

NORMALIZATION OF RISK:
Identifying and rectifying
negative influences on airport safety

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A man dies in a tragic accident while clearing an airport access road of snow. He had exited his equipment and approached a companion piece of heavy equipment from behind on foot. Neither equipment operator had been trained in basic safety procedures or operations on airports.

A Transport Canada aerodrome safety inspector requests immediate intervention in the operation and maintenance of an airport citing "serious and immediate safety concerns" based on the sub-standard level of maintenance.

Following the investigation of an aircraft accident off-airport, it is determined that the airport maintainer is not certified and has not received training in nineteen years.

During a survey for a federal working group study it is found that the majority of volunteer emergency response agencies who are tasked with responding to airport emergencies are not aware of the emergency procedures manuals and are uncertain as to whether they have ever received them.

Is this an airport operator's nightmare, or is it fact?

Unfortunately for all involved, the above examples are true. The questions that remain to be answered are: how did the airport operators arrive at this state; and, what can be implemented to correct the obvious safety and operational concerns?

To place these questions in the proper context this case study will begin with a comparison of another organization's example where the safety system breakdown resulted in a catastrophic accident - NASA's space shuttle Challenger failure. The three main contributing aspects of the Challenger accident can be applied to the Government of the Northwest Territories, and any other organizations that currently operate airports.

This paper will then continue with theory regarding system safety, operational

integrity and the need for risk analysis followed by an abbreviated history of the operations of airports in the Northwest Territories. This will be followed by a comparison of the Challenger themes to what currently exists in the Northwest Territories and finally, recommendations and an action plan for the existing situation in the Northwest Territories airport's operating system.

System Safety and Operational Integrity Theory

In Diane Vaughan's analysis of the space shuttle Challenger disaster The Challenger Launch Decision, the focus was the decision-making process that contributed to the launch of the space shuttle Challenger on January 28, 1986. The launch was conducted even though one of the main contractors recommended against launching the shuttle based on the colder-than-normal temperatures that had been predicted and the uncertainty of the effect of the cold on the Challenger operation.

Once the official accident investigations were completed the Presidential Commission was held as a further attempt to decipher at what point intervention could have prevented this tragic accident. It was discovered that the cause of the accident was the O-ring on the solid rocket booster, which did not seal due to impaired resiliency because of the unprecedented cold temperatures on the morning of the launch. The O-ring failure allowed hot gases between the segments of the solid rocket booster, which resulted in a fire. The flame breached the External Tank holding the liquid nitrogen and oxygen and 75 seconds into the Challenger launch it exploded. The crew compartment plummeted into the sea below, hitting the water at over 200 miles per

hour.

More shocking than the fact that the launch proceeded, despite one of the contractor's recommendations against the launch, was the fact that problems with the O-ring and the ability to seal the joint on the solid rocket booster were identified as early as 1977 - almost nine years before the Challenger accident. The O-ring had not functioned as planned on many of the previous missions, however, a definite cause and corrective action could not be identified and therefore the space shuttle operation continued with the faulty design.

Vaughan documents and describes the process for decision making and offers explanation as to why NASA continued to launch the space shuttle knowing that items were not up to performance expectations. She outlines key points which were widely disseminated in the media as the contributing factors to the fateful accident:

(1) unrelenting pressures which required NASA to meet deadlines with fewer and fewer financial resources; (2) organizational characteristics which rewarded managers and employees for meeting goals "no matter what the cost"; and (3) regulatory ineffectiveness as a result of a sprawling organization with communication difficulties (p.34).

She further expands on the idea of organizational characteristics as she describes norms within organizations which are "cultural beliefs and conventions originating in the environment and creating unreflective, routine, taken-for-granted scripts that become part of the individual worldview" (p.37). Vaughan also elaborates on the theory that cultural norms constrain the options for decision-making which becomes

more an example of rule following and operating within resources, rather than a calculation of costs and benefits (DiMaggio & Powell, cited in Vaughan, p.37).

Finally, Vaughan references Merton as she expands his theories of regulatory ineffectiveness due to bureaucracy. A bureaucracy relies on classification of individual problems on the basis of established criteria, following fixed routines and established hierarchical lines of communication and extensive paperwork which then establishes the precedent for subsequent actions (cited on p.502). In this instance, bureaucracy and cultural norms serve to support and reinforce each other.

While Vaughan goes on to describe and elaborate on the popular view of NASA and the factors involved in the space shuttle Challenger accident, resulting in a broader and more in-depth portrayal of the accident, these three themes remain constant throughout her analysis: (1) a widely spread, ineffective bureaucracy with communication difficulties; (2) meeting unrelenting pressures with fewer and fewer financial resources; and (3) organizational characteristics and cultural norms.

When these three factors impact upon individuals or organizations, previously unacceptable actions or decisions may become the norm. Standards and criteria are slowly degraded as a business struggles to accomplish more tasks with fewer resources, and the level of acceptable risk rises. Over time it becomes “normal” to have a reduced margin of error, insufficient resources, and inadequate direction and until it permeates the entire organization culture. Previously unacceptable risk is now “normalized” and becomes the standard. The situation will continue to degrade until such time as there are repercussions that force a thorough examination of the entire

safety system.

There are numerous articles and discussion on emergency preparedness and risk management and many of the theories can be applied, not simply to accident prevention, but to all aspects of business operation whether it is a public (ie. government) or private business.

In the book Normal Accidents: Living with high risk technology, author Perrow notes "that no human activity is free from risk and that, in fact, accidents are a normal part of our everyday existence. The need for crisis and disaster planning should be based on not whether these events will occur but rather on when they will occur (Emphasis added. Cited in Kuban, January 1995). In the opinion of this writer, "system safety analysis" could be substituted for "crisis and disaster planning".

There is a need to examine system safety because, as stated above, there is risk in all human activities and accidents or incidents will happen. There is a reluctance for analyzing system safety for a number of reasons but it can be summed up by saying that it is a mix of denial and wishful thinking, coupled with the belief that someone else is responsible for analyzing the system.

Denial and wishful thinking can be described as the "Ostrich Syndrome" which is based on two related myths: one is the belief that the industry, organization or system in question is inherently safe through a checks-and-balances and that it will never be confronted with a disaster or a breakdown in the system. The other myth is the acceptance that disasters or system breakdown will occur but somewhere else and in someone else's region (Kuban, January 1995).

Wishful thinking is also found in the "someone else will do it (SEWDIT)" syndrome. Here, it is believed that it is someone's responsibility to ensure that planning and safety analysis are completed on the organization and someone will ensure that appropriate action is taken to rectify any problems or deviations (Kuban, January 1995). But, as we will see in discussions of bureaucracy and communication difficulties, unfavourable information is not sought out, and unless each individual assumes responsibility for identifying and rectifying sub-standard conditions or situations the status quo will remain, further entrenching the belief that all the risks are acceptable.

Everyone involved in an organization must recognize and debunk the "Ostrich Syndrome" and "SEWDIT". In addition, commitment from senior management of any organization is required to accurately assess system safety and adequately address any deficiencies.

Risk is found in all aspects of daily life. The way in which the costs and benefits are analyzed within individuals and organizations is affected by the availability of resources and organizational culture. Resources are required to provide adequate staff for positions and training for all employees. As will be explained in subsequent pages, depending upon the culture of an organization, options for decision-making may be constrained and the ability to affect positive change may be reduced.

A convoluted governmental organization with little allowance for positive action; scarce resources; and cultural aspects of the airport operational organization which assume that "if things have always been done this way and have worked out in the past,

then all will work out in the future" result in degradation of the entire safety system.

These three aspects played a pivotal role in the space shuttle Challenger disaster. They form the backbone of the normalization of risk within the GNWT airport operational system and may also impact on the operation of any airport within Canada.

Historical and Political Background

Beginning in 1974, the Government of the Northwest Territories (GNWT) assumed responsibility for operations and maintenance of airports in the Arctic on behalf of Transport Canada. The GNWT established a category system that was broadly based on runway length, airport activity, and community population size. Each category provided a minimum standard of facilities which ranged from the Arctic "A" with a runway length of 6,000 by 150 feet (minimum) and a passenger terminal, to the Arctic "B" which had a runway length of 5,000 by 150 feet and a passenger shelter. Finally, the Arctic "C" airports had a runway of 3,000 by 100 feet and possibly a passenger shelter (YVR VISTAS, section 6, page 2).

In 1991, the federal government transferred the ownership and responsibility for all aspects of airport development, operations, and maintenance for Arctic B&C airports in forty Northwest Territories' communities to the GNWT. The nine Northwest Territory Arctic A airports were subsequently transferred to the GNWT in 1995.

Responsibility for the delivery of the airport maintenance and operations functions were delegated to the various GNWT regional offices in the late 1970s and this practice continued following the transfer of the Arctic B&C airports. Policy, program

development and delivery of the capital program were coordinated from the GNWT headquarters located in Yellowknife, Northwest Territories from 1991 until 1996 (Howard, March 1998).

During September of 1995, in preparation for the east-west division of the Northwest Territories into the new territory named Nunavut (the eastern portion) and the Northwest Territories (the western portion), the Nunavut Transportation corporate office headquarters located in Rankin Inlet, NT was created. This was followed by the creation of the Nunavut Arctic Airports headquarters, also located in Rankin Inlet. Since that time, creation of the Nunavut Arctic Airports headquarters staffing of positions has occurred slowly, according to a predetermined plan agreed to by the GNWT, the federal government Department of Indian and Northern Affairs and the various Inuit organizations responsible for overseeing the creation of the new territory.

The responsibility for ensuring that delivery of services at airports meets all certification and safety standards remains with the Yellowknife Arctic Airports headquarters group, as airport operations is still one program until division of the territory in 1999. However, as staff is added at the Rankin Inlet office, more and more control and responsibility is delegated from the Yellowknife office to the Rankin Inlet contingent.

In total, Nunavut Arctic Airports headquarters is responsible for twenty-five airports in the eastern Arctic where none of the communities have road access and the sole means of year-round transportation is via air transportation. Nunavut, upon its official creation as the newest territory in Canada, will encompass slightly more than

350,000 square kilometres of land and have a population of approximately 25,000 people.

At the height of Transport Canada's involvement in airport operations and management, the airport system of a total of 52 airports within the Northwest Territories was controlled by the former Central and Western Regional offices from Winnipeg, Manitoba and Edmonton, Alberta respectively. The two offices had a combined staff of approximately 140, responsible for the airports in the Northwest Territories, Manitoba, Saskatchewan and Alberta. Today, there are thirty-two staff members located in Yellowknife and twelve staff members located in Rankin Inlet tasked with the overall coordination of airport management within the whole of the GNWT system.

This brief synopsis now sets the stage for further analysis of the difficulties which face small airports within the Northwest Territories and what will soon be Nunavut. It should be noted however, that many of the challenges faced by small airports in the Arctic are common to small airports across Canada. The problem areas and the warning signals may apply to any and all of the approximately 650 aerodromes certified as airports.

1. Widespread Bureaucracy and Communication Difficulties

Within the Government of the Northwest Territories, the current transportation organizational structure is as follows (see also page 12, figure 1): the Deputy Minister of Transportation delegates his authority to the Assistant Deputy Minister of Transportation who is responsible for overseeing the operation, maintenance and construction as

required, of access roads, community wharf projects, and airports.

For airport management, the structure is further delegated to a Director of Airports is responsible for monitoring programs such as safety, security and operational issues as well as ensuring that airport capital projects, such as buildings and airside civil projects are completed to the necessary standards. Within the Arctic Airports Division lies considerable airport expertise, however, the Division does not directly operate the twenty-five airports within the new Nunavut Territory; this task falls to another branch within the overall bureaucracy of the GNWT.

There are three regions within the new Nunavut Territory - each with a Regional Superintendent who is responsible for ensuring that the community access roads, wharves and airports are operated and maintained. The Regional Superintendent further delegates the responsibility for operations and maintenance monitoring to a Regional Manager, Airport Operations, who in turn contracts the operations of the various airports to the local communities. The communities are most commonly called "Hamlets" which is the title given to the incorporation which manages and operates the communities' infrastructure and activities.

The Director of Arctic Airports, who has the responsibility, the resources and the mandate to monitor airport operations does not have an explicit line of communication or influence upon either the local community, or the next level of Regional Manager, Airport Operations. Rather, the hierarchical chain of command requires that in the event issues at a particular airport must be addressed, the request must pass through the Regional Superintendent, to the Regional Manager and from there, to the community

responsible for operation and maintenance.

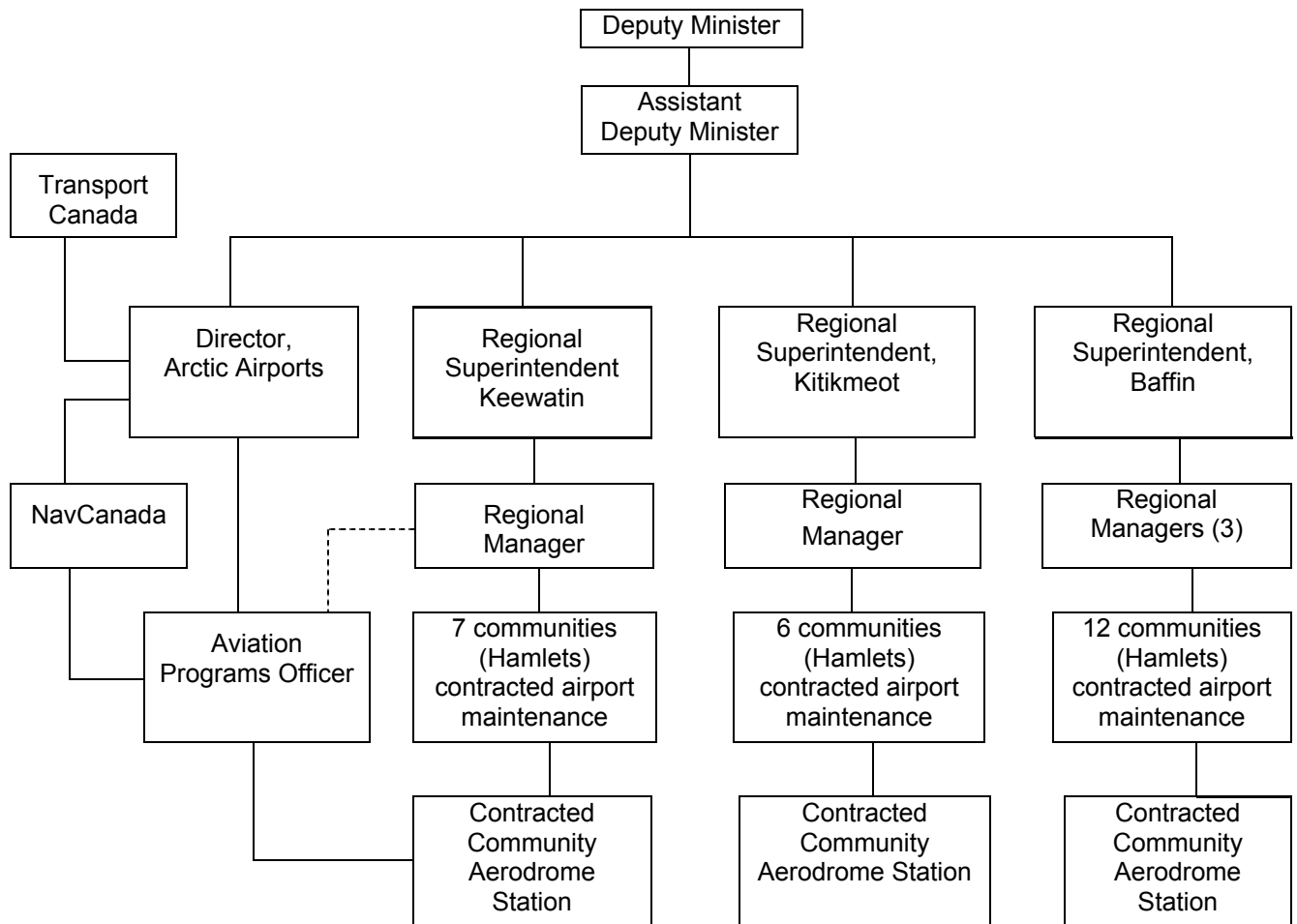
Airport operations in Nunavut are further complicated by the changing mandate of Transport Canada. No longer an airport operational body but fulfilling a regulatory function for all airport operations in Canada, Transport Canada currently communicates directly with the staff of Arctic Airports on all airport certification issues. It then falls to the Arctic Airports staff to coordinate action required at any of the twenty-five airports with the applicable three regional offices. Again, information is required to flow across from the Arctic Airports Division, over to the Regional offices and then down to the community level.

The final complicating factor in the scheme of airport operations in Nunavut is the delivery of NAVCANADA services. The GNWT supports the Community Aerodrome Radio Stations (CARS) at the majority of the airports within Nunavut. NAVCANADA transfers funds to the GNWT, which in turn establishes contracts, at the Regional level with the communities to provide staff for the operation of the stations which provide aerodrome weather information and vehicle coordination at each airport.

NAVCANADA does not have any direct contact with the communities, rather their point of contact is with Arctic Airports who contact the applicable Hamlet or airport operator. Arctic Airports staff are directly responsible for quality assurance, standards and certification of observer/communicators. The Regional offices are involved solely as contract administrators. The hierarchy as outlined with previous aspects of airport operation changes with CARS services delivery as Arctic Airports staff communicate directly with the Hamlet employees and/or airport contractor and are not formally

required to inform the Regional offices as to what issues and concerns are on-going.

Figure 1 – GNWT Organizational Chart



In reality, the cumbersome bureaucracy is often circumvented by a phone call to the Regional Manager with a request to contact the community directly provided that the information be circulated back to the Regional Office. This is the first opportunity for the possibility for the breakdown of communication. The applicable Regional office has the right to require that the official chain-of-command be adhered to - which results in information passing through a minimum of two individuals prior to reaching the intended recipient. Or, the staff under the Director of Arctic Airports may contact the Hamlets directly, but not circulate the information back to the Regional office personnel, who

remain unaware of what has transpired at an airport site under their direct responsibility.

As outlined, the bureaucracy within the GNWT is well established and complex which impedes accurate communication if information is not disseminated in an accurate and timely manner. Accurate communication is essential to safe airport operations and the existing hierarchy is in place to ensure that those responsible for airport operations, the Regional office personnel, are fully aware of any situations at their airports impacting upon safety, security and operational integrity.

The Arctic Airports personnel are then to be utilized to assist the Regional offices and to be the first line of monitoring prior to reaching situations requiring Transport Canada intervention. Diligence in forwarding information up and down the chain of command is required and problems arise when the system is circumvented. According to Vaughan, "people violate laws, rules and regulations in the workplace for many reasons. If they perceive a rule to be irrelevant, that perception may influence their willingness to abide by it" (page 194). It is easy to see that if personnel do not discern the importance of maintaining the communication chain, and violate "the rule" of circulating through the Regional office and then onto Arctic Airports, potentially dangerous situations may go undetected.

This is further supported by David Bella who is an engineer and organizational analyst when he writes about 'systemic distortion'.

Unfavourable information is lost, not by malicious intent, purposeful concealment, or reluctance to say something superiors do not want to hear, but as a collective and systemic consequence of organizational structure and roles: people deliberately do not seek out unfavourable information" (cited in Vaughan, p.273).

2. Inadequate Resources

Inadequate resources are the next factor which contribute to the normalization of risk: funding levels are reduced to meet other governmental objectives (such as a balanced budget) resulting in a reduction of staff and funding for training, travel for inspections and operational contracts. Reduced staff requires increased workload for the remaining members which leads to some tasks being deemed less of a priority. Lack of training results in the possibility of staff with out-of-date skills or lacking completely in skills required to complete their position. Travel for inspections is reduced as a result of lack of staff and funding and reliance is placed on reports from the communities, which may or may not be accurate for the reasons stated by David Bella on the previous page.

When the Arctic “A” airports were transferred from federal to territory ownership, some of the financial resources associated with the transfer provided the Department of Transportation with the flexibility to implement the division plan to staff the Nunavut office in Rankin Inlet in preparation for the division into the two territories in 1999. Airport site resources remained constant, or were slightly decreased. In 1996, the government announced its agenda for change which included securing the future of the Northwest Territories and the future Nunavut, by balancing the books and recovering the deficit. Legislation was passed requiring the elimination of the deficit within two years. Eight million dollars was trimmed from the Department of Transportation's budget.

The Arctic "A" airports bore the brunt of this budget cut while financial resources were reallocated and there was minimal impact at the airport sites and regional offices. In 1997, the overall budget was again reduced by fourteen million dollars and this resulted in reductions at all levels - sites, regions and headquarters (Milley, presentation, January 1998).

Capacity is integrally linked to resources which impacts on the ability to deliver or accomplish set tasks (Milley, presentation, January 1998). The capacity for completing an assigned task is reduced when "organizations tend to pay more attention to the costs of main activities and neglect costs of activities that do not contribute significantly to meeting deadlines" (Vaughan, p.268). Therefore, if the focus is placed on the current costs of airport operations and maintenance contracts with communities and subsequently there is a reduction or elimination of training, there may be an initial savings. However, the long term effects of employee dissatisfaction, inefficiencies or lack of safety awareness may be astronomical.

3. Organizational Culture

Organizational culture forms the final leg of the "normalization of risk" triangle. Organizational culture "includes self-image as well as norms, rules and technical know-how that organize beliefs and actions in light of this image" (Vaughan, page 209). In many organizations, and in the writer's opinion the GNWT is no different, the culture centres on accomplishing more-with-less. There is the implied challenge in the knowledge that aspects of safety and airport operational integrity must be maintained

while resources are reduced and bureaucracy impedes direct action.

Dedicated, professional staff are then driven to find means of accomplishing their assigned tasks through phone calls and reliance on community reports, rather than actual inspections. Or through a one-day inspection when three or five days were required - "but a little is better than none" - becomes the theme. "Small" issues such as a failed back-up alarm on a piece of equipment are allowed to remain unrepaired as there are more crucial, demanding items that require attention.

As each "small" detail is allowed to pass unresolved or with insufficient attention but without repercussions, it strengthens the illusion that always accomplishing more-with-less is feasible and practical. The small details that do not directly contribute to meeting deadlines or goals remain unaddressed and according to Vaughan "we achieve consistency by aligning our actions with the past. As a result, people can see their own conduct as culturally approved and conforming, even when the behaviour is objectively deviant" (p.222-3).

Safety equipment and safety training is required; appropriate, professional operational training is required; adequate resource materials and supplies are required in order to safely operate any business, but particularly an airport, in an efficient proactive manner. Organizational culture serves to "relegitimize the past, provides a medium for the present and sets the stage for the future" (Vaughan, p.223). And a culture that consistently rewards behaviour that violates basic rules of efficient and safe operation may be rapidly disintegrating into failure.

Summary of Normalization of Risk

As outlined on previous pages, normalization of risk takes place when clear, objective thought processes are abandoned in the struggle to maintain operational integrity in an environment fraught with dwindling personnel and funding resources and a corporate culture that encourages personnel to do whatever is required to accomplish a set task. It is only following accidents or incidents that the cultural norms are disrupted which allow for an objective analysis of the cause, effects and ramifications surrounding the occurrence.

The difficulty regarding analysis of disasters or accidents stems from "the tendency for a problem that was ill structured in an organization to become a well-structured problem after a disaster, as people look back and reinterpret information ignored or minimized at the time, that afterward takes on new significance as signals of danger" (Vaughan, p.69).

In common language, hindsight is twenty-twenty and the meaning of events and actions at the time of decision-making take on a different meaning and level of importance following an accident and subsequent reassessment.

Normalizing all risks - even those that were previously unacceptable - becomes ingrained into the organization and requires substantial effort, commitment and vision in order to objectively examine the safety system and effect positive change. However, it is imperative that the effort be expended to create an atmosphere where an objective view is desirable and where positive action is commended. All risks are not acceptable and in the aviation industry the lives and well-being of the travelling public rest in the hands of

airport operators. It is our responsibility to remove our "organizational blinders" and demand that standards and policies be adhered to, and that adequate resources are provided to meet those standards.

This point is further strengthened by the Canadian Aviation Regulations (the CAR) which falls under the provisions of the Aeronautics Act of Canada; the Act and CAR applies to airport operations throughout Canada. In a recent analysis of the CAR GNWT Legal Counsel stated that under the CAR "operator" in respect of an airport is defined to mean the holder of an airport certificate or the person in charge of the airport, whether as an employee, agent or representative of the holder of the certificate. Therefore, even though the GNWT (or any other agency, provincial department) may hold a certificate for an airport, the CAR specifically allow for the person in charge of the airport to be personally liable to prosecution for a breach of the CAR.

The Legal Counsel analysis expands the liability issue by stating that in addition to prosecution for regulatory offences, there is the potential for prosecution in respect of offences under the Criminal Code of Canada. In extreme cases of negligence, where death or serious injury results, provisions of the Criminal Code could be employed to prosecute those persons responsible for the situation that contributed to the death or serious injury. For example, if a runway is in such condition that it is not suitable for landing purposes, whether due to lack of maintenance or extremely shoddy maintenance, the persons responsible for failure to maintain and/or the person responsible for communicating the condition of the runway to the appropriate authorities may be liable to prosecution. This may occur where those persons knowing of the

condition and knowing that use of the runway could result in death or injury, take no steps to remedy the situation or to prevent use of the runway. Or, worse, indicate or imply that the runway is safe for use (Legal Counsel, pp 3-5).

The most prudent course of action personally and professionally, for all operators of airports, is to set aside complacency and to examine the entire safety and operational system with fresh, objective eyes rather than accepting the status quo and normalizing the risks.

System Safety and Operational Integrity Analysis

In order to adequately assess system safety within an organization and to effect any changes it will be necessary for all levels of airport operators to agree to a system of implementation. Using Kuban's framework for successful emergency response plan implementation as the basis for a wide-sweeping audit and subsequent change to an organization's culture, mindset and methods of conducting business, the following five steps are required:

1. Commitment at the highest level which is unwavering even under extreme commitment to and pressure by other significant operational priorities;
2. A team effort that incorporates extensive consultation from all aspects of organization: the front line personnel; middle and senior management; and other agencies that may be involved in or impacted by a disruption of business or changes in the event of an operational disruption;
3. Communication through a team manager who is responsible for coordinating all responses and identified action items from the consultation and ensuring that senior management is aware of the deficiencies and required actions to rectify deficiencies. Once the communication has moved from the team manager upwards, it is vital to the process that feedback be filtered downwards through all levels of the consultation process;

4. A staged approach is necessary for the successful implementation of system wide change. This is necessary for two reasons: it is an overwhelming task to assess and implement changes to an established method or business, and it is magnified when attempting to assess an airport system. Staging the analysis and implementation of changes into manageable and achievable sections allows for a thorough examination without reducing the organization to chaos and dooming the project to failure. Staging also allows the team members and senior management to evaluate the direction of the project before proceeding to the next level. It is vital however, that the commitment to the overall project remains steadfast;
5. Continuity of the process must be retained. Despite the staged process, the team members and manager should remain constant; or, in the event that team members move out of the business and away from the process, the incumbent must be left with a thorough briefing and sufficient documentation to become involved.

Recommendations and Action Plan

The following is a summary of recommendations and an action plan for all airport operators - but particularly those who operate small airports - should consider:

1. Conduct a system safety and operational integrity audit utilizing the five steps outlined in the previous section.

2. Examine the financial and staff resources required to monitor airport operations. The resource level must provide the capacity to accomplish the task as described in job descriptions. For example, within the GNWT the airport operations and standards officer is required to complete "random airport inspections to ensure compliance to standards". Presently there is only one person assigned to that position and for that individual to complete inspections at the most critical airports requires detailed reports from regional and site personnel and a detailed workplan to establish

priorities. This challenge is further complicated by the present financial resources which allow for only five duty travel trips per year. At the very most, only five airports in all of Nunavut would be inspected once in any year by the operations and standards officer of Arctic Airports.

In this instance, either additional staff and travel funds are required, or the mechanism for operational monitoring requires adjustment as it is a sense of false security to rely on the operations and standards officer to monitor sites when that person must rely on members within the communities and regions to forward their questions, concerns and issues for investigation.

3. Implement a comprehensive training plan for all employees - either those of the GNWT or those of the airport contractor - on operations and maintenance of airports. Current records show that sixteen of Nunavut's twenty-five airports have airport maintainers who are operating without formal, recognized theory or structured practical training for the airport environment. This is further complicated by two factors:

(a) absence of appropriate materials that have been translated into Inuktitut which impedes training as the majority of the airport maintainers are indigenous people who may lack sufficient English language knowledge to utilize the standard training materials. Translation will be costly, however it is required in order to provide a successful training program within Nunavut; and,

(b) the transition of Transport Canada from an airport operating body to a regulatory body has reduced the opportunity to contract instructors from the former Transport Canada Training Institute in Cornwall, Ontario to fulfill training requirements.

With the downsizing of Transport Canada and the transition to a regulatory function, access to the training and in-house experience base has become more difficult. Now airport operators must make the contacts and arrange for training utilizing already insufficient resources.

4. Diligent contract monitoring is required by the regional offices. As the airport operations contracts are established and maintained by the regional managers they must be increasingly vigilant in ensuring that all requirements for safe operation to Transport Canada and GNWT standards are satisfied. This is vital considering that the regional offices legally have a duty of care to ensure that the airports are maintained appropriately.

This includes the fundamentals of monitoring hours of operation for the applicable airports. Regional offices must monitor runway surface condition reports and NOTAMs and ensure that the contractor's maintainers are providing the reports to the CARS observer/communicator to be forwarded to the appropriate Flight Service Station for publishing. Finally, the regional manager must ensure that copies of all reports and NOTAMs are retained on file. The regional manager must also verify through site inspections that all the airports within his or her responsibility are in fact maintained to appropriate standards and withhold contract payment for failure to adhere to the contract guidelines.

In conjunction with contract monitoring it is also required that the airport operations contract be reviewed and updated in order that it accurately reflect the expectations of the GNWT and the obligations of the contractor. The current airport

operations contract does not clearly define all of the expectations or outline the lines of responsibility ie: The contract does not specify that it is the contractor's responsibility to adhere to all of the conditions outlined in the NWT Safety Act and Safety legislation, and at the same time the GNWT has not in the past verified that the contractor was meeting the obligations of worker's safety. Therefore, the airport operations contract must be rewritten to clearly outline the expectations and requirements of the GNWT and contractor operations must be monitored to ensure that the contract is adhered to.

Conclusion

This case study began with a few real life situations that have existed in the airport operating environment within the Northwest Territories. Drawing on the contributing factors to the space shuttle Challenger disaster which consisted of ineffective bureaucracy, limited financial resources, and cultural norms a comparison was developed with the existing situation in the GNWT.

Normalization of risk and the need for risk analysis was then discussed, with particular attention to the civil and criminal liability that all airport operators and managers may be subject to. The way in which to ensure a safe and efficient operating environment is to conduct a system wide safety and operational audit and implement the necessary changes following the audit. This can be completed at any airport and consists of examining all aspects of airport operations focusing on the areas of resources, both personnel and financial; training of all individuals involved in airport operations; and diligent monitoring.

If an airport, or a system of airports, is allowed to operate without conducting an objective examination of the standard and condition of operations; without commitment at the highest level to implement changes; without the capacity and knowledge to complete the assigned tasks; and without continuous monitoring, airport safety and operational integrity cannot be guaranteed and risks become normalized. This situation, if allowed to remain unresolved, places airport operators and the travelling public in a precarious situation. And as was the case with the space shuttle Challenger, it will be doomed to eventual failure.

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