

Rope Assisted Deployment System (R.A.D.S.)- Aircraft Type 1 & Type 2 Helicopters										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Adequate Screening/Evaluation	Lack of Standardization	Frequent	Critical	High	Develop National screening/evaluation process, need approved operations guide at appropriate levels	Remote	Critical	Medium				
	Aircraft configuration/performance doesn't meet operational needs	Frequent	Catastrophic	High	Utilize field personnel to help create a national specification for schedule B of the contract. Helicopter managers/HOSs/RAD specialists more directly involved in aircraft contract specifications/modifications.	Remote	Catastrophic	Serious				
Performance, Capabilities, Limitations	Operating outside design limitations of aircraft (weight/balance, DA, height/velocity curve)	Occasional	Catastrophic	High	Strict compliance with flight manual and increased awareness training of aircraft performance for helicopter managers and proper mission planning	Improbable	Catastrophic	Serious				
	Pilot visibility/vertical & horizontal reference	Occasional	Critical	Serious	National screening/evaluation process, identify standard for visibility in fast rope aircraft	Remote	Critical	Medium				
	Pilot moving from right to left seat to fit mission in Bell medium helicopters	Occasional	Critical	Serious	Operate with a Pilot, co-pilot configuration/ pilot mentor/trainee	Remote	Critical	Medium				
Equipment	Anchor failure	Improbable	Catastrophic	Medium	Anchor inspections/testing as described in the STC	Improbable	Catastrophic	Medium				
	Aircraft modifications improperly installed/false documentation	Remote	Catastrophic	Serious	Thorough maintenance inspections, verification of STC documentation and compliance, increased training for helicopter managers	Improbable	Catastrophic	Medium				
	ICS communications not available to all firefighters	Frequent	Critical	High	National R.A.D.S. boilerplate for Schedule B	Remote	Critical	Medium				
	Spotter anchor failure	Remote	Catastrophic	Serious	Ensure anchor is approved with proper & valid STC, tested annually, installed correctly, and inspected at manufacturer's recommendation.	Improbable	Catastrophic	Medium				
	Hardpoint/cargo restraint strength	Frequent	Catastrophic	High	National screening/evaluation process, contract specifications for hardpoints	Remote	Catastrophic	Medium				
Communications	Spotter cannot independently manipulate FM radios from back seat (pilot task saturation)	Occasional	Critical	Serious	Operate with a Pilot, co-pilot configuration/ pilot mentor/trainee. Co-pilot assumes radio operations task.	Remote	Critical	Medium				

R.A.D.S. - Aircraft Type 1 & Type 2 Helicopters (cont.)										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Configuration	Doors open flight; crash survivability	Occasional	Catastrophic	High	Minimize doors open operation to only essential missions, create doors open checklist for IHOG and R.A.D.S. Ops Plan	Occasional	Catastrophic	High				
	Doors open flight; non secured items	Occasional	Catastrophic	High	Training on proper storage of equipment when flying with doors open. Secure items.	Remote	Catastrophic	Serious				
	External basket top not secured	Remote	Catastrophic	Serious	Recommend locking lids, no open external baskets, part of spotter responsibility	Improbable	Catastrophic	Medium				
Maintenance	Lack of compliance with AD's, manufacture's inspections	Remote	Catastrophic	serious	Strict compliance with flight manual, increased awareness training of maintenance requirements and AD's for helicopter managers, spot inspections of aircraft.	Improbable	Catastrophic	Medium				
R.A.D.S. - Equipment										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Common factors	Misuse/mistreatment	Occasional	Critical	Serious	Education, supervision for following equipment use standards	Improbable	Critical	Medium				
	Use of non-standard equipment	Remote	Critical	Medium	Maintain current equipment standards for fast rope equipment	Improbable	Critical	Medium				
	Improper inspections	Occasional	Catastrophic	High	Education, supervision for following equipment inspection standards	Remote	Catastrophic	Serious				
	Improper rigging	Remote	Catastrophic	Serious	Maintain currency, proficiency, checks and balances.	Improbable	Catastrophic	Medium				
	Not following established procedures/policy	Occasional	Critical	Serious	Peer monitoring, annual base reviews, accountability at all levels for compliance, follow-up of action items. Mandatory attendance of spotters to biennial RADS workshop or academy.	Remote	Critical	Medium				
Spotter tether/Gunner strap	Improper adjustment	Occasional	Critical	Serious	Initial set-up of gunner straps and spotter tethers for specific model aircraft, pre-mission check	Remote	Critical	Medium				
Research/Development	Lack of a process for hardware development results in sub-standard equipment specifications	Frequent	Critical	High	Allow systematic Field evaluation of Industry designed and approved equipment following established procedures.	Remote	Critical	Medium				

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Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Cargo delivery system	Improper Cargo Rigging	Occasional	Critical	Serious	Adhere to proper training and reconfiguration procedures, per the R.A.D.S. Ops Plan. Conduct spot training as needed	Remote	Critical	Medium				
	Use of unapproved containers	Remote	Marginal	Medium	Supervisors, managers ensure only approved cargo nets are properly utilized.	Improbable	Marginal	Low				
	Improper cargo restraint straps/cargo compartment netting (internal only)	Occasional	Critical	Serious	Follow established Spotter Procedures for cargo net securing.	Remote	Critical	Medium				
R.A.D.S. System - Operations										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Training	Inconsistency	Occasional	Marginal	Medium	Utilize joint training when practical. Ensure that RADS training be completed within the first two weeks of the helicopter contract beginning. Management shall support not making the RADS platform and crew available for assignment until training is completed.	Remote	Marginal	Medium				
Supervision	Not properly qualified for firefighting mission	Remote	Catastrophic	Serious	Ensure Spotter and firefighters adhere to qualifications outlined in the R.A.D.S. Ops Plan.	Improbable	Catastrophic	Medium				
	Escape routes and safety zones not identified	Occasional	Catastrophic	High	Ensure Spotter and ALL firefighters have knowledge and location of safety zones, and escape routes prior to fast rope deployment.	Remote	Catastrophic	Serious				
R.A.D.S. site selection	Poor site selection	Occasional	Catastrophic	High	Spotter training, CRM, depth of fire experience. Deliver firefighters with LCES in place Spotter training, develop national standard Spotter Training Handbook, CRM, depth of fire experience, minimal redcard qualification of single resource boss with ICT4 being preferred.	Remote	Catastrophic	Serious				

R.A.D.S. System - Operations (cont.)										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
R.A.D.S. procedure	Policy deviation	Occasional	Critical	Serious	Adhere to policy and guides.	Remote	Critical	Medium				
	CRM between pilot and spotter inadequate	Occasional	Critical	Serious	Increase simulation training and proficiency. Ensure proper briefing for new/relief personnel. Develop Challenge and Response criteria between spotter and pilot. Develop CRM training specific to pilot-spotter relationship.	Remote	Critical	Medium				
	Loss of Hand Grip	Remote	Catastrophic	Serious	Proper training,equipment use, and refinement of individual techniques for tower training and mock ups.	Improbable	Catastrophic	Medium				
	Loss of footing during slide	Occasional	Catastrophic	High	Proper training,equipment use, and refinement of individual techniques for tower training and mock ups.	Remote	Catastrophic	Serious				
	Exposure to off site landing	Frequent	Critical	High	Follow standard procedures (high-low recon, power checks, verify load calculations as valid, etc.) Follow risk management process. Site selection needs to be mutually agreed upon by pilot and spotter. Respond to the incident configured to RADS when appropriate.	Occasional	Critical	Serious				
External cargo	Passengers allowed on helo during external load operations	Frequent	Catastrophic	High	Ensure that passengers are off loaded during external load ops. Cargo site selection is mutually agreed upon by pilot and spotter prior to reconfiguration and utilization of CRM.	Remote	Catastrophic	Serious				
	Overflying highways, major population area, personnel	Occasional	Critical	Serious	Establish and brief on proper flight paths, update maps, see and avoid, find other means for mission	Remote	Critical	Medium				
Emergency Procedures	Lack of adequate training / Proficiency	Occasional	Catastrophic	High	Increase simulation training, utilize tower/elevated platform to increase R.A.D.S. / spotter emergency procedure proficiency , develop training which includes pilot, spotter and firefighter. Improve / update spotter/R.A.D.S. training syllabus.	Remote	Catastrophic	Serious				
	Loss of rope control	Remote	Critical	Medium	Develop the ability to cut or release the rope when weighted.	Remote	Critical	Medium				

R.A.D.S. - Personnel (Government)										Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
Sub-System	Hazards	Pre-mitigation			Mitigation	Post-mitigation						
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome				
Utilization	Span of Control/Collateral Duties. Personnel are often tasked with multiple duties especially during the emergence of an incident. Focused on Task at hand & not able to provide adequate oversight.	Occasional	Catastrophic	High	Ensure span of control policies & procedures are met. Need to ensure situation is recognized & ensure additional resources/supervision is ordered. Limit collateral duties in key supervisory positions.	Remote	Catastrophic	Serious				
Qualifications	Utilizing marginally trained personnel for fast rope missions	Remote	Catastrophic	Serious	Ensure personnel have fully completed initial fast rope training program and have demonstrated satisfactory proficiency. Ensure personnel are within acceptable currency as outlined in the R.A.D.S Ops Plan, prior to mission start.	Improbable	Catastrophic	Medium				
	Initial Certification for Spotters, ie proper procedural sequence.	Occasional	Critical	Serious	Adhere to proper qualifications, and training as outlined in the R.A.D.S. Ops Plan. Instruct repetitive tower and mock-up training.	Remote	Critical	Medium				
Training	Unable to bring seasonals on early enough to provide all the required training, provide uninterrupted rappel training and develop crew cohesion prior to sending on incidents	Frequent	Critical	High	Ensure management is committed to providing adequate time to develop personnel as necessary.	Occasional	Critical	Serious				
HUMAN FACTORS	Accepting high risk assignments	Occasional	Catastrophic	High	Thorough risk assessment & brief/debrief. Utilize Go-No-Go Checklist. Mission decision made at appropriate level. Establish trigger points to re-evaluate.	Remote	Catastrophic	Serious				
	Sense of urgency, pressure, mission driven, etc.	Probable	Critical	High	Ensure Managers & Spotters are not placing undue pressure on themselves. Thorough risk assessment & brief/debrief. Pilot training in CRM with the Helitack Crew. Pilot participates in Mission planning. Mission decision made at appropriate level. Ensure pilots receive the best possible weather data available for the mission	Occasional	Critical	Serious				
	Lack of situational awareness (S A)	Occasional	Critical	Serious	Include others in mission development. Look at the big picture. Avoid tunnel vision.	Occasional	Critical	Serious				
	Mission creep; fast rope height above ground has risen from 20 to 50 feet, operations not standardized to prevent further change	Probable	Critical	High	Accomplish a study to determine optimum deployment height, standardize before program grows	Occasional	Critical	Serious				