Independent Evaluation:

Potential use of oil spill dispersants for the

SEQ Oil Spill Response

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Executive Summary

This review evaluates the potential use of oil spill dispersants during the response to oil spill from the container ship *Pacific Adventurer* in South East Queensland in March 2009. Overall the review concludes that the decision by response authorities to not use oil spills dispersants was the correct decision for the following reasons:

- In general:
    - The type of oil spilt (Heavy Fuel Oil or HFO) is not particularly amenable to dispersal.
- At spill source:
    - The ship was not carrying dispersant or dispersant application gear.
    - Even if it did, inclement wind and sea conditions would have made application difficult, even dangerous.
    - High winds would have blown the dispersant away as it was sprayed, preventing effective application to the oil slick.
- At sea prior to oil impact on the coast:
    - Weather conditions would have made dispersant application difficult, even dangerous, from both aircraft and vessels.
    - High winds would have blown the dispersants away from the slick.
    - Sea conditions would have precluded effective mixing of oil and dispersant.
    - Once weather and sea conditions abated to safe levels, the 12-24 hour window of opportunity for using dispersants on HFO had passed, and the oil had already impacted on the coast within this period.
    - The was a need to protect the fisheries resources and sensitive Flinders Reef and other reefs, located in the waters offshore from SEQ, from possible pollution by dispersants and dispersed oil.
- On sandy beaches:
    - Both dispersed oil and dispersant may penetrate the beach causing unacceptable ecological impacts.
    - Environmentally-friendly manual clean-up methods are well suited to beaches and are far preferable.

- In wetlands:
    - Both dispersed oil and dispersant may penetrate down into the wetland causing unacceptable ecological impacts.
    - The wetlands on Moreton Island are also semi-enclosed systems with limited flushing. Adding another pollutant such as dispersant will only increase the toxicity load in the system and compound the overall ecological impact.
    - Oiled wetlands are best cleaned using environmentally-friendly manual methods and low-pressure/high-volume flushing with water.
    - In any case once the HFO had impacted on the Moreton Island wetlands – its weathered state was not amenable to dispersal.
    - The wetland systems are fed from the freshwater groundwater aquifer with only periodic tidal inundation – and therefore have reduced salinity. Dispersants are generally designed to be used on oil on the sea, and may exhibit reduced effectiveness in lower salinity waters.
- On rocky shores:
    - It is often difficult to contain and collect the run-off from the dispersant spray, which may accumulate at the base of the rocky areas being cleaned, potentially penetrating into the sediments.
    - Dispersants may also be highly toxic to invertebrate and micro-fauna and flora on the rocky shore, and may significantly prolong the natural recovery process by removing these critical species from the system.
    - Additionally, dispersant application operations in these very rugged and difficult areas could be unsafe to clean-up crews.
    - Oil o rocky shores is best left in place to weather and breakdown naturally by the effects of the microbes, sun, wind, waves and storms.

The review also evaluated the decision to not use dispersants against the requirements of the *Policy and Guidelines on the Use of Chemical Dispersants* contained in the *Queensland Coastal Contingency Action Plan*, as well as several international guidelines.

It is concluded that considering all applicable circumstances, the decision to not use chemical dispersants on the SEQ oil spill was in full compliance with relevant policy and guidelines as contained in the *Queensland Coastal Contingency Action Plan*, and was totally consistent with international best practice.

Contents

1. Introduction

On Tuesday 17 March 2009 Maritime Safety Queensland (MSQ) engaged Steve Raaymakers of EcoStrategic Consultants (www.eco-strategic.com), to undertake an independent evaluation of the environmental effectiveness of the South East Queensland (SEQ) oil spill clean-up, being mounted in response the discharge of an estimated 250 tonnes of Heavy Fuel Oil (HFO) from the container ship *Pacific Adventurer*, following Cyclone Hamish the previous week.

Oil had impacted on the shores of the Sunshine Coast, Bribie Island and Moreton Island in SEQ, and a response and clean-up operation was mounted under both the Queensland State and Australian National oil spill contingency plans. The brief from MSQ to Steve Raaymakers was specifically to provide expert, independent advice in relation to:

- oiled beaches on Moreton Island,
- oiled creeks and wetlands on Moreton Island, and
- oiled rocky shores and headlands on Moreton Island.

The brief requested an objective evaluation of the environmental effectiveness of the response and clean-up operations to date (to 18 March 2009), and any recommendations to improve effectiveness.

An additional task was added – being to evaluate the potential use of oil spill dispersants during the response and clean up – ***which is the subject of this report.***

Following engagement, the consultant traveled from home base in Cairns to arrive on Moreton Island at approximately 1700 on Tuesday 17 March 2009. The helicopter transfer from Brisbane included a reconnaissance over-flight of the affected areas of Moreton Island. Steve Raaymakers was accompanied by Jamie Storrie, the Manager of Marine Environmental Protection Response at the Australian Maritime Safety Authority (AMSA).

Upon arrival on Moreton Island, Raaymakers and Storrie met with the key on-site staff for briefings and planning – and on Wednesday 18 March inspected the east coast beaches and creeks and wetlands, as well as the northern rocky shores and headlands, by 4WD vehicle and on foot.

The site assessments were used primarily to develop the evaluation of the environmental effectiveness of the spill response - ***which is the subject of a separate report***, and to inform this evaluation of the potential use of dispersants. The findings and recommendations of this report apply equally to the same environments on Bribie Island and the Sunshine Coast.

2. Dispersants as a spill response tool

Anybody who has washed a greasy frying pan or cooking pot with dish-washing detergent, will be familiar with the effect that detergent-type chemicals can have in assisting the breakdown and removal of oil and grease.

Following an oil spill on the sea – some of the oil will disperse naturally into the sea, depending on the viscosity of the oil and the mixing energy – which relates to sea state. Smaller oil droplets will remain suspended in the water column and will be exposed to natural degradation processes, including bio-degradation.

Chemical oil spill dispersants are designed to assist this natural dispersion, and thereby speed-up the oil degradation process. Dispersants achieve their effect because they contain a "surface active agent" or "surfactant" – which reduces the interfacial tension between oil and water. This helps to promote the formation of small oil droplets, and prevent the re-coalescence of droplets into slicks.

Dispersants can therefore be a useful "tool in the tool box" of oil spill response options, potentially assisting the breakdown of oil at sea, before it impacts on coastal resources.

Chemical dispersants were first used on a major sill during the *Torrey Canyon* incident off the UK in 1967. These were highly toxic industrial degreaser chemicals and were a serious cause of pollution in their own right.

In the decades since the *Torrey Canyon*, less toxic and more effective dispersants have been developed. In order to be effective, the surfactant in the dispersant must be distributed throughout the oil, and this is achieved through a "carrier'. Modern dispersant "Types" are classified by the carrier that they contain. Some of these (Type 1 dispersants) have a hydrocarbon-based carrier, and are now considered to be environmentally undesirable due to their own toxicity. Type 2 and 3 dispersants with carriers based on alcohols, glycols or water, are the preferred Types these days.

Not all types of oil are effectively dispersed by the various dispersants, and generally the heavier and more viscous the oil is, and the more weathered it is – the less amenable to dispersion it is.

The effective use of dispersants is therefore very much dependant on the type of oil spilled, and there is no point applying dispersants (adding another pollutant) if it is not going to be effective in dispersing the oil. Determining oil dispersibility is therefore the very fist step in dispersant use decision making.

The effective use of dispersants is also very much dependant on mixing potential – which relates to sea state. A minimum amount of wave energy is required to achieve mixing of the dispersant with the oil, and thereby successful dispersion. However, mixing and dispersion will only improve up to a certain sea state, and in rough seas oil my be submerged by breaking waves and contact and mixing with the dispersant prevented. Field experiments and experience indicate that wind speeds of 5 to 25

knots are optimal. Determining whether wind and sea conditions are appropriate to facilitate effective dispersion, is also a vital first step in dispersant use decision making.

There are also serious environmental considerations to be taken into account when making decisions on the use of oil spill dispersants. Even the latest generation Type 3 dispersants are still toxic chemicals in their own right – and adding them to a spill can increase the pollutant loads and negative effects in the area. Perhaps more importantly, adding dispersant can increase the toxic effect of the oil itself. As the oil is dispersed into smaller droplets, it has a greater surface-area to volume ratio, and therefore releases more of the toxic light-ends, into the water column.

Ideally then, dispersants should only be used in deep, open water, where there are no sensitive resources such as reefs or fisheries resources below the oil slick. The decision to use or not use dispersants should be based on an assessment of Net Environmental Benefit – an assessment of the costs and benefits of using dispersants verses not using them. Sometimes in might be necessary to accept oil impacts on a less sensitive resource, such as a sandy beach, in order to prevent impacts on a more sensitive resource, such as a reef.

3. Review of each spill area

3.1 Use of dispersants at spill source

Ideally, when all conditions allow and the source of an oil spill is a ship at sea – in deep water away from sensitive resources – it is highly desirable to use dispersants immediately on the oil as it leaves the ship, while it is still "fresh" and most amenable to dispersal – thereby maximizing the dispersal of oil as close to the source as possible, and reducing the spread of oil away from the source.

The offshore location of the *Pacific Adventurer* at the time of the spill would have made this option 'theoretically' desirable, had conditions allowed.

However, while some ships, particularly oil tankers, may carry small quantities of dispersant on board as part of the Shipboard Oil Pollution Emergency Plan (SOPEP), it is understood that the *Pacific Adventurer* was not carrying any dispersants, which is often the case for non-tankers (there is no legal requirement for ships to carry dispersants on board).

Even if the ship had been carrying dispersant, the inclement wind and sea conditions (winds 40 knots and and 4-6m swell), would have made dispersant application operations extremely difficult, if not dangerous – for the ship's crew. In any oil spill incident, priority must be given to protecting the safety of people.

Additionally, the high winds would have likely blown the dispersant away as it was sprayed, preventing effective application to the oil slick.

Finally, the type of oil spilled – Heavy Fuel Oil (HFO) 380, is not particularly amenable to dispersal. Dispersants are only partially effective on oils with a specific gravity greater than 0.95. Some effect may be achieved if dispersant is applied to HFO while it is fresh and under ideal conditions (low wind etc), however once HFO has weathered for more than 12-24 hours, it is generally not dispersible.

In summary, the use of dispersants immediately at the spill source was not an option in the case of the *Pacific Adventurer* for the following reasons:

- The ship was not carrying dispersant or dispersant application gear.
- Even if it did, inclement wind and sea conditions would have made application difficult, even dangerous.
- High winds would have blown the dispersant away as it was sprayed, preventing effective application to the oil slick.
- HFO is not particularly amenable to dispersal.

3.2 Use of dispersants at sea

Ideally, when all conditions allow and an oil spill is located at sea – in deep water away from sensitive resources – it is highly desirable to use dispersants on the oil (assuming it is amenable to dispersal) – thereby maximizing the dispersal of oil before it impacts on sensitive coastal resources.

Application of dispersant to an oil slick at sea can either be carried out aerially (from appropriately equipped aircraft or helicopter) or from a vessel. Stockpiles of both aerially and vessel applicable dispersants are maintained in the Brisbane region (Appendix 1).

Aerial application capability in the Brisbane region currently comprises:

- One helicopter under-slung spray bucket located at Pinkenba.
- One fixed wing crop-dusting aircraft based at Emerald that is available at 4 hours notice, under National Plan arrangements.

Vessel application capability in the Brisbane region currently comprises:

- Six sets of Warren Springs boat-mounted spray gear in Brisbane.
- One Pacific Boat Spray System located at Pinkenba.

Theoretically, had all conditions allowed, it would have been desirable to have attempted to disperse some of the oil from the *Pacific Adventurer* while at sea. However, unfortunately, as is often the case, conditions were not amenable at the time.

To be effective in spraying dispersants, aircraft must fly at very low altitudes just above the oil slick, and the inclement wind and seas at the time would have made this difficult, even dangerous for the aircraft. As outlined above, in any oil spill incident priority must be given to protecting the safety of people.

Additionally, the high winds at the time would have blown the dispersant away from the aircraft as it was sprayed – making it difficult to target the actual slick, and adding another pollutant (the dispersant) to the sea, with minimal benefit in terms of dispersing the oil.

The oil is not amenable to dispersal and once weather and sea conditions abated to safe levels, the 12-24 hour window of opportunity for using dispersants had passed.

Finally, the waters offshore from Moreton Island where the oil slick was at sea, contain important fisheries resources, including a prawn fishery, as well as Flinders Reef, which is designated as a Marine National Park (Green) Zone under the Moreton Bay Marine Park. Spraying dispersants in this area may have caused impacts on these marine resources, and it was environmentally preferable to allow the oil to float over these resources.

In summary, the use of dispersants at sea, before the oil impacted on coastal resources, was not an option in the case of the *Pacific Adventurer* for the following reasons:

- Weather conditions would have made dispersant application difficult, even dangerous, from both aircraft and vessels.
- High winds would have blown the dispersants away from the slick.
- Sea conditions would have precluded effective mixing of oil and dispersant.
- Once weather and sea conditions abated to safe levels, the 12-24 hour window of opportunity for using dispersants on HFO had passed, and the oil had already impacted on the coast within this period.
- The was a need to protect the fisheries resources and sensitive Flinders Reef and other reefs, located in the waters offshore from SEQ, from possible pollution by dispersants and dispersed oil.

3.3 Use of dispersants on sandy beaches

Use of dispersants on oil on sandy beaches is generally not an option for environmental reasons.

Assuming the oil is dispersible, if it is dispersed on the beach, both dispersed oil and dispersant may penetrate down into the sand, causing toxicity to in-fauna including shellfish, crabs and bait worms – and potentially causing longer term pollution as the dispersed oil is trapped in the lower sand layers.

Oiled beaches are best cleaned using environmentally-friendly manual methods.

In any case once the HFO had impacted on the SEQ beaches – its weathered state was not amenable to dispersal.

3.4 Use of dispersants in creeks & wetlands

Use of dispersants on oil in creeks and wetlands is generally not an option for environmental reasons. As with beaches - both dispersed oil and dispersant may penetrate down into the wetland substrate, causing toxicity to in-fauna, and potentially causing longer term pollution as the dispersed oil is trapped in the lower sediment layers.

The wetlands on Moreton Island are also semi-enclosed systems with limited flushing. Adding another pollutant such as dispersant will only increase the toxicity load in the system and compound the overall ecological impact.

Oiled wetlands are best cleaned using environmentally-friendly manual methods and low-pressure/high-volume flushing with water.

In any case once the HFO had impacted on the Moreton Island wetlands – its weathered state was not amenable to dispersal. Additionally, the wetland systems are fed from the freshwater groundwater aquifer with only periodic tidal inundation – and therefore have reduced salinity. Dispersants are generally designed to be used on oil on the sea, and may exhibit reduced effectiveness in lower salinity waters.

3.5 Use of dispersants on rocky shores and cliffs

Dispersants have been used to try and clean oil from rocky shores and cliffs in many spills around the world, usually with hand-held sprays, often with serious environmental side-effects.

It is often difficult to contain and collect the run-off from the dispersant spray, which may accumulate at the base of the rocky areas being cleaned, potentially penetrating into the sediments.

Dispersants may also be highly toxic to invertebrate and micro-fauna and flora on the rocky shore, and may significantly prolong the natural recovery process by removing these critical species from the system.

Additionally, dispersant application operations in these very rugged and difficult areas could be unsafe to clean-up crews.

It is therefore recommended that the oil is best left in place to weather and breakdown naturally by the effects of microbes, sun, wind, waves and storms.

The exception is Honeymoon Bay – where it is recommended that a *Rocky Shores Response Plan* be developed and implemented to clean this bay completely, including rocky and cliff areas, for human health, social amenity, and socio-economic reasons. Methods to be used might include the cleaning of individual rocks on the strandline, using dispersant in enclosed tubs or buckets. If this is carried out, extreme care must be taken to ensure that all dispersant and oily wash-off is fully contained and treated as chemical waste, and that all personnel are fully equipped with proper protective equipment. Dispersants should NOT be used on the oiled cliff faces.

4. Compliance with policy, guidelines and plans

4.1 Queensland State Plan

The use of dispersants on oil spills in SEQ is subject to the *Policy and Guidelines on the Use of Chemical Dispersants* contained in the *Queensland Coastal Contingency Action Plan*, which implements the *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances*, in Queensland State waters.

The Queensland *Policy and Guidelines on the Use of Chemical Dispersants* are based on those developed by the Great Barrier Reef Marine Park Authority (GBRMPA) in the early 1990s.

An assessment of the potential use of dispersants in the SEQ spill scenario against the *Policy and Guidelines on the Use of Chemical Dispersants* is presented in the Tables below.

Dispersant policy	**Compliance of SEQ spill response**
The appointed Incident Controller, after consulting with a designated officer from the Environmental Protection Agency, may authorise the use of chemical dispersants in accordance with the Chemical Dispersant Use Guidelines. This use must be subject to regular review. The Incident Controller may authorise, without consultation, the use of dispersants to reduce any threat to human life from fire or explosion.	The Incident Controller did not need to exercise this authority – for the reasons outlined in section 4.
The State Marine Pollution Controller may authorise the use of dispersants outside the scope of the Chemical Dispersant Use Guidelines, after consulting with environmental agency representatives on the State Oil Pollution Committee.	The State Marine Pollution Controller did not need to exercise this authority.
The application of dispersants within the Great Barrier Reef Marine Park must be approved by an officer prescribed within the *Great Barrier Reef Marine Park Regulations 1983*.	Not applicable in SEQ

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Dispersant operational guidelines	Compliance of SEQ spill response
Authorisation must be based on a reasonable belief that the oil is able to be chemically dispersed.	Decision not to use dispersants was based in part on a reasonable assessment that HFO was not able to be chemically dispersed. Guideline complied with.
Authorisation of continued use must be based on demonstrated effectiveness, either through visual confirmation or sampling programs.	No relevant as initial use not authorised.
Generally no application shall take place in waters of less than 5 metres depth, but may vary depending on the sensitivity of the resources within the application area.	Applied / complied with, esp. re. beaches and creeks and wetlands.
The application area must be well flushed.	Applied / complied with, esp. re. wetlands.
The application area must have suitable mixing energy or suitable mixing energy should be provided.	This would only have applied offshore – but other factors prevented used in that area.
The application of dispersants must provide a net environmental benefit.	Net environmental benefit was a major objective in protecting offshore fisheries and Flinders and other reefs by not using dispersants.

Resource Guidelines	Compliance of SEQ spill response
Mangroves Dispersant use to prevent oil entering mangroves is recommended.	Not relevant to this spill. Would have been relevant had spill entered Moreton Bay.
Coral Reefs Dispersant use over sub-tidal coral reefs is not recommended, except where oil is likely to impact upon mangroves or where water depths exceed 10 metres. Dispersant use to prevent oil impacting exposed corals reefs is recommended, provided the application area is at a distance sufficient to allow full dispersion. Prevailing tidal streams and currents will need to be considered in determining this distance.	Applied / complied with, esp. re. Flinders Reef.
Seagrass Dispersant use over sub-tidal seagrass beds is not recommended, except where oil is likely to impact mangroves or where water depths exceed 10 metres. Dispersant use to prevent oil impacting exposed inter-tidal seagrass beds is recommended, provided the application area is at a distance sufficient to allow full dispersion. Prevailing tidal streams and currents will need to be considered in determining this distance.	Not relevant to this spill. Would have been relevant had spill entered Moreton Bay.
Beaches (Sandy) The use of dispersants offshore to prevent oil impacting sandy beaches is recommended where the combination of grain size and oil viscosity is likely to result in oil penetrating sediments. The use of dispersants to clean sandy beach surfaces is not recommended.	Applied / complied with.
Beaches (Rocky) The use of dispersants to prevent impacts on low energy rocky foreshores is recommended. The use of dispersants to prevent impacts of exposed, high energy rocky foreshores is not recommended. The use of dispersants to clean oiled rocky beaches (pebble, cobble) is not recommended, except where species of high importance are threatened by the continued residence of the oil.	Not relevant to this spill. Applied / complied with. Applied / complied with.

Resource Guidelines	Compliance of SEQ spill response
Inter-tidal Mudflats The use of dispersants to prevent impacts on inter-tidal mudflats is recommended.	Not relevant to this spill.
Structures The use of dispersants to clean structures is not recommended.	Not relevant to this spill.
Enclosed Waters The use of dispersants in enclosed poorly flushed waters is not recommended, for example marina's and small bays. The use of dispersants in rivers and creeks with high currents may be considered, however the effect of low salinity on dispersant effectiveness needs to be assessed.	Applied / complied with, esp. re. wetlands.
Wildlife The use of dispersants to prevent oil impacting wildlife and vulnerable wildlife habitats is recommended.	Subject to other resource guidelines. Wildlife oiling was minimum in this spill.
Fisheries The use of dispersants over important fishing grounds, except where ecologically important nursery habitats are threatened (mangroves, seagrasses and coral reefs), is not recommended. Dispersant use in areas where eggs and larvae of important commercial species are present is not recommended, except where important nursery habitats are threatened (mangroves, seagrasses and coral reefs).	Applied / complied with, esp. re. offshore fisheries and reefs.
Aquaculture Facilities The use of dispersants within the vicinity of aquaculture facilities is not recommended, except where the use of dispersants may prevent or minimise impacts to important environmental resources.	Not relevant to this spill.

Overall, it is very clear that the decisions made in relation to the potential use of oil spill dispersants for the SEQ oil spill response were totally in compliance with the *Policy and Guidelines on the Use of Chemical Dispersants* contained in the *Queensland Coastal Contingency Action Plan.*

4.2 International Guidelines

There are a number of international guidelines on the use of oil spill dispersants, as listed below – and with which the reviewer is fully familiar. Overall it is assessed that the decisions made in relation to the potential use of oil spills dispersants for the SEQ oil spill response, were also in general compliance with the best practices outlined in these various international guidelines.

- IMO/UNEP, 1995. Guidelines on Oil Spill Dispersant Application - Including Environmental Considerations. IMO London

- IPIECA, 1993. Dispersant and their Role in Oil Spill Response. International Petroleum Industry Environmental Conservation Association (IPIECA) Report series Vol. 5. IPIECA, London.

- NRC, 1989. Using Oil Spill Dispersants on the Sea. Report of the Committee on Effectiveness of Oil Spill Dispersants, Marine Board, Commission on Engineering and Technical Systems, National Research Council. National Academy Press (NRC), Washington D.C.

- CONCAWE, 1988. A Field Guide to the Application of Dispersants to Oil Spills. The Oil Companies' European Organization for Environmental and Health Protection (CONCAWE) Report No. 2/88. CONCAWE, The Hague.

5. Conclusion

It is concluded that considering all applicable circumstances, the decision to not use chemical dispersants on the SEQ oil spill was in full compliance with relevant policy and guidelines as contained in the *Queensland Coastal Contingency Action Plan*, and was totally consistent with international best practice.

Appendix: Dispersants stockpiled in SEQ region

A = National Plan stockpile location
B = Type
C = Brand name
D = Quantity stockpiled
E = Warehousing location

	A	B	C	D	E
3	Brisbane	Dispersant	BPAB	23000L	1st Fleet warehousing & Distrubution
4	Brisbane	Dispersant	Tergo R40	6000L	1st Fleet warehousing & Distrubution
5	Brisbane	Dispersant	Ardrox 6120	18600L	1st Fleet warehousing & Distrubution
6	Brisbane	Dispersant	Corexit EC9500A	15000L	1st Fleet warehousing & Distrubution
107	Brisbane	Dispersant	Slickgone	5000L	Pinkenba Marine Operations Base
126	Brisbane	Dispersant	BPAB	1600L	Port of Brisbane Corporation whyte Island
134	Brisbane	Dispersant	Slickgone	5000L	1st Fleet warehousing & Distrubution

- BP-AP is a Type 1 dispersant containing between 15% and 25% surfactant in a hydrocarbon (in this case kerosene) carrier base. As a Type 1 hydrocarbon-based dispersant, BP-AB is considered highly toxic and is no longer available on the market, and the manufacturer no longer publishes a Material Safety Data Sheet (MSDS) for this product. Ideally the National Plan BP-AB stockpiles in Australia should be decommissioned as regulated chemical waste.

- BPAP is applied at dosage rates of between 1:1 and 1:3 from ship based platforms, such as the Warren Springs spray gear. There are 6 sets of Warren Springs gear in Brisbane.

- Tergo R40, Ardrox 6120, Slickgone and Corexit 9500 are Type 3 dispersants. These typically have a glycol based carrier and are applied at dosage rates of between 1:5 and 1:30 (neat dispersant: oil).

- These types of dispersants may be applied using vessel-based delivery systems or aerial platforms such as fixed wing aircraft or helicopter under-slung spray buckets.

- For vessel-based delivery there is one Pacific Boat Spray System located at Pinkenba.

- There is 1 helicopter under-slung spray bucket located at Pinkenba.

- Under current National Plan arrangements there is a fixed wing crop-dusting aircraft based at Emerald that is available at 4 hours notice for dispersant spraying operations.

- 1st Fleet Warehousing and Distribution is a privately owned and operated proprietary limited company incorporated in New South Wales.