

**Assessment and Mitigation of: Single Skid, Toe-in and Hover Exit/Entry (STEP)**

STEP-System Aircraft											
Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Nov-16 Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Adequate Screening and Evaluation	Screening, Training, and Evaluation of aircraft not done for STEP suitability	Probable	Marginal	Serious	Office of Aviation Services provided Pilot and crew training in accordance with OPM-40	Remote	Negligible	Low			
				Medium	Make/Model/Aircraft specific training will focus on STEP configuration and procedures.Lessons learned noted and shared as appropriate.	Occasional	Negligible	Low			
Performance, Capabilities, and Limitations	Exceeding Helicopter Weight and Balance	Remote	Critical	Medium	Complete Weight and Balance for crew and litter before beginning operations, utilizing a 300 lb patient in the applicable outboard seat.	Improbable	Negligible	Low			
				Medium	Complete Load Calculation for current conditions	Improbable	Negligible	Low			
				Medium	Establish Weight and Balance minimum fuel loads for STEP operations.	Improbable	Negligible	Low			
				Medium	Ensure power checks are completed before and during mission	Improbable	Negligible	Low			
				Medium	Ensure proper placement of litter when applicable. Identify whether or not the installed litter kit will be utilized, and rig the aircraft accordingly.	Improbable	Negligible	Low			

**STEP System- Aircraft**

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Performance, Capabilities, and Limitations	Exceeding Helicopter Weight and Balance	Remote	Critical	Medium	Pilot will ensure Weight and Balance Limitations are followed	Improbable	Negligible	Low			
					Ensure STEP personnel are seated within Weight and Balance Limitations and only essential personnel are on board	Improbable	Negligible	Low			
	Hovering within the Height Velocity Curve	Frequent	Catastrophic	High	Minimize time within Height Velocity Curve. Perform power check prior to entering hover	Probable	Negligible	Medium			
					Maintain proper rotor clearance	Occasional	Marginal	Medium			
					Maintain proper heading relative to wind direction. Utilize only Part 27 certificated helicopter.	Occasional	Marginal	Medium			
	Equipment (Emergency STEP only)	Litter Security Rope abrasion from Flight Step	Remote	Marginal	Medium	Ensure Flight Step is smooth where Rope or litter contacts it.	Remote	Negligible	Low		
Manager/litter attendant tether attachment point is not uniformly defined, tested and designed		Remote	Catastrophic	Serious	Ensure approved harness and tether attachment point is approved or STC'd	Improbable	Critical	Medium			
Communications	Loss of Communication between Pilot and STEP personnel	Remote	Marginal	Medium	Communication tests are performed prior to operations. Ensure availability of radio to helmet adaptors for STEP personnel working near the helicopter. Utilize hand signal/body language backups.	Remote	Negligible	Low			

**STEP System- Aircraft**

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Configuration	Utilization of aircraft installed litter kit not suitable for specific hover load or toe-in, one skid scenario. <b>(Emergency Only)</b>	Remote	Marginal	Medium	Training evolutions will specifically address the feasibility of using the litter kit during STEP operations.	Improbable	Negligible	Low			
					When employed, ensure litter kit is utilized according to manufacturer instruction.	Improbable	Negligible	Low			
	STEP Operation being performed off Pilot side due to terrain or other considerations.	Remote	Marginal	Medium	Ensure training address STEP operations exiting or entering from either side of the helicopter.	Remote	Negligible	Low			
	No structural Barrier between Pilot and patient in litter resulting in exposure to flight controls with front seat removed. <b>(Emergency Only)</b> .	Remote	Critical	Medium	Left Seat Drive in currently contracted aircraft reduces potential of flight control interference.	Improbable	Critical	medium			
					Manager/Litter attendant will minimize movement and time out of seat belt during patient or litter loading operations, wearing an approved harness that is connected to an approved hard point.	Improbable	Critical	medium			
					Litter or patient attendant present at all times in aircraft, monitoring litter or patient movement, well being.	Improbable	Critical	Medium			
					Ensure STEP training addresses potential interference with Flight Controls	Improbable	Critical	Medium			
	Operation requires unanticipated in-flight door configuration changes	Remote	Critical	Medium	Contract aircraft with sliding rear doors that can be opened in-flight.	Improbable	Negligible	Low			
					When a litter is loaded ensure the head of the patient is adjacent to a closed door, with the foot of litter out open door when necessary.	Remote	Negligible	Low			

**STEP System- Equipment**

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
<b>Manager Tether (Emergency Only)</b>	Tether length does not restrain litter attendant from inadvertent extension beyond aircraft structure if seat belt is removed.	Remote	Marginal	Medium	Attendant should remain seated with Seat Belt fastened as long as possible.	Improbable	Marginal	Medium			
					Utilize adjustable tether.	Improbable	Negligible	Low			
<b>Litter (Emergency Only)</b>	Loading of litter resulting in impact to the aircraft	Occasional	Critical	Serious	Training evolutions that specifically address litter loading at shoulder height.	Remote	Critical	Medium			
					Utilize additional manpower that may not be STEP trained to support heavier loads. Address placement of additional personnel during training evolutions.	Remote	Critical	Medium			
					Training evolutions that specifically address litter tie down and anchor options.	Remote	Critical	Medium			

**STEP-System Operations**

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Training	Training is non-standard and inconsistent	Probable	Critical	High	Work with OAS Inspector Pilots and trainers, evolving and noting best practices as they become apparent.	Remote	Negligible	Low			
				High	Utilize the OPM 40 format and customize training to make, model and configuration.	Remote	Negligible	Low			
				High	Establish target slope % for STEP operations, and define terrain that meets a no go criteria.	Remote	Negligible	Low			
Procedures	Litter loading can lead to interference with the manager tether. <b>(Emergency Only)</b>	Occasional	marginal	Medium	Ensure training evolutions explore best practices for approved anchor utilization(tether hardpoint, rappel plate, or aircraft hardpoint).	Remote	Negligible	Low			
				Medium	Ensure manager/attendant is checked by Helicopter Manager or Pilot for proper configuration of anchor prior to starting the mission	Remote	Negligible	Low			
				Medium	Remove front right seat when appropriate.	Remote	Negligible	Low			
				Medium	Maintain proficiency in accordance with OPM 40	Remote	Negligible	Low			
	STEP personnel may lose footing while entering or exiting aircraft.	Occasional	Marginal	Medium	Training evolutions will focus on muscle memory and smooth transitions on and off the skids during STEP operations. Ground mock ups will emphasize hand and foot placement.	Remote	Negligible	Low			
STEP personnel or others in landing area may approach uphill into main rotor.	Remote	Critical	Medium	Training evolutions will focus on STEP personnel positioning once on terrain, and briefing of STEP landing area personnel before operations commence.	improbable	Critical	Medium				

**STEP-System Operations**

Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Procedures	Emergency Procedures are not part of standard proficiency scenarios	Remote	Critical	Medium	Inspection of aircraft hard mounted and harness mounted ripper/seat belt cutters.	Improbable	Marginal	Medium			
				Medium	Develop standard proficiency scenarios that include emergency procedures in coordination with OAS inspector Pilots and trainers.	Improbable	Marginal	Medium			
	Pilot and STEP personnell communications unclear on whether clear to depart or load	Remote	marginal	Medium	Establish standard communications procedures to include verbal as well as hand/head signalled communications	Improbable	Negligible	Low			
	Operation requires Loading, Unloading, or access from the off Pilot side.	Occasional	marginal	Medium	Training evolutions develop specific procedures for off Pilot side loading/unloading.	Improbable	Negligible	Low			
				Medium	Configure STEP personnel, equipment and aircraft before the mission specific to the side of aircraft being utilized.	Improbable	Negligible	Low			
				Medium	Minimize under-the-rotor travel of STEP personnel from one side of aircraft to other.	improbable	Negligible	Low			
	Miscommunications between Pilot and manager during mission critical procedures results in improper response	Occasional	Critical	Serious	Follow challenge and response criteria between Pilot and STEP personnell.	Remote	Negligible	Low			
Serious				Include emergency response in currency training	Remote	Negligible	Low				
Site selection	Site is surrounded by trees, slope is less than 20%	Occasional	Marginal	Medium	Ensure 1 and 1/2 Rotor Diameter clearance from obstacles in STEP landing area where trees and not slope present the primary obstacle.	Remote	Negligible	Low			

**STEP System- Operations**

Sub-system	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Site selection	Site is on steep ground where a fall by STEP personnel could result in serious injury.	Occasional	Critical	Serious	STEP operations on ground where a fall is likely to result in serious injury not performed.	Remote	Negligible	Low			
	Site is a burned over or otherwise very dusty area where brown out is possible	Occasional	Marginal	Medium	Treat the STEP landing area with water or retardant in order to minimize dust (AK Whiteout), or utilize a different site.	Remote	Negligible	Low			
	Inadequate rotor clearance for Toe In or One Skid landing due to steep slope or obstruction	Occasional	Critical	Serious	Utilize Hover Exit/Entry. Assign one STEP qualified person to monitor rotor clearance from the ground with flight helmet adaptor to radio.	Remote	Critical	Medium			
Loading of Patient or Litter (Emergency Only)	Helicopter movement during one skid, toe in or hover landing presents hazard to STEP personnel and/or patient.	Remote	Critical	Medium	Training evolutions cover best practices with regard to movement of aircraft. Communications between Pilot, manager, and on ground STEP personnel are concise, practiced, and standardized.	improbable	Critical	Medium			
	Departure with STEP personnel on Skid.	Remote	Marginal	Medium	Utilize Standard challenge and response to verify Pilot is clear to depart.	Improbable	Marginal	Medium			

**STEP-System Government Personnel**

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Training	Personnel not STEP trained or not current.	Remote	Critical	Medium	Follow OPM 40 training and currency requirements. Ensure training records are current.	occasional	Negligible	Low			
Human Factors	Perceived nature of emergency leads to external pressure to perform mission.	Remote	Marginal	Medium	Thorough briefing with Incident Managers, Pilot and STEP personnel. Utilize GAR model rapid risk assessment with all mission participants	Remote	Negligible	Low			
					Adherence to STEP training and communications protocols. Training evolutions emphasize muscle memory and procedures	Remote	Negligible	Low			
					Emphasize Pilot and Manager CRM. Look for subtle signs of discomfort. Emphasize that all STEP personnel may stop an operation at any time.	Remote	Negligible	Low			
	Manager tether not attached to anchor by manager. <b>(Emergency Only)</b>	Remote	Catastrophic	Serious	Ensure standard challenge and response for tether connection is used between Pilot and Manager	Improbable	Critical	Medium			
Emphasize precise communications between Pilot and STEP personnel. Notice fatigue and other conditions that distract from the mission	Improbable	Critical	Medium								



### STEP System Contractor Personnel

		Pre Mitigation			Post Mitigation						
Sub-system	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome	Mitigation Achieved ?	Additional Local Mitigation	Post Mitigation Value
Training	Primary/Relief Pilots may not be carded or current per OPM 40	Occasional	Marginal	Medium	Manager will ensure primary and relief Pilots are carded and maintaining currency	Remote	Negligible	Low			
					Exceed currency requirements with frequent low risk (airport) training evolutions.	Remote	Negligible	Low			
Human Factors	Fatigue	Occasional	Critical	Serious	Ensure Pilot is following work rest requirements. Remind Pilot that they have the authority and responsibility to decline any mission.	Remote	Critical	Medium			
					Ensure additional rest during extended periods of high tempo operations	Improbable	Critical	Medium			
					Ensure breaks are taken throughout the duty period	Improbable	Critical	Medium			
	Complacency	Occasional	Critical	Serious	Include Pilot in pre & post mission planning and briefings. Utilize CRM in site selection.	Remote	Critical	Medium			
					Provide comprehensive briefings before each mission	Remote	Negligible	Low			
					Ensure Rapid Risk Assessments (GAR) are utilized. Monitor comfort level.	Remote	Negligible	Low			
					Maintain situational awareness. Review Risk Assessments prior to missions.	Remote	Negligible	Low			
	<b>Final Assessment Value: Medium</b>					<b>Prepared By:</b>	tbd			<b>Date: November 2016</b>	
<b>Operation Approved By: tbd</b>						Title: tbd			<b>Date:</b>		

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).