



COULSON

— GROUP —

OPERATIONAL AIRTANKER SUPPORT PROGRAM REPORT

Retardant Loading, Hot Loading and Simultaneous Fueling

Prepared for the United States Forest Service

By Dennis Hulbert
Coulson Aviation (USA) Ltd.

Publication # CAUSA-E-P-1801

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Coulson Aviation (USA) Ltd.
610 SW Alder St,
Portland, OR 97205, USA

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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 in to 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.

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.



Figure 1 Loading Port Cap C-130

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).



Figure 2 Access to Digital Display C-130

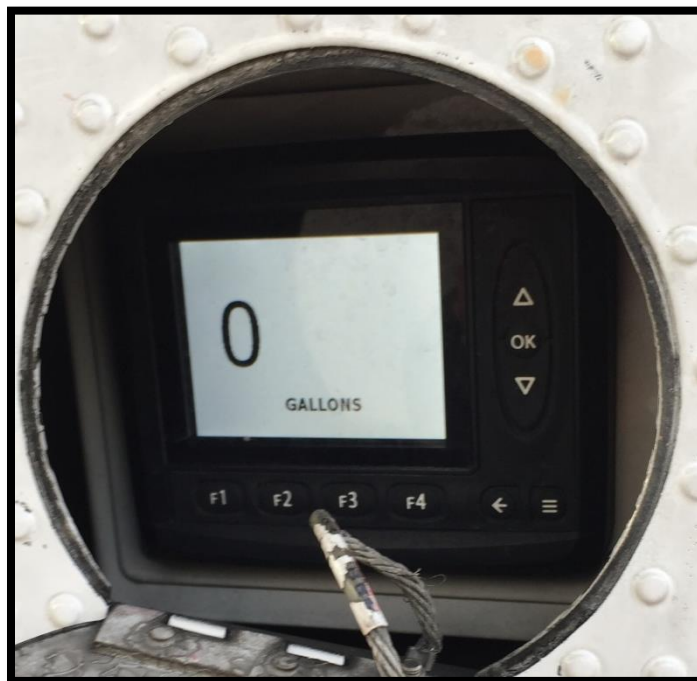


Figure 3 Digital Display C-130

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.



Figure 6 Overseeing the loading C -130

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).

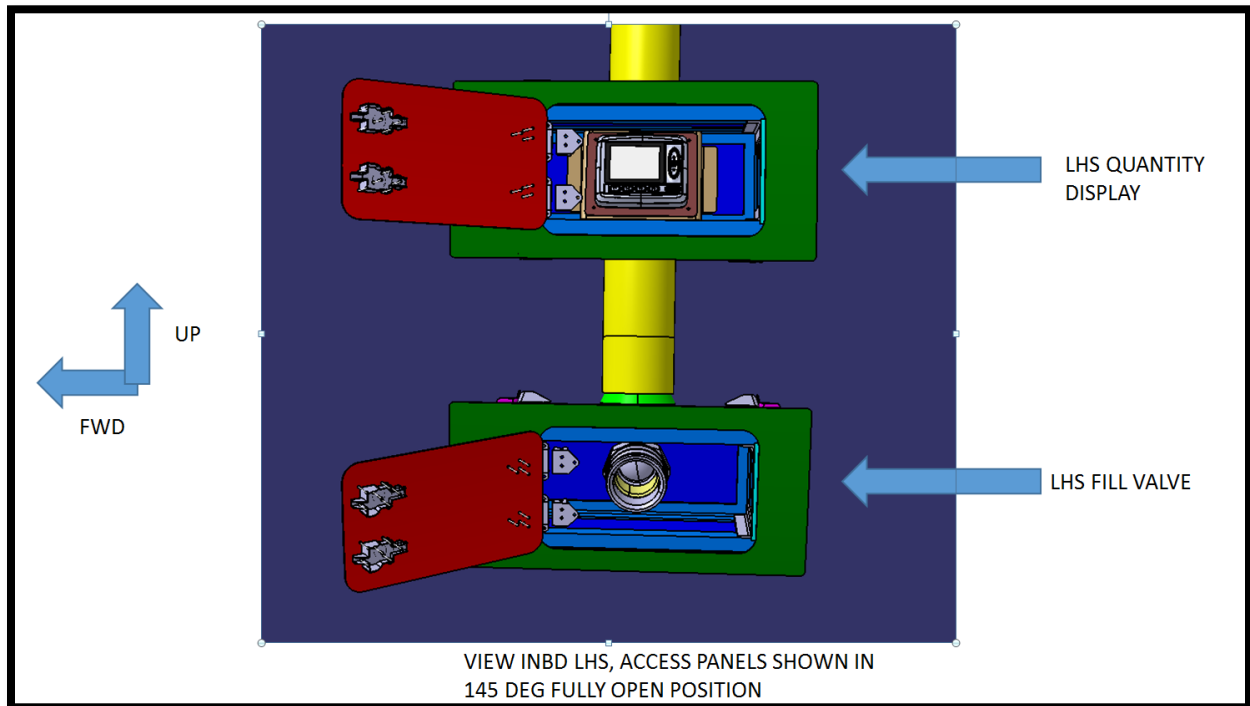


Figure 7 Quantify Indicator and Fill Port.

2. Remove the 3" Camlok Cap and stow.
3. Connect the loading hose and open valve.³
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.⁴
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 - thumbs 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.⁵

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.

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.⁶ 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 tender 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.⁷

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.

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

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

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

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

Final Assessment Value:		Prepared By:	Dennis Hulbert SMS Manager	Date:	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 3 of 3

		Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Sub-system	Hazards	Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Aircraft	Low pressure area in front of an operating jet engine creates risk of ingestion of personnel or equipment.	Remote	Catastrophic	High	Only trained and qualified personnel are permitted access to airside ramp area during operations. Personnel are trained to identify engine inlet hazard areas and are required to remain clear from them at all times.	Remote	Marginal	Low		Flight crew assures positive communication and clearance of personnel prior to engine start.	
Aircraft	Thrust required for breakaway may produce jet blast that can injure personnel and/or damage/dislodge equipment.	Occasional	Critical	High	All personnel are trained to maintain adequate clearance behind the aircraft at all times. Ramp personnel assures clearance of personnel and equipment prior to breakaway.	Remote	Marginal	Low		Flight crew utilizes minimum thrust required during breakaway procedure and taxi operations.	
Aircraft	Sensorineural hearing loss caused by excessive exposure to jet/APU engine noise.	Occasional	Marginal	Serious	Personnel working in high decibel areas wears approved hearing protection.	Remote	Marginal	Low		Coulson flight crews are briefed at each operation and follow Airbase Operating procedures	
Operation	Loading aircraft while engines are operating (hot load) creates increased risk of ingestion of personnel or equipment.	Occasional	Catastrophic	High	Training specific to hot loading procedures is required prior to operation. The engine on the side from which aircraft is being loaded is shut down. Personnel assures engine rotation has ceased prior to approaching the aircraft.	Remote	Marginal	Low		Coulson flight crews are briefed at each operation and follow Airbase Operating procedures	
Operation	Simultaneous Fuel/Load operations result in multiple personnel with operationally divided attention within close proximity to each other and aircraft.	Occasional	Critical	High	A single designate is assigned to oversee both operations, whom ensures positive communication with the flight crew during simultaneous fuel/load operations.	Remote	Marginal	Low		Coulson flight crews are briefed at each operation and follow Airbase Operating procedures	
Final Assessment Value:					Prepared By:	Dennis Hulbert				3/15/2018	
Operation Approved by:							Title:			Date:	

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ENGINE INLET & EXHAUST HAZARD AREAS

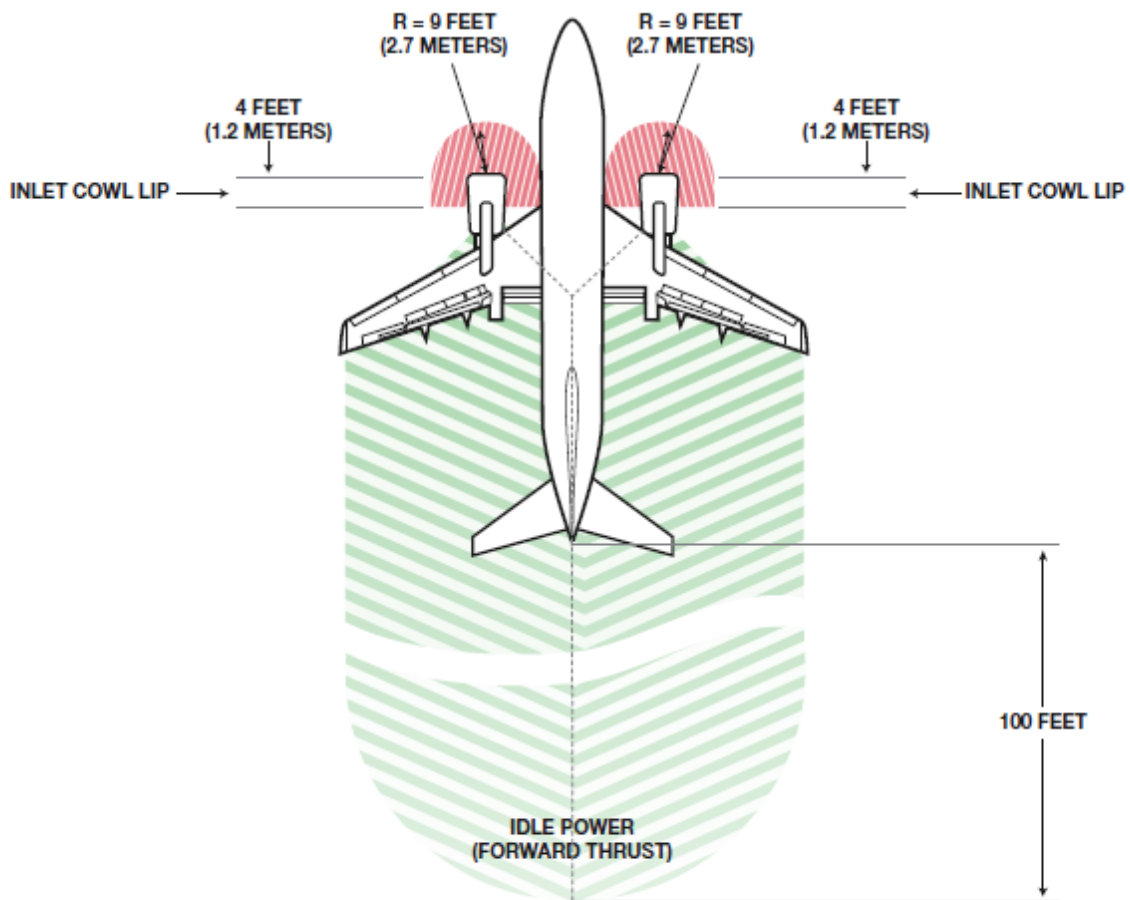


Figure 8 737 Engine Inlet and Exhaust Hazard Areas

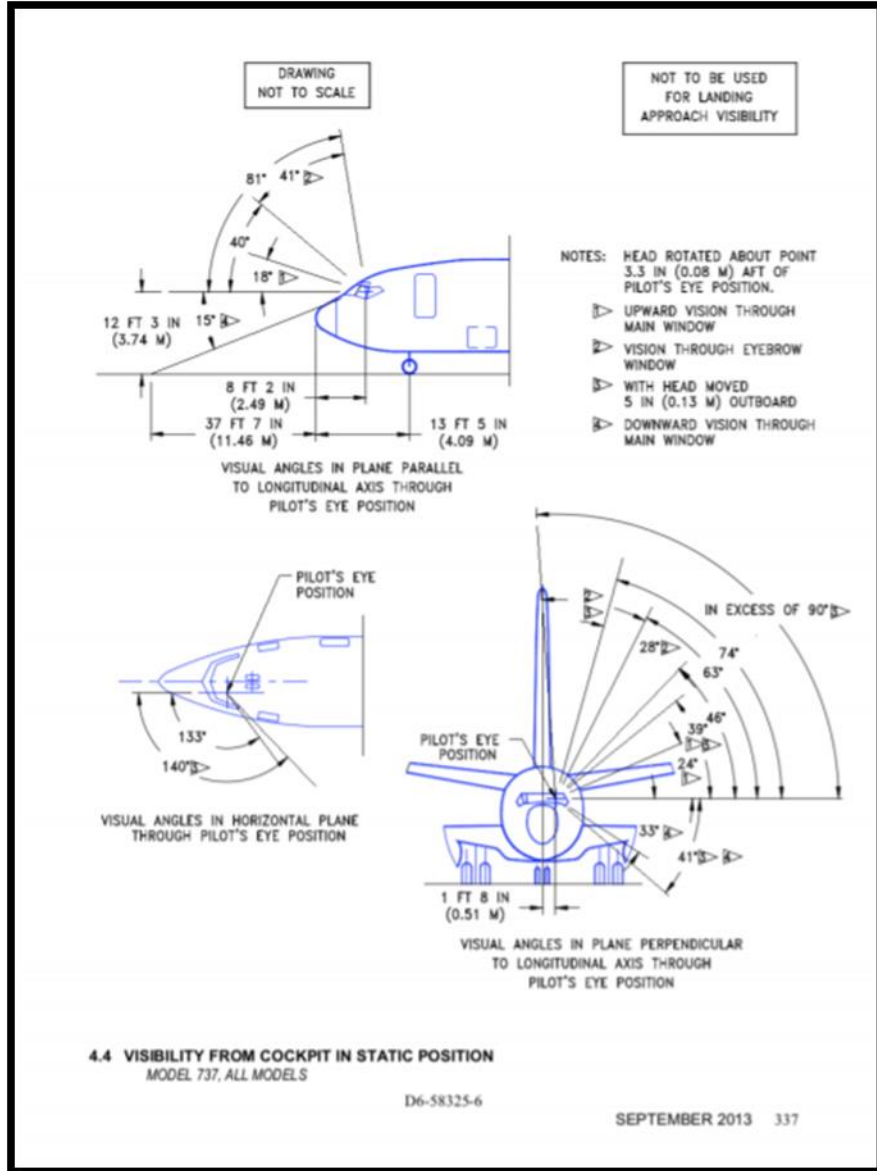


Figure 9 737 Cockpit Visibility

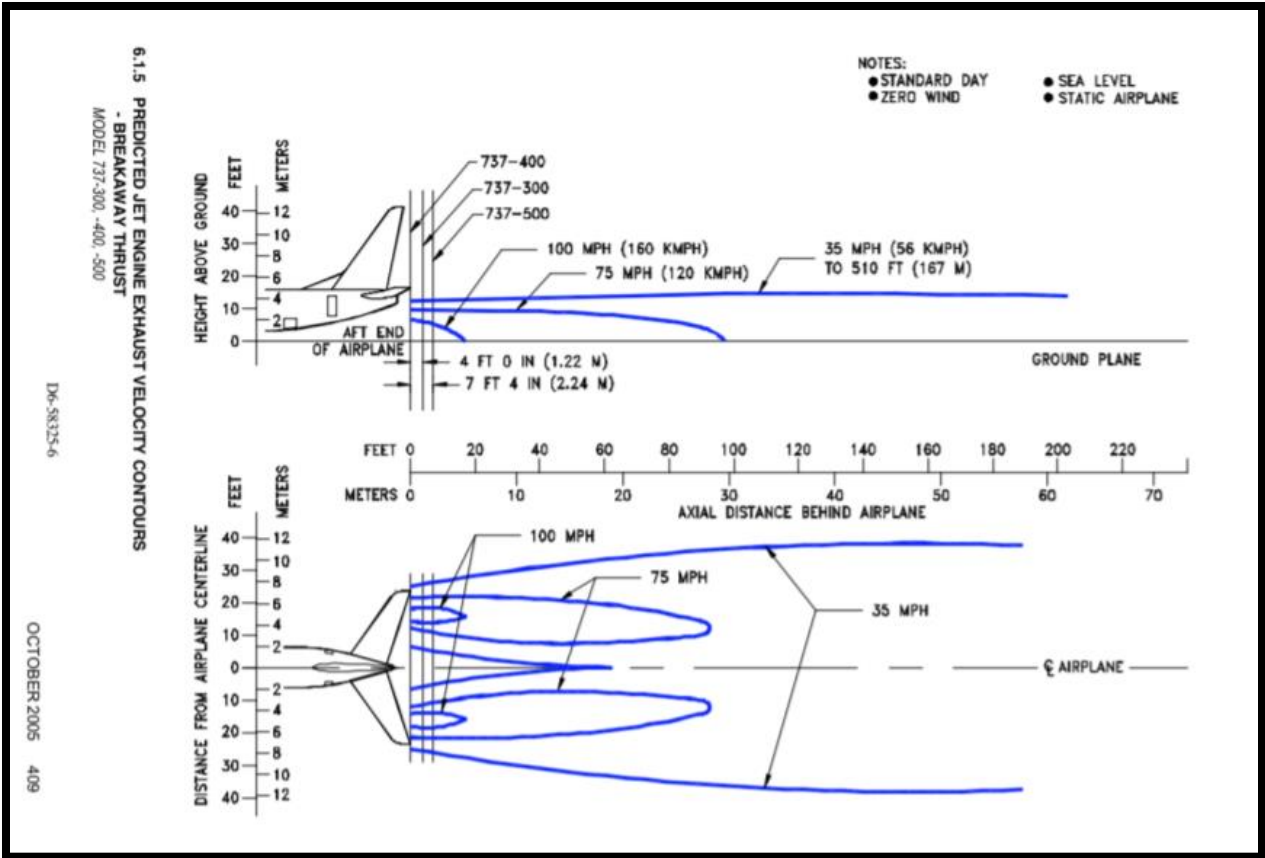


Figure 10 733 Breakaway Thrust

6.1.14 PREDICTED JET ENGINE EXHAUST TEMPERATURE CONTOURS
 - BREAKAWAY THRUST
 MODEL 737-300, -400, -500

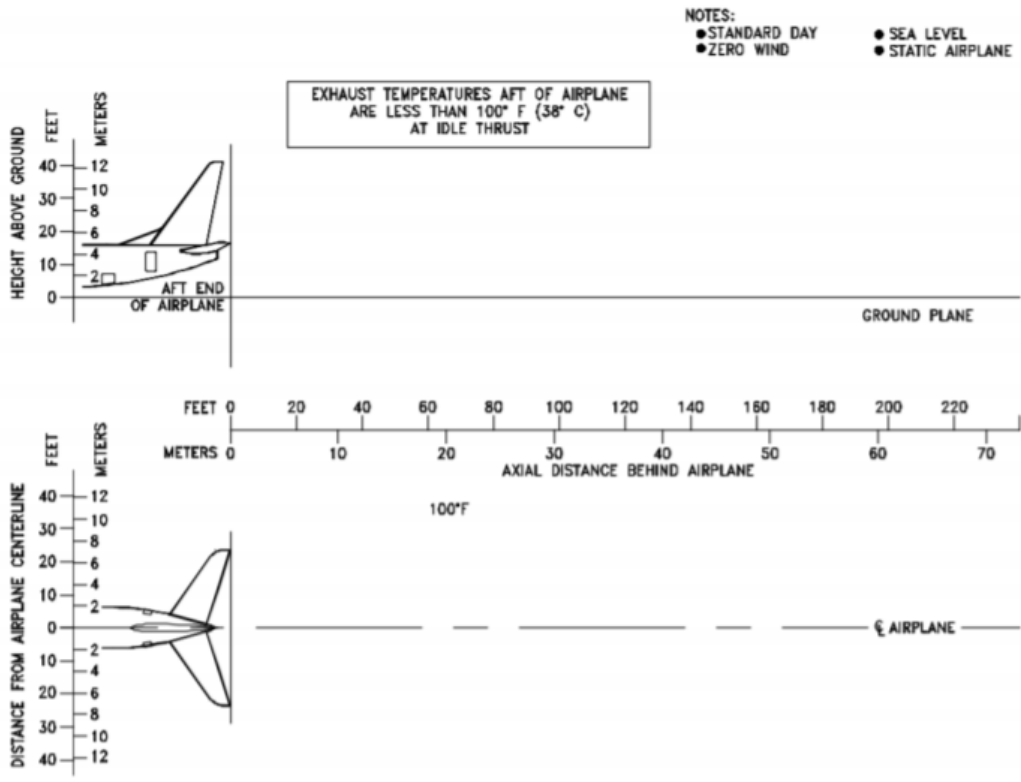


Figure 11 737 Breakaway Thrust Exhaust Temperatures

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

Sub-System- Hot Loading 1 of 2

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Aircraft	Entry of aircraft into the pit area creates a risk to ground personnel and a risk of aircraft contact with ground equipment and facilities	Occasional	Critical	Serious	Flight Crews are trained and operate in compliance with Interagency Airtanker Base Operating Standards	Occasional	Critical	Low		Flight Crew are briefed with airbase personnel before the start of each operations shift.	
Communications	Lack of Communication procedures and understanding with both radio as well as ground handling signals	Occasional	Critical	Serious	Conduct effective airbase in-briefings. Check radio systems with every crew change. Familiarize personnel with Agency ground handling procedures. Ensure effective communication.	Occasional	Critical	Low		Maintain published frequencies and airtanker base guides in aircraft	
Human Factors	Acceptance of Risk as Normal	Occasional	Critical	Serious	Emphasize importance of "situational awareness" as a means to recognize risk	Remote	Critical	Low		Reinforcement at daily base safety briefings	
Human Factors	Understanding of procedures with ground/ramp personnel	Occasional	Critical	Serious	Hot loading procedures requires approval in Air Tanker Base Plan as well as consensus between Base Manager and Flight Crew Personnel	Remote	Critical	Low		Establish Retardant Hot Loading Plan specific to each aircraft type.	
Equipment	Retardant loading has the potential to be over loaded or spilled, creating risk of environmental contamination.	Occasional	Critical	Serious	Ensure ground handling personnel are trained and qualified to fill C-130 aircraft.	Remote	Critical	Low		Coulson aircraft are equipped with state of the art computerized loading technology to mitigate over filling and assure accurate weights.	
Running Engines	Effect of aircraft exhaust, propeller blast on personnel	Occasional	Critical	Serious	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	Remote	Critical	Low		Flight Crew assures all personnel are at a safe distance before operations	

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 C-130

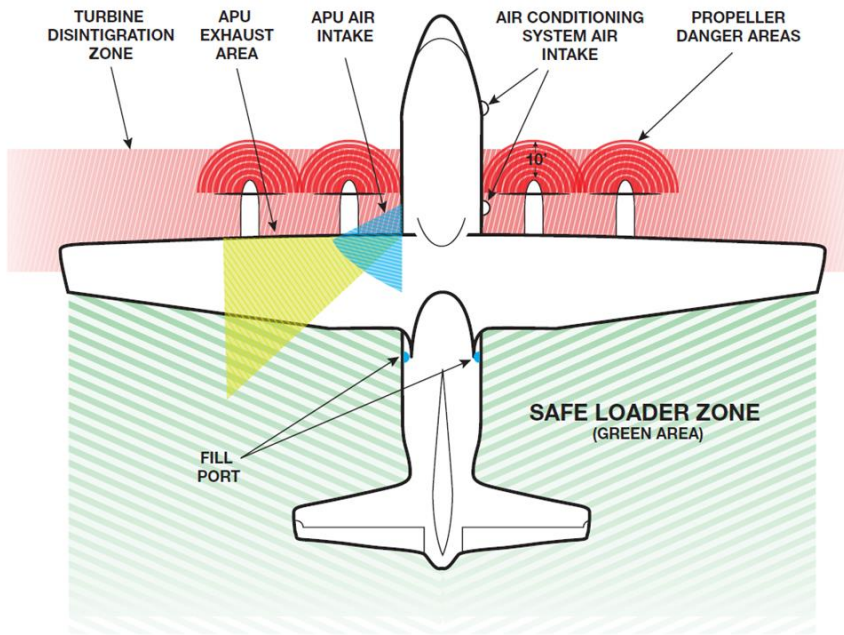
Sub-System- Hot Loading 2 of 2

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



PROP / ENGINE HAZARD AREAS



MAXIMUM POWER, NO WIND

DISTANCE AFT OF PROPS - FEET	100	200	300	400	500
WAKE VELOCITY - KNOTS	128	107	92	80	69

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

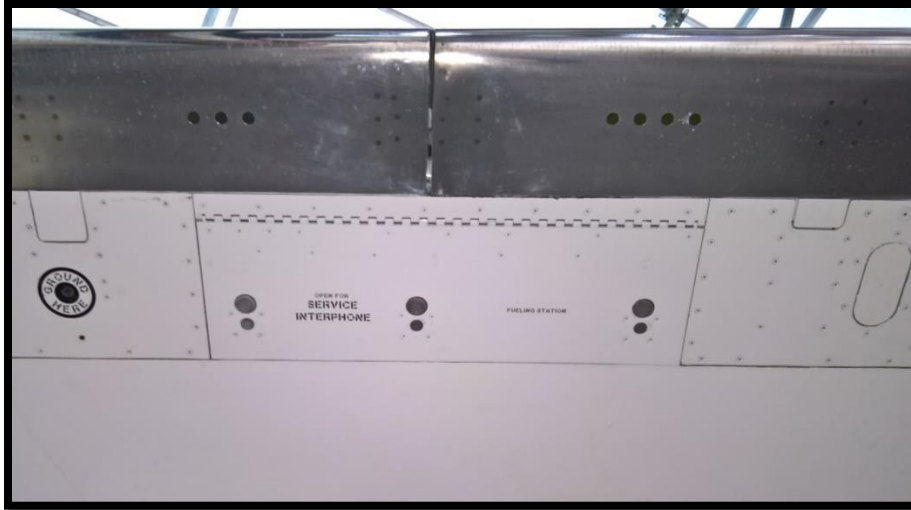


Figure 14 Boeing 737 Single Point Fueling Station Access



Figure 15 Boeing 737 Single Point Fueling Station (Open)

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

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Aircraft	Entry of aircraft into the pit area creates a risk to ground personnel and a risk of aircraft contact with ground equipment and facilities	Occasional	Critical	Serious	Flight Crews are trained and operate in compliance with Interagency Airtanker Base Operating Standards	Occasional	Critical	Low		Flight Crew are briefed with airbase personnel before the start of each operations shift.	
Communications	Lack of Communication procedures and understanding with both radio as well as ground handling signals	Occasional	Critical	Serious	Conduct effective airbase in-briefings. Check radio systems with every crew change. Familiarize personnel with Agency ground handling procedures. Ensure effective communication.	Occasional	Critical	Low		Maintain published frequencies and airtanker base guides in aircraft	
Human Factors	Understanding of procedures with ground/ramp personnel	Occasional	Critical	Serious	Hot loading procedures requires approval in Air Tanker Base Plan as well as consensus between Base Manager and Flight Crew Personnel	Remote	Critical	Low		Establish Retardant Hot Loading Plan specific to each aircraft type.	
Equipment	Retardant loading has the potential to be over loaded or spilled, creating risk of environmental contamination.	Occasional	Critical	Serious	Ensure ground handling personnel are trained and qualified to fill 737 aircraft.	Remote	Critical	Low		Coulson aircraft are equipped with state of the art computerized loading technology to mitigate over filling and assure accurate	
Equipment	Fuel loading has the potential to be over loaded or spilled, creating risk of environmental contamination.	Occasional	Critical	Serious	Designated, trained fuel handlers with PPE will conduct fueling	Occasional	Critical	Low		A trained Coulson Flight Crew member oversees every simultaneous operation	
Environment	Heat, wind, noise, exhaust, direct sunlight all create a hazardous environment	Occasional	Critical	Serious	Training and utilization of Airtanker base safe work procedures including the use of PPE, and established breaks	Occasional	Critical	Low		Proper positioning of aircraft, minimizes aircraft generated exposures.	

Final Assessment Value: _____ **Prepared By:** Dennis Hulbert SMS Manager **Date:** 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- Simultaneous Fueling 2 of 2

Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Operational Layout	Improper placement of equipment and or personnel causing hazard	Occasional	Critical	Serious	Assure each base plan addressed equipment placement in relationship to aircraft for compatibility and safety	Occasional	Critical	Serious		Pit personnel approaches aircraft from the right.	
Communication Loss	Radio Loss: Inability to safely manage and direct	Occasional	Critical	Serious	Suspend operations until positive communication is restored	Occasional	Critical	Low		Flight crew establishes communication CRM to deal with radio or frequency loss.	
Communication Loss	Ground Handling loss: inability to safely manage in the ramp/pit area	Occasional	Critical	Serious	Suspend operations until communication is restored	Occasional	Critical	Low		Flight crew establishes positive communication with ground handling personnel	
Fuel/Retardant Spill	Environmenta hazard, employee slip/fall hazard contact with skin, clothing hazard, fuel fire hazard	Occasional	Critical	Serious	Training and utilization of Airtanker base safe work procedures including retardant/ fuel spill response and the utilization of PPE	Occasional	Critical	Low		Flight Crew is familiarized with base retardant spill response procedures	

Final Assessment Value:		Prepared By:	Dennis Hulbert 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

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

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

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4.4 Assessment and Mitigation of Simultaneous Fueling – C-130

Refer to the following pages for risk assessment:

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

Sub-System- Simultaneous Fueling 1 of 2

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

Final Assessment Value:

Prepared By:

Dennis Hulbert SMS Manager

3/15/2018

Operation Approved by:

Title:

Date:

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

Sub-System- Simultaneous Fueling 2 of 2

Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Operational Layout	Improper placement of equipment and or personnel causing hazard	Occasional	Critical	Serious	Assure each base plan addressed equipment placement in relationship to aircraft for compatibility and safety	Occasional	Critical	Serious		Pit personnel approaches aircraft from the right.	
Communication Loss	Radio Loss: Inability to safely manage and direct	Occasional	Critical	Serious	Suspend operations until positive communication is restored	Occasional	Critical	Low		Flight crew establishes communication CRM to deal with radio or frequency loss.	
Communication Loss	Ground Handling loss: inability to safely manage in the ramp/pit area	Occasional	Critical	Serious	Suspend operations until communication is restored	Occasional	Critical	Low		Flight crew establishes positive communication with ground handling personnel	
Fuel/Retardant Spill	Environmenta hazard, employee slip/fall hazard contact with skin, clothing hazard, fuel fire hazard	Occasional	Critical	Serious	Training and utilization of Airtanker base safe work procedures including retardant/ fuel spill response and the utilization of PPE	Occasional	Critical	Low		Flight Crew is familiarized with base retardant spill response procedures	

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Assessment and Mitigation of: Coulson USA Retardant Loading Procedures C-130												
System- For Simultaneous Loading and Fueling from the same side procedures 1 of 1												
Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value	
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Environment	Heat, wind, exhaust, direct sunlight FOD, noise, lack of situational awareness all create a hazardous environment	Probable	Critical	Serious	Assure IATBOG procedures are followed from: Operations -7. Fueling b- Simultaneous loading and fueling	Remote	Critical	Low		Coulson Flight assures pre-training is accomplished and utilizes check-lists before operations.		
Operational Layout	Improper placement of equipment and or personnel causing hazards	Probable	Critical	Serious	Stop distance from aircraft 25+ Feet. Position at the aircraft, all equipment prior to fuel/retardant flow.	Remote	Critical	Low		Coulson Flight crew does not start operations until assurance that all equipment is in proper place.		
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Communication	Retardant Loaders, Flight Crew, Ramp personnel & Fuel Loaders creates multi-communication needs increasing complexity.	Occasional	Significant	Serious	Communication procedures is established per base Simultaneous Loading and Fueling supplement policy IABOG.	Remote	Critical	Low		Coulson flight crew members are trained and participate in communication procedures		
Final Assessment Value:				Prepared By: Dennis Hulbert SMS Manager				3/15/2017				
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Bibliography

National Wildfire Coordinating Group. (2011, 05). Interagency Airtanker Base Operations Guide. *PMS 508 NFES 002271*. Boise, ID, USA: National Wildfire Coordinating Group.