	mg/kg	10			<10	<10	---	---	<10	<10	---	---	---
C10–C14 Fraction	mg/kg	50			<50	<50	---	---	<50	<50	---	---	---
C15–C28 Fraction	mg/kg	100			<100	<100	---	---	<100	<100	---	---	---
C29–C36 Fraction	mg/kg	100			<100	<100	---	---	<100	<100	---	---	---
EP080S: TPH(V)/BTEX surrogates													
1,2-Dichloroethane-D4	mg/kg	0.2			101	90	---	---	96.7	98.2	---	---	---
Toluene-D8	mg/kg	0.2			119	117	---	---	116	125	---	---	---
4-Bromofluorobenzene	mg/kg	0.2			98.4	107	---	---	106	120	---	---	---
EP090: Organotin compounds													
Monobutyltin	µgSn/kg	1			<1	<1	---	---	<1	<1	---	---	---

Attachment O7.2 Trace contaminant summary – Upper Spencer Gulf (landing facility) (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Max. level	L1	L2	L3	L4	L5	L6	L7	L8	L9
Dibutyltin	µgSn/kg	1			<1	<1	---	---	<1	<1	---	---	---
Tributyltin	µgSn/kg	0.5	5	70	<0.5	<0.5	---	---	<0.5	<0.5	---	---	---
EP090S: Organotin surrogate													
Tripopyltin	µgSn/kg	0.5			69.1	55.5	---	---	48.7	55.6	---	---	---
EP130A: Organophosphorus pesticides (Ultra-trace)													
Bromophos-ethyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Carbophenothion	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Chlorfenvinphos (E)	µg/kg	10			<10	<11	---	---	<10	<10	---	---	---
Chlorfenvinphos (Z)	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Chlorpyrifos	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Chlorpyrifos-methyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Demeton-S-methyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Diazinon	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Dichlorvos	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Dimethoate	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Ethion	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Fenamiphos	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Fenthion	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Malathion	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Azinphos Methyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Monocrotophos	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Parathion	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Parathion-methyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Pirimphos-ethyl	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Prothiofos	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
EP130S: Organophosphorus pesticide surrogate													
DEF	µg/kg	10			44	41.5	---	---	40.2	47.7	---	---	---
EP131A: Organochlorine pesticides													
Aldrin	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
alpha-BHC	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---

Attachment O7.2 Trace contaminant summary – Upper Spencer Gulf (landing facility) (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Max. level	L1	L2	L3	L4	L5	L6	L7	L8	L9
beta-BHC	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
delta-BHC	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
4.4'-DDD	µg/kg	0.5	2	20	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
4.4'-DDE	µg/kg	0.5	2.2	27	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
4.4'-DDT	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
DDT (total)	µg/kg	0.5	1.6	46	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Dieldrin	µg/kg	0.5	0.02	8	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
alpha-Endosulfan	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
beta-Endosulfan	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Endosulfan sulfate	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Endosulfan (sum)	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Endrin	µg/kg	0.5	0.02	8	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Endrin aldehyde	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Endrin ketone	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Heptachlor	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Heptachlor epoxide	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Hexachlorobenzene (HCB)	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
gamma-BHC	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Methoxychlor	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
cis-Chlordane	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
trans-Chlordane	µg/kg	0.5			<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
Total Chlordane (sum)	µg/kg	0.5	0.5	6	<0.50	<0.50	---	---	<0.50	<0.50	---	---	---
EP131B: Polychlorinated biphenyls (as Aroclors)													
Total Polychlorinated biphenyls	µg/kg	5	23		<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1016	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1221	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1232	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1242	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1248	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1254	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---
Aroclor 1260	µg/kg	5			<5.0	<5.0	---	---	<5.0	<5.0	---	---	---

Attachment O7.2 Trace contaminant summary – Upper Spencer Gulf (landing facility) (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Max. level	L1	L2	L3	L4	L5	L6	L7	L8	L9
EP131S: OC Pesticide surrogate													
Dibromo-DDE	µg/kg	0.5			44.7	42.7	---	---	45.6	46.7	---	---	---
EP131T: PCB surrogate													
Decachlorobiphenyl	µg/kg	5			46.6	45	---	---	47.1	50.5	---	---	---
EP132B: Polynuclear aromatic hydrocarbons			4,000	45,000									
3-Methylcholanthrene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
2-Methylnaphthalene	µg/kg	10	70	670	<10	<10	---	---	<10	<10	---	---	---
7.12-Dimethylbenz(a)anthracene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Acenaphthene	µg/kg	10	16	500	<10	<10	---	---	<10	<10	---	---	---
Acenaphthylene	µg/kg	10	44	640	<10	<10	---	---	<10	<10	---	---	---
Anthracene	µg/kg	10	85	1,100	<10	<10	---	---	<10	<10	---	---	---
Benz(a)anthracene	µg/kg	10	261	1,600	<10	<10	---	---	<10	<10	---	---	---
Benzo(a)pyrene	µg/kg	10	430	1,600	<10	<10	---	---	<10	<10	---	---	---
Benzo(b)fluoranthene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Benzo(e)pyrene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Benzo(g,h,i)perylene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Benzo(k)fluoranthene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Chrysene	µg/kg	10	384	2,800	<10	<10	---	---	<10	<10	---	---	---
Coronene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Dibenz(a,h)anthracene	µg/kg	10	63	260	<10	<10	---	---	<10	<10	---	---	---
Fluoranthene	µg/kg	10	600	5,100	<10	<10	---	---	<10	<10	---	---	---
Fluorene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Indeno(1,2,3-cd)pyrene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
N-2-Fluorenyl Acetamide	µg/kg	100			<100	<100	---	---	<100	<100	---	---	---
Naphthalene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Perylene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Phenanthrene	µg/kg	10			<10	<10	---	---	<10	<10	---	---	---
Pyrene	µg/kg	10	665	2,600	<10	<10	---	---	<10	<10	---	---	---
EP132S: Acid Extractable surrogates													
2-Fluorophenol	µg/kg	10					---	---			---	---	---

Attachment O7.2 Trace contaminant summary – Upper Spencer Gulf (landing facility) (cont'd)

Analyte grouping/Analyte	Units	LOR	Screening level	Max. level	L1	L2	L3	L4	L5	L6	L7	L8	L9
Phenol-d6	µg/kg	10					---	---			---	---	---
2-Chlorophenol-D4	µg/kg	10					---	---			---	---	---
2.4.6-Tribromophenol	µg/kg	10					---	---			---	---	---
EP132T: Base/Neutral extractable surrogates													
2-Fluorobiphenyl	µg/kg	10			51.3	54.7	---	---	57.9	68.1	---	---	---
Anthracene-d10	µg/kg	10			51.4	54	---	---	61.6	68.6	---	---	---
4-Terphenyl-d14	µg/kg	10			51.9	52.7	---	---	60.6	68.9	---	---	---

