Retardant Loading, Hot Loading and Simultaneous Fueling

Prepared for the United States Forest Service

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## Revisions

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<th>APPROVAL</th>
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1. Introduction

1.1 Base criteria for operation

The Coulson C-130’s and 737 Fireliners only operate out of approved permanent and temporary airtanker bases qualified to support the C-130 or 737. The retardant loading program is built to expand into hot loading and simultaneous fueling. All general procedures are followed in every case with the application of additional procedures for hot loading or simultaneous fueling and retardant loading when conducting these expanded operations.

1.2 References

The following procedures are based on the USFS Airtanker Base Operating Plans, 5700 FSM, Interagency Airtanker Base Operations Guide, and policy in 509.16, Chapter 28.6 and Chapter 38.7 and Coulson Aviation USA Airtanker Base Operations.

1.3 Training

All personnel involved in operations receive training in procedures specific to the aircraft and local base operations. Documentation of the training received by all base personnel is maintained at the airtanker base in the base personnel training files.

1.4 Job Hazard Analysis

The base-specific job hazard analysis (JHA) addresses the hazards of C130 and 737 operations.
2. General Procedures

2.1 Receiving the Aircraft

The Pilot establishes contact with the Ramp Manager by radio prior to entry into the ramp area. The Ramp Manager directs the aircraft to the appropriate loading pit via radio communication and hand signals.

The turning radius specific to the make and model of the aircraft is considered upon entry into the loading pit.

Upon reaching the loading pit, the aircraft is positioned so the engines are away from the loading area as much as possible. Operating engines are idled and the parking brake is set. The aircraft is shut down according to standard operating procedures.\(^1\) Once the aircraft is secured and all systems are off with no prop movement (if applicable), the Pilot informs the Ramp Manager by radio and/or hand signal (i.e. thumbs-up), that all is clear and loading may begin.

2.2 Loading

After visually checking the area, the ramp manager signals the loader to commence loading. The ramp manager maintains a position that allows for visual observation of the aircraft engines, as well as visual contact with Pilot, Loader and Mixmaster.

The Pilot remains in radio contact with the Ramp Manager. When the Ramp Manager signals the “OK” to the Loader, the Loader approaches the airtanker from the rear.

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\(^1\) Upon initial commencement of a contract, with first landing the base’s crew is briefed on loading procedures by a Coulson aircrew member. At minimum, this is done once per year.
2.2.1 **Loading Procedures for the C-130**

The Loader follows the following procedures for the C-130:

1. Remove the cap from the aircraft loading port (*Figure 1*).
2. Connect the loading hose.
3. Open the Fill Quantity Door.
4. Establish communication with the flight crew, either by radio or via the crew member overseeing the fill through the aft paratroop door to determine what quantity is requested.²
5. Fully open the loading hose valve and begin the fill.

---

²Normal loads for Coulson Aviation USA C130’s/L382’s are 4, 36,000 lb..
6. Monitor Fill Quantity Gauge until the gallons onboard reach the desired quantity. Close the valve. (Figure 2, Figure 3).
The sight gage on the tank may be observed through the rear side door (Figure 4, Figure 5).

Figure 4 Site Gage C-130 (Tanker 132)

Figure 5 View of site gage from rear side door C-130 (Tanker 131)
The Coulson FE/MX may oversee the loading of the aircraft from the rear side door (Figure 6) next to the loading port.

7. Close the Fill Quantity Door.

8. Disconnect the loading hose and replace the loading port cap.

9. Reinstall and secure the 3” Camlok cap.

10. Give the Parking Tender the “All Clear” signal.
2.2.2 **Loading Procedures for the Boeing 737**

The Loader follows the following procedures for the 737:

1. Open the quantity indicator (top) and fill port (bottom) doors *(Figure 7)*.

![Figure 7 Quantify Indicator and Fill Port.](image)

2. Remove the 3" Camlok Cap and stow.

3. Connect the loading hose and open valve.

4. Press the “OK” hard button at the bottom on the right side of the screen and the internal fill valves will open and begin to fill the tanks.

5. Monitor the quantity indication screen. The loader will see a number showing the percent complete as well as a number of gallons loaded.

6. When the airplane has reached its desired volume the internal fill valves will close, there will be no additional retardant flowing onto the airplane, and the screen will display 100% with the volume below the number.

---

3 NOTE: At this point there will not be any retardant flowing into the airplane as both the fill valves are closed.

4 NOTE: The percentage number is scaled based on what the flight crew wants loaded on the airplane. As an example, if they select 4000 USG the screen will show 100% when the quantity reaches 4000 USG. If they select 3500 USG the quantity will show 100% when the quantity reaches 3500 USG.
7. When the Loading Complete screen is displayed, close the fill valve and remove the fill hose.

8. Replace the 3” camlok cap on the fill port.

9. Step 9: Close the quantity indicator (top) and fill port (bottom) doors.

Note: Aircraft mechanics may want to approach the aircraft during loading procedures. This will only be allowed with concurrence and monitoring by the Ramp Manager.

**2.3 Releasing the Aircraft**

Loaders will move back to a safe area. The Ramp Manager will notify the Pilot by radio or hand signal - thumps up, when the loaders are clear and the aircraft is free to exit the loading pit.

**2.4 Non-routine occurrences**

**2.4.1 Communication Loss**

In the event of a loss of radio communication the Ramp Manager secures eye contact with the Pilot, tap both earphones on his/her headset and signal with a thumbs down informing the Pilot of the loss of radio communication. If the aircraft radio is still operational the loading procedure continues using hand signals alone to communicate. If the aircraft radio is not functional the operation is discontinued and the radio repaired.

**2.4.2 Emergency Shutdown**

If at any time a situation arises, requiring the shutdown of engines the parking tender will notify the pilot by radio and by hand signal by using the universal sign of drawing an index finger across the throat.

**2.4.3 Airtanker Base Specific Emergency Procedures**

Follow the emergency procedures for ramp operations outlined in specific airtanker base plan.
3. Retardant Hot-loading Procedures

3.1 Objectives

3.1.1 Provide safe procedures for loading aircraft with fire retardant chemicals without fully shutting down all of the aircraft’s engines.

3.1.2 To maintain compliance with Forest Service Policy 5709.16 Chapter 35.25 and Chapter 38.7.

3.2 Definition

Hot-loading is the loading of an aircraft with one or more engines running.

3.3 Purpose

Hot-loading is done on a case by case basis when authorized as a procedure to load aircraft without shutting down all of the engines. The intention is to prevent adverse impacts on aircraft systems.

3.4 Applicability

The hot-loading procedure requires an approved base plan, trained personnel, and concurrence by both the flight crew and base personnel. If either the flight crew or base personnel elect not to hot-load, the procedure is not done.

Coulson Aviation USA aircraft carry and provide specific information concerning the aircraft and loading system to facilitate these hot loading procedures.

3.5 Training

The Turbine-Engine Aircraft Hot-Loading Video, and sections of the Agency Base Supplement are utilized for training of all Coulson aircrew members.

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5 (National Wildfire Coordinating Group, 2011)
3.6 Initial Shut-down

Coulson Aviation USA aircraft will be shut down for the first loading at all airtanker bases that have not previously operated in the current season. The Base Manager may request aircraft shut-down thereafter to train personnel unfamiliar with the aircraft or procedure. Coulson’s flight crews will review procedures and equipment specific to that aircraft with the retardant ramp personnel including:

- Base safety considerations
- Ramp traffic flow
- General airtanker procedures
- Hot-loading procedures
- Simultaneous servicing procedures

Prior to the aircraft entering the loading area, the Pilot contacts the Parking Tender or Ramp Manager on the appropriate airtanker ramp frequency for loading pit assignment. When radio communication is established with the airtanker Pilot, the Parking Tender or Ramp Manager will direct the aircraft to the appropriate loading pit. The Pilot will assure that the Parking ender and ramp manager understand this is going to be a “hot load” procedure.

Entry into the loading pit will be in full compliance with the applicable turning radius of the make/model of the airtanker being directed.

3.7 Flight Crew Parking

With the airtanker positioned in the loading pit, the pilot ensures the throttles are in ground idle. The engine(s) on the retardant loading side of the aircraft will be shut down. All other operating engine(s) should be in low idle speed which produces minimum thrust.

3.8 Parking Tender Action

The Parking Tender or Ramp Manager will stand in a position that allows a view of the loaders, the running engine(s) on the opposite side of the aircraft. Eye contact with the pilot in the cockpit and communication (radio or hand signals) with the aircrew will be maintained.

The remainder of the loading process will follow General Retardant Filing Procedures. Note: At no time will any ground personnel be within 50 feet of any turning propeller or fan.

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6 (National Wildfire Coordinating Group, 2011)
7 (National Wildfire Coordinating Group, 2011)
3.9 Assessment and Mitigation of Coulson USA Retardant Hot Loading Procedures - 737

Refer to the following pages for risk assessment:
### Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

#### Sub-System- Hot Loading 1 of 3

<table>
<thead>
<tr>
<th>Sub-system</th>
<th>Hazards</th>
<th>Likelihood</th>
<th>Severity</th>
<th>Outcome</th>
<th>Mitigation</th>
<th>Likelihood</th>
<th>Severity</th>
<th>Outcome</th>
<th>Mitigation Achieved?</th>
<th>Additional Local Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Entry of aircraft into the pit area creates a risk to ground personnel and a risk of aircraft contact with ground equipment and facilities</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Flight Crews are trained and operate in compliance with Interagency Airtanker Base Operating Standards</td>
<td>Occasional</td>
<td>Critical</td>
<td>Low</td>
<td>Flight Crew are briefed with airbase personnel before the start of each operations shift.</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>Lack of Communication procedures and understanding with both radio as well as ground handling signals</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Conduct effective airbase in-briefings. Check radio systems with every crew change. Familiarize personnel with Agency ground handling procedures. Ensure effective communication.</td>
<td>Occasional</td>
<td>Critical</td>
<td>Low</td>
<td>Maintain published frequencies and airtanker base guides in aircraft.</td>
<td></td>
</tr>
<tr>
<td>Human Factors</td>
<td>Acceptance of Risk as Normal</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Emphasize importance of “situational awareness” as a means to recognize risk</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Reinforcement at daily base safety briefings.</td>
<td></td>
</tr>
<tr>
<td>Human Factors</td>
<td>Understanding of procedures with ground/ramp personnel</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Hot loading procedures requires approval in Air Tanker Base Plan as well as consensus between Base Manager and Flight Crew Personnel</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Establish Retardant Hot Loading Plan specific to each aircraft type.</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Retardant loading has the potential to be over loaded or spilled, creating risk of environmental contamination.</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Ensure ground handling personnel are trained and qualified to fill 737 aircraft.</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson aircraft are equipped with state of the art computerized loading technology to mitigate over filling and assure accurate weights.</td>
<td></td>
</tr>
<tr>
<td>Running Engines</td>
<td>Effect of aircraft exhaust, fan blast on personnel</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Non-essential personnel are trained to clear the aircraft and exit the ramp. Designated trained ground crew are familiarized with the danger zones and are equipped with PPE</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Flight Crew assures all personnel are at a safe distance before operations</td>
<td></td>
</tr>
</tbody>
</table>

**Final Assessment Value:**

**Prepared By:** Dennis Hulbert Coulson SMS Manager 3/15/2018

**Operation Approved by:**

**Title:**

**Date:**

*In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).*
## Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

### Sub-System- Hot Loading 2 of 3

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<th>Sub-system</th>
<th>Hazards</th>
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<th>Additional Local Mitigation</th>
<th>Post Mitigation Value</th>
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<tbody>
<tr>
<td><strong>Environment</strong></td>
<td>Heat, wind, nose, exhaust, direct sunlight all create a hazardous environment</td>
<td>Occasional Critical Serious</td>
<td>Training and utilization of Airtanker base safe work procedures including the use of PPE, and established breaks</td>
<td>Occasional Critical Low</td>
<td>Proper positioning of aircraft, minimizes aircraft generated exposures.</td>
</tr>
<tr>
<td><strong>Communication Loss</strong></td>
<td>Radio Loss: Inability to safely manage and direct</td>
<td>Occasional Critical Serious</td>
<td>Suspend operations until positive communication is restored</td>
<td>Occasional Critical Low</td>
<td>Flight crew establishes communication CRM to deal with radio or frequency loss.</td>
</tr>
<tr>
<td><strong>Communication Loss</strong></td>
<td>Ground Handling loss: inability to safely manage in the ramp/pit area</td>
<td>Occasional Critical Serious</td>
<td>Suspend operations until communication is restored</td>
<td>Occasional Critical Low</td>
<td>Flight crew establishes positive communication with ground handling personnel</td>
</tr>
<tr>
<td><strong>Retardant Spill</strong></td>
<td>Environmental Hazard, employee slip/fall hazard, contact to skin, clothing hazard</td>
<td>Occasional Critical Serious</td>
<td>Training and utilization of Airtanker base safe work procedures including retardant spill response and the utilization of PPE</td>
<td>Occasional Critical Low</td>
<td>Flight Crew is familiarized with base retardant spill response procedures</td>
</tr>
</tbody>
</table>

**Final Assessment Value:** 3/15/2018

**Prepared By:** Dennis Hulbert  SMS Manager

In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).
### Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

#### Sub-System: Hot Loading 3 of 3

<table>
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<tr>
<th>Sub-system</th>
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</thead>
<tbody>
<tr>
<td><strong>Aircraft</strong></td>
<td>Low pressure area in front of an operating jet engine creates risk of ingestion of personnel or equipment.</td>
<td>Remote</td>
<td>Marginal</td>
<td>Low</td>
<td>Flight crew assures positive communication and clearance of personnel prior to engine start.</td>
</tr>
<tr>
<td><strong>Aircraft</strong></td>
<td>Thrust required for breakaway may produce jet blast that can injure personnel and/or damage/dislodge equipment.</td>
<td>Occasional</td>
<td>Marginal</td>
<td>Low</td>
<td>Flight crew utilizes minimum thrust required during breakaway procedure and taxi operations.</td>
</tr>
<tr>
<td><strong>Aircraft</strong></td>
<td>Sensorineural hearing loss caused by excessive exposure to jet/APU engine noise.</td>
<td>Occasional</td>
<td>Serious</td>
<td>Low</td>
<td>Coulson flight crews are briefed at each operation and follow Airbase Operating procedures.</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td>Loading aircraft while engines are operating (hot load) creates increased risk of ingestion of personnel or equipment.</td>
<td>Occasional</td>
<td>Catastrophic</td>
<td>Low</td>
<td>Coulson flight crews are briefed at each operation and follow Airbase Operating procedures.</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td>Simultaneous Fuel/Load operations result in multiple personnel with operationally divided attention within close proximity to each other and aircraft.</td>
<td>Occasional</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson flight crews are briefed at each operation and follow Airbase Operating procedures.</td>
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ENGINE INLET & EXHAUST HAZARD AREAS

Figure 8 737 Engine Inlet and Exhaust Hazard Areas
Figure 9 737 Cockpit Visibility
Figure 10 733 Breakaway Thrust
Figure 11 737 Breakaway Thrust Exhaust Temperatures
3.10 Assessment and Mitigation of Coulson USA Retardant Hot Loading Procedures C-130

Refer to the following pages for risk assessment:
### Assessment and Mitigation of: Coulson USA Retardant Loading Procedures C-130

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<td>Maintain published frequencies and airtanker base guides in aircraft</td>
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- **Prepared By:** Dennis Hulbert  Coulson SMS Manager
- **Date:** 3/15/2018

**Operation Approved by:**

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Assessment and Mitigation of: Coulson USA Retardant Loading Procedures C-130

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<td>Radio Loss: Inability to safely manage and direct</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
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Prepared By: Dennis Hulbert  SMS Manager
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In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).
Figure 12 C-130 Prop / Engine Hazard Areas
4. Simultaneously Servicing Procedures

4.1 General

This serves to outline procedures and safety considerations for servicing Coulson Aviation USA airtankers with retardant and fuel simultaneously. Individual tanker base personnel are encouraged to review this document in addition to a face-to-face briefing by Coulson aircrew/MX members prior to concurrent servicing. Individual tanker base managers will give permission for concurrent servicing and assign pit personnel and refueling personnel familiar with this procedure.

4.2 Procedures

1. The aircraft will have all engines shut down and APU running.

2. Pit personnel approaches the aircraft from the right side and use right fill port.

3. An aircrew or maintenance member will assist the fuel truck in positioning itself forward of the wing on the right side of the aircraft.
4. The fuel hose will run to the refueling panel in a manner that will not interfere with the retardant hose.

Figure 13 C-130 Single Point Fueling Station
5. Refueling and retardant loaders will keep visual contact with each other in case of a malfunction in ether operation.

6. Oral and visual signs of “cut off” will be given to terminate servicing should a dangerous situation arise.
7. In the event that retardant servicing must be accomplished from the left side of the aircraft, an additional “spotter” will be stationed aft of the aircraft in a position to see both operations and will act as the relay to advise of any dangerous situation.
4.3 Assessment and Mitigation of Simultaneous Fueling - 737

Refer to the following pages for risk assessment:
## Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

### Sub-System: Simultaneous Fueling 1 of 2

<table>
<thead>
<tr>
<th>Sub-system</th>
<th>Hazards</th>
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<th>Post Mitigation</th>
<th>Additional Local Mitigation</th>
<th>Post Mitigation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Entry of aircraft into the pit area creates a risk to ground personnel and a risk of aircraft contact with ground equipment and facilities</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Flight Crews are trained and operate in compliance with Interagency Airtanker Base Operating Standards</td>
</tr>
<tr>
<td>Communications</td>
<td>Lack of Communication procedures and understanding with both radio as well as ground handling signals</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Conduct effective airbase in-briefings. Check radio systems with every crew change. Familiarize personnel with Agency ground handling procedures. Ensure effective communication.</td>
</tr>
<tr>
<td>Human Factors</td>
<td>Understanding of procedures with ground/ramp personnel</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Hot loading procedures requires approval in Air Tanker Base Plan as well as consensus between Base Manager and Flight Crew Personnel</td>
</tr>
<tr>
<td>Equipment</td>
<td>Retardant loading has the potential to be over loaded or spilled, creating risk of environmental contamination.</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Ensure ground handling personnel are trained and qualified to fill 737 aircraft.</td>
</tr>
<tr>
<td>Environment</td>
<td>Heat, wind, nose, exhaust, direct sunlight all create a hazardous environment</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Designated, trained fuel handlers with PPE will conduct fueling</td>
</tr>
</tbody>
</table>

**Final Assessment Value:** Critical

**Prepared By:** Dennis Hulbert SMS Manager
**Date:** 3/15/2018

In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).
### Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

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<th>Additional Local Mitigation</th>
<th>Post Mitigation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational Layout</strong></td>
<td>Improper placement of equipment and or personnel causing hazard</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Pit personnel approaches aircraft from the right.</td>
</tr>
<tr>
<td><strong>Communication Loss</strong></td>
<td>Radio Loss: Inability to safely manage and direct</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Flight crew establishes communication CRM to deal with radio or frequency loss.</td>
</tr>
<tr>
<td><strong>Communication Loss</strong></td>
<td>Ground Handling loss: inability to safely manage in the ramp/pit area</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Flight crew establishes positive communication with ground handling personnel</td>
</tr>
<tr>
<td><strong>Fuel/Retardant Spill</strong></td>
<td>Environmenta hazard, employee slip/fall hazard contact with skin, clothing hazard, fuel fire hazard</td>
<td>Occasional</td>
<td>Critical</td>
<td>Serious</td>
<td>Flight Crew is familiarized with base retardant spill response procedures</td>
</tr>
</tbody>
</table>

**Final Assessment Value:**

Prepared By: Dennis Hulbert SMS Manager  
3/15/2018

In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).
### Assessment and Mitigation of: Coulson USA Retardant Loading Procedures 737

System: For Simultaneous Loading and Fueling from the same side procedures 1 of 1

<table>
<thead>
<tr>
<th>Sub-system</th>
<th>Hazards</th>
<th>Likelihood</th>
<th>Severity</th>
<th>Outcome</th>
<th>Mitigation</th>
<th>Likelihood</th>
<th>Severity</th>
<th>Outcome</th>
<th>Mitigation Achieved?</th>
<th>Additional Local Mitigation</th>
<th>Post Mitigation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Heat, wind, exhaust, direct sunlight FOD, noise, lack of situational awareness all create a hazardous environment</td>
<td>Probable</td>
<td>Critical</td>
<td>Serious</td>
<td>Assure IATBOG procedures are followed from: Operations -7. Fueling b- Simultaneous loading and fueling</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson Flight assures pre-training is accomplished and utilizes check-lists before operations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational Layout</td>
<td>Improper placement of equipment and or personnel causing hazards</td>
<td>Probable</td>
<td>Critical</td>
<td>Serious</td>
<td>Stop distance from aircraft 25+ Feet. Position at the aircraft, all equipment prior to fuel/retardant flow.</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson Flight crew does not start operations until assurance that all equipment is in proper place.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational Layout</td>
<td>Additional hazards with two operations within close proximity of same side of aircraft.</td>
<td>Probable</td>
<td>Critical</td>
<td>Serious</td>
<td>Emergency shut down procedures in place. Separation between each operation. Communication established between fueling and retardant</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson Flight Crew member monitors each operation to assure communication and procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Or Retardant Spill</td>
<td>The risk exists of a fuel or retardant spill</td>
<td>Occasional</td>
<td>Significant</td>
<td>Serious</td>
<td>Rapid shutdown procedures are in place for both fueling and retardant operations</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>If a spill occurs both operations initiate rapid shut down.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Retardant Loaders, Flight Crew, Ramp personnel &amp; Fuel Loaders creates multi-communication needs increasing complexity.</td>
<td>Occasional</td>
<td>Significant</td>
<td>Serious</td>
<td>Communication procedures is established per base Simultaneous Loading and Fueling supplement policy IABOG.</td>
<td>Remote</td>
<td>Critical</td>
<td>Low</td>
<td>Coulson flight crew members are trained and participate in communication procedures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Final Assessment Value:**

Prepared By: Dennis Hulbert SMS Manager  
3/15/2017

Operation Approved by:  
Title:  
Date:

In no case would the overall risk of the mission be less than the highest specific risk factor (example: one high, one serious, and two medium threats couldn’t result in anything less than high).
4.4 Assessment and Mitigation of Simultaneous Fueling – C-130

Refer to the following pages for risk assessment:
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</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Entry of aircraft into the pit area creates a risk to ground personnel and a risk of aircraft contact with ground equipment and facilities</td>
<td>Flight Crews are trained and operate in compliance with Interagency Airtanker Base Operating Standards</td>
<td>Flight Crew are briefed with airbase personnel before the start of each operations shift.</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>Lack of Communication procedures and understanding with both radio as well as ground handling signals</td>
<td>Conduct effective airbase in-briefings. Check radio systems with every crew change. Familiarize personnel with Agency ground handling procedures. Ensure effective communication.</td>
<td>Maintain published frequencies and airtanker base guides in aircraft.</td>
<td></td>
</tr>
<tr>
<td>Human Factors</td>
<td>Understanding of procedures with ground/ramp personnel</td>
<td>Hot loading procedures requires approval in Air Tanker Base Plan as well as consensus between Base Manager and Flight Crew Personnel</td>
<td>Establish Retardant Hot Loading Plan specific to each aircraft type.</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Retardant loading has the potential to be over loaded or spilled, creating risk of environmental contamination.</td>
<td>Ensure ground handling personnel are trained and qualified to fill C-130 aircraft.</td>
<td>Coulson aircraft are equipped with state of the art computerized loading technology to mitigate over filling and assure accurate.</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Fuel loading has the potential to be over loaded or spilled, creating risk of environmental contamination.</td>
<td>Designated, trained fuel handlers with PPE will conduct fueling.</td>
<td>A trained Coulson Flight Crew member oversees every simultaneous operation.</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Heat, wind, nose, exhaust, direct sunlight all create a hazardous environment</td>
<td>Training and utilization of Airtanker base safe work procedures including the use of PPE, and established breaks</td>
<td>Proper positioning of aircraft, minimizes aircraft generated exposures.</td>
<td></td>
</tr>
</tbody>
</table>

**Final Assessment Value:**

**Prepared By:** Dennis Hulbert SMS Manager  
**Date:** 3/15/2018

Operation Approved by:  
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## Assessment and Mitigation of: Coulson USA Retardant Loading Procedures C-130

### Sub-System - Simultaneous Fueling 2 of 2

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#### System: For Simultaneous Loading and Fueling from the same side procedures 1 of 1

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| Final Assessment Value: | Prepared By: | Dennis Hulbert SMS Manager | Date: 3/15/2017 |

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Bibliography