FOR EXAMPLE – CANADA

RISK ANALYSIS (RDIMS 6000379)

Risk measurement formula

When conducting a Risk Analysis, the Risk Level is based on an evaluation of the following two factors:

Likelihood that a risk scenario will occur, and
Severity of the events.

The Risk Level is a subset of a two-digit Risk Indicator (number and letter) resulting from the intersection of LIKELIHOOD and SEVERITY on the Risk Matrix as identified in Figure 1 below.

Likelihood (L)

What is the Likelihood of that sequence of events/situation/activities happening during the exposure interval?

1 – Improbable - Rare	• Almost inconceivable that the event will occur during the exposure interval
	• statistically impossible [10^{-9} and below]
	• Event is almost never expected to occur
2 – Remote - Unlikely	• Unlikely, but possible to occur during the exposure interval
	• Statically 10^{-7} – 10^{-9}
	• Event is not expected to occur very often
3 – Occasional	• Likely to occur sometimes during the exposure interval
	• Statistically 10^{-5} – 10^{-7}
	• Event is expected to occur in some circumstances
4 – Probable - Likely	• Will occur several times during the exposure interval
	• Statistically 10^{-3} – 10^{-5}
	• Event is expected to occur in majority of circumstances
5 - Frequent - Almost certain	• Likely to occur often during the exposure interval
	• Statistically 10^{-1} – 10^{-3}
	• Event is expected to occur in almost all circumstances

Note: *- Qualitative or quantitative measures can be used as deemed appropriate.*
- The numerical values for the statistics found above were obtained from engineering certification standards. These quantitative values may not apply in cases where there is no available data or the values may have to be adjusted appropriately to the activity.
- The descriptors above do not all have to be met to identify the level of likelihood. They are meant to help differentiate between the different levels.

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Severity (S)	
The sequence of events has happened. How serious is the severity of the consequences?	
A **Negligible**	• Little to no impact on TCCA program or system objectives • Less than minor injury and/or less than minor system damage ***Personnel****: No injuries.* ***Operations****: Minor operational delay with no immediate costs.* ***Equipment****: No damage or minor technical delay with no immediate costs.* ***Environment****: Minor contained release that does not significantly threaten the quality of life of humans and/or the habitat.* ***Media attention****: No media attention.* ***Public confidence****: No loss of public confidence.*
B **Minor**	• Minimal questioning of TCCA program or system objectives • Nuisance / Operating limitations / Use of emergency procedures / Minor incident • Minor injury and/or Minor system damage ***Personnel****: First aid injury, no disability or lost time.* ***Operations****: May result in operating limitations, or emergency procedures; operational delay incurring relatively minimal costs.* ***Equipment****: Technical delay requiring grounding of aircraft and causing the operator to incur relatively minimal costs.* ***Environment****: Contained release that may reduce the quality of life of humans and the habitat.* Full recovery *period will be less than 5 years* ***Media attention****: Media attention that requires Briefing and/or Question Period notes and Minister's attention.* ***Public confidence****: May be lowered, but public accepts situation.*
C **Moderate**	• Significant questioning of TCCA program or system objectives • Injuries to persons / Serious incident / Significant reduction in safety margins / Reduction in the capacity to cope with adverse operating conditions / Increase in workload ***Personnel****: Lost time injury or passenger injuries (i.e. broken bone), no disability. Difficult for crew to cope with adverse conditions.* ***Operations****: Operational delay requiring grounding of an aircraft and causing the operator substantial costs. May result in significant reduction in safety margins.* ***Equipment****: Technical delay requiring grounding of an aircraft and causing the operator relatively substantial costs.* ***Environment****: Small uncontained release that threatens lives of humans and the habitat with effects lasting up to 15 years* ***Media attention****: Media attention that elevates occurrence to High profile status requiring Minister's action and/or results in Parliamentary debates.* ***Public confidence****: Significantly lowered with high profile media coverage and numerous ATIP requests.*
D **Major - Critical**	• Necessitates modifications to TCCA program or system objectives • Major damages to equipment / Serious injuries / large reduction in safety margins / Physical distress or excessive workload such that the operation cannot be conducted safely, accurately or completely • Severe injury and/or major system damage ***Personnel****: Disability or severe injuries. Crew extended because of workload or environmental conditions.* ***Operations****: Operational delay grounding air operator's fleet. May result in a large reduction in safety margins.*

	***Equipment**: Technical delay grounding aircraft fleet causing substantial costs and long delays to return the aircraft to service.* ***Environment**: Moderate uncontained release that kills and/or threatens lives of humans and the habitat with effects lasting up to 30 years.* ***Media attention**: Media attention that initiates legal action against the Crown and/or public servants, Parliamentary debate.* ***Public confidence**: Decreased; significant reduction in travelling public flying on a particular aircraft type or airline.*
E **Catastrophic - Extreme**	• Necessitates a significant change to and/or revocation of portions of TCCA program or system objectives • Equipment destroyed / multiple fatalities • Results in fatalities and/or loss of the system ***Personnel**: Fatal injuries to personnel or passengers. Public exposed to life threatening hazard.* ***Operations**: Operational delay grounding all operating certificates for the subject aircraft/ engine/ major component. Removal of the operating certificate for subject aircraft/engine/major component or airline.* ***Equipment**: Loss of aircraft.* ***Environment**: Large uncontained release that kills and threatens lives of humans and the habitat with irreversible effects lasting for more than 50 years.* ***Media attention**: Media attention having severe repercussion for the Minister, and/or public servants.* ***Public confidence**: Public demonstrations organized against the Crown.*

Note: *Where the level of media and public levels are speculated operational and technical consequences should be considered (and stated). These descriptors are meant to help differentiate between levels it is not necessary to have all descriptors to determine a level.*

Risk Indicator	***Risk Level***	***Suggested decision***
4E, 5D, 5E	Very High	**Stop the activity**: Extensive management of situation is essential 1. Safety action shall be taken to reduce the risk to an acceptable level: ***Use Delegation of Authority (DoA) and take immediate action as required.*** *2.* Do not proceed until sufficient control measures and action plans have been managed to an acceptable level.
3E, 4D, 5C	High	**Immediate actions shall be taken** to reduce the Risk Level. These actions shall include tangible measures to mitigate the likelihood and/or the severity.
2E, 3D, 4C, 5B	Medium-High	**May proceed**: risk elements must be considered carefully to prevent the situation from escalating to a higher level. Considerable management is required. In the case of 2E, specific measures must be taken in order to reduce the severity. The same approach must be followed in the case of 5B, but in order to reduce the likelihood.
1E, 2D, 3C, 4B, 5A	Medium	**May proceed** after considering risk elements; manage and monitor risk. However, as much as possible, 1E and 5A might be subjected to a special attention to have respectively their severity and likelihood reduced.
1D, 2C, 3B, 4A	Low-Medium	**Proceed** after considering risk elements. Management effort worthwhile.
1C, 2B, 3A	Low	**Proceed**: risk may be worth accepting with monitoring. Consideration of mitigation strategy optional.
1A, 1B, 2A	Very Low	**Proceed**: Accept risk

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Figure 1 Risk Matrix

Risk Level = Intersection of Likelihood and Severity