Maritime Helicopters

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RISK MANAGEMENT PROGRAM

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1	09/01/16	Added Management of Change	D. Busch
2	05/15/19	New Risk Care Review (Appendix)	D. Busch
3	08/21/20	Added Fixed Wing Risk Assessments	D. Busch
Reissue	02/01/22	Added Class B (Human External Cargo)	D. Jones

2. LIST OF EFFECTIVE PAGES

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3. OVERVIEW

3.1 The ICAO SMS Model

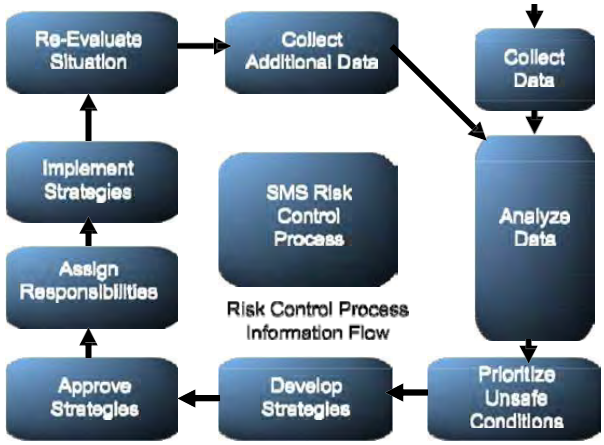
Maritime Helicopters' Risk Management Program is based on an ICAO model called the SMS Risk Control Process. In this process, data is collected from system & task analysis, employee reports, audit findings and other safety assurance sources. This data is used to identify Latent (unrecognized) Unsafe Conditions. Appropriate managers promptly analyze this data for sufficient information, as well as validity and applicability.

If the information is sufficient and the data is valid, members of management then identify hazards and determine root causes. Managers further evaluate exposure, likelihood and potential severity of the hazard or safety concern, in order to establish a quantified level of risk. If a hazard or safety concern can be eliminated, the record is closed. If the level of risk is low, the risk is normally accepted. Moderate or high-level risks require that risk mitigating strategies be implemented. All identified hazards are prioritized and managed within the MH Incident Reporter (IR) database.

Maritime Helicopters utilizes the following methods to document and track each identified area of concern, or "safety risk":

- The Incident Reporter™ database is used to document safety risks identified from system / task analysis, employee reports, audit findings, management reviews, and data from other sources;
- The Safety risk Profile (within the IR database) is used to document the company's ten or twelve highest- risk activities that require contingency plans and/or continued monitoring, to ensure that all risks associated with the activity are controlled and maintained at acceptable levels;
- Form SP007: Risk Control Worksheet is used for change management and to document safety risks identified during strategic planning meetings and the development stages of projects, activities, growth, acquisitions and other changes.

For safety risks that cannot be eliminated and which are classified as moderate or high, Corrective Action Plans (which consist of risk controls and / or corrective actions) are developed by those department managers with the required knowledge and background. These CAPs are recorded, accepted by the appropriate level of authority, and managed in the Incident Reporter database.



ICAO SMS RISK CONTROL PROCESS MODEL

4. SOURCES OF DATA

4.1 Internal Data

This program's data-driven approach to effective risk management requires internal data generated through system & task analysis, and data generated by various Safety Assurance processes. These processes include employee reporting, and vendor audits of contracted fueling, maintenance, deicing, and training providers. The company's Internal Evaluation Program also generates data from three sources:

- Departmental Audits whereby each department (e.g., operations & maintenance) performs its own internal audit for regulatory compliance and of operational processes (including those performed by contractors), to determine the performance and effectiveness of risk controls;
- Internal Evaluations which evaluate performance of various operational processes and confirm conformance / effectiveness of risk controls and the MH SMS;
- Management Reviews which sample SMS process outputs to determine whether any improvements are needed to SMS processes, and/or to operational processes within the organization.

4.2 External Data

External data is also applied from safety reports, external audits, FAA inspection & surveillance findings, industry safety reports, manufacturers' service bulletins, airworthiness directives and other sources. Aircraft Accident / Incident Reports generated by other operators of similar equipment also provide important safety information for risk assessment and management.

When utilized, **External Evaluation** audit findings are provided to senior management for the development of risk-mitigating strategies. These objectives and "outside-the-box" inspections often reveal deficiencies or areas requiring improvement that would otherwise remain undetected. When external audits (such as third-party auditsrequested by management or those performed by FAA) reveal operational process or SMS deficiencies, audit findings are entered into the IR database for development of Corrective Action Plans.

4.3 Proactive Risk Management

Proactive risk management occurs through the use of **Operational Risk Management** during planning and system design, and through the collection of data from continuous monitoring, departmental audits, internal evaluations and management reviews.

4.4 Reactive Risk Management

Although emphasis is placed on a forward-thinking, proactive approach to risk management, Maritime Helicopters' overall risk management process is also reactive, by nature. ***Reactive*** risk management occurs out of necessity when an employee report or external data (such as an Airworthiness Directive or SAFO) indicates an area of high risk, or when an incident occurs that requires immediate risk controls or corrective actions.

4.5 Predictive Risk Management

Predictive risk management is possible through the collection and proper management of data, over time, that may indicate a systemic problem or developing trend. This may include repeated reports of problems with a vendor or an individual, an aircraft, vehicle, item of equipment, or procedures, etc. Evaluation of flight and maintenance records may indicate a deteriorating trend with an engine or other system (trend monitoring). Reports from other operators of common

difficulties or hazards encountered may also be predictive, and utilized to develop risk-mitigating strategies before and incident or accident occurs.

5. POLICY

5.1 Eliminating Hazards

Whenever possible, management should attempt to eliminate hazards or hazardous activities, rather than mitigate associated risks. One example of such a strategy would be to conduct flight training and checkrides in a simulator as opposed to the actual aircraft. This simple policy change eliminates many of the hazards associatedwith flight training in an actual aircraft.

5.2 Risk Acceptance

Risk is accepted by applying Operational Risk Management Principles. Risk acceptance procedures include acceptance criteria and designation of authority and accountability for risk management decision-making. Acceptability of risk is determined using a **Risk Assessment Matrix** or relative calculated risk equation in order to determine a quantifiable level of risk. It is the policy of this company that all risks, other than those classifiedas **Acceptable/Green/Low,** be mitigated and, when necessary, documented utilizing the forms, instructions and procedures set forth herein.

5.3 Mitigating Risk

When risks are classified as **Unacceptable/Red/High** or **Acceptable With Mitigation/Yellow/Moderate,** managers must take immediate action and/or implement risk controls or corrective actions to address root causes and reduce the likelihood of an accident or incident. Whenever possible, it is the policy of MH to not rely on one single approach to risk mitigation, instead striving to build defenses in depth. This may include development of engineered systems, procedural controls, behavioral fixes, the distribution and wearing of personal protective equipment, posting of safety notices and revisions to written guidance. Where the results of risk assessment fall between acceptance and required mitigation, or when external factors could tip the scales towards an unacceptable level of risk, risk controls may require continuous monitoring to prevent the onset of an undesirable outcome.

5.4 Accepting Risk for short-Term Hazards

Circumstances may arise whereby hazards exist in the short-term while a Corrective Action Plan and safety risk controls are being developed and implemented. In this case, appropriate MH managers shall determine acceptability of the risks associated with these hazards, and if necessary, take interim measures to mitigate such risks in the short-term. These actions are recorded in the IR database.

5.5 Managing Daily Risks

To achieve the highest degree of safety, **Operational Risk Management** must be applied on a daily basis by every person within the company. Proper risk management requires an assessment of risk by each individual, ***each time a decision is made.*** For example, a Captain's decision to permit a first officer to land the aircraft ona wet runway in gusty crosswind conditions is a decision that must be made in the field and without the benefit ofdocumented data on which to base the decision. Similarly, maintenance technicians must make safety assessments each time a maintenance item is deferred or work is interrupted; it may be best for a technician to complete the installation of a component, even at the expense of overtime. Operational Risk Management provides the tools and techniques for all personnel, at all levels within the company, to assess risks when making time-critical decisions and during routine job planning, as well as for the management of change and strategic long-term planning.

NOTE: It is essential for all personnel and vendors to recognize the potential safety impact of each and every decision that is made. Applied Operational Risk Management improves the decision-making process, resulting in fewer work interruptions, smoother operations and reduced injuries and incidents.

6. RESPONSIBILITIES

6.1 Senior Management

Maritime Helicopters' accountable executive is responsible and accountable for continued quality assurance of this Risk Management Program. The MH accountable executive is responsible for the continued performance of the Q&S Manager and all Safety Committee members in their duties with regard to this Risk Management Program.

6.2 Quality and Safety Manager (Q & S Manager)

With regard to the risk management process, the Safety Officer is responsible and accountable for:

- Performing risk assessment activities jointly with appropriate managers when requested;
- Administering the Incident Reporter database and assisting department managers with their creation of Risk Management Records and Corrective Action Plans;
- Performing follow-up audits for assurance of risk controls and corrective actions recorded in IR;
- Maintaining a current and applicable Safety risk Profile, including risk-mitigating strategies;
- Maintenance and security of the company's Risk Management Files and IR database.

6.3 Managers

Each manager is responsible and accountable for identifying areas of **potential moderate or high risk** for operational processes within their respective departments, and for promptly eliminating or mitigating such risks whenever possible. Managers are also responsible for communicating risk controls, corrective actions and lessons learned to appropriate department personnel.

All managers are further responsible and accountable for the prompt validation and risk assessment of reports received under the company's **Employee Reporting System**. In addition, each manager is responsible for bringing to the attention of the Q&S Manager any and all incidents, violations, near-accidents or other safety concerns, regarding any operational processes, of which that manager is aware.

Risk assessment of maintenance-related safety concerns may be performed by the DOM or jointly by the Director of Maintenance and one or more additional managers. Risk assessment of flight training-related safety concerns may be performed individually by the Chief Pilot / Director of Training or jointly by including one ormore additional managers in the process. Risk assessment of dispatch or other operations-related safety concerns may be performed by the Director of Operations, or jointly by including the input of one or more additional managers.

In each case, appropriate manager(s) should possess the necessary training, knowledge, experience and expertise to identify and validate hazards, assess risk, and develop risk controls and corrective actions (strategies) to mitigate risk. These strategies are recorded in the Incident Reporter database and accepted by the appropriate risk-decision authority. The risk-decision

authority could be a department manager or higher level of authority, depending on the nature of the safety concern. See **Operational Risk Management** below for more information.

NOTE: When using the IR database to manage risk, open one Risk Management Record for each specific hazard and set up individual RC/CAs for each manager as part of the Corrective Action Plan (CAP). Managers should develop their own CAPs for the processes they own, and may further specify the details of risk controls and corrective actions under the RC/CAs tab in the Incident Reporter database.

6.4 Safety Committed

Hazards are identified through system / task analyses and safety assurance activities of continuous monitoring, internal audits and evaluations, external audits, event investigation, employee reports and management review. For each identified hazard as a result of these activities that is brought before the Safety Committee for resolution, the Safety Committee is responsible and accountable for:

- Validation of the data;
- Determination of root cause(s);
- Assessment ofrisk.

For each hazard with associated moderate or high risk, the Safety Committee then assigns responsibilities to specific managers for development and implementation of risk controls and corrective actions. The Safety committee is also responsible for:

- Assessing the performance and effectiveness of risk controls, and conformance of risk controls to SMS expectations and safety policy objectives;
- Assessing the performance of safety-related functions of operational processes against their objectives and expectations;
- Assessing the performance of the SMS against its objectives and expectations.

The Safety Committee is further responsible and accountable for applying **Deliberate and/or Strategic Operational Risk Management** processes to all company plans for growth, acquisitions, new aircraft, facilities and types of operations. Utilizing these change management techniques, the Safety Committee effectively controls risk and manages changes in organizational structure, staff, procedures, regulations and contractual requirements. The Safety Committee is also responsible for evaluating other areas of potential moderate or high risk, including risks associated with products and services received from vendors.

7. AUTHORITY

7.1 Senior Management

As an authorized representative of senior management, MH's accountable executive may take whatever steps are necessary to eliminate identified hazards and/or mitigate associated risks. The accountable executive is authorized by senior management to reject each Corrective Action Plan (CAP) that, in the accountable executive's opinion, will not effectively address root causes or deficiencies in systems or processes. The accountable executive is authorized to direct further corrective actions and follow-up audits in the interest of safety.

7.2 Quality & Safety Manager (Q&S Manager)

The Q&S Manager is authorized to OPEN a Risk Management Record in the IR database for each identified andvalidated hazard or safety concern requiring risk mitigation. The Q&S Manager is authorized to CLOSE those Risk Management Records for which risk controls and/or corrective actions have been implemented, hazards communicated to personnel, and whose follow-up audit results have indicated that risk mitigation strategies wereeffective.

7.3 Managers

All managers, including the Q&S Manager, are authorized to eliminate any hazard that could cause injury to personnel or damage to property. They are further authorized to take whatever actions are necessary to eliminate or mitigate risk, including interruption, diversion or cessation of flight operations, interruption of groundor maintenance operations, or evacuation of personnel in the interest of safety.

7.4 Personnel

All company personnel are authorized to eliminate any hazard that could cause injury to personnel or damage to property (all hazards must be brought to the attention of the Q&S Manager or a department manager). All personnel are authorized to take whatever actions are necessary to eliminate or mitigate risk, including interruption, diversion or cessation of flight operations, interruption of ground or maintenance operations, or evacuation of personnel, if the person taking such action believes a life-threatening situation or other threat of serious injury or property damage exists, in the interest of safety.

8. THE SAFETY RISK PROFILE

8.1 Purpose

Maritime Helicopters' Safety Risk Profile is a documented listing of high priority safety issues. Also known as a **Significant Safety Issue List,** or SIL, the profile lists the top ten or twelve high-risk activities or situations in maintenance, ground and flight operations that require risk controls and monitoring in order to ensure the highest level of safety. To be effective, the Safety Risk Profile should be limited to the top 10-12 highest risks to flight and personnel safety. This methodology allows management to effectively allocate resources where they are required the most. When developing a Safety Risk Profile or considering adding an activity or situation, the following factors should be considered:

- **Operational factors** such as VFR / IFR operations, radar coverage, airport facilities and approaches, weather information, terrain, and type of mission;
- **Technical factors** such as condition and age of equipment, type and number of powerplants, onboard equipment, MEL items, recent maintenance, and servicing facilities;
- **Human factors** such as experience and training of flight and maintenance personnel, number of crewed positions, currency, and physical, psychological, psycho-social and environmental factors that affect human error;
- **Environmental factors** of weather, wind, turbulence, precipitation, visibility, temperature, available light, etc.

As examples, the following activities or situations may be listed on the MH Safety Risk Profile:

- Off-airport scene calls conducted at night;
- Operations in mountainous terrain with low ceilings and poor visibility;
- Runway incursions;

- Near-misses at high traffic airports;
- Search and rescue operations;
- Unstabilized approaches;
- Operations that require a high degree of piloting skill;
- High altitude operations;
- Test flights upon completion of major maintenance;
- Entry and maintenance of aircraft fuel tanks;
- Actuation of landing gear, electrical or hydraulic systems during maintenance.

Each area of potential moderate or high risk requires continued monitoring and proactive risk management to reduce potential risk. This could include the development of risk controls that include changes to policies and procedures, additional training, hazard communication and increased surveillance.

8.2 Objectives, Goals & Measurements

The Safety Risk Profile should be linked to the objectives and goals of MH. This means that for each profile element, safety objectives and goals should be established, and risk-mitigating strategies implemented that will facilitate reaching those goals. For example, high risk of an accident and loss of life may exist when conducting circling approaches with large or high-speed aircraft at certain airports. Objectives might include prohibiting circling approaches as a standard operating procedure, and a goal might include a quantified reduction in the number of circling approaches conducted each winter season.

8.3 Profile Revision Procedures

The company's **Safety Risk Profile** is presented by the Q&S Manager at each regularly scheduled meeting of the Safety Committee for review of profile elements and to control and validate risk control strategies. When a department manager or other Safety Committee member has identified an area of moderate or high risk that requires risk controls to keep that risk "in check", or at an acceptable level, the issue is brought before the committee for discussion.
The committee first determines if the risk is valid. By developing one or more risk statements and performing riskassessment, the committee confirms the overall risk level (without risk controls) as moderate or high. The committee then determines which departments will be required to implement risk controls. Depending on the urgency of the situation, immediate action may be needed by one or more department managers to mitigate risk.

Next, by opening a Risk Management Record in the IR database and developing a Corrective Action Plan (CAP), department managers are tasked with developing and documenting risk controls and corrective actions (RC/CAs) within IR for their respective departments. Implementation dates, methods, monitoring, communicationand accountabilities are agreed upon and documented as a part of the CAP.

The Q&S Manager is responsible for maintaining the MH Safety Risk Profile in the Incident Reporter™ electronicdatabase. If vendors are involved, appropriate department managers are responsible for working with their respective vendor POCs to ensure that vendors develop their own acceptable risk controls or effect necessary communications to vendor employees. The IR database provides a necessary interface between accountable managers and vendor personnel for the proper and timely completion of risk controls, monitoring, communications and other responsibilities associated with the CAP.

NOTE: Vendors and their managers may also be assigned risk controls or corrective actions. "POC" denotes a vendor's Point-of-Contact.

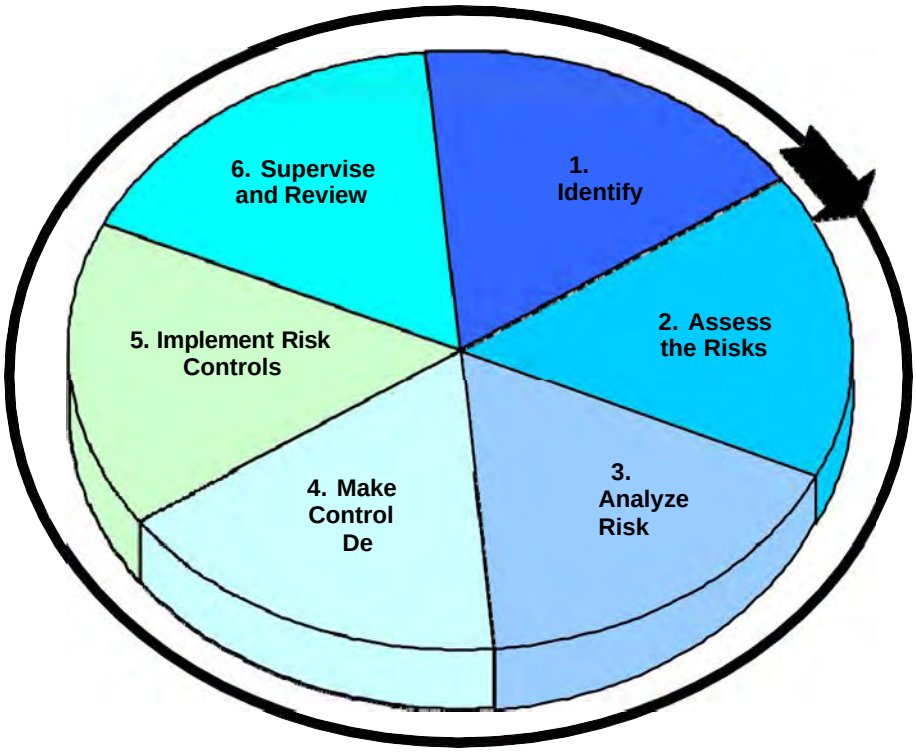
9. OPERATIONAL RISK MANAGEMENT

Operational Risk Management (ORM) consists of policies, methods and procedures for all personnel to manage risk by making good decisions based on risk assessment, during the normal course of daily ground, maintenance and flight operations. When performing system/task analysis and managing problems, irregularities, and other events, ORM provides managers with a number of tools which can be applied to Safety Risk Management processes. This includes the effective management of change in organizational structure, staff, hiring / training procedures, regulations and contractual requirements. **Strategic ORM** is also utilized to plan for growth, acquisitions, new aircraft, and facilities.

Various levels of Operational Risk Management (ORM) are applied by scheduling when selecting crewmembers; by flight crews during preflight planning; by maintenance personnel each time maintenance is performed; and by ground crews at all times on the ramp. In many ways, we already intuitively apply ORM principles each time we pair crews based on experience, assess suitability of weather forecasts, choose not to stand on the top rung of a ladder, or wait for a wing-walker before towing an aircraft. ORM principles are clear and straight-forward:

- Accept no unnecessary risk;
- Make risk decisions at appropriate levels;
- Accept risk only when benefits outweigh the costs;
- Integrate ORM into planning and policy at all levels.

Applied Operational Risk Management often reveals hazards and systemic deficiencies that require safety- critical risk controls. It is therefore essential that all personnel responsibly and assertively report these hazards or deficiencies to their supervisor, manager or the Q&S Manager for corrective action.



Operational Risk Management Model

10. ORM PHILOSOPHY

Traditional risk management practices assert that risk is “bad.” In reality, taking calculated risks is a necessary part of aviation, and is essential for an organization to grow and capitalize on its capabilities. Maritime Helicopters’ objective is to complete all ground, maintenance and flight operations successfully while reducing risk to personnel, resources, and the environment to a level acceptable for the particular operation or task in a given situation. To accomplish this, all personnel should identify hazards and mitigate risk using the same disciplined, organized, logical thought processes that govern other aspects of aviation maintenance and flight operations.

10.1 Benefits

Operational Risk Management (ORM) provides a framework to minimize risk, show concern for co-workers and maximize the successful completion of all ground, maintenance and flight operations. Additional benefits include safeguarding employees’ health and welfare, and the protection and conservation of aircraft, support equipment and other vital resources. Beyond reducing losses, Operational Risk Management provides opportunities for producing the greatest return on our investments of time, dollars, and personnel.

10.2 Focus

To accomplish these objectives, all personnel must change their focus from a compliance-based to a risk-based philosophy. With **compliance as a minimum standard**, ORM focuses on each task or operation, the risks involved, and the safeguards in place to ensure success of the operation. Each person involved with a task, operation or process should apply ORM principles to ensure the highest level of safety and success.

11. ORM CONCEPTS

The Operational Risk Management (ORM) process is a decision-making tool used by personnel at all levels to increase operational effectiveness by anticipating hazards and reducing the potential for loss. Application of ORM thereby increases the probability of a successful outcome for all tasks and operations. The ORM process exists on three levels:

- Time-critical (“I only have minutes or seconds to act!”);
- Deliberate (“I have a few hours or days to plan this activity”);
- Strategic (“I have several weeks or months to plan this operation”).

Higher levels of the ORM process advocate harnessing feedback and input from all organizational levels to make the most informed decisions possible.

NOTE: Risk decisions must be made at levels of responsibility that correspond to the degree of risk, considering the significance of the task or operation and the timeliness of the required decision. The three levels of risk management application are discussed in more detail below**.**

11.1 Time-Critical

Time-critical risk management is an “on the run” mental or verbal review of a situation using the basic risk management process without recording the information. Personnel employ the time-critical process to consider risk when making decisions in time-compressed situations. This level of risk management is used during all ground, maintenance and flight operations and training, and when executing crisis responses. It is particularly helpful in choosing the appropriate course of action when an unplanned event occurs while performing a routine task. Use the following technique to apply time-critical risk management:

Simple Risk Assessment Questions Technique: This technique employs five simple questions that anyone, anywhere, can ask. It requires no documentation and can be applied very quickly and easily, with very little training. It is an exceptional tool for all employees to effectively address common, everyday risk situations. Some individuals may dismiss this process as overly simple and purely "common sense," yet the unfortunate truth is, common sense is an uncommon virtue. The natural human tendency is to just do it, rather than stop for a moment to think about the risks associated with a certain activity or task. These questions are:

- Why am I doing this task?
- What could go wrong?
- How could it affect me or others?
- How likely is it to happen?
- What can I do about it?

11.2 Deliberate

Deliberate risk management applies the complete ORM process. Each step is documented in some manner, at the discretion and for the benefit of the process owner. It primarily uses experience and brainstorming to identify hazards and develop controls and therefore is most effective when performed in a group. Examples of deliberate applications include flight planning and maintenance planning; reviewing standard operating, maintenance, or training procedures.

Job Planning Process Technique: When the simple risk assessment question technique requires a more structured environment, the job-planning process offers a suitable alternative. Work teams can use this method when assigned to complete unusual or infrequent tasks or common tasks that must be completed in unusual circumstances, e.g., foul weather, crisis response, etc. The primary difference between this and the five simple questions technique is that the job planning process requires documentation of risk levels (low, moderate, or high) in the IR database. Hazards are identified and risks are analyzed and assessed by considering all people, equipment, materials, and environmental issues involved in the specific task. Hazards for which risk assessment reveals moderate or high risk require risk controls or corrective actions, and consideration of substitute risk. Residual risk is also assessed, based on expected outcomes of the Corrective Action Plan.

11.3 Strategic

The strategic ORM process identifies hazards and assesses risk more thoroughly than the deliberative process by determining acceptable safety risk for changes within the organization which may affect established processes and services. Strategic ORM is also applied to new system designs, changes to existing system designs, new operations/procedures, and modified operations/procedures. This includes complex operational planning and introductions of new aircraft, equipment, routes, facilities and areas of operations. Again, hazards, risk assessments, and risk mitigating strategies are recorded in the IR database, including substitute and residual risk assessments.

NOTE: Strategic ORM may require expertise and input from persons with experience in the proposed equipment, mission, operation, environment, and operational processes where undiscovered hazards and latent conditions reside.

12. ORM PRINCIPLES

Apply ORM decision-making principles before executing any anticipated task, activity, operation, or change. As the activity or operation evolves and hazards are identified, risk controls to address hazards

with unacceptable risk must be monitored for continued conformance and effectiveness. Those hazards identified with acceptable levels of risk remain in the system for continued monitoring through safety assurance activities.

12.1 Accept Risk When Benefits Outweigh the Costs

All identified benefits should be compared to all identified risks and costs. Weighing risks against opportunities and benefits helps to maximize capability. Even moderate-to-high risk endeavors may be undertaken when thereis clear knowledge that the sum of the benefits exceeds the sum of the risks and costs. In these cases, all risk- mitigating strategies must be implemented. Balancing risk / cost with benefits may be a subjective process and open to interpretation. Ultimately, the balance may have to be determined by the appropriate risk-decision authority, such as a department manager, the Safety Committee or senior management.

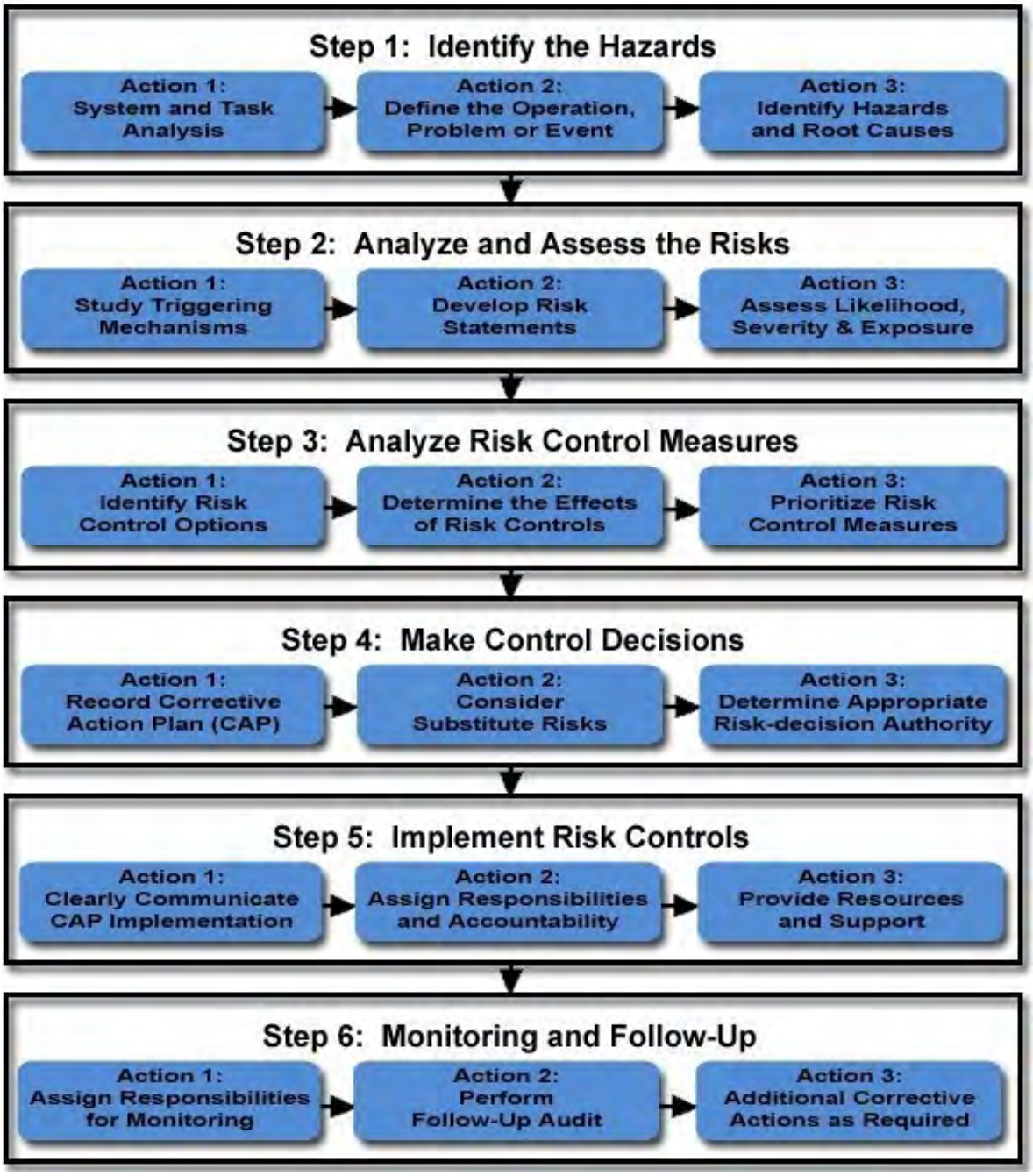
12.2 Integrate ORM Into Planning, Executing and Problem Solving

While ORM is critically important in system design and planning stages, risks can change dramatically during an actual operation. Therefore, personnel and managers should remain flexible and vigilant for new hazards, while monitoring existing risk controls through safety assurance activities. Integrate ORM into the execution of tasks, as much as in planning for them. During both planning and execution of a task, activity or operation, feedback must be obtained from personnel at all levels to ensure the process is working, and for the benefit of future operations/activities. Team meetings and informal surveys are effective tools for obtaining this feedback.

13. ORM PROCESS

Operational Risk Management is a continuous process used to detect, assess, and control risk while enhancing performance and maximizing operational capabilities. This program utilizes the ORM process for both **proactive risk management** (used during planning, design/development and to manage change) and **reactive risk management** (used when hazard, irregularity or other reports indicate a problem or deficiency that must be corrected). Specific actions associated with each step of the ORM process are depicted on the following page.

14. ORM PROCESS REVIEW



Use this chart and the procedures on the following pages to perform Operational Risk Analysis. For a reported hazard, irregularity, error, potential violation or other safety concern, opena Risk Management Record to perform root cause analysis and develop risk statements.

For task planning and change management, use Risk Control Worksheet SP007. Develop risk controls and corrective actions in the IR database.

15. OPERATIONAL RISK MANAGEMENT PROCEDURES

Operational Risk Management is applied to task planning, problem-solving, and analysis of data collected from all safety assurance activities. In each case, the process is similar; it is first necessary to analyze the system, operation, task, problem or safety concern within the context of its operational environment in order to identify hazards and discover root causes and latent conditions.

15.1 System & Task Analysis

Proper management of safety risk begins with system design, and system design requires system and task descriptions. Systems consist of the organizational structures, processes and procedures, as well as the people, equipment and facilities used to deliver a product or service. Description's need be only as extensive as needed to understand the system, process or task in sufficient detail to

:

- Develop procedures;
- Design appropriate training curricula;
- Identify hazards; and
- Measure performance.

As the MH SMS is implemented, perform a system and task analyses of existing operational processes for the entire scope of MH's aviation activities, and develop an accurate Safety Risk Profile. Using the ORM procedures outlined below, a thorough system and task analysis will ensure that all risks associated with existing operations, as well as proposed operations, activities or changes are identified.

15.2 Further Define the Operation or Task

When applying ORM to system & task analysis, job planning or change management, the activity, task, change or operation must first be defined. This could range from a single activity within a department (such as the completion of a heavy check or other substantial maintenance) to a multi-departmental, multi-faceted activity (such as commencing operation of a new type of aircraft).

Construct a list or chart depicting the operation's major phases or steps in the job process, normally in time sequence. Break down the various tasks and activities that comprise the operation into "bite-size" chunks. Specify what is required to accomplish each task, including requirements for:

- Equipment – Hardware, software, type, number, condition, transport, handling, and continued functioning in the environment;
- Personnel – Number, qualifications, training, knowledge, experience, fatigue, attitude;
- The Environment – Weather, geography, temperature, physical barriers, available light.

NOTE: A time-line of events and review of available resources, regulatory or contractual requirements and other details will be helpful in this process. Those personnel best suited to evaluate each task or activity should be involved in the ORM process.

15.3 Define the Problem, Irregularity or Event

When applied to a reported hazard, event, deficiency, error, potential violation or other safety concern, an initial assessment must first be made to determine if **IMMEDIATE ACTION** is necessary to prevent an injury or accident. Thereafter, **root cause analysis** is performed to identify hazards and develop risk statements.

Initial Assessment:
Whenever the Q&S Manager or other manager receives a report (either in writing, by telephone, radio, or by other means) of a hazard, irregularity, deficiency, error, potential violation or other safety concern, a prompt initial assessment of the report shall be made. If the report indicates that one or more hazards might exist that could result in property damage or physical injury of persons, the person receiving the report shall:

- Take immediate action to eliminate or mitigate the risk;
- Immediately contact other appropriate managers.

Managers may then further identify potential hazards, analyze safety risks and complete the ORM process.

Evaluation of Data:
Evaluation of data should be performed by more than one manager, if possible, whenever there is any doubt as to the level of risk. To properly evaluate reports and associated data, it may be necessary to call upon each manager's area of knowledge and expertise. For example, if the Director of Maintenance receives a hazard report concerning an aircraft that is in flight, he should immediately contact the DO and/or Chief Pilot. If the Chief Pilot receives information that a hazard exists in the maintenance hangar, the Chief Pilot should promptly contact the DOM or shift supervisor. Using good judgment and experience in their respective fields of expertise, appropriate manager(s) will make an initial determination of whether additional immediate actions are necessary in the interest of safety.

16. IDENTIFY THE HAZARDS: STEP 1

During planning and design (system & task analysis), the purpose of Step 1 is to identify as many hazards as possible. When responding to a reported hazard, irregularity, deficiency, error, potential violation or other safety concern, the purpose of Step 1 is to determine root causes and contributing factors. A hazard can be defined as any real or potential condition that can cause degradation, injury, illness, death to personnel or damage to or loss of equipment or property. The following tools help identify real or potential hazards.

16.1 Hazard ID & Risk Statement of Development Tools

ROOT CAUSE ANALYSIS
- Purpose: To determine underlying causes of an observed hazard, event or safety concern.
- Method: Look at contributing systemic factors and human factors versus isolated findings.

OPERATIONS ANALYSIS
- Purpose: To understand the flow of events.
- Method: List events in sequence. Use time checks if necessary.

PRELIMINARY HAZARD ANALYSIS (PHA)
- Purpose: To get a quick hazard survey of all phases of an operation. In low hazard situations the PHA may be the final Hazard ID tool.
- Method: Tie the PHA to an operations analysis. Quickly assess hazards using scenario thinking, brainstorming, experts, accident data, and regulations. Consider all phases of an operation to provide early identification of highest risk areas. Prioritize areas for further analysis.

"WHAT IF" TOOL

- Purpose: To capture the input of operational personnel in a brainstorming-like environment.
- Method: Choose an area (not the entire operation), and generate as many "what ifs" as possible.

SCENARIO PROCESS TOOL

- Purpose: To use imagination and visualizations to capture unusual hazards.
- Method: Using the operations analysis as a guide, visualize the flow of events.

CHANGE ANALYSIS

- Purpose: To detect the hazard implications of both planned and unplanned change.
- Method: Compare the current situation to a previous situation; apply lessons learned.

CAUSE & EFFECT TOOL

- Purpose: To add depth and structure to the Hazard ID process through use of graphic trees.
- Method: Draw the basic cause and effect diagram on a worksheet. Select the four "P's (people, procedures, policies, plant) or the four "M's (manpower, methods, machinery, materials) or tailor the branches of the diagram. Use a team knowledgeable of the operation to develop causal factors for each branch.

16.2 Root Cause Analysis

Managers must ensure that the root causes of each identified hazard are determined, as opposed to direct causes or intermediate causes. This process of **root cause analysis** is critical to developing effective risk controls and/or corrective actions.

All outcomes, or effects, are the result of one or more causes. These causes may be natural or man-made, active or passive, initiating or permitting, obvious or hidden. Those causes that lead immediately to the effect or outcome are often called direct or proximate causes. Direct causes often result from another set of causes, which could be called intermediate causes, and these may be the result of still other causes. When a chain of cause-and-effect is followed from a known end-state back to an origin or starting point, root causes are found.

17. ANALYZE AND ASSESS THE RISKS: STEP 2

Risk is the probability and severity of loss from exposure to the hazard. The assessment step applies quantitative or qualitative measures to determine the level of risk associated with a specific hazard. Triggering mechanisms that could cause an undesired event are evaluated, and risk statements developed. Variables of exposure, probability and severity of a potential consequence are then analyzed in order to accurately analyze and assess risk.

17.1 Triggering Mechanisms

To accurately assess risk, it is necessary to study the possible range of triggering mechanisms, or conditions, which could give rise to a potential adverse consequence. This includes human errors, equipment failures (hardware / software), environmental conditions (such as weather or lighting), process breakdowns (such as communications or control failures) and human interfaces with the hardware and software involved. Some failures and accidents may require a combination or specific sequence of triggering conditions; others may require only one. All combinations of triggering mechanisms should be considered.

17.2 Developing Risk Statements

Examine the potential consequences associated with each identified hazard and develop a **risk statement** for each hazard. Potential consequences should address the effects of all possible situational factors (such as weather, lighting, equipment, knowledge and experience of personnel, etc.).

NOTE: Consequences should be considered in their worst credible state; e.g., "What's the worst possible outcome that could realistically occur?"

17.3 Risk Analysis and Risk Factors

Each risk statement developed (which includes an identified hazard and worst potential consequence) is then evaluated for levels of likelihood, severity and exposure. Various risk factors affect these levels. Identification of these factors will aid in risk assessment and provide specific targets for risk controls or corrective actions. Risk factors are often situational (e.g., a new employee, a non-standard operation, etc.) or deficiencies in systems, process design or performance (e.g., missing procedures or procedures not complied with).
Effective risk controls and corrective actions should address both situational factors and triggering mechanisms by eliminating them or by reducing their impact. The presence of these factors and mechanisms may affect the likelihood of a consequence occurring, the severity of a potential consequence, and / or the level of exposure.

17.4 Likelihood

Likelihood is assessed using five levels (Certain, Extremely Likely, Likely, Unlikely and Remote). Likelihood assessments are produced by managers using a combination of available data and expert judgment. Likelihood levels are defined as follows:

- **Certain** – The threat will be realized because all of the conditions necessary are present
- **Extremely Likely –** It is probable that the threat will be realized, as most of the conditions are present
- **Likely** – It is possible that the threat will be realized
- **Unlikely** – It is possible, but the possibility is low for the threat to be realized
- **Remote** – It is extremely improbable that the threat will be realized because many of the conditions necessary are not present.

17.5 Severity

Severity is also assessed in five levels (Catastrophic, Critical, Major, Minor and Negligible). Severity assessments are produced by managers using a combination of available data and expert judgment. Severity is defined using the following scale:

- **Catastrophic** – Accident with serious injuries and/or fatalities. Total loss of the asset, or serious disruption in operations causing extreme financial distress.
- **Critical** - Accident or serious incident with injuries and/or moderate damage to aircraft. Complete breakdown of an operation or process.
- **Major** – Injury or illness with loss of work day(s), significant operational errors or reduction in system capability. Equipment or aircraft damage that requires major repair or replacement.
- **Minor –** Slight damage to aircraft or equipment, minor injuries, partial breakdown of an operation or system, violation of regulations or company rules.
- **Negligible** – Minor disruption that has no injury potential, or results in minor equipment damage or very minor cost impact. Little or no effect on operations or processes.

17.6 Exposure

Exposure is assessed in five levels (Continuously, Very Often, Often, Hardly Ever, Never). Exposure may be expressed in time, proximity, volume, or repetition. In addition to factors such as amount of time, number of cycles or distance, exposure also considers the number of people involved, and/or amount of equipment involvedin any potentially undesirable event. Exposure is factored into overall risk levels.

NOTE: Risk may be assessed using only levels of Likelihood and Severity, as shown in the Risk Assessment Matrix below. However, consideration of Exposure regarding number of people and/or equipment / facilities involved may provide a more accurate understanding of potential risk. Exposure is considered when using the Incident Reporter database to perform risk assessment.

17.7 Risk Assessment Matrix

By combining values of severity and likelihood values using the matrix below, risk assessment is performed to determine **overall risk level.** The overall risk level (high, moderate, or low overall risk), is color-coded as shown in the matrix. This assessment allows management to establish priorities, make decisions and implement risk controls and/or corrective actions to mitigate the risk.

Likelihood	Severity				
	Catastrophic	Critical	Major	Minor	Negligible
Certain					
Extremely Likely					
Likely					
Unlikely					
Remote					

17.8 Overall Risk Levels

Red HIGH	High Risk – Unacceptable; REQUIRES HAZARD ELIMINATION or IMMEDIATE ACTION. If hazard cannot be eliminated, requires prompt risk controls and/or corrective actions to mitigate risk.
Yellow MODERATE	Moderate Risk – May be acceptable with risk-mitigating strategies; requires risk controls and/or corrective actions to mitigate risk.
Green LOW	Low Risk – May be acceptable without further action

WARNING

For overall risk levels determined to be RED / HIGH / UNACCEPTABLE, immediate action is required. Take whatever actions are necessary to eliminate the hazard or mitigate risk, if you believe that persons may be injured or property damaged. This includes cessation of flight operations or interruption of maintenance and ground activities.

18. ANALYZE RISK CONTROL MEASURES: STEP 3

Effective risk controls and corrective actions require evaluation of proposed actions to ensure they are effective, and that they do not introduce new hazards into a system. New hazards introduced as a result of risk controls or corrective actions are referred to as **"substitute risks,"** and may result in a situation where "the cure is worse than the disease." An effective plan for implementing risk controls, corrective actions, (or both) may include more than one control or action, such as initial notification to personnel (cautions or warnings), elimination of one aspect of a hazard, if possible (such as illuminating an obstruction hazard on a dark ramp), changes to written policy and procedures, or the design of controls into a system. The designing of controls into a system is one of the most effective ways of mitigating risk. Investigate specific strategies and tools that reduce, mitigate, or eliminate the risk. Effective control measures reduce or eliminate one of the three components of risk: (exposure, likelihood or severity).

18.1 Macro Options

- **Reject** – We can and should refuse to take a risk if the overall costs of the risk exceed its operational benefits.
- **Avoid** – Avoiding risk altogether requires canceling or delaying the job, task, or operation, but is an option that is rarely exercised due to the importance of tasks or operations.
- **Delay** – It may be possible to delay a risk. If there is no time deadline or other operational benefit to speedy accomplishment of a risky task, then it is often desirable to delay the acceptance of risk. During the delay, the situation may change and the necessity to accept the risk may go away.
- **Transfer** – Risk transference does not change likelihood or severity of the hazard, but it may decrease exposure actually experienced by the individual or organization accomplishing the activity. As a minimum, the risk to the original individual or organization is greatly decreased or eliminated because the possible losses or costs are shifted to another entity.
- **Spread** – Risk is commonly spread out by either increasing the exposure distance or by lengthening the time between exposure events.
- **Reduce** – The overall goal of risk management is to plan tasks, activities and operations, or design systems, that do not contain hazards. When designing risk controls or corrective actions to address identified system deficiencies, the same structured approach should be used.

18.2 Preferred Order of Controls

System Safety technology and practice has provided a **preferred order of control actions** that range from most to least effective. Depending on the hazard and its complexity, there may be more than one action or strategy that may be applied. Further, the controls may be applied at different times depending on the immediacy of the required action and the complexity of developing more effective controls. As noted above, it may be appropriate to post warnings while a more effective elimination of the hazard or mitigation of the risk is developed. The order of controls is shown here, from most effective to least effective:

- **Plan or Design for Minimum Risk:** Design the system to eliminate hazards. Without a hazard there is no exposure, likelihood or severity.
- **Incorporate Safety Devices:** Reduce risk through the use of design features or devices. These devices usually do not affect likelihood but reduce severity: Use of shoulder harnesses won't prevent an accident but reduces the severity of injuries;
- **Provide Warning Devices:** Warning devices may be used to detect undesirable condition and alert personnel. This could be in the form of a warning light, warning in an operation manual, safety bulletin, advisory or signals of the hazard;
- **Develop Procedures and Training:** Where it is impractical to eliminate hazards through design selection or adequately reduce the associated risk with safety and warning devices, procedures should be developed and published, and training should be administered.

18.3 Corrective Action Plan Procedures

A Risk Management Record is opened in the IR database and a Corrective Action Plan developed to document and track Risk controls and corrective Actions (RC/CAs being applied to risks identified within Risk ManagementRecords.
One RMR is opened and a Corrective Action Plan (CAP) is developed to document and track controls and actions associated with a specific hazard and its associated risk. Typically, the CAP is then divided into individual risk controls and corrective actions within IR for assignment to appropriate managers.
When developing their respective department's risk controls and/or corrective actions, managers should considerall strategies including **Macro** and **Reduce Options** as set forth in **Step 3: Analyze Risk Control Measures.** Apply the **Preferred Order of Controls** as described above, and enter risk controls and corrective actions in order of priority.

NOTE: Reference tutorials are provided in the IR database regarding macro-options, reduce options, and use of a preferred order of controls, to assist managers in developing effective corrective action plans.

After controls and/or corrective actions have been selected to eliminate hazards or reduce their risk, assess and record the overall level of residual risk. If the CAP and level of residual risk are acceptable, the appropriate Risk- Decision Authority (supervisor, manager, VP, or member of senior management) accepts and locks the CAP in the IR database.

NOTE: A department manager may accept his/her own CAP & residual risk, but only for CAPs that pertain specifically to that department. The department manager must be the appropriate risk-decision authority and possess the necessary resources and authority to effectively implement the CAP.

The Q&S Manager retains copies of all Risk Control Worksheets, and administrates all Risk Management Records opened in the IR database, for presentation to the Safety Committee at scheduled meetings. The Safety Officer presents all RCWs and both open and closed RMRs for committee review of controls, actions, monitoring, communications and follow-up audits. All Risk Control Worksheets and Risk Management Records are retained for no less than one year after each record is closed.

19. MAKE CONTROL DECISIONS: STEP 4

For a reported hazard, irregularity, deficiency, error, incident, near-accident, potential violation, audit finding or other safety concern:

- Accept the CAP as is: Corrective actions and risk controls have reduced risk to an acceptably low level, provided the CAP is properly implemented, monitored, followed-up and communicated to personnel.
- Reject the CAP out-of-hand. Residual risk is too high after proposed risk controls and corrective actions are implemented, or an unacceptable level of substitute risk has been introduced. Risk is too high to justify continued exposure.
- Modify the CAP by changing or adding additional risk controls and corrective actions. Additional risk controls and corrective actions may lower residual risk to an acceptable level. The CAP is valid, but does not adequately minimize risk. Further work to control the risk is necessary before proceeding.
- Add the hazard to the company's Safety risk Profile whereby it will be continuously monitored to keep risk at an acceptable level. The risk control must include adequate monitoring procedures, with responsibilities for monitoring assigned to one or more accountable managers.
- Elevate the decision to higher authority. The risk is too great for the decision-maker to accept, even after all measures of controlling risk have been considered. If the operation is to continue, a higher authority must make the decision as to whether the operation is worth it, and accept the risk.

For a specified task, activity, change or operation:

- Accept the plan as is: Benefits outweigh risks (costs), and overall residual risk is low enough to justify the proposed task, activity or operation if something goes wrong. No one should accept an appreciable risk of any injuries. The decision maker must allocate resources to control risk. Availableresources are time, money, personnel, and/or equipment.
- Reject the plan out-of-hand. Residual risk is too high to justify the task, activity or operation in anyform. The plan was probably faulty in some manner, or the objective was not that important.
- Modify the plan to permit additional risk controls. The plan is valid, but the current concept does notadequately minimize risk. Further work to control the risk is necessary before proceeding. Developfurther risk statements and design further risk controls.
- Elevate the decision to higher authority. The risk is too great for the decision-maker to accept, but allmeasures of controlling risk have been considered. If the operation is to continue, a higher authoritymust make the decision if the operation is worth the risk, and formally accept the risk.

19.1 Make Risk Decision at the Appropriate Level

The factors below should be considered when determining who is the appropriate risk-decision authority:

- Who will answer in the event of an injury, incident or accident?
- Who is the senior person at the scene?
- Who possesses best insight into the full benefits and costs of a risk?
- Who has the resources to mitigate the risk?
- What level of management makes the most operational sense?
- What level of management makes these types of decisions in other activities?

20. IMPLEMENT RISK CONTROLS: STEP 5

Once the risk control decision is made, assets must be made available to implement specific controls and/or corrective actions. Part of implementing control measures is informing personnel in the system of risk management process results and subsequent decisions. Careful documentation of the risk management process within IR facilitates risk communication and the rational processes behind risk management decisions. Managers, be sure to:

- Communicate Implementation – Be sure the CAP is understood and accepted by all affected departments
- Assign responsibilities for individual RC/CAs and establish accountability for performance
- Provide the necessary resources and support to ensure effectiveness.

When developed and recorded within the IR database, **Corrective Action Plans (CAPs)** provide a method of documenting each of these steps, with clearly defined responsibilities and accountability for controls, actions, acceptance, communication, monitoring and follow-up.

It is seldom possible to entirely eliminate risk, even when highly effective controls are used. After a CAP has been developed and controls are designed into it, an assessment must be made of whether the CAP and its associated controls are likely to be effective, and whether they might introduce new hazards into the system (substitute risk). This should be done before the system is placed back on line. When the controls are acceptable, the system is placed back into operation.

21. MONITORING AND FOLLOW-UP: STEP 6

Risk management is a process that continues throughout the life cycle of the system, task, activity or operation. Supervisors and managers at every level must fulfill their respective roles in assuring controls are sustained over time. Once controls are in place, the process must be periodically reevaluated. This safety assurance function is critical to ensure control effectiveness. A two-part approach to safety assurance is applied to each individual risk control, and consists of:

- Monitoring of the risk control (on a continuous basis); and
- A Follow-up audit (to confirm implementation and initial adequate functioning of the control)

NOTE: Monitoring as described herein applies to individual risk controls. Risk control monitoring is performed in addition to the Safety Assurance process of Continuous Monitoring, wherein department managers continuously monitor the outputs of operational processes they own.

21.1 Monitoring of RC/CAS

Many corrective actions are one-time actions that will not require monitoring. Risk controls, on the other hand, are often applied to repeated or ongoing processes which must be monitored to ensure effectiveness. This is why initial, close monitoring of each risk control or corrective action is important, particularly when one is first implemented. Each RC/CA recorded in the IR database defines who will be responsible for monitoring, and methods used. A description of what events will be monitored (such as the conduct of training, a maintenance procedure, or a flight operation) and/or of what records will be monitored, including a specified monitoring interval, are also recorded in IR. Each person assigned monitoring is accountable for continued vigilance.

NOTE: Monitoring intervals may be recorded in terms of calendar days, flight hours or other interval, such as “each time an aircraft is returned to service”, based on an evaluation of the risk control / corrective action and associated level of risk.

More than one RC/CA may be implemented for a specific safety risk. RC/CAs are typically assigned to department managers or other supervisory personnel, each of which possesses specific departmental knowledge and oversight to perform the necessary RC/CA monitoring. Monitoring should ensure:

- Controls are effective and remain in place.
- Changes which require further risk management are identified.
- Action is taken when necessary to correct ineffective risk controls and reinitiate the risk management process in response to new hazards.

Whenever personnel, equipment, or operation taskings change, or new operations are anticipated in an environment not covered in the initial risk management analysis, associated safety risks and control measures should be reevaluated.

21.2 Follow-Up Audits & Surveillance

After initial monitoring, the Q&S Manager continues the safety assurance process by performing a follow-up auditon each Risk Control / Corrective Action (RC/CA) that has been assigned to department managers. When risk controls or corrective actions are designed, implemented and put into place, one or more follow-up audits will confirm that each RC/CA continues to conform to established requirements and continues to be effective in maintaining risk within acceptable levels.

Each RC/CA contains provisions for the Q&S Manager to document a satisfactory follow-up audit. Upon satisfactory audit results, and thereafter at the discretion of the Q&S Manager, the RC/CA may be signed off and closed. If audit results are unsatisfactory and produce audit findings, additional RC/CAs may be required. If a series of follow-up audits is deemed necessary to accurately evaluate effectiveness, additional follow-up audits may be required.

During an audit the Q&S Manager should also evaluate the effectiveness of those **communications of lessons learned** which are a part of a Corrective Action Plan. To accomplish a follow-up audit, the Safety Officer may simply visit the department, hold a discussion with the department manager or other personnel, or review certain documents and records.

Follow-up audits should include a **cost benefit review** to determine if residual risk and cost are in balance.

- Did follow-up audits accurately evaluate how effectively controls eliminated hazards or reduced risks?
- Did feedback confirm that the control or corrective / preventative action taken was effective?
- What effect did control measures have on performance?
- Is the actual cost in line with expectations?
- Review the control decision process as documented in the IR database. Was the process effective?

22. PROCEDURES FOR MANAGING EMPLOYEE REPORTS

Whenever the Q&S Manager, department manager or other supervisor receives a report (either in writing, by telephone, radio, or by other means) of a hazard, irregularity, deficiency, error, incident, near-accident, potential violation, audit finding or other safety concern, a prompt initial assessment of the report shall be made. If the report indicates that one or more hazards **might exist** that could result in property damage or physical injury of persons, the person receiving the report shall:

- Take immediate action to eliminate or mitigate the risk;
- Immediately contact other appropriate managers.

The report should first be initially assessed by the manager receiving the report. To properly evaluate reports and associated data, it may be advisable to call upon each manager's area of knowledge and expertise.

Using good judgment and experience in their respective fields of expertise, appropriate manager(s) will make an initial determination as to whether additional immediate actions are required in the interest of safety. If no immediate or urgent hazard exists (such as when an administrative error has occurred), each report of a hazard or safety concern shall be forwarded to the appropriate department manager.

The Q&S Manager is responsible for the timely evaluation and safekeeping of all reports and IEP data collected. Each week the Safety Officer reviews all reports, safety information, audit findings and other safety concerns with appropriate department managers who are responsible for various areas of the company's operational processes (flight operations, ground services, maintenance, inspection, administration, etc.). These data are reviewed and evaluated for the following qualities to determine data validity:

- Accuracy of data
- Completeness of data
- Discrepancies in the data
- Timeliness (does the hazard or irregularity continue to exist?)
- Continuation (is the hazard or irregularity of an ongoing nature?)
- Objectivity (is the data unbiased and without prejudice?)

Based on these evaluations, the appropriate manager and the Q&S Manager determine whether additional observations are warranted and if additional information is needed. If the hazard or safety risk concern no longer exists and cannot reoccur, or if immediate actions taken have eliminated the hazard or safety risk concern, this information should be documented in a **Risk Management Record** (RMR) in the IR database, and the RMR closed without further process.

If however the hazard or safety risk concern still exists, and the data is sufficiently accurate, complete, timely and valid, the Q&S Manager and/or appropriate managers then proceed to identify other root-cause potential hazards and assess levels of risk by developing risk statements and completing the various risk management processes in the IR database.

NOTE: A copy of the source document or original report may be attached to the RMR under the "Photos" tab of the IR database.

23. "OFFICIAL TIME-OUT" RISK MITIGATION TOOL

23.1 Background

Experience has shown that the aviation industry tends to hire "mission oriented" individuals who will seek ways around an obstacle to complete the mission. It may be beneficial to intentionally slow the go/no-go decision- making process, particularly at the first indication that an abnormal situation might be developing.

MH's "Official Time-Out" risk mitigation tool may be used to mitigate risk when pilots experience an abnormal or emergency operation. These types of events can sometimes impair a pilot's judgment and decision-making abilities in the hours immediately following the event. An "official time-out" enables pilots to reflect on the event and return to work in a higher state of physiological and psychological preparedness.

23.2 Policy

It is the policy of Maritime Helicopters that any pilot or other crewmember who experiences any of the events listed below, be granted an "OFFICIAL TIME OUT" (i.e., off duty for the remainder of the shift). This policy recognizes the situational stress induced and simply says "Nice job, and we're glad you're OK - take the rest of the day off."

The awarding of an Official Time Out is at the discretion of the Chief Pilot, but may be granted by the Director of Operations or Q&S Manager in his absence. Any award of an Official Time Out is contingent upon notification of Headquarters and specific direction by the Chief Pilot or any of the above listed personnel. Site Managers have the Emergency Authority to award an Official Time Out if, in their judgment, waiting for specific direction from the Chief Pilot would compromise operational safety. The objective of this policy is to remove the stressed pilot from the decision-making process. There are numerous pilots, maintenance technicians, and support personnel onthis team. This is the time to use their knowledge and experience.

23.3 Events Subject to Award of an Official Time Out

An official time-out will be granted to any pilot or crewmember who experiences any of the following events:

- Any aircraft system malfunction requiring a precautionary landing.
- An in-flight engine failure.
- Any event for which an NTSB report is required.
  - An aircraft incident.
  - A flight control system malfunction.
  - The inability of a flight crewmember to perform his/her duties due to injury or illness.
  - Failure of structural components of a turbine engine.
  - In-flight fire.
  - Damage to property other than the aircraft in excess of $25,000.
  - Aircraft collision in flight.
  - In-flight failure of electrical systems requiring sustained use of emergency bus power such as a battery or auxiliary power system.
  - In-flight failure of hydraulic systems.
  - Sustained loss of engine power.
  - An evacuation of the aircraft in which the emergency egress system is used.
- Any time an emergency is declared.

Should there be a question as to whether an event fits the criteria for an Official Time Out, the station or site

24. MANAGEMENT OF CHANGE (MOC)

24.1 Background

Procedures are stablished and maintained to manage changes associated with safety and risk. The systematic approach to managing and monitoring organizational change is part of the risk management process. Safety issues associated with change are identified and standards associated with change are maintained during the change process:

Procedures for managing change include

- Risk Assessment
- Identification of the goals and objectives and nature of the proposed change
- Operational Procedures are identified
- Changes in location, equipment, or operating conditions are identified
- Maintenance, Safety, and Operational manuals are posted with current changes
- All personnel are made aware of and understand changes
- Only the Company President/Chief Operations Officer has authority to approve changes identified
- The responsibility for reviewing, evaluating, and recording the potential safety hazards from the change or its implementation
- Approval of the agreed change and the implementation procedures
- Continuous Improvement Audits and monitoring of the changes

The Management of Change process has four basic phases: screening, review, approval, implementation and audit monitoring. Both the change and the effect of implementing change are considered. There are methods for managing the introduction of new technology. All personnel shall be consulted when changes to the work environment, processes or practices could have health or safety implications. Changes to resource levels and competencies and associated risks are assessed as part of the control procedure.

24.2 Documentation

An integral part of the Management of Change process is documentation. Maritime Helicopters will document each MOC through an Excel Spreadsheet created for each MOC event. That document will be created by the owner of the MOC (e.g., Director of Maintenance) but held for future use in the Quality and Safety Manager's office. Section C. shows and example of process steps to be covered in the MOC documentation.

24.3 Management of Change Document

There are many possible formats/programs available to document management of change. While a simple WORD document may suffice for a simple MOC, more complex changes may need to use Microsoft Excel or other spreadsheet for documentation. At this time, Microsoft Excel will be the method for documenting most Maritime Helicopters' MOC.

The content of the Management of Chain document is more crucial to the successful program. The following format will be used, although certain Sections made be added or deleted from this list by the judgement of the MOC Team.

Management of change Document Format

Section	Paragraph	Description
Title Page	NA	Title of Change
1	1	Project Approval Authority
1	2	Project Manager
1	3	Basis for the Change
1	4	Change Team
2	1	Description of Change
2	2	Change in Terms
2	3	Structure of Change
2	4	Definitions
2	5	Project Management
3	1	Effect on Facilities/Equipment
3	2	Effect on Spares/Stores
3	3	Changes to Limitations
		Restrictions/Procedures from
3	4	Regulatory Agencies Human Resources/Changes
3	5	Effects on Risk Management
3	6	Risk Cases Changes to Standards
3	7	Mandatory Legal Changes
3	8	Changes to Operations/
3	9	Processes/Procedures Changes to Training Department
4	1	Follow up to the MoC Process is added to the Continuing Aviation Surveillance System (CASS) Quarterly Meeting to Follow up on MoC's in progress

26. APPENDIX A – TASK RISK ASSESSMENTS

Maritime Risk Assessments

The following Task Risk Assessments of Maritime Helicopter operations were conducted using the following risk assessment matrix from our Safety Management System:

LIKELIHOOD	SEVERITY				
	Catastrophic	Critical	Major	Minor	Negligible
Certain					
Extremely Likely					
Likely					
Unlikely					
Remote					

Overall Risk Levels are indicated by the following table:

High	High Risk - Unacceptable; If the hazard cannot be eliminated, it requires prompt risk controls and/or corrective actions to mitigate the risk.
Moderate	Moderate Risk – May be acceptable with risk-mitigating strategies; requires risk controls and/or corrective actions to mitigate risk.
Low	Low Risk – May be acceptable without further action.

I accept the analysis of the risk assessments on the following pages and consider that these tasks may be performed once they comply with the existing and recommended mitigating controls.

Dave Jones Position: Director of Operations Signature_____Date: 1 February 2022

1. Horizon Lines Vessel Operations-RW
2. Maritime Maid Operations-RW
3. Coast Guard Cutter Healy Operations-RW
4. Offshore Platform Operations-RW
5. External Load Operations-RW
6. Powerline/Utility Operations-RW
7. Search & Rescue/Medivac-RW
8. Volcano Operations-RW
9. Passenger and Cargo Loading Operations-RW
10. Night Operations-RW
11. Heliskiing/Heliboarding Operations-RW
12. Animal Darting Operations-RW
13. Winter Operations-RW
14. Confined Area/Pinnacle Operations-RW
15. Class B Human External Cargo (HEC)-RW
16. Firefighting Operations-RW
17. Pipeline Patrol Operations-RW
18. Single-Skid/Toe-In/Hover Exit (STEP) Operations-RW
19. Overwater Operations-RW

20. Engine Failure during takeoff (with Passengers)-FW
21. Lower Than Standard Takeoff Minima Operations-FW
22. Night Operations-FW
23. Winter Operations-FW
24. Contaminated/Icy Runway Operations-FW
25. High Crosswind Operations-FW
26. Wildlife on the Runway During Takeoff/Landing-FW
27. Aircraft Egress Without Stairs-FW
28. Passenger and Cargo Operations-FW
29. Pipeline Patrol Operations-FW

26.1 Horizon Lines Vessel Operations-RW

Task to be performed: Horizon Lines Vessel Operations-RW
Risk Assessment Profile #: 1
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Horizon Line Vessel Operations, the MHI Pilot and project personnel will conduct a detailed briefing that willcover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Reduced visual references at night	Potential of inadvertent flight into IMC; CFIT/water	Unlikely	Catastrophic	H	Pilots will brief an inadvertent. IMC plan prior to takeoff, use two pilots; use Radar Altimeter	L
Unable to visually acquire vessel	Disorientation or possible inadvertent IMC	Unlikely	Major	M	Comply with SOP. Use established weather minimums	L
Turbulence on short final behind vessel	Increased power requirements, possibly exceeding operating limits	Likely	Major	M	Go-around if necessary; request winds from vessel; request vessel turn into more favorable conditions	L
Landing on small Helideck with reduced rotor clearance	Inadvertent rotor contact with containers on vessel	Unlikely	Catastrophic	H	Strictly comply with Helideck markings when landing the aircraft. Ensure pad lighted.	L

26.2 Maritime Maid Operations-RW

Task to be performed: Maritime Maid Operations-RW
Risk Assessment Profile #: 2
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Maritime Maid Operations, the MHI Pilot, Maritime Maid Captain and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Helideck Landing in seas up to four feet	Possible rotor to vessel contact	Likely	Critical	H	Use established SOP guidance. Land when deck is flat. Turn vessel down swell	L
Helo sliding on helideck	Possible damage to aircraft or vessel	Unlikely	Major	M	Crewman will connect helo to deck at cargo hook. Look for signal. Keep rpm at 100% Nr until helo is tied down	L
Loss of Ground Effect	Possible loss of altitude during takeoff from helideck	Extremely Likely	Minor	M	Plan climbing takeoff up from helideck, then transition to forward flight. 40kt attitude	L
Attempted takeoff while attached to helideck	Possible damage to aircraft or vessel	Unlikely	Major	M	Remove skid tie downs prior to start; at 100% Nr pilot will signal crewman to release cargo hook tie down	L
Inadvertent fueling of aircraft with #2 diesel fuel	Possible damage to fuel system and fuel filters	Unlikely	Major	M	Yellow Jet A tags are on all valves for Jet A tank. Fuel is tested for proper color (clear) before refueling	L

26.3 USGS Cutter Healy Operations-RW

Task to be performed: USGS Cutter Healy Operations-RW
Risk Assessment Profile #: 3
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting USCG Cutter Healy Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Landing on helideck in rough seas	Possible rotor to vessel contact	Likely	Critical	H	Use established SOP guidance. Request Captain turn vessel down swell.	L
Turbulence during landing or takeoff	Possible damage to aircraft or vessel	Unlikely	Major	M	Expect turbulence in windy conditions; request vessel change heading if necessary	L
Helo sliding on helideck	Possible damage to aircraft or vessel	Unlikely	Major	M	Keep rpm at 100% Nr until helo is tied down	L
Loss of Ground Effect	Possible loss of altitude during takeoff from helideck	Extremely Likely	Minor	M	Plan climbing takeoff up from helideck, then transition to forward flight. 40kt attitude	L
Attempted takeoff while attached to helideck	Possible damage to aircraft or vessel	Unlikely	Major	M	Remove skid tie downs prior to start	L

26.4 Offshore Platform Operations-RW

Task to be performed: Offshore Platform Operations-RW
Risk Assessment Profile #: 4
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Offshore Platform Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria. 3) Procedures to determine **RED**/**GREEN** deck status.	L
Turbulence encountered during landing or takeoff	Possible damage to aircraft or vessel	Unlikely	Major	M	Note wind direction/ velocity before approach/takeoff. Expect turbulence, plan accordingly	L
Loss of Ground Effect	Possible loss of altitude during takeoff from helideck	Extremely Likely	Minor	M	Plan climbing takeoff up from helideck, then transition to forward flight. 40kt attitude	L
Mid-air collision with other Platform traffic	Possible loss of life and destroyed aircraft	Remote	Catastrophic	M	Use SOP guidance; self-announce on CTAF; scan actively for other platform traffic	L
Operations near gas venting booms	Possible inadvertent ingestion of combustible gases into the engine	Likely	Major	M	Avoid overflight of Rigs/Platforms by either 3nm laterally or 2000’ vertically when Cold Gas Flaring is taking place.	L

Risk Assessment Profile #4 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Landing on rigs/platform during gas venting	Possible inadvertent ingestion of combustible gases into the engine	Likely	Major	M	1. Plan the approach and takeoff to observe and **avoid the downwind ordirectly over the gas vent**, remaining as far away as practicable fromthe open end of the vent boom. 2. Aircraft operating toan installation during '**COLD FLARING' MUST** ensure that their approach, landing area and departure path will be well clear of the unlit plume. When this cannotbe achieved, the Pilot in Command will suspend operations. Consideration must alsobe given to suspending operations with wind speed below 5 kts as gas may be present around the installation. 3. Downwind landings **will** only occur after the concentration is confirmed to be less than 10% of Lower Flammable Limit (LFL). 4. Except in an emergency, aircraft will not be shutdown offshoreduring '**COLD FLARING'** due to the possibility of a change ofwind direction.	L

Risk Assessment Profile #4 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Presence of Hydrogen Sulfide gas	Possible loss of consciousness within a few seconds when exposed to sufficient concentrations	Unlikely	Catastrophic	H	When operating in offshore areas that have been identified as having concentrations of Hydrogen Sulfide gas pilots will ensure the following: 1) An approved protective air pack is available for the crew. 2) When shutdown on the helideck know the location of protective equipment and safety procedures of the specific platform. 3) When flying near a helideck and a visual red alarm or “rotten egg” smell is detected, immediatelydon the protective mask and exit the area upwind.	L
Helicopter-Crane operations	Crane boom/cable come into contact with the helicopter on the platform	Unlikely	Catastrophic	H	Prior to approaching, maneuvering, running onthe platform with a crane,the pilot will ensure that either the crane boom is cradled, or the boom is pointed away from the helipad and that the operator is out of the cab.	L

Risk Assessment Profile #4 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Perforation Operations	Explosive charges could be detonated byhelicopter radio transmission	Unlikely	Catastrophic	H	A NOTAM will be issued when a drilling rigis conducting perforating operations that close the helideck. A visual indication that perforation operations areongoing is a **WHITE "X"** and a sign **"NO RADIO"** in red.	L
Landing on an Unsafe **"RED"** deck	Personnel/ equipment on the helideck	Likely	Major	M	MHI pilot will establish radio contact and ensure that the deck is **"GREEN"** (safe to land)	L

26.5 External Load Operations-RW

Task to be performed: External Load Operations-RW
Risk Assessment Profile #: 5
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting External Load Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Blowing debris during landing/takeoff	Injuries or loss of equipment	Likely	Minor	L	Ensure departure site is clean from debris prior to departure	L
Inadequate rigging	Dropped or uncontrollable load, injuries or loss of equip.	Extremely Likely	Major	M	MH briefs personnel; ensure loads are rigged IAW existing guidance;use only steel, nylon or Kevlar slings, minimum personnel on LZ.	L
Inadequately trained personnel	Loose debris may come in contact with rotors	Likely	Major	M	MH will ensure Operators have conducted required slingtraining	L
Snagged cable on ground (Empty line fouling)	Cable snap into rotor systems or acft contact with ground	Unlikely	Catastrophic	H	Trained and briefed personnel; proper use of hand signals/radio communication	L

Risk Assessment Profile #5 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Reduced aircraft performance	Operation of acft outside design limitations	Unlikely	Major	M	Pilots will strictly comply with approved Flt Manual. Complete performance computations during preflight planning. Aircraft will be operated with HOGE performance	L
Settling with Power	Possible damage toaircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L
Inadvertent release of cargo	Possible damage ofcargo and injury to personnel	Unlikely	Major	M	MHI Pilot will ensure that a pre operational check is conducted daily.In addition, the helicopterwill not be flown over any personnel or facilities. No personnel will be beneath the helicopter when it is in flight.	L
Empty cable contacts T/R during flight	Possible damage to aircraft and injuries to personnel.	Likely	Catastrophic	H	MHI Pilots will ensure that the aircraft is flown at an airspeed less than 80 KIAS	L
Downdrafts/ Gusty Winds	Aircraft unable to maintain sufficient altitude.	Unlikely	Major	M	MHI Pilot will ensure that the aircraft is operated with HOGE performance capability.	L
Failure of lifting equipment	Uncontrollable load inadvertent release of cargo	Unlikely	Major	M	MHI Pilot will inspect suspension system/ cable daily prior to use.	L

Risk Assessment Profile #5 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Fuel Exhaustion	Aircraft run out of fuel causing a forced landing	Unlikely	Catastrophic	H	MHI Pilot will ensure that the helicopter is operated with a 20-minute fuel reserve at all times.	L
In-Flight loss of Control of the load	Potential loss of aircraft control	Unlikely	Catastrophic	H	MHI Pilot will slowly accelerate and monitor load oscillations. The pilot will not allow the oscillations to become out of control.	L
Engine Failure while operating within the height/ velocity diagram	Potential damage to the aircraft upon landing	Unlikely	Major	M	Power assurance checks will be completed daily and trended to ensure the engine is meeting manufacturer specifications.	L
External Load Operation	Increased exposure to non-essential personnel	Unlikely	Minor	L	By FAR 133 only essential personnel willbe onboard the aircraft.	L
Uncontrolled personnelin helicopter landing area	Injuries to personnel from flying debris or contacting the Main/Tail rotor system.	Likely	Catastrophic	H	Only personnel directly associated with the operation will be allowed within the helicopter safety zone. These personnel will receive a detailed safety briefing prior to conducting the operation	L

26.6 Powerline/Utility Operations-RW

Task to be performed: Powerline/Utility Operations-RW
Risk Assessment Profile #: 6
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Powerline/Utility Operations and receiving Tier 1 approval, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Collision with static wires, guy wires or conductors	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	Formal training completed by MH pilots and utility crewmen; clear communications in the cockpit; radio contact between pilot and ground crewman;	M
Unable to see wires in flight path when landing or takeoff	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	Crew concept; pilot and crewmen will call out all wires and relative clock position, both on approach and departure	M
Loss of aircraft performance due to Loss of Trans. Lift, LTE, or OGE hover	Possible damage to aircraft and injuries to personnel	Unlikely	Critical	M	Use SOP guidance; maintain situational awareness; execute sound Aeronautical Decision Making	L
Centenary or suspension cables	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	MHI Pilot will not fly below the altitude of the poles except for takeoff and landing.	L
Collision with structures or towers	Possible loss of life and destroyed aircraft	Unlikely	Critical	M	MHI Pilot will not fly below the altitude of the poles except for takeoff and landing.	L
Controlled flight into terrain	Possible loss of life and destroyed aircraft.	Unlikely	Critical	M	Powerline Patrol operations will require use of an observer allowing the pilot to maintain situational awareness and to avoid task overload.	L

Risk Assessment Profile #6 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Engine Failure while operating within the height/ velocity diagram	Possible loss of life and destroyed aircraft.	Unlikely	Catastrophic	H	Power assurance checks will be completed daily and trended to ensure theengine is meeting manufacturer specifications	L
Settling with Power	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L
Loss of Tail Rotor Effectiveness	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operatedwith HOGE performance.	L
Bird Strikes	Possible damage to aircraft or personnel	Unlikely	Minor	L	When birds are identified,the aircraft should turn and climb above the birds.	L
Loss of situational awareness due to sun, low light, or haze	Inability to see natural/ manmade hazards causing a CFIT accident	Unlikely	Major	M	Powerline patrol operations will not be conducted into a rising/setting sun.	L
Landing with inadequate main/tail rotor clearance.	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that the landing area allows 1/3 diameter rotor clearance (12').	L
Inadequate training or proficiency of the crews involved.	Possible damage to aircraft or personnel	Likely	Major	H	MHI Pilot must be approved by the Director of Operations prior to conducting this operation.	M
Long line snags on ground, trees or structures.	Possible damage to aircraft or equipment	Likely	Major	H	MHI pilot will vertically ascend above the hook, ifthe line becomes snaggedand the pilot is unable to free it, the pilot will release the long line fromthe cargo hook.	L

26.7 Search & Rescue (SAR) Operations-RW

Task to be performed: Search & Rescue (SAR)/Medevac Operations-RW
Risk Assessment Profile #: 7
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Volcano Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Operating aircraft within ash/debris cloud	Loss of life and destruction of aircraft	Unlikely	Catastrophic	H	Use SOP guidance; aircraft will not fly when ash or debris is emitting from volcano	M
Loss of references due to blowing ash while landing	Possible severe personnel injuries and extensive damage to aircraft	Likely	Critical	H	Ensure adequate reconnaissance before landing; if possible, choose landing site with no ash present; “Blow out” ash from high hover to prevent engine ingestion and possible flameout	M
Operating aircraft within steam/gas cloud	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Aircraft will avoid any steam/gas cloud emissions from volcano	L
Landing on surface during changing conditions	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Pilots will pay particular attention to rapidly changing conditions: snow/ice melting, creeks/rivers rising, prepared for immediate departure when necessary	L

26.8 Volcano Operations-RW

Task to be performed: Volcano Operations-RW
Risk Assessment Profile #: 8
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Volcano Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 3) Review of this Risk Assessment. 4) Go/No Go criteria.	L
Operating aircraft within ash/debris cloud	Loss of life and destruction of aircraft	Unlikely	Catastrophic	H	Use SOP guidance; aircraft will not fly when ash or debris is emitting from volcano	M
Loss of references due to blowing ash while landing	Possible severe personnel injuries and extensive damage to aircraft	Likely	Critical	H	Ensure adequate reconnaissance before landing; if possible, choose landing site with no ash present; “Blow out” ash from high hover to prevent engine ingestion and possible flameout	M
Operating aircraft within steam/gas cloud	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Aircraft will avoid any steam/gas cloud emissions from volcano	L
Landing on surface during changing conditions	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Pilots will pay particular attention to rapidly changing conditions: snow/ice melting, creeks/rivers rising, prepared for immediate departure when necessary	L

26.9 Passenger and Cargo Operations-RW

Task to be performed: Passenger and Cargo Operations-RW
Risk Assessment Profile #: 9
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Passenger and Cargo Operations, the MHI Pilot, and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Passengers contacting rotor system when boarding or deplaning aircraft	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Ensure required Passenger Briefings are completed; passengers must have permission to approach or depart under rotor of operating aircraft	L
Passengers carrying loaded weapons in passenger compartment	Possible personnel injuries and damage to aircraft	Likely	Major	M	Ensure required Passenger Briefings are completed	L
Loading aerosol bear repellant in passenger compartment	Possible personnel injuries and damage to aircraft	Likely	Major	M	Comply with SOPs and published cargo loading guidance; ensure required Passenger Briefings are completed	L
Operating aircraft outside design limits due to cargo loading	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Strictly comply with Flight Manual and other applicable guidance	L

26.10 Night Operations-RW

Task to be performed: Night Operations-RW
Risk Assessment Profile #: 10
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Night Operations and upon receiving Tier 1 approval, the MHI Pilot, and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Reduced visual references at night	Inadvertent Instrument Meteorological Conditions or Controlled Flight into Terrain	Unlikely	Catastrophic	H	Pilot will formulate an inadvertent IMC plan prior to takeoff, use Radar Altimeter; complete preflight planning to ensure terrain clearance	M
Reduced pilot proficiency due to infrequent operations at night	Possible minor injuries and slight damage to aircraft	Extremely Likely	Minor	M	Ensure night currency is up-to-date; fly with a second pilot with recent night flight experience	L
Increased likelihood of damage during night forced landing	Possible personnel injuries and damage to aircraft	Remote	Critical	M	Thorough preflight; familiarity with critical system switches & circuit breakers; night sun/landing light controls and operation	L
Controlled flight into terrain	Loss of aircraft control causing damage to aircraft and personnel injuries	Likely	Catastrophic	H	Aircraft will be not be operated at night unless there is enough visual surface light reference to safely control the helicopter	M

26.11 Heliskiing/Heliboarding Operations-RW

Task to be performed: Heliskiing/Heliboarding Operations-RW
Risk Assessment Profile #: 11
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Heliskiing/Heliboarding Operations and upon receiving Tier 1 approval, the MHI Pilot, and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Loss of visual references during landing or takeoff	Possible personnel injuries and damage to aircraft	Extremely Likely	Critical	H	Use good whiteout approach technique; land to references; use OGE power to “blow out” LZ to keep references	M
Passengers contacting rotor system when boarding or deplaning aircraft	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Ensure required Passenger Briefings are completed; passengers must have permission to approach or depart under rotor of operating aircraft	L
Landing on unstable surface	Possible personnel injuries and damage to aircraft	Likely	Major	M	Don’t let power out until stable surface is confirmed; do not land on cornice or avalanche-prone area; do not allow pax to depart or approach aircraft until stability assured	L

26.12 Animal Darting Operations-RW

Task to be performed: Animal Darting Operations-RW
Risk Assessment Profile #: 12
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extreme lyLikely	Major	M	Prior to conducting Animal Darting Operations, the MHI Pilot, and project personnel will conducta detailed briefing thatwill cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Fixation on target resulting in CFIT	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Use only highly experienced pilots, situational awareness must be emphasized	L
Passengers contacting rotor system when boarding or deplaning aircraft	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Ensure required Passenger Briefings are completed; passengers must have permission for movement under operating rotor	L
Adverse lighting conditions/flat light	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Delay flight until adequate lighting conditions exist	L
Firearm Dart to Main Rotor Contact	Possible damage to aircraft	Likely	Major	M	Conduct safety briefing. Clear, concise in-flight communication between pilot and shooter	L
Operating aircraft outside design limits due to cargo loading	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Strictly comply with Flight Manual and other applicable guidance	L

26.13 Winter Operations-RW

Task to be performed: Winter Operations-RW
Risk Assessment Profile #: 13
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Winter Operations, the MHI Pilot, and project personnel willconduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Loss of visual references during landing or takeoff	Possible personnel injuries and damage to aircraft	Extremely Likely	Critical	H	Use good whiteout approach technique;land to references; use OGE power to “blow out” LZ to keep references	M
Encountering icing conditions	Possible personnel injuries and damage to aircraft	Extremely Likely	Critical	H	Ensure the aircraft is free of ice before flight, exit icing conditions and/or land ifencountered inflight	M
Flying without snow baffles installed on aircraft	Possible personnel injuries and damage to aircraft	Unlikely	Critical	M	Comply with Flight Manual guidance. Do not fly any helicopter in snow without snowbaffles/relight kit installed.	L
Landing on unstable surface	Possible personnel injuries and damage to aircraft	Likely	Major	M	Don’t reduce power out until stable surfaceis confirmed; do not allow pax to depart or approach aircraft until stability assured	L
Controlled Flight into Terrain	Possible loss of aircraft control causing aircraft damage and personnel injuries	Likely	Critical	H	The aircraft will not be operated in areas conducive to whiteout/flat light without thefollowing: **1)** 1 mile during daylight hours **and** **2)** A visual surface reference is maintained that would allow a safelanding **and** **3)** A visible horizon that distinguishes theground and the horizon **and** 4) The aircraft is equipped with anoperational radar altimeter.	L

Risk Assessment Profile #13 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Spatial Disorientation	Possible loss of aircraft control causing aircraft damage and personnel injuries	Likely	Critical	H	The aircraft will not be operated in areas conducive to whiteout/flat light without the following: **1)** 1 mile during daylight hours **and** **2)** A visual surface reference is maintained that would allow a safe landing **and** **3)** A visible horizon that distinguishes the ground and the horizon **and** 4) The aircraft is equipped with an operational radar altimeter.	L
Helicopter departs with frost/ice on surface	Possible damage to aircraft and personnel injuries	Likely	Minor	M	Pilot will not depart with any frost/ice present on the aircraft.	L

26.14 Confined Area/Pinnacle Operations-RW

Task to be performed: Confined Area/Pinnacle Operations-RW
Risk Assessment Profile #: 14
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Confined Area/Pinnacle Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Loss of aircraft performance due to Loss of Trans. Lift, LTE, or OGE hover	Possible damage to aircraft and injuries to personnel	Unlikely	Critical	M	MHI Pilot will ensure that the aircraft is operated within HOGE performance.	L
Blowing debris during landing/takeoff	Injuries or loss of equipment	Likely	Minor	L	Ensure departure site is clean from debris prior to departure	L
Reduced aircraft performance	Operation of acft outside design limitations	Unlikely	Major	M	Pilots will strictly comply with approved Flt Manual. Complete performance computations during preflight planning. Aircraft will be operated with HOGE performance	L
Settling with Power	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L
Downdrafts/ Gusty Winds	Aircraft unable to maintain sufficient altitude.	Unlikely	Major	M	MHI Pilot will ensure that the aircraft is operated with HOGE performance capability.	L

Risk Assessment Profile #14 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Fuel Exhaustion	Aircraft run out of fuel causing a forced landing	Unlikely	Catastrophic	H	MHI Pilot will ensure that the helicopter is operated with a 20-minute fuel reserve at all times.	L
Engine Failure while operating within the height/ velocity diagram	Potential damage to the aircraft upon landing	Unlikely	Major	M	Power assurance checks will be completed daily and trended to ensure the engine is meeting manufacturer specifications.	L
Landing with inadequate main/tail rotor clearance.	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that the landing area allows 1/3 diameter rotor clearance (12’).	L

26.15 Class B Human Cargo Operations-RW

Task to be performed: Class B Human Cargo Operations-RW
Risk Assessment Profile #: 15
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Short- Haul Operations, the MHI Pilot and project personnelwill conduct a detailed briefing that will cover: Review of this Risk Assessment. Go/No Go criteria.	L
Improper Rigging	Possible fatal injuries and loss of equipment	Extremely Likely	Catastrophic	H	All crew will undergo initial and recurrent training per MHI Class B HEC RLCFM. All training will be logged for records. Buddy system will be used to check harness rigging.	L
Inadvertent release of HEC	Possible fatal injuries and loss of equipment	Remote	Catastrophic	M	HEC operations will be performed using only Boost HEC equipped aircraft and approved HEC rigging	L

Risk Assessment Profile #15 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Environmental hazard to HEC crew	Injuries and potential damage to equipment	Likely	Major	M	Propper PPE will be worn to include eye protection, hearing protection, and gloves. Environmental hazards will be discussed in the briefing and considered in the Go/No Go criteria.	L
Aircraft emergency procedures involving loss of control/ engine failure	Possible fatal injuries and damage to equipment	Remote	Catastrophic	H	Special consideration will be given to the HEC crew. Boost HEC system will be checked daily for operational release of HEC. Land immediately responses apply to getting HEC crew on ground as soon and safely as possible.	L
Excessive descent rate while setting HEC on the ground	Possible injuries	Likely	Major	M	Descent rates shall be limited to under 100 FPM when HEC cargo is being set on the ground. Communication with HEC crew will be maintained throughout HEC operations.	L
Excessive spinning of HEC load	Possible injuries	Extremely Likely	Minor	M	Crew member training will include techniques to reduce spinning while inflight.	L

26.16 Firefighting Operations-RW

Task to be performed: Firefighting Operations-RW
Risk Assessment Profile #: 16
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting External Load Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Blowing debris during landing/takeoff	Injuries or loss of equipment	Likely	Minor	L	Ensure departure site is clean from debris prior to departure	L
Inadequate rigging	Dropped or uncontrollable load, injuries or loss of equip.	Extremely Likely	Major	M	MH briefs personnel; ensure loads are rigged IAW existing guidance; use only steel, nylon or Kevlar slings, minimum personnel on LZ.	L
Inadequately trained personnel	Loose debris may come in contact with rotors	Likely	Major	M	MH will ensure Operators have conducted required sling training	L
Snagged cable on ground (Empty line fouling)	Cable snap into rotor systems or acft contact with ground	Unlikely	Catastrophic	H	Trained and briefed personnel; proper use of hand signals/radio communication	L
Reduced aircraft performance	Operation of acft outside design limitations	Unlikely	Major	M	Pilots will strictly comply with approved Flt Manual. Complete performance computations during preflight planning. Aircraft will be operated with HOGE performance	L
Settling with Power	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L

Risk Assessment Profile #16 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Inadvertent release of cargo	Possible damage of cargo and injury to personnel	Unlikely	Major	M	MHI Pilot will ensure that a pre operational check is conducted daily. In addition, the helicopterwill not be flown over any personnel or facilities. No personnel will be beneath the helicopter when it is in flight.	L
Empty cable contacts T/R during flight	Possible damage to aircraft and injuries to personnel.	Likely	Catastrophic	H	MHI Pilots will ensure that the aircraft is flown at an airspeed less than 80 KIAS	L
Downdrafts/ Gusty Winds	Aircraft unable to maintain sufficient altitude.	Unlikely	Major	M	MHI Pilot will ensure that the aircraft is operated with HOGE performance capability.	L
Failure of lifting equipment	Uncontrollable load inadvertent release of cargo	Unlikely	Major	M	MHI Pilot will inspect suspension system/ cable daily prior to use.	L
Fuel Exhaustion	Aircraft run out of fuel causing a forced landing	Unlikely	Catastrophic	H	MHI Pilot will ensure that the helicopter is operated with a 20-minute fuel reserve at all times.	L
In-Flight loss of Control of the load	Potential loss of aircraft control	Unlikely	Catastrophic	H	MHI Pilot will slowly accelerate and monitor load oscillations. The pilot will not allow the oscillations to become out of control.	L
Engine Failure while operating within the height/ velocity diagram	Potential damage to the aircraft upon landing	Unlikely	Major	M	Power assurance checks will be completed daily and trended to ensure the engine is meeting manufacturer specifications.	L

26.17 Pipeline Patrol Operations-RW

Task to be performed: Firefighting Operations-RW
Risk Assessment Profile #: 17
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Pipeline Patrol Operations, the MHI Pilotand project personnel will conduct a detailed briefingthat will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Collision with static wires, guy wires or conductors	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	Formal training completed by MH pilots and utility crewmen; clear communications in the cockpit; radio contact between pilot and ground crewman;	M
Unable to see wires in flight path when landing or takeoff	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	Crew concept; pilot and crewmen will call out all wires and relative clock position, both on approach and departure	M
Loss of aircraft performance due to Loss of Trans. Lift, LTE, or OGE hover	Possible damage to aircraft and injuries to personnel	Unlikely	Critical	M	Use SOP guidance; maintain situational awareness; execute sound Aeronautical Decision Making	L
Cantenary or suspension cables	Possible loss of life and destroyed aircraft	Likely	Catastrophic	H	MHI Pilot will not fly below the altitude of the towers/poles except for takeoff and landing.	L
Collision with structures or towers	Possible loss of life and destroyed aircraft	Unlikely	Critical	M	MHI Pilot will not fly below the altitude of the poles except for takeoff and landing.	L
Controlled flight into terrain	Possible loss of life and destroyed aircraft.	Unlikely	Critical	M	Powerline Patrol operations will require the use of an observer allowing the pilot to maintain situational awareness and to avoid task overload.	L

Risk Assessment Profile #17 (Continued)

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Engine Failure while operating within the height/ velocity diagram	Possible loss of life and destroyed aircraft.	Unlikely	Catastrophic	H	Power assurance checks will be completed daily and trended to ensure the engine is meeting manufacturer specifications	L
Settling with Power	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L
Loss of Tail Rotor Effectiveness	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that aircraft is operated with HOGE performance.	L
Loss of situational awareness due to sun, low light, or haze	Inability to see natural/ manmade hazards causing a CFIT accident	Unlikely	Major	M	Powerline patrol operations should not be conducted into a rising/setting sun.	L
Fatigue related stress resulting in “complacency” or “over confidence”	Possible damage to aircraft or personnel	Unlikely	Major	M	MHI Pilot conducting Pipeline Patrol will be ona schedule of 2 weeks On/Off or similar to reduce fatigue.	L
Landing with inadequate main/tail rotor clearance.	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that the landing area allows 1/3 diameter rotor clearance (12’).	L
Inadequate training or proficiency of the crews involved.	Inability for client to complete required surveillance	Unlikely	Minor	L	MHI Pilots will receive a pipeline orientation prior to conducting the operation.	L
Low Altitude Flight	Inability to see man-made hazards	Likely	Major	M	Surveillance flights will be flown at 400 to 500 feet AGL. When a lower altitude is required, the maximum airspeed will be 60 KIAS. Low altitudes below 400 feet AGL will be of limited duration	L

26.18 Skid/Toe-In/Hover Exit (STEP) Operations-RW

Task to be performed: Skid/Toe-In/Hover Exit (STEP) Operations-RW
Risk Assessment Profile #: 18
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	H	Prior to conducting STEPt Operations and upon receiving Tier 1 approval, the MHI Pilot, and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	M
Inadequate training or proficiency of the crews involved.	Inability for client to complete required work	Extremely Likely	Major	H	MHI Pilots **must** demonstrate proficiency IAW STEP SOP to a MHI Instructor prior to conducting the operation.	M
Engine Failure while operating within the height/ velocity diagram	Possible loss of life and destroyed aircraft.	Unlikely	Catastrophic	H	Power assurance checks will be completed daily and trended to ensure the engine is meeting manufacturer specifications	L
Landing with inadequate main/tail rotor clearance.	Possible damage to aircraft or personnel	Likely	Major	M	MHI Pilot will ensure that the landing area allows 1/3 diameter rotor clearance (12’).	L
Downdrafts/ Gusty Winds	Aircraft unable to maintain sufficient altitude.	Unlikely	Major	M	MHI Pilot will ensure that the aircraft is operated withHOGE performance capability.	L
Passengers contacting rotor system when boarding or deplaning aircraft	Possible fatal injuries and damage to aircraft	Unlikely	Catastrophic	H	Ensure passengers practice entry/exit procedures on theground, before they are performed in the field.	L
Center of Gravity shifts to to passengers embarking or debarking	Possible fatalinjuries and damage to aircraft	Unlikely	Catastrophic	H	Ensure that at least 1/3 of theapplicable skid(s) are in contact with the ground.	M

26.19 Overwater Operations-RW

Task to be performed: Overwater Operations-RW
Risk Assessment Profile #: 19
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Overwater Operations, the MHI Pilot and project personnel will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Engine Failure overwater	Possible aircraft damage and injuries to personnel	Extremely Likely	Catastrophic	H	Aircraft will not be operated beyond glide distance unlessit is equipped with floats.	L
Controlled Flight into Terrain	Possible loss of aircraft control and injuries to personnel	Likely	Major	M	Aircraft will not be operatedoffshore without a visible horizon that distinguished the water and the sky.	L
Survival of occupants in the event of a water landing (Successful float inflation)	Possible aircraft damage and injuries to personnel	Likely	Major	M	Aircraft will be equippedwith a life raft capable of holding all occupants.	L
Survival of occupants in the event of a water landing (Unsuccessful float inflation)	Possible loss of aircraft control and injuries to personnel	Extremely Likely	Catastrophic	H	All offshore pilot should attend HUET training. Occupants should wear a life preserver and immersion suit to extend survival time in thewater.	M

26.20 Engine Failure during Takeoff with Passengers-FW

Task to be performed: Engine Failure during Takeoff with Passengers-FW
Risk Assessment Profile #: 20
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting all operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria	L
Engine Failure during Takeoff	Possible aircraft damage and injuries to personnel	Unlikely	Major	M	Maximum aircraft gross weight for takeoff (12,500 lbs) allows for adequate single engine climb performance in the event of an engine failure.	L
Loss of Situational Awareness	Possible loss of situational awareness / aircraft controlwith an engine failure	Unlikely	Major	M	Pilots are trained for engine-out procedures during annual simulator training and evaluated every six months.	L
Controlled flight into terrain	Loss of aircraft control causing damage to aircraft and personnel injuries	Remote	Catastrophic	H	Pilots are trained for engine-out procedures during annual simulator training and evaluated every six months.	M
Survival of occupants in the event of a forced landing	Possible aircraft damage and injuries to personnel	Extremely Likely	Catastrophic	H	Passengers are briefed on emergency egress, and onboard first aid and survival equipment in the event of emergencies.	M

26.21 Lower Than Standard Takeoff Minima Operations-FW

Task to be performed: Lower than standard Takeoff Minima-FW
Risk Assessment Profile #: 21
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting lower than standard takeoff minima operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria	L
Lower Than Standard Takeoff Minima Operations (1600 RVR or 1/4 SM)	Possible aircraft damage and injuries to personnel	Remote	Major	M	Pilots are required to follow SOPs and are specifically trained for lower than standard takeoff minima operations during annual simulator training and evaluated every six months	L
Loss of Situational Awareness/Spatial Disorientation	Possible loss of situational awareness / aircraft control during lower than standard takeoff minima operations	Unlikely	Major	M	Pilots are required to follow SOPs and are specifically trained for lower than standard takeoff minima operations during annual simulator training and evaluated every six months	L
Controlled flight into terrain	Loss of aircraft control causing damage to aircraft and personnel injuries	Remote	Catastrophic	H	Pilots are required to follow SOPs and are specifically trained for lower than standard takeoff minima operations during annual simulator training and evaluated every six months	M

26.22 Night Operations-FW

Task to be performed: Night Operations-FW
Risk Assessment Profile #: 22
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Night Operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria	L
Reduced pilot proficiency due to infrequent operations at night	Possible minor injuries and slight damage to aircraft	Unlikely	Minor	M	Aircraft will only be operated under dual pilot IFR for all night operations. Pilots will maintain proficiency in accordance with 135.247	L
Loss of Situational Awareness/Spatial Disorientation	Possible loss of situational awareness / aircraft control during night operations	Unlikely	Major	M	Pilots are required to follow SOPs and are specifically trained for night IFR operations during annual simulator training and evaluated every six months	L
Controlled flight into terrain	Loss of aircraft control causing damage to aircraft and personnel injuries	Remote	Catastrophic	H	Aircraft will only be operated under dual pilot IFR for all night operations.	M

26.23 Winter Operations-FW

Task to be performed: Winter Operations-FW
Risk Assessment Profile #: 23
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries orloss of equipment	Extremely Likely	Major	M	Prior to conducting Winter Operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment 2) Go/No Go criteria	L
Loss of visual references during landing or takeoff	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Aircraft will be operated under dual pilot IFR during winter operations when carrying passengers. Runways are required to have proper lighting before dispatch during day or night IFR operations.	L
Encountering icing conditions	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	DHC-6-400 is equipped with de-icing equipment which is capable of operating in moderate icing or below conditions. Pilots are trained to operate in winter operations to include icing conditions.	L
Spatial Disorientation Due to White-out Conditions	Possible lossof aircraft control causing aircraft damage and personnel injuries	Unlikely	Major	M	Aircraft will be operated under dual pilot IFR during winter operations when carrying passengers. Runways are required to have proper lighting before dispatch during day or night IFR operations.	L
Aircraft departs with frost/ice on surface	Possible damage to aircraft and personnel injuries	Unlikely	Minor	M	Pilot will not depart with any frost/ice present on the aircraft. SOPs require the pilot to visually check the aircraft to be free of ice/frost/snow and make a takeoff within 5 minutes of the visual inspection.	L
Controlled flight into terrain	Loss of aircraft control causing damage to aircraft and personnel injuries	Remote	Catastrophic	H	Aircraft will only be operated under dual pilot IFR for all winter operations.	L

26.24 Contaminated/Icy Runway Conditions-FW

Task to be performed: Contaminated/Icy Runway Conditions-FW
Risk Assessment Profile #: 24
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Operations with contaminated runways, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment 2) Go/No Go criteria	L
Loss of Directional Control While Taxing	Possible minor injuries and slight damage to aircraft	Unlikely	Minor	M	Pilot are required to follow SOPs and will not operate when ramp/taxiway or runway conditions are less than 20 mu/Nil.	L
Loss of Directional Control During Takeoff/Landing	Possible loss of aircraft control causing damage to aircraft or personnel injuries	Unlikely	Major	M	Pilot are required to follow SOPs and will not operate when ramp/taxiway or runway conditions are less than 20 mu/Nil. Pilots will reduce crosswind limits when runway conditions are contaminated/icy.	L
Aircraft Departs the Runway or Taxiway Surface	Loss of aircraft control causing damage to aircraft and personnel injuries	Likely	Catastrophic	H	Pilot are required to follow SOPs and will not operate when ramp/taxiway or runway conditions are less than 20 mu/Nil. Pilots will reduce crosswind limits when runway conditions are contaminated/icy.	M

26.25 High Crosswind Operations-FW

Task to be performed: High Crosswind Operations-FW
Risk Assessment Profile #: 25
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Operations with high crosswinds, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment 2) Go/No Go criteria	L
Exceeding Aircraft Design CrosswindLimits	Possible loss of aircraft control causing damage to aircraft and personnel injuries	Likely	Major	M	Pilots are required to follow SOPs and will not operate with an observed/forecasted crosswind component over 20 KTS.	L
Loss of Directional Control during High Crosswind Operationwith Icy Runways/Taxiways	Possible loss of aircraft control causing damage to aircraft or personnel injuries	Likely	Major	M	Pilots are required to follow SOPs and will reduce crosswind limits when runway conditions are contaminated/icy.	L
Aircraft Departs the Runway or TaxiwaySurface	Loss of aircraft control causing damage to aircraft and personnel injuries	Likely	Catastrophic	H	Pilots are required to follow SOPs and will reduce crosswind limits when runway conditions are contaminated/icy.	M

26.26 Wildlife on the Runway During Takeoff/Landing-FW

Task to be performed: Wildlife on the Runway During Takeoff/Landing-FW
Risk Assessment Profile #: 26
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Operations with Wildlife in the vicinity of the airport, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment 2) Go/No Go criteria	L
Loss of Aircraft Control During Takeoff/Landing to Avoid Wildlife on the Runway	Possible loss of aircraft control causing damage to aircraft or personnel injuries	Likely	Major	M	Pilot are required to follow SOPs and will do a visual check of the runway and adjacent area to ensure no wildlife are near the runway. If wildlife are on or near the runway for landing the pilots will go around. Pilots will delay takeoff if wildlife are near or on the runway.	L
Aircraft Impacts Wildlife on the Runway During Takeoff/Landing	Possible loss of aircraft control causing damage to aircraft or personnel injuries	Likely	Major	M	Pilot are required to follow SOPs and will do a visual check of the runway and adjacent area to ensure no wildlife are near the runway. If wildlife are on or near the runway for landing the pilots will go around. Pilots will delay takeoff if wildlife are near or on the runway.	L
Aircraft Departs the Runway or Taxiway Surface to Avoid Wildlife on the Runway	Loss of aircraft control causing damage to aircraft and personnel injuries	Likely	Catastrophic	H	Pilot are required to follow SOPs and will do a visual check of the runway and adjacent area to ensure no wildlife are near the runway. If wildlife are on or near the runway for landing the pilots will go around. Pilots will delay takeoff if wildlife are near or on the runway.	M

26.27 Aircraft Egress Without Stairs-FW

Task to be performed: Aircraft Egress Without Stairs-FW
Risk Assessment Profile #: 27
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment 2) Go/No Go criteria	L
Fall Hazard for Passenger Egress During Ground Emergencies Without Stairs (controlled evacuation)	Possible personnel injuries	Likely	Major	M	Passengers are briefed on emergency egress with and without stairs prior to each fight. Time permitting, the Captain will insert the temporary stairs onboard the aircraft and direct an evacuation from the aft cargo door.	L
Fall Hazard for Passenger Egress During Ground Emergencies Without Stairs (immediate evacuation)	Possible personnel injuries	Extremely Likely	Critical	H	Passengers are briefed on emergency egress with and without stairs prior to each fight. When an immediate evacuation is initiated by the Captain, the passengers are directed to open the aft cargo door, sit down with their legs outside the aircraft and then push off slightly. There is a 12-18” drop before ground contact can be made making it a high potential for injury.	M

26.28 Passenger and Cargo Operations-FW

Task to be performed: Passenger and Cargo Operations-FW
Risk Assessment Profile #: 28
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries orloss of equipment	Extremely Likely	Major	M	Prior to conducting Passenger and Cargo Operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria.	L
Passengers contacting propeller when boardingor deplaning aircraft	Possible fatal injuries and damage to aircraft	Remote	Catastrophic	H	Passenger loading/unloading procedures are not authorized with engines running. Pilots will direct all passenger loading and unloading to remain clear of the propellers.	L
Passengers carrying loaded weapons in passenger compartment	Possible personnel injuries and damage to aircraft	Likely	Major	M	Ensure required Passenger Briefings are completed	L
Loading aerosol bear repellant in passenger compartment	Possible personnel injuries and damage to aircraft	Likely	Major	M	Comply with SOPs and published cargo loading guidance; ensure required Passenger Briefings are completed	L
Operating aircraft outside design limits dueto cargo loading	Possible personnel injuries and damage to aircraft	Unlikely	Major	M	Strictly comply with Flight Manual and other applicable guidance	L
Cargo shifting during flight	Possible personnel injuries and damage to aircraft	Likely	Major	M	Pilots are required to properly secure the cargo prior to engine start/taxi. Pilots received initial cargo loading training to properly secure cargo with and without passengers	L

26.29 Pipeline Patrol Operations-FW

Task to be performed: Pipeline Patrol Operations-FW
Risk Assessment Profile #: 29
Assessment Member(s): Dir of Ops, Dave Jones; Chief Pilot, Dave Buzga, Assistant Chief Pilot, Mark Hedlund; Quality and Safety, Dennis Busch

Hazard	Potential Consequence	Likelihood	Severity	Risk	Mitigation	Residual Risk
Unknown responsibilities	Injuries or loss of equipment	Extremely Likely	Major	M	Prior to conducting Pipeline Patrol Operations, the MHI Pilots will conduct a detailed briefing that will cover: 1) Review of this Risk Assessment. 2) Go/No Go criteria	L
Collision with structures or towers	Possible loss of life and destroyed aircraft	Unlikely	Critical	M	Pilots will follow SOPs and will not fly below 500 feet AGL except to land or takeoff.	L
Controlled flight into terrain	Possible loss of life and destroyed aircraft.	Unlikely	Critical	M	Powerline Patrol operations will always be flown dual pilot allowing the pilot flying to maintain situational awareness and avoid task overload.	L
Loss of situational awareness due to sun, low light, or haze	Inability to see natural/ manmade hazards causing a CFIT accident	Unlikely	Major	M	Powerline patrol operations should not be conducted into a rising/setting sun.	L
Fatigue related stress resulting in “complacency” or “over confidence”	Possible damage to aircraft or personnel	Unlikely	Major	M	Pilots conducting Pipeline Patrol will be on a schedule of 2 weeks On/Off or similar to reduce fatigue.	L
Inadequate training or proficiency of the pilots involved.	Inability for client to complete required surveillance	Unlikely	Minor	L	Pilots will receive pipeline orientation training and examination prior to conducting the operation.	L
Low Altitude Flight	Inability to see man-made hazards	Likely	Major	M	Surveillance flights will be flown dual pilot and at 500 feet AGL.	L