



Operational Information Erickson Air-crane S-64F Helitanker

Introduction

The Erickson S-64F Air-crane Helitanker (*Air-crane*) is an integral resource of the State of Victoria's fleet of aerial fire fighting aircraft. The *Air-crane* is a heavy vertical lift helicopter with a 9000 Lt firebombing tank. It has been included into the recently formed National Aerial Firefighting Centre's (*NAFC*) firefighting aircraft fleet for the 2004-fire season.



The tank is fitted with a fast self-fill snorkel that allows it to hover-fill from a variety of water sources. The microprocessor controlled tank system is capable of delivering multiple drops. In addition the *Air-crane* is fitted with the Sea Snorkel. The Sea Snorkel allows the *Air-crane* to fill from salt-water sources during forward flight.

Operational Base

The identified Nominated Operational Base (*NOB*) is Essendon Airport.

Dispatch and Management Procedures

The *Air-crane* is a contract aircraft and is a 'Statewide' resource. It is assigned to Incident Controllers for wildfire fighting. If the *Air-crane* is assigned to an Incident Controller it is managed by the Incident Controller until released or until the State Aircraft Coordinator (*SAC*) reassigns it.

The State Aircraft Unit (*SAU*) has a standard evaluation process to be undertaken when requesting contract aircraft. Information to be provided when requesting the resource is:

- What is the tasking?
- Where is the wildfire?
- The nearest known location, Latitude and Longitude and/or AMG grid references.
- Who is the primary contact?
- Other aircraft in the area radio frequencies that will be operating?
- Any known hazards and if Restricted Air Space (*RAS*) has been implemented?

Additional Factors to consider:

- Availability of accessible large capacity water sources
- The *Air-crane* will only use water and water injected with foam concentrate.
- A 35,000 litre refuelling truck will be despatched with the Air-crane, consider the availability of supplementary fuel supplies during extended dispatch times for the refuelling truck.

The *Air-crane* is a contract aircraft and is assigned to Incident Controllers for wildfire suppression operations. Once it has been dispatched it then becomes the responsibility of the Incident Controller, who is responsible for arranging and maintaining the appropriate level of management and ensuring the logistical support is facilitated for any contract aircraft engaged on the incident. When the *Air-crane* is dispatched to a going fire essential ground resources will support it consisting of, a fully pressurised refuelling truck containing 35,000 Lt of *JET-A1*, one of five strategically based;

- Department of Sustainability and Environment (*DSE*),
- Department of Primary Industries (*DPI*) or
- Parks Victoria (*PV*)

work centre mobile foam support units and an engineering maintenance team.

Air Attack Supervisors (*AAS*) are reminded that the *SAC* may allocate additional resources during forecast periods of Very High to Extreme fire danger and complex wildfire scenarios, to support the *Air-crane*.

Tactical Deployment

The *Air-crane* is a fire bombing aircraft and will operate with other National Fleet and State Contract fire bombing aircraft during a wildfire operation. It has operated successfully with both rotary-wing and fixed-wing fire bombers at wildfire operations during previous fire seasons.

Delivery System- Fire Bombing Tank

The *Air-crane* is fitted with a 9000 Lt tank designed for the delivery of long term retardant, water injected with foam concentrate and water. The tank has been designed to deliver a concentrated drop pattern.

The tank doors are controlled by a microprocessor. The flight crew can pre-select the volume and coverage level of each drop. The minimum volume available to be delivered is 25 % of the volume available in the tank. The other volume options available to be selected and delivered are 50 %, 75 % or 100 %.

The microprocessor also controls the coverage level of suppressant to be delivered to the ground. This is achieved by regulating the flow of suppressant through the tank doors. A Global Positioning System receiver monitors the delivery speed of the *Air-crane* and has the ability to adjust and modify the flow rates from the doors if the delivery speed is too fast or slow. As a general guide coverage levels (refer to Table below) 1 to 3 are used in light fuels similar to grasslands, 4 to 6 for eucalypt vegetation and coverage levels 7, 8 and full salvos are used on high fire intensities and in high fuel load areas.

Foam concentrate is injected into the tank from a separate 290 litre internal foam storage tank, the injection rates that can be selected range from are 0.1% to 0.7%.



Coverage Levels

Coverage Level	1	2	3	4	5	6	7	8
Volume Litres Per 9 m2	3.78	7.56	11.3	15.1	18.9	22.6	26.4	29.9

Delivery System- Forward Mounted Pressurised Water Cannon (Experimental)

The *Air-crane* has an experimental delivery system, which is a forward mounted water cannon. The cannon is located on the left-hand side of the *Air-crane* forward of the lead pilot. The cannon has the ability to direct fire suppressant up to fifty metres with a constant flow of 1100 Lt per minute.

The cannon is not a Contract requirement.

The ability to control the direction of the cannon is restricted to a vertical adjustment of 15 degrees using a hydraulic ram mounted on the side of the aircraft, the horizontal directional control is provided by the ability of the aircraft to turn.



Fill systems

The fixed tank is fitted with a fast self-fill flexible fresh water hover fill snorkel and a salt-water ram fill snorkel.

The fresh water hover fill snorkel has the ability to hover fill 9000 Lt in 40 seconds from a variety of water sources.

The ram fill snorkel allows the *Air-crane* to fill the tank in forward flight while the induction points on the snorkel are submerged. The ram fill snorkel has the ability to fill the tank in less than 40 seconds.



Fill Points



The *Air-crane* is similar to the contract medium helicopters and can utilise natural or man made bodies of water. Suitable fill points should have:

- A minimum diameter of 100 metres.
- A minimum depth in clear water of 1.0 metres.
- A large capacity.

DSE and Country Fire Authority (**CFA**) have implemented a Good Neighbour Policy. The intent of the policy is to consider the integrity of water sources in rainfall deficient periods, when not working in life threatening situations.

Preparedness

A preparedness statement has been developed to manage the *Air-crane* and essential resources to ensure rapid deployment. The document specifies the requirement for a resource according to the fire danger level determined for each day.

It is acknowledged that an accredited and experienced *AAS* with knowledge and awareness of specific details of the *Air-crane's* attributes and operation have the ability to supervise the aircraft in a fire bombing operation. This document is acknowledged as providing adequate information for *AAS*.

AAS are to recognise their limitations and operational experience in complex wildfire scenarios and are reminded that Incident Controllers will appoint additional resources during forecast periods of Very High to Extreme Fire Danger and complex wildfire scenarios combined with additional aircraft resources.

In addition *AAS* are advised that in a complex wildfire scenario with multiple aircraft operating, the *Air-crane* will require dedicated supervision to maintain effectiveness.

Operational Air Base

The *Air-crane* has a significant rotor wash, which has the ability to dislodge loose items on vehicles or structures. Consideration is to be given to the landing area design and layout.

- Landing areas of 150 metres by 150 metres are required.
- Heavy vehicle access is required to allow for refuelling.
- Aircraft management and marshalling is required to provide public safety and landing area security.

Refuelling

The *Air crane* is a high performance fire bombing aircraft and requires substantial quantities of fuel.

- The *Air-crane* has a fuel tank capacity of 4900 litres
- It consumes 2080 Lt per hour.
- A 35,000 Lt refuelling truck is despatched with the *Air-crane* to provide hot refuelling capability.
- The refuelling truck will also supply all *JET AI* powered contract aircraft during wildfire operations.



If the *Air-crane* is deployed to a wildfire greater than 1.5 hours travel time for the refuelling truck, consideration must be given to the provision of a *goto-helipad* for refuelling. The *goto-helipad* is a site identified by the *Air-crane* and refuelling truck, which is en-route to the wildfire. The *goto-helipad* will be located in consultation with the Incident Management Team.

Suppressant

The fixed tank of the *Air-crane* has an internal tank fitted, which holds 290 litres of foam concentrate.

- Foam support units are located at strategic locations in the metropolitan and regional areas-Bacchus Marsh, Westerfold Park, Keith Turnbull Research Institute, Colac and Bendigo.
- If the *Air-crane* is deployed the nearest foam support unit will be dispatched. The foam support units will supply all contract aircraft.



Operational Support

General maintenance of the *Air-crane* and other contract aircraft at the end of a day's operation will require:

- A wash-down/wash-out to remove suppressant residues.
- The provision of mobile lighting units to assist with overnight maintenance.

Sea Snorkel Operations

It is essential that if the *Air-crane* utilises salt water sources using the ram fill snorkel during a deployment that wash down facilities and resources are provided at the completion of the day's flight.

Wash down facilities and resources are identified as fire tankers and operators. Incident controllers are to ensure that appropriate resources are allocated for the task. It is also desirable that washes down facilities are available during refuelling and maintenance periods.

Operational Performance- Load Capacity

The availability of 9000 Lt from one aircraft provides the ability to produce longer lengths of line and the ability to deliver a single high volume drop and then provide additional drops of similar capacity within a short period of time.

However the ability to split the load numerous times has the potential to develop the uneconomical practice of *heli-mopping*. If this situation develops then alternative resources and tactics should be employed.

Operational Performance- Delivery

The *Air-crane* normally drops its load of fire suppressant at a speed of 45 knots. The optimum height of a drop to be delivered is 150 feet AGL.

The design of the tank delivery system and the drop height ensures that the rotor wash from the *Air-crane* has no adverse effect on the fire edge activity, delivery of fire suppressant or vegetation within the drop zone.

The use of full salvo drops is not common practice. Delivery of a full salvo does not allow for miscalculation of delivery, incorrect direction from the air attack supervisor or the effect of the suppressant on the wildfire intensity.

Drop Options

The *Air-crane's* delivery system is very similar to the medium helicopters (Bell 205 and 212). The medium helicopters have the ability to split their loads and restrict the rate of flow.

The *Air-crane* has the ability to provide additional options with the large volume available and restricted door control options.

The practical number of workable drops is a maximum of four. It is possible that the further division of the load indicates that other resources would be more appropriate for the tasking and the helitanker be redeployed to a more appropriate tasking.

Drop Pattern

The drops delivered by the *Air-crane* result in a concentrated elongated footprint in the drop zone.

The pattern is elongated in shape compared to an elliptical shape from fixed wing fire bombers. Because of the constant delivery flow there is no break up of the load.



Operational Limitations

- The operational endurance of the *Air-crane* is limited to 1.5 to 2.0 hours subject to transit times.
- The use of salt-water sources must be carefully considered because of the significant rotor wash blast producing airborne salt particles that will enter the airframe and cause corrosion.
- The *Air-crane* operates under Visual Flight Rules (*VFR*) and is restricted to daylight hours for flying operations.
- The availability, accessibility and capacity of water sources within the area of operation.
- The impact of the distance from filling point to drop zone will have on turn around times.

Heli-mopping

The potential use of the uneconomical practice of *heli-mopping* will restrict the ability of the helitanker to successfully suppress going fire in the drop zone. The rotor wash has the potential to produce dirty air and most likely rekindle fire edges and hotspots before the load is delivered. This will result in the continued use of the *Air-crane* on inappropriate tasking, which could be successfully attacked by another resource.

Drop Zone Safety

Advice to ground crews of fire bombing drops will be provided by the *AAS*. The *Air-crane* is fitted with a siren to advise of fire bombing drops.

If ground crews are caught in a drop zone they are to employ the standard drop zone safety procedures as set out in the *Aircraft Safety Handbook*.

The additional factors to consider if ground crews are caught in a drop zone are:

- The drop will be for an extended period of time and
- The drop will cover a greater distance in length as compared to other contract aircraft.

Air Operations Safety

Despite the physical size of *Air-crane*, the performance and operation of the aircraft is no different to the medium helicopters currently engaged for fire bombing operations. The speed and manoeuvrability of the *Air-crane* allows it to work with fixed wing fire bombers and other rotary wing fire bombers.

A factor to consider is the potential effect of the significant rotor wash effect on other aircraft in the operating environment. The flight path taken by the *Air-crane* will result in residual dirty air, which will produce turbulence activity for any aircraft that passes through the flight path immediately after the *Air-crane*.

Further Information

If you require any further information or clarification regarding the operation of the *Air-crane* please contact the State Aircraft Unit telephone 03 9412 4777.