Report to Saskatchewan Health

Air Medical Services Review

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I. Introduction

As the oldest non-military aeromedical transport program in the world, Saskatchewan Air Ambulance, its operators and its employees have many reasons to be proud. The service has helped countless patients reach the care they need, and interviews with stakeholders revealed an enviable level of trust, confidence and satisfaction with the system. Moreover, interviews with the service's employees and operators suggested an extremely proud, dedicated, skilled and compassionate workforce.

Indeed, Saskatchewan Air Ambulance's progress during its existence and its service to the residents of Saskatchewan in that time is impressive. This report examines opportunities for SAA to reach the next level and dimension of capacity, service and safety, putting it on par with world leaders in the field of transport medicine. By exploring opportunities to improve the level of service and safety with the existing system, providing guidance on how the system can best prepare for expected changes in population size and density and by bringing forward options for the introduction of helicopters to the Air Ambulance fleet, this report indicates a general path to reaching an even greater level of service and safety.

Subsequent reports including more detailed analysis and modelling may lead to more specific recommendations, cost, benefit and timeline projections. Ornge would be pleased to assist in that effort.

Executive summary

Saskatchewan Air Ambulance's current operations reflect a service that has grown incrementally in capacity and sophistication as demand for its services has grown larger and more complex. As this program has developed, there has become a need to clearly articulate a vision for the future of the program and examine the cost ramifications of these decisions.

In this document, the options for introducing a rotary wing (i.e. helicopter) program into the service are explored. After thorough analysis of the data available and consideration of both objective and subjective measures, it is our recommendation that, of the two scenarios discussed, Saskatchewan Health proceed to a more granular analysis for the second proposed scenario: a rotary wing program with bases in both Saskatoon and Regina. In this scenario a rotary wing program would operate three aircraft and be an around-the-clock operation, responding to on-scene calls during the day only[1].

Inputs are discussed herein; major consideration should be given to choices for each input as they can have a significant effect in the financial model. High-level estimates based on required

[1] http://www.ntsb.gov/events/Hearing-HEMS/; http://www.ntsb.gov/Publictn/2006/SIR0601.pdf

infrastructure, staffing, preparation, back office and administration, capital investments, aircraft direct operating costs and select system improvements are provided below. They indicate roughly what can be expected in terms of both startup and ongoing annual costs:

- One time capital start-up cost projections are $42,500,000; and
- Year one annual operating cost projections are $9,000,000

Capital cost projections include the aircraft, medical interiors, aviation communication equipment, ground support equipment, IT infrastructure, disaster resource planning, rooftop helipads, ground helipads, some accommodation allowances for hangars in Saskatoon and Regina, legal, consulting and other fees associated with the endeavor, and contingencies (5% of the total cost).

Direct operating costs including maintenance, fuel and miscellaneous flight expenses (based on 1,500 flight hours per year for the rotary wing fleet as a whole). Fixed aviation overhead costs including pilots' salaries and benefits, ongoing pilot training, pilots' uniforms, five aircraft maintenance engineers, liability insurance (assumed to be 2% of the aircraft value) and admitted liability insurance (based on the number of aircraft seats). Fixed medical overhead costs including nurses' salaries and benefits, paramedics' salaries and benefits, paramedics' ongoing training, travel and medication, office and other supplies. Fixed admin costs including, back office staff, hangar insurance, a leased hangar in Regina, insurance for the rooftop helipads, insurance for the ground helipads, the land lease for the Saskatoon hangar, travel, communications, disaster resource planning, professional fees, administrative and maintenance fees (e.g. property tax, utilities, building maintenance) and contingencies (5% of the total cost).

Detailed 'order of magnitude' financials are found in Appendix E.

These financials are based on the suggested model which we feel will provide the people of Saskatchewan with a safe, high-quality air service into the future. Alternate models could be considered that may impact on the costing estimates.

In all the areas mentioned above, the effects of projected population growth on SAA were found to be relatively small and not adequate to impact on the overall recommendations for this report. Though there is significant expected population growth in the north, these areas are outside of the recommended areas of operation that could be served by a rotary wing program based out of Regina and Saskatoon.

In addition to the recommendations surrounding the air ambulance program, Ornge made a number of other observations and recommendations regarding the existing fixed wing service. These observations and recommendations are quite lengthy and are divided into three sections Air Operations, Medical Operations and System Management. In each of these sections there are a number of key recommendations. These recommendations have not be prioritized across the three sections.

We have identified the following three recommendations as being, in our view, critically important to the ongoing development and operation of Saskatchewan Air Ambulance:

1. Clarify the governance of the program so as to have a single point of accountability for total quality management of all aspects of the service and rationalize the organizational and accountability structure of the service into a workable management structure, including on-line medical control;

2. The move towards two-pilot flight crews (a move that would be consistent with the rotor wing staffing projections) rather than the current practice of largely single pilot operations;

3. The building of a new hangar at the Saskatoon John G. Diefenbaker International Airport to support faster response times, improved aviation safety and greater capacity for growth.

Scope of work and methodology

Ornge was retained to:

- Examine the current state of affairs with respect to the Saskatchewan Air Ambulance system, highlight the most important opportunities for improvement, make recommendations and provide order of magnitude timelines for implementing those recommendations;

- Analyze the projected impact of future population growth on the Saskatchewan Air Ambulance system and make recommendations that will help SAA accommodate that projected growth, along with order of magnitude timelines for implementing those recommendations if warranted;

- Examine and present two options for the introduction of a rotary-wing program (i.e. helicopters) into the Saskatchewan Air Ambulance system, provide order of magnitude cost and timeline estimates for implementing the recommended option.

The methodology included:

- Primary research consisting of interviews with key Saskatchewan Air Ambulance employees and stakeholders and analyses of raw data;

- Secondary and tertiary research using documents provided by Saskatchewan Air Ambulance, the Saskatchewan Ministry of Health and Patrick O'Byrne (Director of

Emergency Medical Services and Community Hospitals)[2].

- Examining provincial road ambulance data[3] to explore the demand for a rotary wing program and the impact such a program would have on the road ambulance system.

Ornge assigned resources to this project from among its Executive Management Team and other key personnel as required. Those team members focused on areas of this report relevant to their areas of expertise. Biographies of the team members are provided in Appendix G.

Having designed and implemented comprehensive, integrated transport medicine systems for the province of Ontario, Ornge takes a system-wide perspective, aiming to maximize the efficacy and productivity of the overall system rather than its component parts in isolation of one another.

In conducting our research and preparing this report, four key themes became apparent:

1. Challenges with unclear governance and accountability structures;
2. Safety and service concerns caused by infrastructure challenges;
3. The desire to better integrate with the road ambulance system; and
4. Care provided by private northern air medevac services that are not a part of SAA.

These themes form the framework of the majority of this report. Items that are out of scope for this report include:

- The exploration of a critical care road transfer program;
- The consideration of future demographic or socio-economic changes in the Province besides simple population growth projections; and
- The consideration of possible or probable future locations of new hospitals and healthcare facilities.

[2] A record of interviews conducted and documents and data considered in the creation of this report are included in the appendixes.

[3] Database provided by Saskatchewan Health on 2005-2008 road ambulance statistics representing nearly 300,000 transfers.

Ornge background and disclosure

Ornge, a non-profit charitable organization, was appointed in July 2005 by the province of Ontario's Ministry of Health to coordinate all aspects of Ontario's air ambulance system. It began operations under the Ornge name in August 2006.

Ontario's air ambulance program originally began in 1977 with a single rotor wing aircraft based in Toronto. The program has since grown to include 11 helicopters, access to over 50 fixed wing aircraft operated under various service providers, a critical care land transfer program and 22 bases around the province, 11 of which are staffed on a 24/7 basis. Ornge admits over 18,000 patients annually, making it one of the largest and most sophisticated programs in transport medicine in North America.

Regional medical directors representing each geographic area of the Province are part of the Ornge Medical Advisory Committee responsible for all decisions and standards relating to patient care. Ornge operations include a communications centre, ongoing education, quality improvement programming and information technology.

As an operator of a large and complex transport medicine system including fixed wing, rotary wing and critical care land operations, internal and contracted resources, multiple stakeholders with diverse interests and responsibility for both urban and remote northerly regions, Ornge brings valuable expertise, experience and insight to the question of improving Saskatchewan's air ambulance system and exploring the possibility of introducing a rotor wing program.

Ornge has evolved a culture of quality control, integrating patient and aviation safety. Where possible, externally validated best practices are referenced and are being adopted by Ornge.

We would be pleased to share our experience in further developing, refining and costing the recommendations and options presented in this report.

II. Introducing rotary wing operations

The primary objective of this report is to provide two potential strategies for the introduction of a rotary wing program, to recommend the preferred option and to provide estimated timelines for rollout and rough order of magnitude cost estimates for the recommended "preferred" option. The analysis examines the suitability of both rotary and fixed wing alternatives and their integration with the existing ground ambulance system. Potential challenges are also noted, along with considerations that apply regardless of which implementation option is selected.

Decision criteria in evaluating rotary wing implementation options include:

- The degree to which a rotary wing program would alleviate stress on the road ambulance program, which is indicated by the volume and locations of calls served by Saskatchewan road ambulances;

- The degree to which a rotary wing program would alleviate stress on SAA's existing fixed wing program, which is indicated by the number of flights flown with fixed wing aircraft that could be better served with rotary wing aircraft;

- The speed of response possible under different scenarios and conditions;

- The location of existing air bases;

- The cost effectiveness of patient transfers under the possible models;

- The mission profile, which is defined by the operational parameters in which a rotary wing program could reasonably operate;

- The overall impact on patient care.

Ornge made the following assumptions before carrying out its analysis of the provided road ambulance data:

- The rotary wing program will operate in an area between five and 125 nautical miles from the rotary wing base(s). Under five nautical miles, road ambulances are faster. Over 125 nautical miles, helicopters are inefficient and prohibitively expensive except in the case of areas that are not accessible by road or airstrip.

- The last three years of air ambulance data are representative of the service in general, and a fair indication of the near future demands on the service.

- SAA's rotary wing program will not conduct search and rescue missions because that is not the intent of the program nor the mission profile of the most appropriate types of aircraft under consideration. Furthermore, abstaining from search and rescue missions preserves the response capacity of the program.

- There are to be no more than three rotary wing aircraft at the outset of the program launch.

- The rotary wing program will respond only to 'code 4' emergency transfers, and will therefore have no impact on non-emergent road ambulance activity. This is so that the rotary wing program can support the neediest patients — those who are critically ill or require special care that cannot be accommodated by the road ambulance system.

- Without helipads at the sending and/or receiving facilities, there is no benefit to a rotary wing program. If all transfers are airport-to-airport, then fixed wing aircraft would be both faster and more economical.

- Receiving hospitals' helipads will operate 24 hours per day, seven days per week.

- Operations on a '24 hours per day, 365 days per year' basis is not precluded.

- Each transfer is treated as an independent flight. At the end of each transfer, the aircraft returns to its base (i.e. there is no routing efficiency planning, due in part to a lack of relevant data necessary for such planning).

- "Day" calls are classified as any flight that begins between 7am and 7pm, regardless of what time the flight terminates or the actual daylight hours on that day. Conversely, "night" calls start between 7pm and 7am.

- Dispatching is done when a call is received, rather than waiting for a road ambulance or other first responder to arrive at the scene.

- Saskatchewan weather statistically favours visual flight (versus instrument flight).

- Any flight that includes any leg over 125 nautical miles (nm) long or that originates or terminates farther than 125nm from a base will not routinely be served by the rotary wing program.

- Any flight with legs that sum to over 250nm will not routinely be served by the rotary wing program.

- Helicopters will fly direct to their destinations (i.e. no complex routing around restricted airspace, etc.)

Mission profile

It is beyond the scope of this document to evaluate and recommend a particular model of rotary wing aircraft. Based on our analysis of demand in the Province and our own experience, a twin-engine mid-weight helicopter seems appropriate. The discussion that follows is based on the capabilities of such an aircraft. Much more research and analysis is required before a particular aircraft type can be chosen definitively. Ornge has recently gone through such a process and would be pleased to share its experience and expertise in that area.

In generating the implementation options, the following was taken into account:

- Redundancy in a rotary wing operation is critical. Rotary wing aircraft have far greater maintenance needs than fixed wing aircraft. Dispatch reliability is challenging at best with a single aircraft; it is preferable to have at least one 'primary' aircraft and one 'backup' aircraft to maintain service availability in a demand-driven environment while accommodating maintenance requirements.

- Rotary wing aircraft generally operate to and from off-airport locations with little or no aviation infrastructure support (e.g. fuel facilities, flight planning facilities, etc.). With this in mind, the proposed radius of operation for a rotary wing aircraft from its home based was based on:

    - Road ambulance loading;

    - The largest radius that can be reliably covered by an aircraft that falls within the proposed budget;

    - Topography that would yield a maximum advantage (i.e. land that is relatively flat and featureless is more conducive to rotary wing operations than the rocky terrain usually seen around the Canadian Shield);

    - Reasonable travel time from home base, preparing patient for flight at the scene and delivery of the patient while maintaining sufficient fuel reserves; and

    - Maintaining a response time advantage over road or fixed wing assets[4].

Integration with the existing road ambulance system

Ornge investigated the potential for new system-wide efficiencies by introducing a rotary wing program that would, to some extent, alleviate stress on the road ambulance system and improve the quality and speed of patient care. Road ambulance data from the past three years were provided to Ornge. The following methodology was applied to evaluate its significance:

1. Data was filtered to remove spurious information and any data related to non-emergent calls;

2. Data was further filtered to remove all trips that originated inside of 5nm from the Regina or Saskatoon airports, whose final destinations were farther than 125nm from those airports or that totaled over 250nm of travel;

[4] Within a short distance of the rotary wing base, response times to the patient are faster with road vehicles. Beyond a certain distance from the base, response times are faster with fixed wing aircraft. This helps define the geographical boundaries in which it makes sense to operate a rotary wing program. For the purposes of analysis we assume that rotary wing aircraft will not serve calls within 5nm of their base(s) or beyond 125nm from their base(s).

3. Approximate latitude and longitude coordinates for trip origin and termination points were applied; and

4. Direct vectors between origins and destinations for each patient call, representing the path a helicopter would have taken to and from that patient, were mapped.

Our analysis[5] revealed the following with respect to both day and night operations[6]:

- If based out of Saskatoon only, 24.5% of the code 4 (i.e. emergency) road transfers could be done by helicopter, assuming day and night operations.

- If based out of Regina only, 25.9% of the code 4 road transfers could be done by helicopter, assuming day and night operations.

- If based out of Saskatoon and Regina, 46.6% of the code 4 road transfers could be done by helicopter, assuming day and night operations. This is less than the sum of 24.5% and 25.9% because there is some overlap between the two regions.

Our analysis revealed the following with respect to day operations only:

- If based out of Saskatoon only, 14.5% of the code 4 road transfers could be done by helicopter, assuming day operations only.

- If based out of Regina only, 16.0% of the code 4 road transfers could be done by helicopter, assuming day operations only.

- If based out of Saskatoon and Regina, 28.1% of the code 4 road transfers could be done by helicopter, assuming day operations only. This is less than the sum of 14.5% and 16.0% because there is some overlap between the two regions.

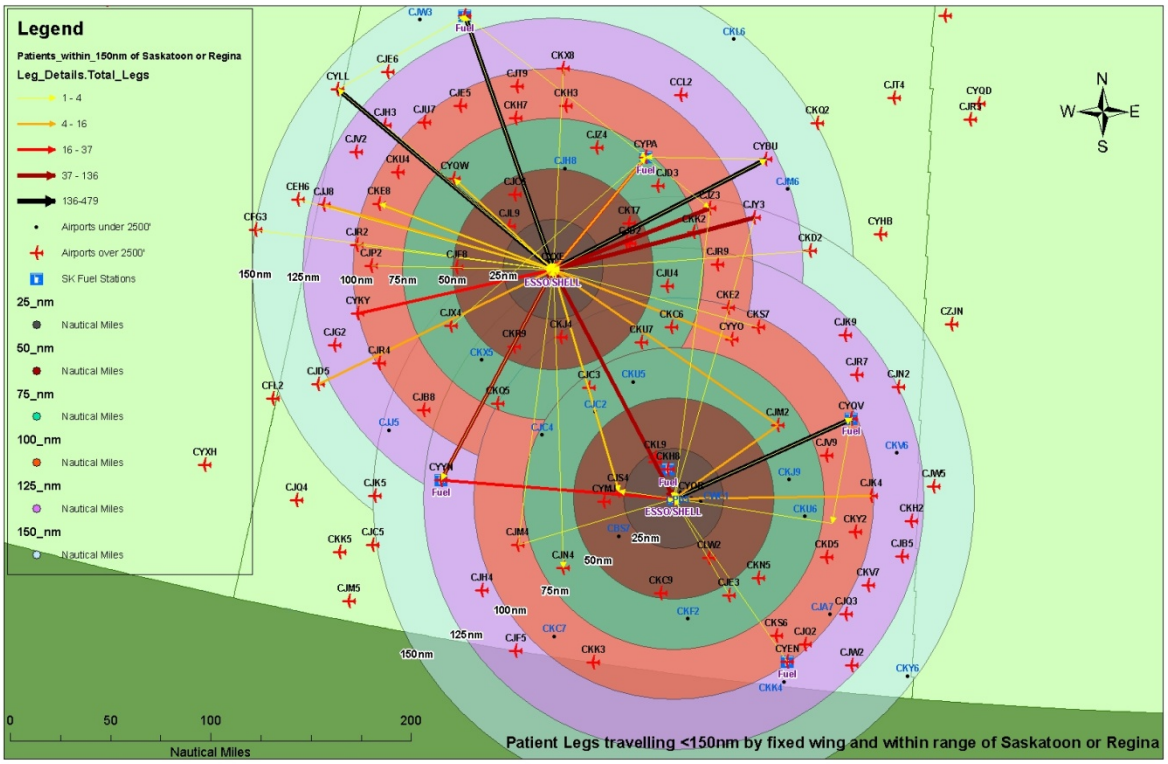
The annual reduction of road ambulance activity could reach as high as 3,385 transfers. Based on the current ratio of code 4 deliveries conducted by the four biggest service providers, the impact is 0.48%, which is immaterial. In short, a rotary wing program will help many critically ill and special care patients get the help they need more quickly, but will not have a significant impact on demand for the road ambulance system. The rotary wing program will serve both inter-facility and on-scene calls, but on-scene responses will be limited due to the already excellent responses provided to these types of calls by the existing road ambulance network.

[5] What appears here is a synopsis. The complete analysis appears in Appendix B.

[6] Analysis of the road ambulance database revealed that in Saskatoon, 59% of calls take place during the day. In Regina, 62%. In both regions combined, 60%.

Impact on existing fixed wing operations

The following map illustrates the potential range for rotary wing aircraft operating out of Regina and Saskatoon, and the volume of patients within those areas currently transferred by fixed wing aircraft.



The map above and our analysis of the data reveal that the impact of a rotary wing program on the existing fixed wing operation would be minimal. Only 2163 of the 7041 (31%) flight legs carried out by the fixed wing program fell within a 150nm range of the Saskatoon and Regina airports. Fewer still lie within 125nm. That represents barely 5% of the flight miles carried out by the fixed wing program. Typically, the patients who would be served by the rotary wing program are currently served by road ambulance and not by fixed wing aircraft.

While the introduction of a rotary wing program may enable SAA to serve more patients or improve its ability to provide timely, quality care, our analysis suggests that each program would serve a discrete type of patient need. As a result, there would be no noticeable cost offsets in the fixed wing program should a rotary wing program be instituted.

A complete analysis is provided in Appendix B.

Aircraft capabilities and rotary wing infrastructure[7]

The lack of helipad infrastructure in the Province at this time would compromise the utility of a larger aircraft built for Instrument Flight Rules[8] flight. We anticipate that the Province's rotary wing infrastructure would grow in the rotary wing program's early years and that, once the infrastructure is in place, a different service delivery model or a different aircraft type could be considered. At the outset, however, the program should reflect the infrastructure as it exists today.

In selecting an appropriate aircraft to fit the existing infrastructure, and what future infrastructure will be required to best support that equipment, the following should be taken into account:

- Daytime VFR versus daytime IFR. VFR operations support faster response times because less preparation is required prior to launch and because flight routes can be more direct. IFR-equipped aircraft are known to be safer and can safely accommodate unexpected incursions into low visibility areas (a common cause of accidents in aircraft without IFR equipment).

  It is our recommendation that SAA capitalize on the 'best of both worlds' by using fully IFR-capable aircraft and IFR-trained pilots, to benefit from the increased safety margin made available by IFR aircraft, but to operate those aircraft according to VFR guidelines. This combination provides the widest safety margin and the fastest response times while also leaving room for the operation to take advantage of infrastructure improvements as they are made.

- Payload. It is critically important that the aircraft be able to accommodate all flight crews, medical crews, medical equipment, patients and patient escorts while also carrying enough fuel to make the trip. Hot weather further reduces the aircraft's payload.

  Based on our analysis of SAA's operations and the intended use of the rotary wing aircraft, Ornge's own payload requirement of 1,200 pounds, inclusive of medical crew and equipment but exclusive of the flight crew, is applicable to SAA.

- Base locations. In addition to the urban centres of Regina and Saskatoon, Ornge also considered the possibility of locating rotary wing bases in other areas, including Prince Albert and Moose Jaw. These and other locations were ruled out early due to the difficulty of incorporating many small bases at the outset of the program. Furthermore, the topography in many areas of the Province makes rotary wing operations challenging

[7] 'Rotary wing infrastructure' primarily refers to the hangars and helipads required to operate a rotary wing program effectively. Helipads are required at both the sending and receiving healthcare facilities.

[8] Instrument Flight Rules, or IFR (as opposed to Visual Flight Rules, or VFR) describes a higher standard of aircraft instrumentation and ability that makes it possible to fly the aircraft when weather or visibility is poor. Such aircraft are considerably more expensive to purchase and operate than their VFR counterparts. Maximizing the benefits of an IFR rotary wing aircraft requires a complex aviation infrastructure that does not yet exist in Saskatchewan. Therefore, Ornge does not recommend that SAA's rotary wing program employ full IFR aircraft at the outset. They may become part of later fleet upgrades if and when the associated infrastructure materializes.

and of limited value. Based on these considerations and discussions with the client, only Regina and Saskatoon were considered as potential locations for a rotary wing base.

- Number of pilots. As discussed in more detail later, it is our recommendation that all aircraft and all operations, for both fixed and rotary wing, be optimized for two-pilot flight crews for the greatest degree of risk mitigation.

- Range. The lack of on-site refueling abilities and integration with the existing road ambulance and fixed wing air ambulance programs suggest that a range of 250 nautical miles is reasonable, meaning a helicopter will be expected to cover a 125nm radius around its home base.

- Speed. Based on the projected coverage area of the aircraft and the proposed fiscal planning envelop, a block speed of 120 knots[9] is reasonable and appropriate.

- Loading. Based on the planned use of the aircraft, it should be able to accommodate a single stretcher with patient, plus another ambulatory patient or patient escort (e.g. a family member).

- Local fundraising opportunities. Helipad construction projects outside of major urban areas often succeed at attracting local funds. The availability of local funds may inform where and when helipads can be constructed.

- Helipads. Helicopters are most efficient relative to fixed wing aircraft when there are helipads at both the sending and receiving facilities. For airport-to-airport travel, fixed wing aircraft are both faster and more economical. Providing helipads at sending facilities only will improve response times (i.e. patients will wait less before coming under the care of SAA). Having a helipad at the receiving facility as well will also reduce the patient's out-of-hospital time, with the potential benefit of further improving patient outcomes. Helipad-to-helipad flights make the most of the helicopter's abilities and offer the greatest improvement over the use of fixed wing aircraft or road ambulances.

- Equipment. The aircraft should have sufficient equipment on board to ensure that it can remain operational most of the time. In other words, it must offer sufficient system redundancy and poor weather capability to avoid unscheduled periods of unavailability. Key indicators of dispatch reliability can be identified and compared with other services and stakeholder expectations to evaluate that aspect of the service's performance.

[9] 'Block speed' refers to the average speed one could expect to maintain over the entire course of a journey, including the takeoff, cruise and landing phases of flight. Block speed is always slower than cruise speed, and is a more accurate indication of travel time than cruise speed because it takes into account the slower phases of flight.

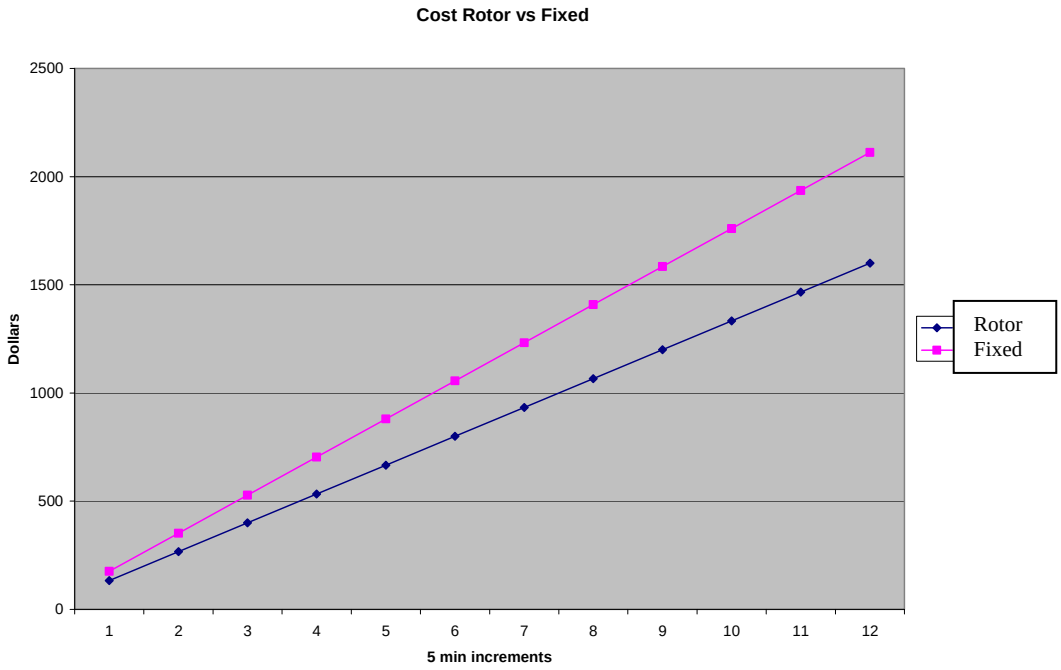
- Icing. It was suggested early in our research efforts that the Province would prefer an aircraft capable of flight into known icing conditions[10]. There are very few rotary wing aircraft with this ability, and they are considerably more expensive than other medium twin-engine helicopters. Given the substantial capital and operating costs of these aircraft and the very small number of days where icing poses a problem in Saskatchewan, further research is required to determine if the benefits of this capability justify the associated costs.

These are the most important criteria to consider when selecting a rotary wing aircraft type. It is premature at this stage to recommend a particular aircraft type. Ornge, having recently completed this process itself, would be pleased to assist in the research and analysis that would lead to a definitive recommendation.

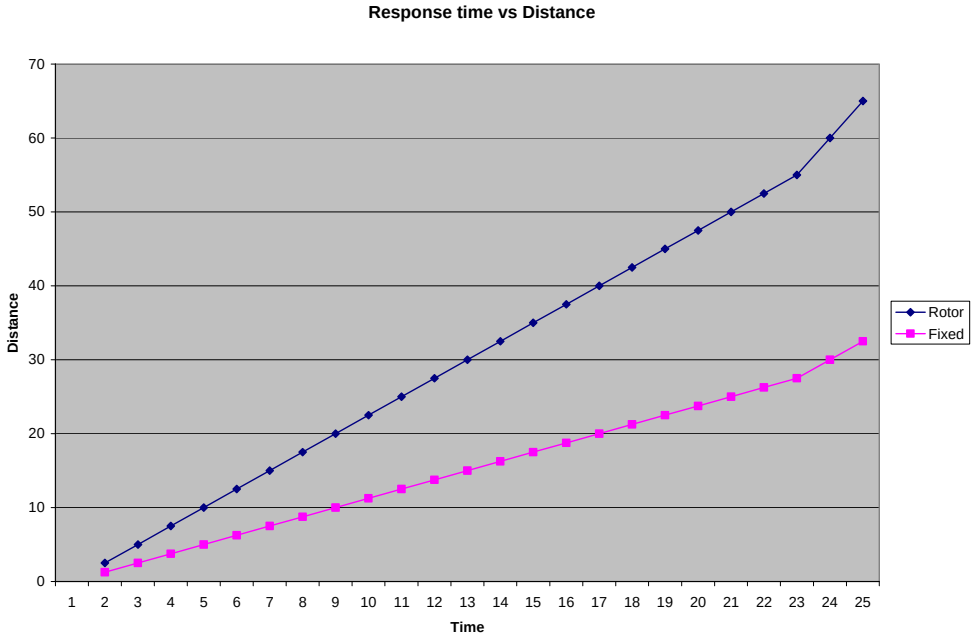
Limitations of rotary wing aircraft

The efficiency of a rotary wing aircraft decreases markedly with the distance travelled. The cost constraints and the response time expectations dictate that a flight radius of about one hour or 125nm from base is appropriate. The following graphs illustrate the decreasing efficiency of rotary wing aircraft as flight distances increase. The costs represent direct operating costs (i.e. variable costs directly related to flight hours) from the authoritative source *Conklin & de Decker*.

[10] Icing can occur unexpectedly during any flight, and avoiding unknown icing is not always possible. However, flight into areas where icing is known to be an issue requires specially equipped and certified aircraft.



The table above illustrates that, after one hour of flight, there is a $600 advantage of fixed wing versus rotary wing aircraft.



The above table illustrates the demonstrable degradation of response time with distance in rotary versus fixed wing.

Rotary wing implementation options

Two potential implementation scenarios were explored based on interviews and analysis of the road ambulance database. Options were discussed and subsequently in accordance with the instructions we received from Saskatchewan Health, one of the scenarios was to include a single base of operations in Saskatoon while the other were to includes bases of operations in both Saskatoon and Regina.

It is important to note that the timelines presented in this section and in the included Gantt charts represent the time required to implement the options as recommended with minimal outside assistance. The true time required to implement will depend on what external expertise, if any, SAA chooses to engage. Timelines can also be accelerated by making different choices which won't necessarily have a negative impact on patient care. Ornge would be pleased to assist in the exploration of these alternatives or to provide expertise and guidance that may help accelerate implementation.

Scenario One: a single base of operations in Saskatoon

The first scenario under consideration is as follows:

- Two aircraft are employed. One is designated as the primary aircraft while the other is a full-time backup aircraft. If there are a sufficient number of flight and medical crew members available, it is conceivable that from time to time both aircraft could be operational and in use, but the intention is to ensure that there is always at least one aircraft in service.

- Both aircraft are located at the Saskatoon John G. Diefenbaker International airport. They can potentially be accommodated along with SAA's fixed wing fleet in a new hangar east of Runway 15/33.

- Operations are to be defined as 24/7, responding to scene calls during daylight hours only[11].

- The aircraft will serve an area of roughly 130,000 square kilometres.

[11] Assumes a combined total of 1,000 flight hours per year for both aircraft.

- Helipads[12] will be constructed at the most used receiving facility in Saskatoon and at the top five sending facilities within a 125nm radius of Saskatoon. The rotary wing program will be challenged in providing better care than what exists already without helipads at both the sending and receiving facilities. Those top five sending facilities, in descending order of volume, are[13]:

    - Battlefords Union Hospital
    - Victoria Union Hospital – Prince Albert
    - Riverside Memorial Union Hospital - Turtle
    - St. Elizabeth Hospital – Humbolt
    - Rosetown

The benefits of this scenario include:

- Simplicity and ease of implementation;
- The necessary relationship between local hospitals and health authorities already exists;
- Training is more easily made consistent by having all medical staff under one roof;
- A reduced need for infrastructure investments;
- 100% redundancy and a high degree of service reliability by virtue of housing two aircraft under one roof;
- A lower overall cost.

The drawbacks of this scenario include:

- Coverage of an area smaller than what could theoretically be achieved with the same number of aircraft, representing compromised service;
- Possible criticism from stakeholders in the Regina region for seemingly giving Saskatoon preferential treatment.

[12] This scenario proposes one helipad at the major receiving facility and one helipad at each of the top five sending facilities. Since the receiving facility is in an urban area, it is likely that the helipad will have to be built on the hospital rooftop. Sending facilities outside of urban areas can often accommodate a helipad on the ground near the facility. This is the reason for the cost difference between helipads at receiving facilities versus those at sending facilities; rooftop helipads are considerably more expensive that ground-level ones.

[13] These five sending hospitals were identified based on a data analysis of the road ambulance database, examining code 4 responses from the scene, sorted by volume of pick-up call location descriptions (both day and night) over a three year period.

Scenario Two: twin bases in Saskatoon and Regina

The second scenario under consideration is as follows:

- Three aircraft are employed[14]. One is designated as the primary aircraft for Saskatoon while another is the primary aircraft for Regina. The third aircraft is a full-time backup resident in Saskatoon. If there are a sufficient number of flight and medical crew members available, it is conceivable that from time to time all three aircraft could be operational and in use, but the intention is to ensure that there are always at least two aircraft in service.

- The aircraft in Saskatoon can potentially be accommodated along with SAA's fixed wing fleet in a new hangar east of Runway 15/33. Alternatively, new space will have to be found at the Saskatoon airport to accommodate the rotary wing aircraft.

- Operations are to be defined as 24/7, responding to scene calls during daylight hours only[15].

- All new medical personnel hires, whether destined for Saskatoon or Regina, will begin their tenure at SAA with a six month assignment in Saskatoon working on fixed wing aircraft. This will facilitate good team dynamics and a consistent corporate culture across both regions. It will also ensure that all medical personnel are qualified to work on both fixed and rotary wing aircraft, maximizing staffing flexibility.

- Medical staffing model is based on Ornge's current practice; defined as a cumulative total of 11 Full Time Equivalency (FTE) positions per 24/7 two (2) person crew base. The FTE are mostly made up of full time personal but often include part time personnel calculated at 0.25 FTE. This head count allocation allows backfill of holidays, sick time, medical (i.e. CME) and non medical related (i.e. survival training).

- Helipads[16] will be constructed at the most used receiving facility in each base city (i.e. Saskatoon and Regina) and at the top five sending facilities within a 125nm radius of each (i.e. ten sending facilities total). The rotary wing program will be challenged in providing better care than what exists already without helipads at both the sending and

[14] Assumes a combined total of 1,500 flight hours per year for all three aircraft.
[15] Assumes a combined total of 1,500 flight hours per year for both aircraft.
[16] This scenario proposes one helipad at each of the two major receiving facilities and one helipad at each of the top ten sending facilities. Since the receiving facilities are in an urban area, it is likely that the helipads will have to be built on the hospital rooftops. Sending facilities outside of urban areas can often accommodate a helipad on the ground near the facility. This is the reason for the cost difference between helipads at receiving facilities versus those at sending facilities; rooftop helipads are considerably more expensive that ground-level ones.

receiving facilities. The top ten sending facilities, in descending order of volume, are[17]:

- Battlefords Union Hospital
- Canora Hospital
- St. Joseph's Hospital – Estevan
- Weyburn General Hospital
- Assiniboia Union Hospital
- Swift Current Regional Hospital
- Riverside Memorial Union Hospital-Turtle
- Victoria Union Hospital - Prince Albert
- Moose Jaw Union Hospital
- Rosetown

- If the required hangar space in Regina cannot be leased then one may need to be designed/ built. There is an allowance of $2.5 Million for capital costs associated with the rotary wing program for each of Regina and Saskatoon.

- Six pilots will be resident in Regina.

- Aircraft maintenance will remain in Saskatoon.

- The aircraft will serve an area of roughly 207,000 square kilometres.

The benefits of this scenario include:

- A larger area of coverage;

- The appearance of an equitable distribution of resources between Saskatoon and Regina;

- A larger pool of talent from which to draw front line medical personnel;

- A strong alignment with the road ambulance system's need for relief and support.

The drawbacks of this scenario include:

- A more complex and difficult implementation;

- A greater need for infrastructure investments;

- The added difficulty of maintaining consistent training standards in two different regions;

[17] These five sending hospitals were derived based on data analysis of Road ambulance database, examining code 4 response from scene, sorted by volume of pick up calls (day and night) location descriptions for each base.

- A higher overall cost.

A complete financial model is included in the appendix. Below is a synopsis of the rough order of magnitude costs associated with this recommended scenario:

One-time costs:

Capital costs including the aircraft, medical interiors, aviation communication equipment, ground support equipment, IT infrastructure, disaster resource planning, rooftop helipads, ground helipads, new hangars in Saskatoon and Regina, legal, consulting and other fees associated with the endeavor, and contingencies (5% of the total cost):

$ 42,431,552

Grand total, one-time costs:

$ 42,431,552

Annual operating costs for the first year:

Direct operating costs including maintenance, fuel and miscellaneous flight expenses (based on 1,500 flight hours per year for the rotary wing fleet as a whole):

$ 1,842,249

Fixed aviation overhead costs including pilots' salaries and benefits, ongoing pilot training, pilots' uniforms, five aircraft maintenance engineers, liability insurance (assumed to be 2% of the aircraft value) and admitted liability insurance (based on the number of aircraft seats):

$ 3,174,138

Fixed medical overhead costs including nurses' salaries and benefits, paramedics' salaries and benefits, paramedics' ongoing training, travel and medication, office and other supplies:

$ 2,553,277

Fixed admin costs including back office staff, hangar insurance, a leased hangar in Regina, insurance for the rooftop helipads, insurance for the ground helipads, the land lease for the Saskatoon hangar, travel, communications, disaster resource planning, professional fees, administrative and maintenance fees (e.g. property tax, utilities, building maintenance) and contingencies (5% of the total

operating cost projections):

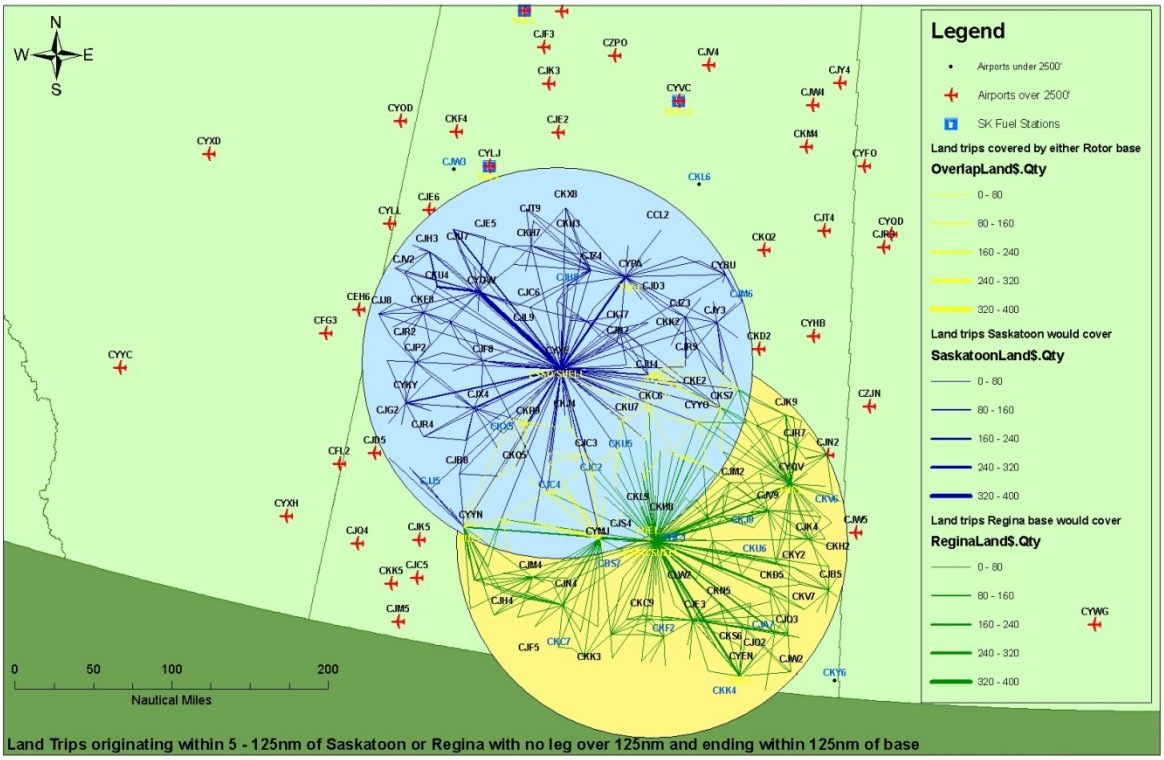
$ 1,384,593

Grand total, annual operating costs:

$ 8,954,257

Ornge would be pleased to assist in further research and analysis that would more precisely quantify the costs and benefits associated with the recommended solution. A Gantt chart illustrating the proposed implementation timeline is included in Appendix E.

The following map illustrates the volume of road ambulance calls performed annually within the proposed area of coverage of this scenario that could be served more quickly by helicopter:



Rotary wing considerations irrespective of the chosen scenario

There are a number of considerations and recommendations that are equally applicable to both scenarios. Those considerations and recommendations follow.

Hiring and training of medical staff for the rotary wing program

Regardless of which scenario SAA chooses to implement, finding, hiring and training the required medical staff to serve in the rotary wing program will be a significant challenge. Establishing strict standards for online medical control will be a prerequisite before hiring can commence, as will be strict certification standards for all medical staff. Ornge's own experience suggests that qualified medical staff is in short supply throughout Canada.

Recommendation: begin planning for the hiring and training that will be required prior to the implementation of the rotary wing program.

Hiring and training the required personnel may take six to 12 months. Therefore, the process of preparing for and executing this major phase of hiring should begin early — at least one year before the program's launch.

Instrument Flight Rules versus Visual Flight Rules

Aircraft can be flown under either Instrument Flight Rules (IFR) or Visual Flight Rules (VFR). IFR implies a higher standard of aircraft equipment and pilot training that enables the aircraft to operate when conditions or visibility is poor. VFR flights offer greater flexibility because less preparation is required (e.g. no flight plan needs to be filed) and because flight routing is usually more direct. Generally speaking, IFR operations are safer while VFR operations are more flexible.

Recommendation: employ Instrument Flight Rule-certified aircraft and pilots but fly under Visual Flight Rules.

By employing IFR-certified aircraft and pilots but operating under VFR guidelines, it is possible to enjoy both the flexibility of a VFR operation and the increased safety of IFR-capable pilots and equipment.

The number of days in Saskatchewan during which IFR is an absolute requirement is very small. Operating exclusively under VFR will not have a material impact on patient care.

Responding to the scene of an accident

Rotary wing aircraft have the unique ability to land and take off from the scene of many accidents. The ability to respond to 'scene calls' would represent a substantial augmentation to SAA's current abilities. But responding to scene calls also involves new safety considerations. By definition, such calls involve operating the aircraft on unprepared surfaces, often near obstructions such as trees or telephone poles and around people unfamiliar with helicopters. Coordination with other emergency services and first responders is also critical to secure the landing zone and prevent damage to the aircraft or injury to people on the ground.

Recommendation: conduct scene calls during daylight hours only.

Without question, the ability to respond to the scene of an accident is a major driver behind the desire to implement a rotary wing program, and would provide the residents of Saskatchewan with a valuable new tool with great lifesaving potential. At the same time, the safety of the flight and medical crews as well as people on the ground is paramount. While some other operators do

conduct scene calls at night, industry accident statistics indicate a higher probability of an aviation accident when attending scene calls at night[18].

Saskatchewan's 'Operating Certificate'

A Transport Canada-issued Operating Certificate will be required before rotary wing operations can commence. The following details are relevant when considering who should hold the Certificate:

- SAA and the Saskatchewan government are currently only experienced in fixed with CAR 604 and CAR 703 operations;
- SAA and the Province have, at this time, no experience with or existing facilities to handle the maintenance of a rotary wing fleet;
- Combining fixed and rotary wing operations under unified management is complex and challenging;
- The learning curve associated with integrating a rotary wing fleet will be substantial, with or without the burden of managing the fleet and its maintenance;
- The ideal locations of new helipads, hangars and other infrastructure is not yet known, and some experimentation or experience may be required before this can be determined;
- Contracting out the operation and maintenance of a rotary wing fleet can increase costs over performing those tasks in-house, but come with the benefit of reduced risk and more predictable cash flows.

Recommendation: retain a rotary wing management expert to oversee the integration of helicopters into the service.

Assuming that this recommendation is considered independently of others within this report, Saskatchewan Health will be entirely responsible for the staffing and provision of all healthcare service on board the aircraft. The aviation management infrastructure currently used for fixed wing operations will manage the rotary wing operation.

[18] http://www.ntsb.gov/events/Hearing-HEMS/; http://www.ntsb.gov/Publictn/2006/SIR0601.pdf

Saskatchewan's 'lease or buy' decision

In procuring new rotary wing aviation assets, the Province will face the question of whether it is best to lease or buy these assets. There is also the further option of doing neither, but rather having a contracted operator provide the aircraft (this option would likely have the fastest implementation time).

Recommendation: purchase the assets.

To maximize value for money, ensure consistency across the fleet and guarantee control over equipment and operational standards, we recommend that the Province purchase the required aviation assets. The savings in doing so, if any, will depend on SAA's cost of capital but may be substantial versus having a contractor supply the aircraft. Similarly, leasing aircraft may be a consideration but the impact of the cost of capital should be considered. The Province's ownership of the assets provides it with total control over aircraft type, equipment and standards.

This is not a simple decision. In Ornge's experience, it is preferable to purchase rather than lease, but thorough financial analysis is required to discover which of these two options leads to more attractive cash flows and long term overall cost management.

Rotary wing recommendation and conclusion

The Saskatchewan Air Ambulance has a long and distinguished history of exemplary service. The obvious pride and commitment of each and every member interviewed was evident. The suggestions and recommendations included in this report represent some of the best practices Ornge has learned in its years of operation[19] as both Ornge and, previously, as Ontario Air Ambulance, and are intended to help Saskatchewan Air Ambulance reach an even greater level of operational and patient care excellence.

Based on the analysis above, our research and our interviews with key stakeholders, and the planning budget and return on investment from a patient care perspective, we recommend the second scenario – scenario two, a model with two bases, one in Saskatoon and one in Regina.

The recommended service will operate IFR-capable aircraft and IFR-trained pilots, but will operate under Visual Flight Rules. Scene calls will be conducted during daylight hours only.

The integration of a rotary wing program into the Saskatchewan Air Ambulance system will have a greater impact on the road ambulance network than it will on the existing fixed wing operation. It will essentially be a completely new and separate program providing an entirely different patient service compared with the fixed wing operations. It adds a new dimension of response capability with the potential to leverage some of the existing aviation infrastructure.

[19] Ornge best practices are cited because, often, no industry best practices are established. In the absence of evidence-based industry best practices, Ornge establishes its own standards based on our knowledge and experience.

To move Saskatchewan Air Ambulance closer to implementing a rotary wing program, Ornge recommends the following next steps:

- Review, prioritize, then execute an operational improvement program to strengthen the core of the existing SAA to prepare for the rotor wing program launch;

- Review, test and validate the analysis assumptions and methodology and discussion of the two rotor wing scenarios to further solidify scenarios and reach agreement on the best scenario to pursue; and

- Advance the planning for the preferred scenario to next level of detail and begin implementation where appropriate.

Summary of Recommendations

The following is a list of recommendations in regards to the introduction of a rotor wing program.

1. Based on the two scenarios we analyzed, we recommend the implementation of scenario two, which encompasses the deployment of three aircraft with a primary aircraft in Saskatoon and one in Regina. The third aircraft would be the backup.

2. Begin planning for the hiring and training of medical staff prior to the implementation of the rotor wing program at least one year prior to the program's launch.

3. Employ Instrument Flight Rule certified aircraft and pilots but fly under Visual Flight Rules. This would enable the flexibility of a VFR operation with the increased safety of IFR capable pilots and equipment.

4. Scene calls be conducted during daylight hours only due to the higher probability of an aviation accident when attending scene calls at night.

5. Retain a rotary wing management expert to oversee the integration of helicopters into service.

6. Our preliminary analysis of a lease versus buy decision indicated that the assets be purchased. A further detailed analysis should be undertaken to further review, test and validate the assumptions underlying the analysis.

7. Review, prioritize, then execute an operational improvement program to strengthen the core of the existing SAA to prepare for the rotor wing program launch.

8. Review, test and validate the analysis assumptions and methodology and discussion of the two rotor wing scenarios to further solidify scenarios and reach agreement on the best

scenario to pursue.

9. Advance the planning for the preferred scenario to next level of detail and begin implementation where appropriate.

III. Current operations

The focus of the 'current state analysis' that follows is on the importance of strengthening and solidifying Saskatchewan Air Ambulance's core in preparation for significant growth. As the service looks to expand its operations, improve access to healthcare for all Saskatchewan residents and explore the merits and avenues of introducing rotor wing assets into the service, it will be critical to first solidify the foundation on which all growth is based. In this way, Saskatchewan Air Ambulance can continue to build on its past successes and ensure that any future growth in the system, including possible rotor wing operations, is fully integrated with what exists already. The end result will be an integrated transport medicine system rather than a collection of independent operations serving a common objective under fragmented leadership. The benefit of this integration is maximum system-wide efficacy and productivity while emphasizing the importance of patient and aviation safety across the system.

This section of the report includes the most important observations and recommendations. The complete analysis is included in an appendix.

Aviation: observations

The following key observations were made with respect to the current state of SAA's aviation operations in general:

- There are three main aviation facilities in the Province used by SAA: Regina International Airport, Saskatoon John G. Diefenbaker International Airport and Prince Albert Municipal Airport;

- The service operates three primary aircraft, all of which are reasonably new Beechcraft King Air BE200 twin-turboprop aircraft with several updates;

- Flights are conducted under Instrument Flight Rules by a single pilot;

- Flights are often conducted into unpaved airstrips as short as 2,500 feet, which represents a very challenging landing for the BE200 pilot with little or no margin for error;

- Aircraft carry patients to distant facilities in Ontario approximately once every two months, representing a prolonged period of time during which that aircraft is engaged and

cannot respond to incoming calls;

- SAA adheres to a standard of launching within 30 minutes of receiving a call for service;
- SAA and Exec Air (based in Regina) both operate assets owned by the Saskatchewan Ministry of Government Services, but under different Canadian Transport Agency-issued operating certificates and using different accountability standards and systems;
- Flights to and from remote communities are often conducted by private northern carriers that are not part of SAA but rather designated by the Regional Health Authority. There are no contracts or other mechanisms for prescribing and enforcing quality standards with these carriers;
- Prior to the implementation of the Provincial Air-medical Coordination Centre, standards for the private northern operators (who are not part of SAA) and their aircraft were not in place. Prior to the implementation of PACC, often there was no medical escort on board to monitor the patient and no quality assurance processes in place to ensure safe, high-quality patient care. The Ministry of Health and the Northern Regional Health Authorities still have significant work to do to ensure safe, high-quality care in the provision of these contracted services. ;
- There is an inconsistent application of flight crew standards between contracted air operators and the SAA itself; as reflected in SAA Policy 3-310[20].

The following key observations were made with respect to the current state of SAA's hangar at the Saskatoon John G. Diefenbaker International Airport:

- All maintenance on SAA aircraft is conducted in a shared hangar at the airport;
- Parts are stored in three separate locations including a portable shed outside the hangar, posing a potential security risk involving parts critical to flight safety;
- There is no dedicated area within the hangar, off-limits to unauthorized personnel, for aircraft maintenance;
- The hangar uses a dated, bi-fold door, which is potentially dangerous in the event of a door failure and which allows a great deal of heat to escape from the hangar when opened in winter, contributing to difficult working conditions inside the hangar or even necessitating that maintenance operations stop until the hangar has warmed up again;

[20] Air Ambulance Policy Manual, Section III – Operational Policies, 3-310. Standards for Air Operators, (Privately Chartered Aircraft). "Multi-engine pressurized aircraft with two pilots will normally be used for charters carrying Saskatchewan Air Ambulance employees or designated personnel."

- Given that SAA's aircraft are retrofitted with Raisbeck wing extensions, increasing the aircraft's wingspan, the width of the hangar door is marginal and poses a risk to the aircraft during ground handling;

- Access to the hangar facility from the city's road system is via a convoluted system of sub-roads, increasing travel time to and from the hangar, and consequently increasing response times for some calls;

- Aircraft are positioned very closely together in the hangar with no dedicated space for aircraft undergoing maintenance versus those ready for operation, posing a risk of collision during ground handling and maintenance;

- The hangar is shared with another twin-turboprop aircraft not operated by SAA but rather owned and operated by the hangar's owner. That aircraft is flown approximately 30 hours per month, and its movements often disrupt or delay maintenance on SAA's aircraft;

- The taxiway between the SAA hangar and the airport's runways are crowded with various small general aviation aircraft, posing a risk of collision with SAA aircraft or unexpected obstructions of the taxiway that may delay SAA operations. Furthermore, rotary wing activity is not permitted on that taxiway;

- The taxiway between the SAA hangar and the airport's runways includes a gate which poses the risk of accidental collision with SAA aircraft or unexpected obstructions leading to the active runway;

- Three of the four runways at the airport are a considerable distance from the hangar, which contributes to launch delays;

- The hangar cannot accommodate rotary wing aircraft, nor is the apron outside the hangar suitable for rotary wing operations;

- The hangar is located on the uncontrolled portion of the airport, making it a low priority for snow removal equipment and contributing to potential delays or disruptions of SAA's operations;

- The maintenance area of the hangar is not secured from unauthorized personnel, increasing the possibility of accidental or intentional damage to parts critical to flight safety;

- There are no lead-in lines (i.e. painted lines) on the hangar floor indicating the track the aircraft's wheels should follow during ground handling, creating a collision hazard;

- Pilots currently self-dispatch their flights. On- and off-call times are recorded but there is no real time flight tracking.

- Aircraft ground movements, particularly outside of normal business hours, are often conducted by a single person without the aid of 'wing walkers' to help guide the aircraft and avoid collisions that could result in costly damage and delayed service.

Aviation: opportunities for improvement and recommendations

Given the observations above, we recommend that SAA consider the benefits of addressing the following opportunities for improvement, listed in order of importance. Order of magnitude timeline projections for implementing the recommendations are provided. Ornge would be pleased to assist in the further exploration and implementation of these recommendations.

1. *Opportunity for improvement: single pilot operations.*

   SAA's aircraft are generally piloted by a single pilot (i.e. no co-pilot or first officer on board the aircraft). This represents a safety risk.

   The Beechcraft King Air BE200 is a complex, multi-engine turbine aircraft. The aircraft is certified for single pilot operation, and flying a fully operational BE200 is a demanding but achievable task for a single pilot. When the aircraft is not fully functional, such as during an engine failure or other malfunction, the workload in the cockpit increases dramatically and could become overwhelming for a single pilot.

   In private, corporate, commercial or aeromedical use, the BE200 is generally operated as a two-pilot aircraft in the field, and statistics show that this aircraft is substantially more likely to be involved in an accident when it is piloted by a single pilot[21]. By some estimates, such an aircraft with one pilot on board is 1.5 times more likely to be involved in a fatal accident than one piloted by two qualified pilots[22].

   Recommendation: implement two-pilot flight crews on all flights as soon as possible.

   There is a demonstrable reduction in accidents in turbine aircraft when a properly trained and qualified two-pilot flight crew is employed[23]. Ornge operates two-pilot flight crews exclusively. The majority of BE200 operators use two-pilot crews[24].

   SAA operates its aircraft into airstrips offering little or no margins for error. Flight following notification, a task normally delegated to the first officer, must instead be delegated to the flight nurse, creating an undesirable mixing of medical and aviation

[21] Robert E. Breiling, Aircraft Specific Accident Analysis, 2003
[22] Ibid.
[23] Transport Canada, http://www.tc.gc.ca/civilaviation/commerce/circulars/AC0198r.htm, 2002
[24] Robert E. Breiling, Aircraft Specific Accident Analysis, 2003

duties and potentially compromising the duties in one area for the sake of the other. Pre-flight preparation and in-flight re-routing take longer because the complex tasks involved therein are completed by a single person rather than two.

Implementing two-pilot flight crews has the added benefit of providing two points of entry at SAA for pilots; experienced pilots can apply for captain positions while less experienced pilots can apply for first officer positions. Those first officers gradually gain training and experience and ultimately become SAA captains themselves. This dual stream of pilots helps decrease employee turnover and facilitates the establishment and perpetuation of a safety culture.

For all these reasons, we recommend that SAA implement two-pilot crews on all flights to achieve an even higher degree of safety than what exists now. The benefits will be a substantially greater safety margin by having two qualified pilots in the cockpit, reduced pilot fatigue and improved safety by virtue of shared duties in the cockpit, reduced workload for the flight nurse which will improve patient care, and reduced exposure in the event of an aviation accident.

Implementing this recommendation likely involves doubling the number of employed pilots with a resultant cost increase of approximately $1 million to $1.5 million in payroll expenses. This recommendation can be implemented as quickly as financial support can been earned, and following this only as quickly as additional pilots can be hired and trained.

2. *Opportunity for improvement: flight crew duty day.*

   Saskatchewan Air Ambulance currently adheres to Transport Canada guidelines dictating the maximum length of a duty day for a flight crew (i.e. a maximum of 15 hours on duty and 8 hours in flight).

   Given that SAA aircraft are crewed by a single pilot, that the BE200 is a complex and demanding aircraft to fly, that many of the airstrips from which SAA operates offer little or no margin for error, that a typical duty day includes several takeoffs and landings, that flight operations often occur at night and that pilots are often ‘on call’, the lengthy duty days worked by SAA could be a hazard. While SAA conforms to Transport Canada guidelines, these guidelines may not provide a substantial safety margin for duties as demanding as those encountered by SAA pilots. The potential scenario of a pilot who has spent almost eight hours flying alone in the cockpit over a 13 hour duty day and then lands on a short airstrip with minimal approach and landing aids is a cause for concern.

   Furthermore, when flight crews ‘duty out’ away from their base because they have reached the legal maximum number of hours they can fly for that day, service may be negatively impacted. Shorter duty days and more flight crews would likely reduce the number of duty-outs and facilitate consistent and reliable service to the Province.

Recommendation: shorten the flight crew duty day.

Any reduction in the length of the flight crew duty day will provide SAA with an even greater safety margin by giving pilots the rest and off-duty time they need to remain alert and focused in the performance of their duties. For reference, Ornge operates under a strict duty day of no more than 13.75 hours and eight hours of flight per shift. Eight hours of prone rest must be obtained by Ornge pilots between shifts[25]. Over time, SAA might consider the benefits of a shorter flight crew duty day.

This change can be implemented immediately, or as soon as more pilots are hired to fill the gaps left by the shorter duty day. Implementing this change will bring an immediate improvement in safety and a reduction in the chances of an aviation incident. Financial impact will be dependent on the number of additional pilots chosen and time required to secure additional incremental operating funds to support this decision.

3. *Opportunity for improvement: hangar facilities.*

The Saskatchewan Air Ambulance hangar at the Saskatoon John G. Diefenbaker International Airport is in a location that limits growth potential and precludes rotary wing operations. Moreover, the hangar is no longer large enough to accommodate SAA's aircraft and maintenance facilities. SAA faces the following options:

- Extend the lease on the existing hangar for a long enough period to justify investing capital in the necessary leasehold improvements. This option has been explored but ruled out by the hangar's owner;
- Purchase the existing hangar and invest in the necessary improvements. This option has been explored but ruled out by hangar's owner;
- Build a new hangar on optioned property at the airport east of Runway 15/33.

Recommendation: build a new hangar at the Saskatoon airport.

Given that the existing hangar is of inadequate size, is in a problematic location, offers limited growth potential, is unsuitable for rotor wing operations and is shared with another aircraft that frequently interrupts maintenance operations, we recommend building a new hangar on the site already identified as suitable east of Runway 15/33.

Further benefits of building new include a more efficient design, expedient and unrestricted access to the aircraft maneuvering surface, access to preferred lot lease costs, safer and more efficient maintenance areas, improved aircraft response time, more comfortable working conditions and reduced operating costs.

[25] Ornge, Standard Operating Procedures, 2009

The time required for the construction of a new hangar is to some extent driven by the tenure of the existing contract for the current hangar. The current contract expires October, 2010, leaving roughly 16 months to approve, design and build the new facility. While we cannot make assumptions about the length of time necessary to gain approval for such a project, it is possible to design and build an appropriate facility in this time. If a proposed design already exists, modifying it to accommodate helicopters should require only minor alterations.

4. *Opportunity for improvement: flight planning.*

   SAA pilots conduct their flight planning activities in an office shared with the medical staff. Patient details are often seen or overheard by pilots, making it difficult for them to base go/no-go decisions on aviation safety considerations alone. Multiple flights may be planned by different pilots in the same office simultaneously, making it difficult for pilots to concentrate on their own tasks.

   SAA pilots do all their own flight planning via NavCanada's website, adding to the pilots' workload and contributing to pilot fatigue and launch delays, as well as creating opportunity for errors or omissions in the flight planning process. Pilots check for relevant NOTAMs (NOTices to AirMen) twice daily[26].

   Recommendation: provide a dedicated flight planning room.

   We recommend that SAA consider the benefit of modifying or rearranging the existing facility to provide a dedicated flight planning room for flight crews only, and in including such a room in any future facilities.

   The flight planning room could include a constant and frequently updated display of provincial weather and the status of all aviation facilities so that flight crews can plan their flights with greater ease and safety and maintain situational awareness of the weather picture between flights. To achieve an even greater degree of aviation safety, information in the flight planning room should be sanitized such that pilots are advised only of their destination. Aviation safety practices dictate that aviation decisions should be made in an undisturbed environment free from any distractions or information not directly related to aviation.

   A flight planning room could be provided immediately with minor facility updates and can evolve in functionality gradually over the coming months.

   It is also worth considering that pilot workload, and therefore flight safety, would be further enhanced by the retention of a commercial flight planning service. A flight planning service is a one-stop-shop for flight planning with guaranteed quality and accuracy and up-to-the-minute information on NOTAMs (NOTices to AirMen) and

[26] Chief Pilot of Saskatchewan Air Services – January 2009

weather. While SAA's pilots are fully able to plan their own flights, the retention of a professional service reduces the chance of error, ensures consistency in completeness and quality of information and provides the greatest degree of risk mitigation.

5. *Opportunity for improvement: flight tracking.*

Currently, pilots report their departures and arrivals, and there is a way to track the progress of a flight in real time; but it is not utilized[27]. Such ability would help SAA achieve an even higher level of safety because it would support immediate notification in the event of an air crash and facilitate the direction of emergency responders to the scene. Real time flight tracking also facilitates improvements in system efficiency by providing a constantly up-to-date picture of the service's aviation assets in a fast-changing, dynamic environment.

Recommendation: activate the installed GPS locators on the fleet and consider outsourcing flight tracking to a third party specialist.

The first step in implementing real time flight tracking is to outfit each aircraft in the fleet with an active GPS locator/transmitter. Aircraft movements can then be tracked as they happen by SAA personnel back at the base. This component is installed but not yet active.

6. Opportunity for improvement: maintenance scheduling.

Maintenance on SAA aircraft is conducted under a single AMO (aviation maintenance organization), shared with Exec Air. The AMO is based in Regina with a supervisory position at the Saskatoon John G. Diefenbaker International Airport. Maintenance is scheduled for 8am to 5pm, Monday to Friday, with maintenance engineers remaining on-call for off-hours maintenance when necessary. Whenever possible, maintenance is deferred so that it occurs during regular business hours (i.e. 8-5, Monday to Friday).

Recommendation: employ maintenance personnel to remain on site and perform maintenance 24 hours per day, seven days per week.

The data provided to Ornge indicate that there are times when aircraft maintenance results in potential service delays. At other times, aircraft from Alberta are used to augment the system while aircraft are being maintained. Aircraft availability and utilization would be enhanced by an around-the-clock maintenance presence on site to immediately carry out any required maintenance and perform routine maintenance during off-peak hours.

[27] The PACC has Flight Tracker (a software program) which is capable of real time flight tracking through the AirCell Phones. However, real-time tracking will not be possible until the Regional Health Authority can certify to the FAA that the PACC computer system is secure. Per email from C. Oleson, 23 June 2009

Furthermore, with an around-the-clock maintenance presence, maintenance engineers can assist and supervise all aircraft ground movements in and around the hangar which will reduce the risk of collisions by making sure there are always 'wing walkers' present to help guide the aircraft into the hangar and around obstacles.

Lastly, an around-the-clock maintenance operation with routine maintenance taking place at night results in the possibility that all three aircraft may be available and operational during peak hours. Increased system capacity will also depend in part of staffing levels, but an around-the-clock maintenance operation removes one substantial bottleneck in the system and contributes to the potential for greater overall system capacity.

An around-the-clock maintenance operation may necessitate hiring more maintenance engineers.

Ornge would be pleased to assist in a more detailed analysis that would quantify the operational benefits of an around-the-clock maintenance operation from both the aviation and patient care perspectives.

Closely linked to this recommendation is an opportunity to enhance quality controls by implementing a safety management system (SMS) with clear accountability to aviation management staff. Although a funded head count was mentioned no (daily) on-site aviation management staff was observed. Such an individual could best champion an SMS program and lead any related safety/ quality control certification process.

Medical and operations: observations

The following key observations were made with respect to the current state of SAA's medical operations in general:

- SAA aircraft are staffed with a medical crew of one nurse and one paramedic or two nurses;
- There are always two aircraft and crew on shift, 24 hours per day, seven days per week;
- SAA nurses and paramedics practice the same medical skill set under the "Transfer of Function" or medical delegated act principle[28];
- SAA flight nurses are designated as the "most responsible" person on board the aircraft;

[28] This is the principle whereby a paramedic or nurse performs complex tasks under the direct medical direction of a physician; the paramedic or nurse operates in this case under the physician's license.

- SAA paramedics are educated and perform skills under the Extended Role Transport Training Program, a non-accredited in-house training program to the national paramedic competency level of 'critical care';
- Nurses and paramedics are regulated through their own respective professional colleges;
- No formal annual practitioner recertification process is in place for SAA nurses or paramedics;
- Continuing medical education (CME) includes predefined 'off the shelf' courses and electives;
- There does not exist a true 'employer/employee' relationship between SAA and its paramedics, as their services are contracted out via third parties (nurses through the Regional Health Authority and paramedics through MD Ambulance Care Ltd.);
- Special 'hospital' teams are on call to attend to obstetrical or pediatric cases, but SAA attends to many of these cases without a special team;
- Medical orders to SAA personnel are generally provided by the sending physician;
- Medical control, albeit informal and seldom used, takes the form of a group of emergency room physicians available on demand for consultation;
- External complaints and conflicts are rare and are handled by SAA's Nurse Manager — there are a number of processes for handling complaints and incidents;
- Call and chart reviews are conducted on an ongoing basis by the Clinical Nurse Educator; no other audit tools were observed;
- Systematic issues are addressed at a quarterly meeting of the Air Ambulance Advisory Committee;
- No clear standards for the level of care and medical practice provided on board private northern air carriers' aircraft (not operated by or affiliated with SAA and beyond the purview of SAA) are present.

Medical and operations: opportunities for improvement and recommendations

Given the observations above, we recommend that SAA consider the benefits of addressing the following opportunities for improvement, listed in order of importance. Order of magnitude timeline projections for implementing the recommendations are provided. Ornge would be pleased to assist in the further exploration and implementation of these recommendations.

1. *Opportunity for improvement: designation of the most responsible physician (MRP[29]).*

   In the existing system, the most responsible physician (MRP) is not clearly defined. Clarity about the MRP in transport eliminates confusion about who is ultimately responsible for the patient's care.

   Recommendation: define and communicate the identity and role of the MRP.

   Clearly define the MRP as the physician providing on-line medical control for the transport. Outline to stakeholders, medical staff and the physicians themselves that the on-line control physician is the MRP and is to be contacted for all patient care issues not covered by standing orders. Provide a list to all medical staff detailing specific circumstances in which the MRP must be contacted.

   This recommendation could be easily implemented in approximately 90 days.

2. *Opportunity for improvement: utilization of on-line medical control.*

   On-line medical control at SAA is used sporadically and is not mandated. Without explicit orders from a physician, nurses and paramedics are limited in what interventions they can perform on the patient.

   Recommendation: mandate and define the use of on-line medical control.

   Direct medical staff to contact the on-line control physician for all medical care concerns or care beyond those addressed by standing orders, including questions about call triage and decisions related to diverting the aircraft to a potentially needier patient. It will likely be beneficial to improve the availability of on-line medical control and establish a culture of patching in the MRP on all but routine medical concerns.

   This recommendation could be completed in approximately 180 days. It is a complex task involving cooperation among various stakeholders and an eventual cultural change at SAA towards one that routinely includes the input of the MRP.

3. *Opportunity for improvement: annual evaluation and CME for nurses and paramedics.*

   While CME requirements are clearly defined, there is no formal mechanism in place to monitor compliance and evaluate the retention and application of the skills learned. This potentially compromises patient care, or at least exposes SAA to accusations of compromised patient care in the case of an adverse patient event.

[29] The 'most responsible physician' is the physician who has ultimate responsibility and accountability for the patient's care.

Recommendation: clearly define the CME and annual evaluation requirements for nurses and paramedics.

Reaching an even higher standard of patient care requires clear minimal annual evaluations, CME and certification for all front line medical staff. Doing so ensures consistent quality of care, a foundation for continual system improvement and detailed practitioner documentation in accordance with Ornge best practices[30].

This recommendation could be implemented in approximately 180 days. It is a complex task, involving the development and implementation of an annual evaluation system.

SAA should consider that it may be necessary to increase the number of medical personnel in order to provide staff with adequate time off the aircraft to complete their CME. Ornge's experience is that introducing a float position (i.e. a person who is available for duty but not regularly scheduled for work) may not be sufficient to ensure CME compliance. Additional full time employees may be necessary.

4. *Opportunity for improvement: accuracy of job descriptions.*

   The job descriptions of SAA's medical staff are not up to date and do not reflect present responsibilities and expectations (e.g. with respect to the Provincial Aeromedical Coordination Centre, or PACC).

   Recommendation: update medical staff job descriptions.

   Clear, up-to-date job descriptions ensure complete and timely process flow throughout the system. We recommend a review and update of all job descriptions.

   This recommendation could be completed in the next 180 days. The task is of medium complexity.

5. *Opportunity for improvement: manuals and reference materials.*

   Several of the manuals and reference materials provided to Ornge[31] are not up-to-date and do not reflect the realities of the current system.

   Recommendation: Maintain updated manuals and references according to evidence-based practices.

   Currency and a system of continual maintenance of manuals and reference materials ensure a consistent and appropriate provision of care and understanding of expectations.

[30] Ornge best practices are cited because no industry best practices are established. In the absence of evidence-based industry best practices, Ornge establishes its own standards based on our knowledge and experience.
[31] Refer to Appendix A for a list of sources.

We recommend that SAA consider a review and update of all existing manuals and reference materials.

This recommendation could be implemented in the next 180 days. This task is of medium complexity.

6. *Opportunity for improvement: training documentation.*

   The initial and on-going training programs that support SAA's medical standards are not well documented. This poses a problem for consistency and continuity of the training programs, particularly in the case that a person with key institutional knowledge should leave the organization.

   Recommendation: thoroughly document the initial and on-going training programs.

   We recommend that the documents provide clear direction for the on-going training program to support the implementation of standards plus new information related to the implementation of a rotary wing program. This will be especially important with on-boarding of new staff given the earlier recommendation of staff being capable of serving on both fixed with and rotor programs.

   This recommendation could be completed in the next 180 days. The task is of medium complexity.

7. *Opportunity for improvement: health and safety preparation for a rotary wing operation.*

   Rotary wing aircraft have unique health and safety implications for patients, medical personnel and all other people and structures that come into contact with the aircraft. These differ substantially from those related to fixed wing aircraft, and have implications for the hangar and other infrastructure items as well as for personnel. Early preparation can help speed the later implementation of a rotary wing program.

   Recommendation: initiate development of a rotary wing health and safety strategy.

   A rotary wing Occupational Health and Safety strategy could be developed, incorporating but not limited to safety in and around the aircraft, the use of Nomex fire-retardant clothing, underwater escape, wilderness training, emergency aircraft egress, routine procedures for aircraft ingress and egress, hangar safety and the nature and use of flight helmets and survival equipment.

   This recommendation could be implemented over the next year. It is of medium complexity.

8. *Opportunity for improvement: equipment procurement for a rotary wing operation.*

Selecting the type of aircraft and other required equipment (e.g. flight helmets, fire retardant clothing, etc.) as well as identifying and negotiating with potential vendors is a time consuming process. Most helicopter manufacturers also have lengthy waiting lists for their products, sometimes as long as two to three years. Beginning the procurement process now will facilitate a speedier implementation of a rotary wing program later.

Recommendation: develop a research and procurement plan.

The procurement of rotary wing aircraft is in itself a significant undertaking, but is accompanied with the need to procure equipment unique to a rotary wing program. With the new ability to provide patient care at the scene of an accident, sometimes in the absence of road-based paramedics for support, SAA's rotary wing program will require equipment not currently used by the service. To speed the later implementation of a rotary wing program, we recommend the construction of a research and procurement plan to evaluate what equipment will be needed and how it should be acquired.

This recommendation would take approximately one year to implement fully and is of medium complexity.

9. *Opportunity for improvement: private northern air carriers not operated by or affiliated with SAA and other outsourced carriers occasionally used to supplement SAA.*

   Both the Government of Saskatchewan's Northern Medical Transport Program and Health Canada's First Nations Non-Insured Health Benefits Branch fund private air carriers providing basic to intermediate medical evacuations from Northern Saskatchewan. These providers were largely unregulated until October of 2008 when Saskatchewan Air Ambulance became involved in the coordination of the delivery of this service. To date there are no contractual or regulatory relationships guiding how these services are delivered.

Recommendation Develop, communicate and introduce clearly defined policies, standards and payment mechanisms so as to ensure safety and delivery of high quality services to Northern patients on trips coordinated by the Provincial Air-medical Coordination Centre.

Clearly defined standards for medical equipment, patient care, personnel and other variables for private non-SAA aircraft will establish consistency and decrease risk exposure to SAA and the provincial government. To avoid undue impact on the system, these new standards should be implemented gradually.

To maximize private carriers' ability to comply with the standards, we recommend communicating the standards and audit procedure to them early and working with them to determine what is realistic and practical. A phased approach to implementing new standards also makes it easier for private carriers to comply, and is therefore worth considering.

This is a potentially complex undertaking.

10. *Opportunity for improvement: Medical Director role.*

    The annual evaluation and CME requirements of the Medical Director are not well defined. This potentially compromises patient care, or at least exposes SAA to accusations of compromised patient care in the case of an adverse patient event.

    Recommendation: clearly define the CME and annual evaluation requirements of the Medical Director.

    Standards for Ornge dictate that the Medical Director is required to hold Emergency Medicine (CCFP[EM], FRCPC[EM]), FRCPC with Critical Care certification. This ensures a minimum level of experience and certification from the Medical Director. Doing so also provides a basis on which on-line medical control can be evaluated and improved.

    This recommendation could be implemented easily in approximately 90 days.

11. *Opportunity for improvement: medical benchmarking.*

    Benchmarking provides the foundation for a program of continual process and system improvement. The development of benchmarks and metrics that track performance with respect to the benchmarks are at the core of a sound quality improvement (QI) system.

    Recommendation: develop a quality improvement program that incorporates clinical benchmarking and risk management.

    A benchmarking system will help to evaluate patient care within the SAA system and will establish the current standards on which improvements can be based. Such a system measures key performance indicators and establishes a foundation for ongoing quality assurance and improvement as well as a basis for comparing SAA with other services and organizations. We recommend the development of a prospective benchmarking instrument that will evaluate all key areas of patient care against evidence-based medical care standards and help SAA to achieve even greater standards of patient care.

    This recommendation could be implemented in the next 180 days. The task is of medium complexity.

System: observations

The following key observations were made with respect to the current state of the overall air ambulance system:

- Nursing staff are primarily responsible for the day-today operations of the service;
- SAA's call-taking and triage is performed by the flight nurses at the Provincial Aeromedical Coordination Centre (PACC), launched in October 2008;
- Nurses are contracted through the Regional Health Authority while paramedics are contracted through MD Ambulance Care Ltd.
- Stakeholder relations activities have taken place (e.g. educational seminars in the Cyprus Health Region) with some success, and are funded from non-designated operating funds;
-
- Improved system awareness and integration between air and land resources would facilitate and enhance the transport of critical and acute care patients between facilities, ensuring that the most appropriate transport resources was utilized to serve both the patients and stakeholders needs.
- SAA staff exhibit an admirable 'make it work' attitude in spite of challenges created by disparate systems and stakeholders;
- There is a lack of on-site aviation management — nurses generally supervise and often manage the aviation staffing component of the service;
- In our research, we heard several anecdotes about incidents in which the person accountable could not be clearly identified;
- A 6-month review of PACC is pending, but no framework for that review exists;
- Patients living in remote northern communities are often faced with excessively long road ambulance trips because of poor quality roads;
- Pediatric specialty teams do not often launch in a timely manner. This was consistently expressed during several interviews with one northern health region. One policy/ practice sited included delayed launch until a baby is delivered (although they are often 2-4 hours away) with the result being that high risk obstetrical patients and premature neonatal patients often face long delays for treatment;
- Remote communities require access to a broad range of services from primary to critical care needs that are not currently adequately resourced;
- EMS practitioners throughout the Province (not employed by SAA) exhibit a great deal of variability in their skill sets;

- Crescent Point Energy Trust, an oil and gas income trust operating in the south of the Province, has expressed an interest in making donations towards a rotary wing program for the Province.

System: opportunities for improvement and recommendations

Given the observations above, we recommend that SAA consider the benefits of addressing the following opportunities for improvement, listed in order of importance. Order of magnitude timeline projections for implementing the recommendations are provided. Ornge would be pleased to assist in the further exploration and implementation of these recommendations.

1. *Opportunity for improvement: organizational structure and governance.*

   To fully appreciate the impact of a rotor wing operation on the system it is critical to understand the existing physical and management infrastructure at Saskatchewan Air Ambulance.

   The organizational infrastructure involves two government ministries and two worker unions. The Ministry of Health is responsible for operational costs, the medical equipment used in the service and the provision of the service itself.

   Executive Air is a separate entity operating as a non-revenue Canadian Aviation Regulation (CAR) 604 operation, and is used exclusively for the transport of government officials. It is based in Regina, while SAA is based in Saskatoon.

   Executive Air's aviation assets and those of Saskatchewan Air Ambulance are both maintained under a joint aviation maintenance organization (AMO) with the Directors of Operations and Maintenance in Regina and a Production Manager and Chief Pilot in Saskatoon.

   While Ornge was on site, SAA pilots, nurses, medics and aircraft maintenance engineers repeatedly reported a considerable amount of confusion with regard to reporting structure and accountability.

   Recommendation: rationalize the organizational and accountability structure of the service so that there is a single point of accountability and responsibility for the service as a whole.

   Differing reporting structures are potentially inefficient and make it difficult to apply a consistent approach to quality control or to maximize teamwork and alignment of goals among the system's different components and players. A single point of accountability makes possible a holistic approach where pilots, medical personnel and maintenance personnel all work towards a patient centred, quality driven organization.

Furthermore, the magnitude and importance of the Saskatchewan Air Ambulance system is such that there is a need for continual on-site managerial presence that represents both the Ministry of Health and the Ministry of Government Services and their respective responsibilities. As a unionized worker, the Chief Pilot is limited in his managerial flexibility. It may be more appropriate to subordinate him to a representative of the Department and the Ministry.

This recommendation can be implemented immediately and is complex, but should be implemented as soon as is practical because it provides a basis for maximizing the quality of patient care and the efficient use of resources.

2. *Opportunity for improvement: organizational complexity.*

SAA's paramedics are contracted via a third party operator while nurses are under the Regional Health Authority. Having two distinct medical systems introduces a level of complexity that creates the potential for confusion with regard to maintaining consistent standards and clear accountability.

Recommendation: explore the opportunity to bring paramedics and nurses under the same management.

Bringing paramedics and nurses under common management makes it easier to ensure consistent standards of practice and clear lines of accountability. Over time, SAA may wish to consider the benefits of common management for both groups.

This recommendation could be completed over the next year. It is complex.

3. *Opportunity for improvement: PACC integration.*

Though the PACC operates in a collaborative relationship with the EMS system, there is an opportunity for greater integration with the provincial EMS dispatch system. Further partnership with PACC will help PACC streamline and harmonize the Province's various medical responders and develop PACC from a startup program into a more integral part of the greater system. Doing so may also improve communication among service providers, increase the utilization and utility of the Province's aeromedical EMS component, and improve SAA's response times as the provincial EMS dispatch are the first to be informed of the potential need for an air ambulance call. These benefits will become even more pronounced when the rotary wing program brings further complexity to the system.

Recommendation: better align PACC with the provincial EMS dispatch system.

Partnering PACC with the provincial EMS dispatch system is an important step towards maximizing the system-wide efficiency and productivity of Saskatchewan's emergency medical response bodies. Clear lines of communication should be established between

PACC and the provincial EMS dispatch (i.e. the patient triage and resource priority process) to facilitate integration with road or rotary wing 911 calls and pre-alerts for potential fixed or rotary wing calls. Ultimately, criteria for the dispatch rotary wing assets will have to be drafted and implemented.

One of the objectives in doing this is to have PACC coordinate all aspects of interfacility transfers in the Province — not just those conducted by SAA. Where SAA is unable to attend to a call, PACC should ensure a 'warm transfer' to whoever accepts the call, thereby closing the loop on the patient transfer. This is what is meant by recommending that PACC becomes a more integral part of the larger system.

This recommendation could be implemented within the next 180 days. Ease of implementation will depend on the degree of integration and the use, if any, of new telecommunications equipment. Refining the patient triage/response priority process will be one of the more time consuming aspects of this initiative.

4. *Opportunity for improvement: external audit and accreditation guidelines.*

   Maximizing patient care and system efficacy is driven in part by a robust quality assurance program and a consistent standard of competence and training among medical staff. Core to these concepts are audits and accreditations provided by objective third parties.

   Recommendation: develop a partnership with external auditing and accreditation agencies.

   A relationship with a reputable patient care-focused aeromedical accreditation or audit organization will provide objectivity and expertise with respect to auditing and accreditation. It will also bolster SAA's credibility in the eyes of stakeholders. The Commission on Accreditation of Medical Transport Systems (CAMTS) is a possible external auditor and accreditor.

   This recommendation could be implemented in the next 180 days. The task is of medium complexity. Preparations for the first audit will be time consuming, but subsequent audits will benefit from the initial time investment.

5. *Opportunity for improvement: stakeholder relations.*

   Maintaining relations with stakeholders is an important part of ensuring the continued utility and success of the air ambulance service. Stakeholder relations activities do currently take place, but there is no dedicated budget or personnel for these initiatives. A dedicated stakeholder relations position and strategy can help improve the overall efficacy and efficiency of the system and prevent miscommunication among stakeholders.

Recommendation: explore the feasibility and impact of launching a dedicated public and stakeholder relations program.

A dedicated stakeholder and public relations program would include its own budget and dedicated incremental funding to SAA for outreach and education programs.

As a transition in moving towards such a program, SAA may consider continuing with its current communications activities, targeting one major initiative per quarter, while a more comprehensive stakeholder relations program is being considered. The main objective would be to educate stakeholders on what SAA is for, how it can and should be used and what benefits it offers to stakeholders in the medical world as well as to the residents of Saskatchewan.

This recommendation could be implemented in the next 180 days. The task is of medium complexity.

6. *Opportunity for improvement: the role of PACC.*

   The Provincial Air Ambulance Coordination Centre is new and is so far a success. More precise definitions of the role of PACC and the expectations of PACC stakeholders would further improve the efficacy of the service.

   Recommendation: further define the role of PACC and the expectations of stakeholders.

   For PACC to achieve maximum success, its purpose and role, plus the expectations of stakeholders, could be more clearly defined. This may begin with a definitive 6-month review of pilot project operations, defining key metrics and successes to date. A communications plan could then be constructed and disseminated to all other organizations that have a touch-point with PACC (e.g. sending and receiving healthcare facilities, road ambulance dispatch centres, etc.).

   This recommendation can be implemented within 180 days.

7. *Opportunity for improvement: integration with northern communities' service providers.*

   Strong linkages to northern (predominantly aboriginal) communities exist, though patient care in those regions varies. Pediatric teams typically have to travel long distances to reach patients in need and on-line medical control is largely absent. Better integration and collaboration with the road and air services in the north may help improve response times, rationalize the use of private carriers and increase the standard of patient care among this important stakeholder group.

   Recommendation: Conditional on the acceptance and implementation of recommendations 1, 2, and 10 found earlier in the section on medical and operations, this new recommendation would be to create then implement a strategic roadmap for

integrating private air ambulance carriers in SAA, thereby providing even greater support to northern communities.

Private northern service providers are often the only practical way in and out of remote northern communities. Once strict standards have been implemented for those carriers and the role of SAA's Medical Director is clearly defined, the next step is to provide to those carriers the same on-line medical control available to SAA's own personnel, through the SAA Medical Director. Giving these private non-SAA carriers access to SAA's Medical Director as the most responsible physician will improve the quality of patient care provided by private carriers and will further improve the general standard of healthcare to residents of these uniquely challenging remote communities.

While the prerequisites for this recommendation are complex (i.e. creating and enforcing standards with private carriers and better defining the role of the Medical Director), extending access to the Medical Director to those carriers is not complex.

8. *Opportunity for improvement: hearing the voices of local industry.*

During the course of this consulting project, one industry party stepped forward asking to be heard: Crescent Point Energy Trust, an oil and gas income trust very active in the south of the Province. They and/or other local industry players may be willing to contribute to the launch of a provincial rotary wing program.

Recommendation: explore the possibility of securing corporate donations and applying them to the implementation of a rotary wing program.

Local industry donations can be mutually beneficial. They provide the necessary funds to launch new initiatives while helping the donor firm to build local goodwill. While Crescent Point Energy Trust may not necessarily be representative of local industry in general, their interest in sponsoring a rotary wing program suggests that these donations are worth further exploration.

Since the service is currently governed by the Province and is under custodial governance by the local Saskatoon Regional Health Authority, it may be possible to funnel dedicated funds through the SRHA Foundation. Alternatively, it may make sense to found a separate SAA Foundation whose sole mandate would be to raise local financial support for the program. These and other options deserve further study. In general, it is worth exploring the possibility of stronger linkages with the private sector that may support both the rotary and fixed wing programs.

To make sure that any rotary wing program remains integrated with fixed wing operations, we do not recommend that a separate rotary wing program be set up in isolation of the SAA system, as might be the desire of some corporate donors. Furthermore, to make sure that the program does not become overly reliant on donations which may unexpectedly dry up, we recommend that corporate donations make up no

more than 20% of total operating costs. In any case, corporate donors are likely to prefer making donations for capital purchases rather than operating expenses.

The exploration of these options is relatively easy and can take less than 90 days.

Summary of recommendations for the operation as it exists now

This section provides a concise summary of the recommendations made in this document with respect to improving the current operations, and is done without the benefit of a formal operations audit. Details and analysis follow in subsequent sections and in the appendixes.

Although the following recommendations encourage the program to move towards an even higher level of quality and safety, we acknowledge that not every recommendation can be implemented immediately. We do, however, take a firm position on upholding the highest levels of quality and safety and therefore suggest that time is of the essence. Decisions in prioritizing and funding the changes that these recommendations represent should be based on discussions with all key stakeholders.

The recommendations from an aviation productivity and safety perspective, in order of importance are:

1. Implement two-pilot flight crews on all flights to reduce pilot workload, benefit from crew resource management techniques[32] and provide an even greater degree of risk mitigation;

2. Shorten the flight duty day to achieve an even greater level of safety by ensuring that pilots are well rested;

3. Build a new hangar at the Saskatoon John G. Diefenbaker International Airport to accommodate both the existing fixed wing fleet and the new rotary wing fleet;

4. Provide a dedicated flight planning room where pilots can perform their monitoring and planning duties in a quiet and removed environment;

5. Activate the global positioning satellite (GPS) locators/transmitters to facilitate real time flight tracking, and consider outsourcing flight planning to a third party specialist; and

[32] 'Crew resource management' refers to the practice of the aviation crew working together as a cohesive team through rigorous cognitive and interpersonal training. It is much more than simple redundancy. A well trained team is immensely more able to handle aviation emergencies than a single pilot. When the flight is complicated by poor weather, challenging landings or unfamiliar territory, the benefit of a two-pilot crew is even greater.

6. Employ maintenance personnel to remain on site and perform maintenance 24 hours per day, seven days per week, to maximize utilization of the aircraft and supervise aircraft ground movements.

The recommendations from a medical and operations perspective, in order of importance are:

1. Define and communicate the identity and role of the most responsible physician (MRP) to ensure a consistent understanding across the system of the expectations for medics, nurses and physicians;

2. Mandate and define the use of on-line medical control so that there is consistent understanding across the system of when a physician must be involved in the decision making process;

3. Clearly define the continuing medical education (CME) and annual evaluation requirements for nurses and paramedics to ensure that, in each of these groups, training, maintenance and evaluation of skills is consistent;

4. Update medical staff job descriptions to better define the roles and responsibilities of SAA personnel and to limit excursions outside one's area of expertise;

5. Maintain updated manuals and references based upon evidence-based fact to provide personnel with clear, up-to-date instructions and information related to patient care;

6. Thoroughly document the initial and on-going training programs to ensure consistent training within the paramedic and nurse groups;

7. Initiate development of a rotary wing health and safety strategy to prepare for the implementation of a rotary wing program;

8. Begin an equipment research and procurement plan that represent the first steps towards implementation of a rotary wing program;

9. Develop policy and payment mechanisms so as to ensure safety and delivery of high quality services to Northern patients on trips coordinated by the Provincial Air-medical Coordination Centre.

10. Clearly define the CME and annual evaluation requirements of the Medical Director to make clear the expectations of the Director and maintain consistent standards of care and skills maintenance; and

11. Develop a quality improvement program that incorporates clinical benchmarking and risk management to facilitate ongoing quality improvement efforts.

The recommendations from a system level perspective, in order of importance are:

1. Rationalize the organizational and accountability structure of the service into one accountable body to maximize efficiency of resources, eliminate confusion among personnel regarding accountability and reporting structures and create lines of accountability that are most conducive to quality patient care and maximum aviation safety;

2. Consider the benefits of bringing paramedics and nurses under the same management to promote teamwork, facilitate training, build a common safety culture and promote the upkeep of consistent quality standards;

3. Better align PACC with the provincial EMS dispatch system to maximize its efficacy and its contribution to the efficiency of the provincial emergency response system;

4. Develop a relationship with external auditing and accreditation agencies to provide objective, third party assessments that can drive quality improvement efforts and highlight opportunities for improvement;

5. Implement a stakeholder relations program to maintain the types of communications with SAA stakeholders that increase support for the system and improve its effectiveness

6. Better define the role of PACC and communicate its purpose to stakeholders so that they may make the most of the service;

7. Extend SAA's on-line medical control to private non-SAA carriers so that they can also benefit from the increased level of patient care afforded by having access to the Medical Director, with particular benefits to the remote communities that most frequently use those private carriers;

8. Explore the potential of securing corporate donations to supplement SAA's existing financial resources.

IV. Future state operations

As part of its analysis, Ornge was asked to project the future state of the Saskatchewan Air Ambulance system assuming that population growth is the only variable. Economic, political, social and other factors were not considered.

Among the documents provided to Ornge was an analysis of population projections for the Province. That document included a presentation of recent Saskatchewan population projections conducted by two separate bodies, Saskatchewan Health and Statistics Canada.

Saskatchewan Health projects modest population increases over the studied timeframe while Statistics Canada projects modest population decreases. Both projections represent very small changes from today's population, and as such are immaterial to any discussion of SAA's future operations. Furthermore, the most substantial projected population changes are in areas that would not be served by a rotary wing program because of their distance from Regina and Saskatoon.

If population is assumed to be the only factor that changes over time, then the future state of SAA's operations is essentially what exists today.

V. Appendix A: sources and data

Data file sources

Database files were provided by Saskatchewan Health reflecting the most recent three year data set for

- Road / land EMS [Land.mdb], and
- Saskatchewan Air Ambulance [Air database.xls].

A robust data set was not available to assess the northern carriers.

Secondary Appendices

1. 101.0 - Organizational Chart – Air Ambulance Services
2. 101.1 - Airway Algorithm Appendix To 101.1
3. 101.1 - Airway Algorithm Appendix To 101-1
4. 101.1 - Airway Algorithms
5. 101.1 - Airway Management
6. 101.1 - Patient Assessment Preparation For Transport
7. 101.2 – Rapid Sequence Induction
8. 101.3 – Intubation
9. 101.4 – Laryngeal Mask Airway
10. 101.5 – Cricoidthyrotomy
11. 101.7 - Patient Assessment For Transport
12. 101.8 – Mechanical Ventilation
13. 101.8 – Mechanical Ventilation Draft
14. 1-103 Lifeguard Purpose And Mission
15. 2004-2005 Fiscal Year Stats Spreadsheet
16. 2005-2006 Fiscal Year Stats Spreadsheet2006-2007 Fiscal Year Stats Spreadsheet
17. 2006-2007 Fiscal Year Stats Spreadsheet
18. 2007-2008 Fiscal Year Stats Spreadsheet
19. 201.1 - Chest Pain (Cardiac)
20. 201.1 - COPD
21. 201.2 - Bradyarrhytmias
22. 201.3 - Unstable Tachycardia
23. 201.4 - Ventricular Tachycardias Stable
24. 201.5 - VF Pulseless VT
25. 203.1 –Seizures Draft
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27. 3-301 –Request For Lifeguard
28. 3-302 –Request For Lifeguard (On-Call Medical Crew)
29. 3-303 –Air Ambulance Dispatch
30. 3-304 - Use Of Supplemental Crew Member Flight Paramedic

31. 3-305 –Planning And Loading Procedures For Air Medical Transport
32. 3-306 - Pre-Flight Assessment And Planning; Flight Medical Crew
33. 3-308 –Re-Routing The Aircraft
34. 3-309 –Re-Fueling Of Aircraft
35. 3-310 –Standards For Air Operators
36. 3-311 –Ground Transport Of Medevac Patients
37. 3-312 - Death In The Aircraft
38. 4-402 - Management Of Biohazardous Waste, Contaminated Equipment Or Linen
39. 4-404 –Safety Around Aircraft
40. 4-405 - Medical Standards For Air Medical Crew January 2005
41. 4-405 –Medical Examination Report
42. 4-405 –Medical Examination Report Appendix To 4-405
43. 4-406 –Physical Fitness Standard For Air Medical Crew
44. 4-407 – Routine Duties And Directives Air Medical Crew2
45. 4-408 - Blood Products For Transport
46. 4-408 - Routine Duties And Directives Flight Crew
47. 5-501 - Medical Direction And Control, Medical Director Contract Position
48. 5-503 - Position Description Flight Nurse And Flight Nurse Trainee
49. 6-601 - Quality Improvement Program
50. 6-602 - Data Input And Monitoring
51. 6-604 - Point Of Care Testing Istat
52. Air Ambulance - Flight Nurse Job Description 2005
53. Air Ambulance - Flight Nurse Trainee Job Description
54. Cancelled Trips
55. Dispatch Delay
56. Health Region Chart
57. L-New Org Chart
58. Organization Chart – Revised – October 06
59. P PRO-AP01 ASG Implementation
60. Patient Transport Process Flow Chart
61. PM-1-101 - Organizational Chart
62. PM-1-102 –Description Of Lifeguard
63. PM-1-103 –Lifeguard Statement Of Mission
64. PM-1-104 –Purpose And Objective Of The Air Ambulance Service
65. PM-2-201 –Criteria To Provide Service
66. PM-2-202 –Out Of Province And Non-Resident Policy
67. PM-2-203 –Activation Of Lifeguard
68. PM-2-204 –Air Medical Crew
69. PM-2-205 –Guidelines For The Provision Of Privately Arranged Medevacs
70. PM-3-301 –Request For Lifeguard
71. PM-3-302 –Request For Lifeguard (On-Call Air Medical Crew)
72. PM-3-303 –Flight Dispatch And Control Reporting Procedures

73. PM-3-304 –Air Ambulance Dispatch
74. PM-3-305 –Dispatch Centre
75. PM-3-306 –Flight Paramedics
76. PM-3-307 –Flight Procedures For Air Medical Evacuations
77. PM-3-308 –Take Off / Descent And Landing
78. PM-3-309 –Pre-Flight Assessment And Planning
79. PM-3-310 –Family Member (Significant Other) Accompanying Patient/Pre-Flight Briefing
80. PM-3-311 –Re-Routing The Aircraft
81. PM-3-312 –Refueling Of Aircraft
82. PM-3-313 –In-flight Safety
83. PM-3-314 –Flight Nurse – Pilot Communications
84. PM-3-315 –Physician's Orders
85. PM-3-316 –Standards For Air Operators (Privately Chartered Aircraft)
86. PM-3-317 –Ground Transport
87. PM-3-318 –Response To The Arrested Patient
88. PM-3-319 –Death In The Aircraft
89. PM-3-320 –Selection Of Aircraft For Long Range Air Medical Transfers
90. PM-4-401 –Narcotic Control
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92. PM-4-403 –Non-Medical Procedures In The Aircraft
93. PM-4-404 –Safety Around The Aircraft
94. PM-4-405 –Assignment Of Casual Hours
95. PM-4-407 –Routine Duties (Nursing)
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97. PM-5-501 - Position Description – Medical Director
98. PM-5-501 - Position Description – Medical Director (Newest)
99. PM-5-502 - Position Description – Flight Manager
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102. PM-5-504 –Position Description – Flight Paramedic
103. PM-5-505 –Standards Of Professional Performance
104. PM-5-506 –Flight Nurse: Standards Of Care
105. PM-5-507 –Competency Profile: Flight Paramedic
106. PM-6-601 –Quality Improvement Program
107. PM-6-603 - Chart Audits
108. PM-6-605 –Disruption Of Health Services
109. PM-6-606 –Quality Management Program
110. PM-Index –Saskatchewan Air Ambulance Service Policy Manual
111. PRO-AP03 -Pulse Oximetry
112. PRO-AP04 -Oxygen
113. PRO-AP05 -End Tidal CO2 Measurement

114. PRO-AP06 -Cardiopulmonary Resuscitation
115. PRO-AP07 -Pediatrics
116. PRO-AP08 –Transfusion Reactions
117. PRO-AP09 –Automated External Defibrillation (AED)
118. PRO-AP10 –Transcutaneous Pacing
119. PRO-AP11 –Intraosseous Infusion Procedure
120. PRO-AP12 –Fracture Care
121. PRO-AP13 –Cain Altitude Restrictions
122. PROT-A01 –Physician's Orders
123. PROT-A02 - Intravenous Therapy
124. PROT-A03 - Rapid Sequence Induction
125. PROT-A04 - Defibrillation
126. PROT-A05 - Airway Control
127. PROT-A06 - Trauma Emergencies
128. PROT-A07 - Electrical Shock
129. PROT-A08 -Burns
130. PROT-A09 - Seizures
131. PROT-A10 - Head Trauma
132. PROT-A11 - Chest Trauma
133. PROT-A12 - Trauma Abdominal
134. PROT-A13 –Musculoskeletal Injuries
135. PROT-A14 –Acute Abdominal Pain (Non Traumatic)
136. PROT-A15 –Chest Pain (Cardiac)
137. PROT-A16 - Anaphylaxis
138. PROT-A17 - Bradyarrhythmias
139. PROT-A18 –Unstable Tachycardia
140. PROT-A19 –Narrow Complex Supraventricular Tachycardias (Stable) Excluding Atrial Fibrillation And Atrial Flutter
141. PROT-A20 –Premature Ventricular Contraction (PVC's) Stable Ventricular Tachycardia
142. PROT-A21 –Ventricular Fibrillation/Pulseless Ventricular Tachycardia
143. PROT-A22 - Asystole
144. PROT-A23 –Pulseless Electrical Activity (Pea)
145. PROT-A24 –Cyclic Antidepressant Overdose
146. PROT-A25 –Stroke (Cerebrovascular Accident)
147. PROT-A26 –Respiratory Emergencies
148. PROT-A27 –Cold Emergencies
149. PROT-A28 –Heat Injuries
150. PROT-A29 –Unconscious Of Unknown Etiology
151. PROT-A30 - Hypoglycemia
152. PROT-A31 –Obstructed Airway
153. PROT-A32 –Submersion Injury
154. PROT-A33 –Gastrointestinal Disorders (Non-Neonatal)

155. PROT-A34 - Epistaxis
156. PROT-A35 –Ophthalmologic Conditions
157. PROT-A36 - Combative Patient
158. PROT-A37 –Intraosseous Infusions (IO)
159. PROT-A38 - Obstetrical Emergencies
160. PROT-A39 –Transport Of Potential Organ Donors
161. PROT-A40 - Poisoning
162. PROT-A41 –Testing Temporary Transvenous Pacemakers
163. PROT-B01 –Primary Survey
164. PROT-B02 –Secondary Survey
165. PROT-B03 - Communications
166. PROT-B04 –Abdominal Pain
167. PROT-B05 –Trauma; Abdominal
168. PROT-B06 –Amputated Part
169. PROT-B07 - Anaphylaxis
170. PROT-B08 - Burns
171. PROT-B09 –Chest Pain
172. PROT-B10 –Cardiac Arrest
173. PROT-B11 –Chest Injuries
174. PROT-B12 –Cold Emergencies
175. PROT-B13 –Diabetic Emergencies
176. PROT-B14 - Dyspnea
177. PROT-B15 –External Bleeding
178. PROT-B16 –Fractures/Dislocations Of Extremities
179. PROT-B17 –Head/Neck/Spine Injuries
180. PROT-B18 –Heat Emergencies
181. PROT-B19 –Interfacility Transport Of Patient Receiving IV Heparin
182. PROT-B20 –Load And Go
183. PROT-B21 –Trauma Multiple
184. PROT-B22 –Obstetrical Emergencies
185. PROT-B23 –Obstructed Airway
186. PROT-B24 - Shock
187. PROT-B25 –Pneumatic Anti-Shock Garment (PASG)
188. PROT-B26 - Poisoning
189. PROT-B27 –Psychiatric Emergencies
190. PROT-B28 - Seizures
191. PROT-B29 –Sexual Assault
192. PROT-B30 –Stroke (Cerebrovascular Accident Or CVA)
193. PROT-B31 –Transfusion Of Blood Or Blood Products
194. PROT-B32 - Triage
195. PROT-B33 –Unconscious Patient
196. PROT-B34 –Organophosphate And Carbamate Poisoning Basic Life Support

197. PROT-G01 –Death In The Aircraft
198. PROT-G02 –Guidelines To Death Notification
199. PROT-G03 –Refusal Of Care
200. PROT-G04 – Advanced Life Support Intercept/Diversion Protocol
201. PROT-G05 – Safety Around Aircraft
202. PROT-G06 – Organophosphate And Carbamate Poisoning
203. PROT-IABP Draft – Intra-Aortic Balloon Counterpulsation
204. PROT-M01 –Pain Management: Administration Of Morphine And Fentanyl
205. PROT-M02 – Sedation Protocol: Administration Of Midazolam
206. PROT-M02 –Sedation Protocol: Administration Of Midazolam
207. PROT-M03 –Diazepam IV, Rectal
208. PROT-M04 –Lorazepam Administration (Sublingual)
209. PROT-M06 –Nitroglycerine IV
210. PROT-M07 –Administration Of Dopamine
211. PROT-M08 –Administration Of Amiodarone
212. PROT-M09 –Ipratropium Bromide (Atrovent) (Inhaled)
213. PROT-M10 –Glucagon (Subcutaneous)
214. PROT-M11 –Administration Of Vecuronium Bromide
215. PROT-TAB – Medication And Treatment Protocols Table Of Contents
216. SHR Organization Chart – November 2006
217. SHR Organization Chart – November 22, 2006
218. Sub Sentinel Dx
219. Take Off Location
220. Time Of Day
221. Top 15 Receiving Facilities
222. Top 25 Referring Facilities
223. Trips Per Month

VI. Appendix B: aviation analysis

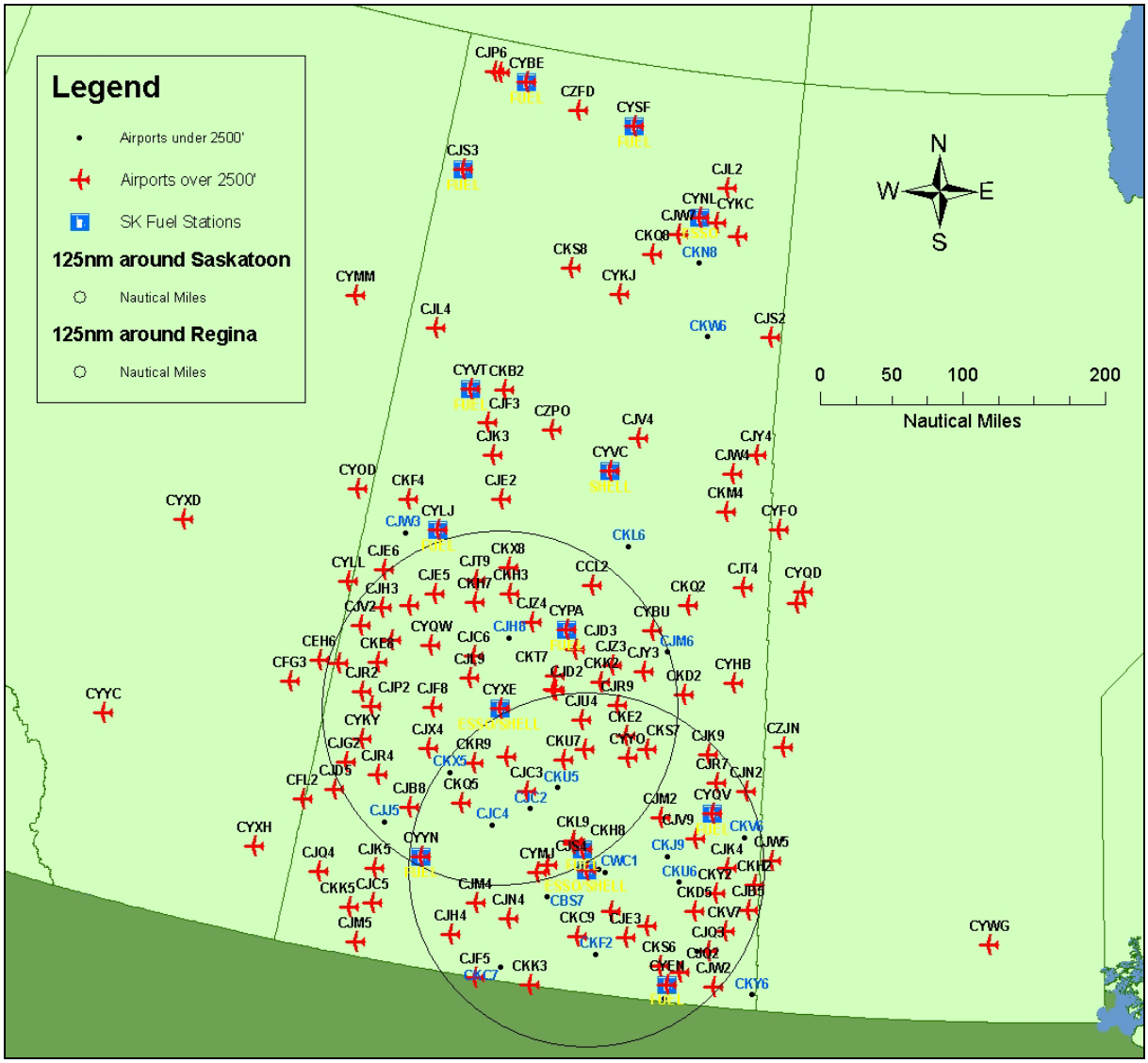
Methodology

Base map

Steps:

1. Found airports and corresponding lat/longs through various websites by searching Google (i.e. http://gc.kls2.com/airport/CKX8)
2. Mapped airports on GIS map filtering by length of longest runway
3. Found fuel locations (off Esso/Shell websites) and plotted on map
4. Created buffer of 125nm around each potential base (Saskatoon and Regina)

NOTE: 125 nautical miles was used for rotor analysis as it is considered the maximum range for operating in an efficient system. Any distance greater than 125nm is considered inefficient if using the rotor wing aircraft.


Legend
Airports under 2500'
Airports over 2500'
SK Fuel Stations
125nm around Saskatoon
Nautical Miles
125nm around Regina
Nautical Miles
N
W
E
S
0
50
100
200
Nautical Miles
CYBE
CZFD
CYSF
CJS3
CJL2
CYNL
CYKC
CKO8
CKN8
CKS8
CYKJ
CYMM
CJL4
CKW6
CJS2
CYVT
CKB2
CJF3
CZPO
CJV4
CJK3
CJY4
CYVC
CJW4
CYOD
CKF4
CJE2
CKM4
CYXD
CYLJ
CJW3
CYFO
CKL6
CJE6
CKX8
CJT9
CCL2
CJT4
CYQD
CYLL
CJE5
CKH7
CKH3
CKQ2
CJH3
CJV2
CJZ4
CYPA
CYBU
CJH8
CJD3
CJZ3
CJY3
CJM6
CEH6
CKP4
CYQW
CJC6
CFG3
CJL9
CKT7
CKK2
CYHB
CJR2
CJD2
CKD2
CYYC
CJP2
CJF8
CYXE
CJR9
CJU4
CKE2
CYKY
CJX4
CKR9
CKU7
CYYO
CKS7
CJK9
CZJN
CJG2
CJR4
CKX5
CJC3
CKU5
CJR7
CJN2
CFL2
CJD5
CJB8
CKQ5
CJC2
CJM2
CYOV
CJU5
CJC4
CJV9
CKV6
CYXH
CKL9
CKH8
CJK4
CJW5
CJQ4
CJK5
CYYN
CYMJ
CJS4
CWC1
CKJ9
CKH2
CKK5
CJC5
CJM4
CJN4
CBS7
CKU6
CKY2
CJB5
CJM5
CJH4
CKC9
CJE3
CKD5
CKV7
CKF2
CJO3
CJF5
CKK3
CKS6
CJO2
CJW2
CKY6
CYWG

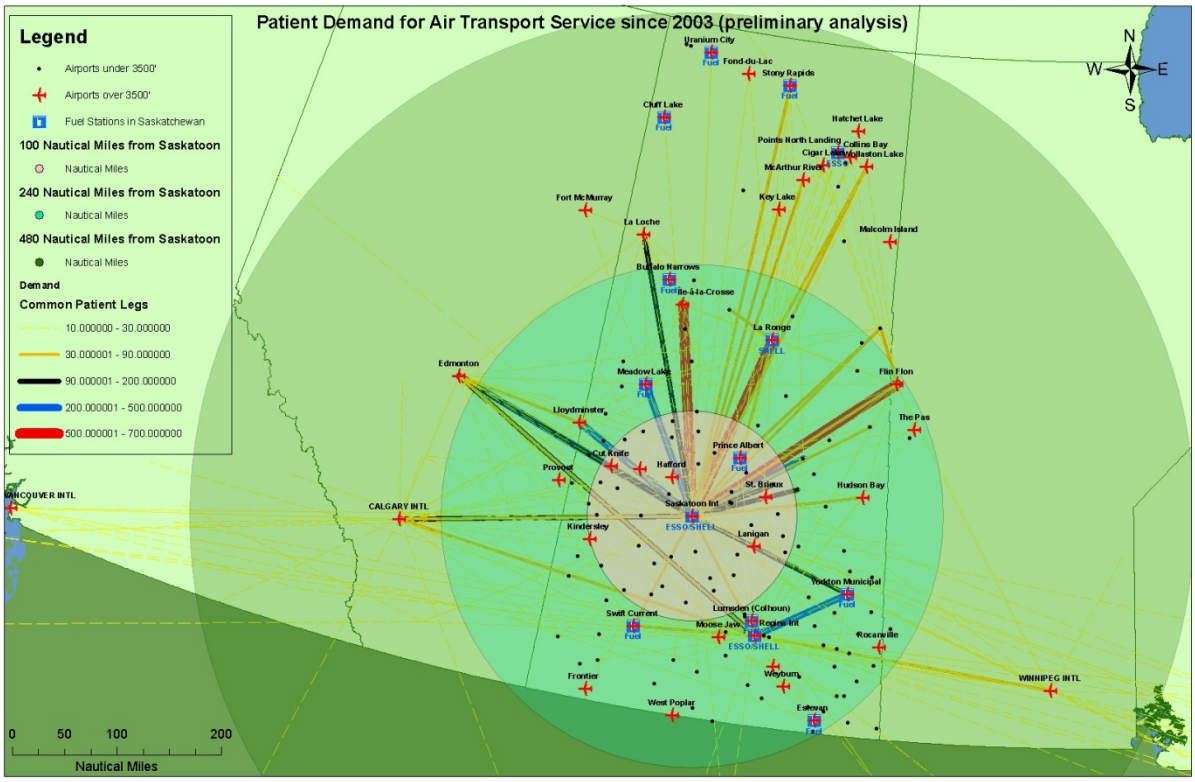
Air Ambulance – Fixed Wing

Date Range: 03/11/03 – 09/05/08

Note: this does not include data from PACC which was implemented in October 2008

Steps:

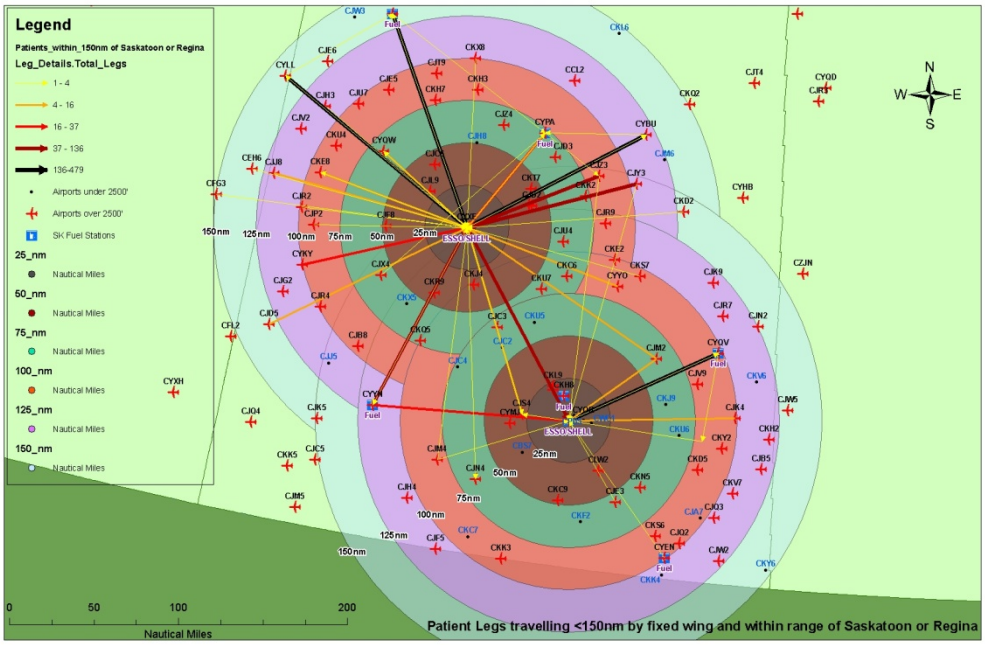
1. Any patient transferred by fixed wing air ambulance was plotted on a map, based on origin and destination of the flight leg.
2. Locations were based on airports. If airport code was missing or invalid, leg was removed from data set.



3. Patient legs were separated into “within 150nm of Saskatoon or Regina” or “outside 150nm.” This was based on preliminary criteria of 150nm (although later modified to 125nm).

Results

2163 of the 7041 patient legs were within this range (even fewer would be within 125nm). In terms of distance travelled, 5536nm of patient flying was within 150nm. Of the 106448nm of patient legs flown by fixed wing, this is minimal (5%).



Land Ambulance

Date Range: 4/1/2005 - 3/31/2008

Steps:

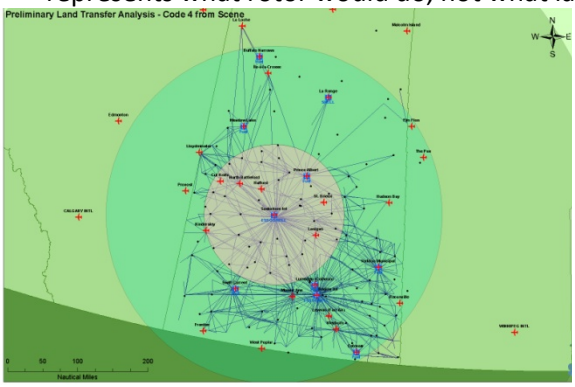
1. Filtered land ambulance patient calls by those classified as “emergency” (code 4) in the field, “response from scene.” This was an assumption by Ornge that was confirmed by Saskatchewan Health on February 27th in Saskatoon. Code 3 (“removal”) were not considered as in hindsight, a rotor wing would not be sent to remove a deceased person. Code 2 and below were not considered urgent enough to warrant the transfer by rotor wing. The codes were broken down as follows:

Responses	To		From
	-	Cancelled	0
	1	Scheduled	1
	2	Non-Urgent	2
	(4)	Emergency	(4)
	-	Removal	5

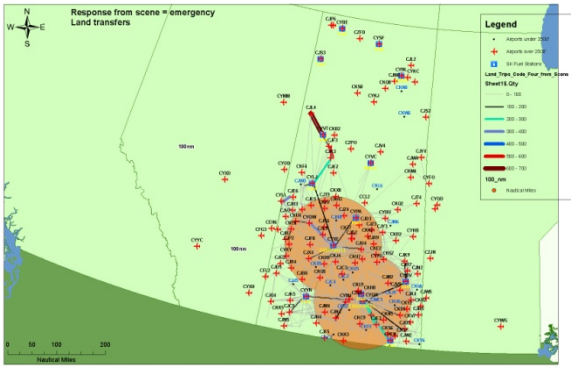
Priority	Scene		Dest'n
	1	No Patient	1
	2	Minor	2
	3	Serious	(3)
	(4)	Life Threat	4
	5	No Life Signs	5

2. Removed data with errors (missing times, location rescodes blank, times out of sequence, negative times, etc).
3. Determined estimated lat/long for “rescode” listed in land database.

4. Mapped direct vector between origin and destination for each patient transfer (this represents what rotor would do, not what land actually did).



or



5. Filtered on transfers within 125nm of Saskatoon or Regina, that originated at a minimum of 5nm from the base, and had no leg more than 125nm.

Assumptions

- Data provided by Saskatchewan Health Land Ambulance
- Records with errors (as defined in #4 above) were removed from the data set
- 3 years worth of data analyzed, and result divided by 3 for annual demand
- Data set is limited to land transfers with code 4 (emergency) "response code from the scene." This was agreed upon during the meeting with Ornge and Saskatchewan Health on February 27, 2009.
- Each transfer is an independent flight and at the end of each transfer, the aircraft returns to base (no routing efficiency planning) – 2 empty & 1 full patient leg per transfer. This was decided based on the limited data set and complexity of routing efficiency planning.
- "Day" calls are classified as any flight originating between 7am – 7pm, regardless of what time the flight goes until. "Night" calls start between 7pm – 7am.

- Dispatching is done at the time of call (do not wait until the land arrives before dispatching rotor). This is considered most efficient in this type of system.
- Weather is not a factor in data analysis due to lack of weather data
- Patient legs greater than 125 nm and less than 5nm are not considered for rotor wing. This was agreed upon as over 125nm would be inefficient and less than 5nm could be done faster by land (building in weather check, start up of rotor wing, etc)
- Transfers that originate less than 5 nm or farther than 125nm from the base are not considered for rotor wing. This was agreed upon as it was assumed that patients were not taken out of major city (eliminating origins under 5nm)
- Transfers that end farther than 125nm from base are not considered for rotor wing
- Sum of all legs for each patient transfer is less than or equal to 250nm (based on fuel capacity and payload)
- Locations are based on latitude/longitude of the pick-up and drop-off rescodes and vectors are direct from origin to destination (assume helipads available 24//7 or scene location clear to land at)

Total Records	293858

Date range (3 yrs)
04/01/05 - 03/31/08

Description	#	%
Unknown response from Scene	666	0.2%
Code 0 response from Scene	40793	13.9%
Code 1 response from Scene	22724	7.7%
Code 2 response from Scene	204730	69.7%
Code 4 response from Scene*	24307	8.3%
Code 5 response from Scene	638	0.2%
Total	**293858**	

% of Code 4 from scene with data entry errors* 10.3%

Remaining data set of code 4's	**21806**

Description	Code	#	%
Illness (Emergency Response)	2	10845	44.6%
Inter-Hospital Transfer Admitted	4	5052	20.8%
Injury/Trauma (Emergency Response)	1	4559	18.8%
Med-Evac	25	166	0.7%
Obstetrics	20	577	2.4%
Inter-Hospital Transfer Not Admitted	3	228	0.9%
Miscellaneous Transfer	6	208	0.9%
Other	99	14	0.1%
Co-ordinated Transfer	8	48	0.2%
Neonatal	22	47	0.2%
Treated-No Transfer	31	0	0.0%
Refused Service	33	0	0.0%
Equipment/Team Transfer	12	10	0.0%
Cancelled Call	30	0	0.0%
Diagnostic Transfer Return	7	22	0.1%
Convalescent Return	5	17	0.1%
Organ Transfer	11	13	0.1%
Emergency Stand By	44	0	0.0%
Mass Casualty Incident	50	0	0.0%
Sporting Event Stand By	40	0	0.0%
Specialized Transfer	9	0	0.0%
Total	**21806**		

Day	12735	58.4%
Night	9071	41.6%

*** errors include: times missing, locations rescode blank, times out of sequence, negative times, etc.**

Results

Day & Night

1. If based strictly out of Saskatoon, 24.5% of the code 4 land transfers could be done by rotor, assuming day and night operations.
2. If based strictly out of Regina, 25.9% of the code 4 land transfers could be done by rotor, assuming day and night operations.
3. If based out of Saskatoon and Regina, 46.6% of the code 4 land transfers could be done by rotor, assuming day and night operations.

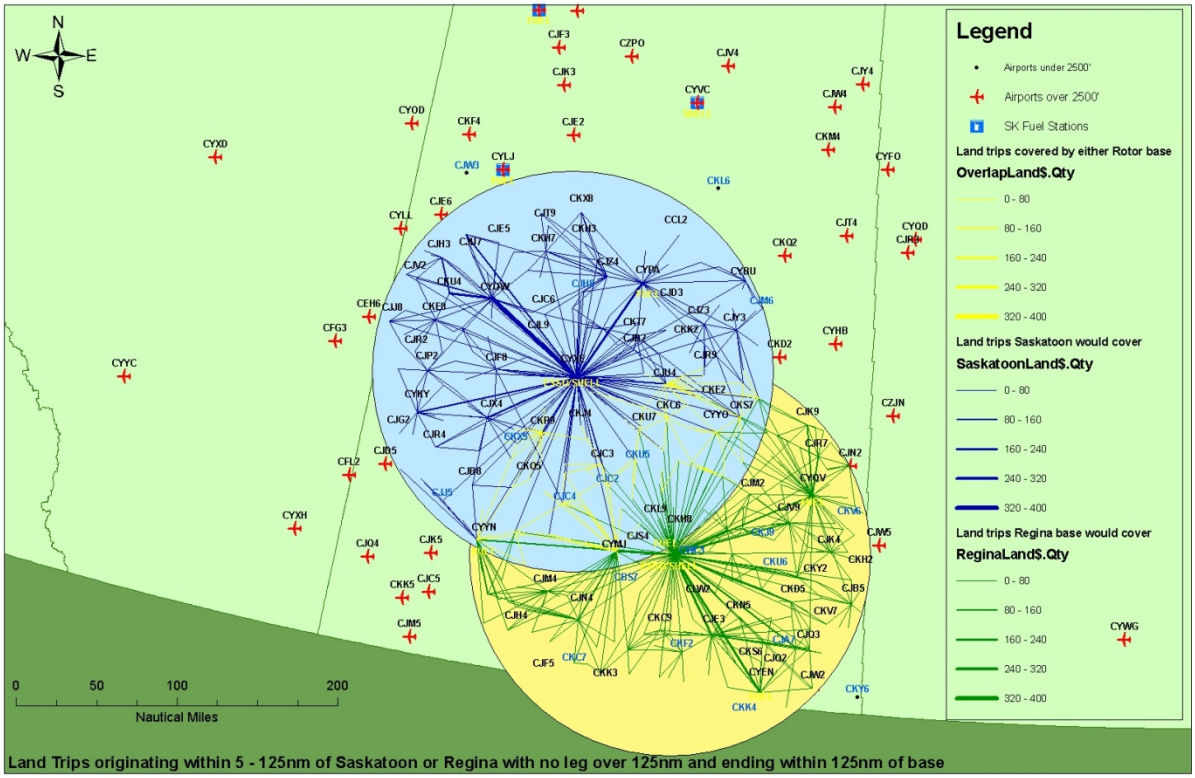
Day Only

1. If based strictly out of Saskatoon, 14.5% of the code 4 land transfers could be done by rotor, assuming day-only operations.
2. If based strictly out of Regina, 16.0% of the code 4 land transfers could be done by rotor, assuming day-only operations.
3. If based out of Saskatoon and Regina, 28.1% of the code 4 land transfers could be done by rotor, assuming day-only operations.

Annual	Day			Night			Day & Night		
	#	nm	hr	#	nm	hr	#	nm	hr
Saskatoon	1,052	127,630	1,276	732	89,012	890	1,784	216,642	2,166
Regina	1,162	151,754	1,518	722	93,899	939	1,884	245,653	2,457
Overlap	174	23,052	231	110	14,538	145	283	37,590	376
Saskatoon & Regina	2,040	244,139	2,441	1,344	160,632	1,606	3,385	404,770	4,048

Annual	% of code 4 calls (day only)	% of code 4 calls (night only)	% of code 4 calls (day & night)
Saskatoon	14.5%	10.1%	24.5%
Regina	16.0%	9.9%	25.9%
Overlap	2.4%	1.5%	3.9%
Saskatoon & Regina	28.1%	18.5%	46.6%

This is shown in the following map.



Reduction of Land Service

Annual reduction of land transportation could reach as much as 3,385 transfers. Potential impact on service providers though will be negligible. Based on current ratio of code 4 deliveries analyzed for 4 biggest providers, the impact is 0.48% which is immaterial.

VII. Appendix C: medical and operations analysis

Final DRAFT Report
Provided by Richard Yelle, EMCA, RN, BA, MA(Ed), CCP(f)
Manager Medical Affairs
March 11, 2009 (table format March 31, 2009)

Introduction and Reviewed Data Sources

The following report will encompass Medical Affairs (patient related issues) as well as Operational assessments and recommendations following a visit to the Saskatchewan Air Ambulance service and review of their provided data.

The following data sources were utilized for this report in no order of priority:

- Saskatchewan Air Ambulance data (printed and electronic) provided prior to the February 26th 2009 visit:
  - Saskatchewan Air Ambulance Policy Manual (1997)
  - Saskatchewan Air Ambulance Patient Care Principles (2005)
  - Saskatchewan Air Ambulance Emergency Treatment Protocols (1998-2003)
  - Saskatchewan Air Ambulance Medication Protocols (1998-2001)
- Saskatchewan Air Ambulance web site (http://health.gov.ca/)
- Saskatchewan EMS Development Project (authored by Richard A. Keller and Dr. James Cross), November 8th 2000.
- Saskatchewan Ambulance Act
- Saskatchewan Paramedic Act
- Face to face Meetings held:
  - February 26th, 2009 - in attendance from the Saskatchewan Air Ambulance (SAA) was Ms. Cindy Seidl, Nurse Manager, Ms. Ann Parker, Clinical Nurse Educator and Mr. Stan Wiebe, Flight Nurse
  - February 27th,2009 Meeting with Saskatchewan Air Ambulance personnel, Ministry of Health representative as well as a Saskatchewan Government Services representative

Saskatchewan Air Ambulance Process Review

The following are clarified processes at the February 26th meeting as not being present or different from what was provided in the documentation Saskatchewan Air Ambulance (SAA) to Ornge prior to the February visit (in no order of priority):

Clarified Processes at the February 26th Meeting	
Communications	• SAA « carbonless » Patient Record (3 page document) • Satellite telephones in patient compartment of aircraft

Job Descriptions	• Nurses and paramedics practice same medical skill set under "Transfer of Function" • Nurse are the "most responsible" on all calls • Paramedics educated to the Extended Role Transport Training Program or ERTTC which is a non accredited in-house training to the CCP level
Annual Practitioner Certification	• Both nurses and paramedics fall under their distinct professional College (Transfer of Function) • No formal annual practitioner recertification process present • CME involves canned courses such as ACLS, TNCC, … as well as elective clinical such as OR / OBS • SAA has no official "employer / employee" interaction with the Paramedics • Paramedics even though working at the National Paramedic Competency Level of Critical Care are not accredited at that level
Operational Process	• Hangar located at the John Diefenbaker Airport in Saskatoon • Crew at base 24/7 (12 hours shift from 07-19 & 19-07 hrs) and made up of 1 nurse, 1 pilot and I paramedic • Second crew 12 hrs a day from 09-21 hrs made up of 1 nurse and 1 pilot (second medical person called in or provided by Nurse Manager or Clinical Nurse Educator if available)
Specialty teams	• Overflow (i.e. OBS and peads) covered by the SAA
Aviation	• Patient diagnosis no longer provided to the pilot in pre-flight call briefing
Medical Control	• Sending physician usually provides medical orders to SAA personnel (Transfer of Function) • Small group of ER physicians act as medical control but are not formally orientated to this role and according to the SAA staff are not often utilized
Air Ambulance Dispatch	• Provincial Aeromedical Communication Center (PACC) implemented October 2008 (located at Saskatoon hanger) • Staffed by experienced Flight nurses 24/7 on 12 hr shifts • Responsible for call taking, call triage, some flight following and database completion
Complaints / Resolution	• "Do not occur often" and when the do, are handled by the

Process	Nurse Manager
Audit Tools	• Call / Chart Reviews presently completed on an on going basis by the Clinical Nurse Educator who follows up as required with the personnel • No other audit tools observed
Air Ambulance Advisory Committee	• Meet quarterly and deal with system wide issues integral to all parties on committee • No operational issues raised / discussed
Equipment	• Monitor – LP12 • Ventilators – LTV1000 (adult) and MVP10 (peads) • Infusion Pump – IVAC 3 channel • Medical supplies, pharmaceutical and such obtained via the Saskatoon RHA (mostly St Paul's Hospital with the exception of peads related supplies)
Team Dynamics	• Nurses contracted thru Saskatoon RHA • Paramedics contracted thru MD Ambulance Care Ltd • Pilot members of the Sask Government Services
Research	• Sepsis presently being assessed as a benchmark with others to follow such as myocardial infarct (MI) • Sepsis selected because of its high addressing impact thru education leading to medical change in practice using outreach (crews, Medical Director lectures, PACC nurse sharing protocol and so on)
Fixed Wing Standing Offer / Charter Process	• Every RHA provide the MoH with 2 air carriers who will be the primary ones called for basic / intermediate air ambulance transports within that area • No present standards for aviation or medical practice exist • Call must be channeled thru the Provincial Aeromedical Communication Center (PACC) for payment approval (PACC ensures medical escort present on transfers which was not always the case in the past)

Strong Points Worthy of Noting

- Experienced nursing core
- Patient focused organization
- Provincial Aeromedical Communication Center (PACC) permits the nurses the required time to provide patient care while the other duties are still being taken care of in an efficient manner (several of these tasks were the responsibly on the on duty nurse prior to PACC)
- Bariatric and aircraft emergency procedures P and P
- Sepsis metric / benchmark

Calls

- Provincial Aeromedical Communication Center (PACC) implemented October 2008
- ~ 50% "tarmac transfers" vs. hospital transfers

The following call data was provide by SAA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr End	Ave Mth	% Prev Yr
2005	129	102	113	111	94	88	95	100	109	88	103	116	1248	104	n/a
2006	113	98	132	113	111	94	99	125	94	105	108	129	1321	110	5.53%
2007	128	96	115	104	125	122	119	113	103	116	125	101	1367	114	3.37%
2008	123	120	132	123	129	155	138	135	146	134	111	149	1595	133	14.30%
Month Sub	**493**	**416**	**492**	**451**	**459**	**459**	**451**	**473**	**452**	**443**	**447**	**495**	**5531**	**115**	
Mon Aver	**123**	**104**	**123**	**113**	**115**	**115**	**113**	**118**	**113**	**111**	**112**	**124**			
Month %	**9.0%**	**7.6%**	**9.0%**	**8.3%**	**8.4%**	**8.4%**	**8.3%**	**8.7%**	**8.3%**	**8.1%**	**8.2%**	**9.1%**			

The SAA call volume has jumped dramatically in 2008 (up 14.3%). Average monthly calls are about 115 with Jan, March and Dec as the busiest months (~123) while February being the least. On average the remainder of the year sees 111 – 113 calls / month.

VIII. Appendix D: list of interviews and acknowledgements

The Ornge Team would like to acknowledge and thank all those who provided assistance and dedicated their time, effort and insights to the successful production of this report. We would especially like to thank Saskatchewan Air Ambulance Nurse Manager Cindy Seidl. She often conveyed her messages reflecting both the pulse of the SAA and the absolute commitment from front line staff to the provision of patient care excellence.

A list of key interviews will be detailed below; please note that this is not an exhaustive list but reflective of major sources of insight/ intelligence/ knowledge transfer that helped enhance the quality of our report.

- Project Kick-Off (via tele-conference) January 5th. Members from Saskatchewan Health, MGS, Saskatchewan Air Ambulance, and Ornge. Project Leads: Patrick O'Bryne and Peter Fenwick. Review statement of work terms, discussion provides clarity on scope and availability of data.

- First on-site at Saskatoon hangar, January 22nd /23rd . Ornge staff (R. Potter, S. Farquhar, J. Lebo, P. Fenwick) visit with P. O'Bryne, C. Oleson, C. Seidl, and other. Primarily data gathering and observational meetings with various aviation and medical staff.

- Second on-site at Saskatoon hangar, February 27th. SAA Cindy Siedl, Dr. Jon. P. O'Bryne, C. Oleson. Ornge project team (R. Potter, S. Marques, R. Yelle, P. Fenwick). Individual (and separate) interviews also held with consultants Don Cummings and John Jacques. Follow-up on March 2nd by P. Fenwick with C. Seidl to clarify previous week's discussions.

- Mamawetan-Churchill Regional Health Authority evening meeting March 2nd with CEO Kathy Chisholm, and two members her staff (Emergency Planning Coordinator – Karyn Steinke, Paramedic, Sandy Bay Nursing Station Mgr – Brenda Beckman) with C. Seidl, P. O'Bryne and P. Fenwick. A great deal of listening to better understand the needs of the North (in the context of our scope of work).

- Telephone Interview with Dr. Stoll, MCRHA Medical Director; 03 March 2009, 1430-1520h EST

- Phone Interview with staff of Crescent Point Energy Trust. Anna , Michelle Codelase and Corey Larsen. 1 April 2009, 1600h EST. Conducted by Ornge, P. Fenwick.

- Telephone conversation with Don Cumming, chair of the Road EMS tri-partied review committee. Friday 03 April 2009, 1110h EST. Conducted by Ornge, P. Fenwick.

Draft reviews and final review meetings are not included in the above list; typically those involved have been from SAA, SaskHealth, and MGS.

IX. Appendix E: Scenario two financials and Gantt chart

Financial Model

Saskatchewan Transport Medicine Project
Scenario 2: twin bases in Saskatoon and Regina

Purpose of Spreadsheet:
To develop a financial model that includes capital requirements and annual ongoing operating costs for a rotor wing transport medicine service in the province of Saskatchewan. The model examines costs to establish an in-house service. Key assumptions are made and expressed within the notes.

A procurement process will be launched to purchase all necessary aviation and aviation related infrastructure assets. The new model will be in place by the {TBD} year.

Worksheets:
This spreadsheet consists of the following worksheets:

Capital Requirements
Operating Cost Requirements

Note:
All amounts are in CAD, unless indicated otherwise
Staffing, legal and other costs associated with the procurement process cost are included as a projected percentage of total costs (professional fees; consulting fees)

Projected Capital Requirements

Exchange rate	**0.8700**
No. of Hulls	**3**

	Amount in USD	Amount in CAD	Total CAD	Comments
Aircraft	21,000,000		24,137,931	assumed 3 @ USD 7M
Medical interiors	1,800,000		2,068,966	assumed 3 @ USD 600K
Communication (aviation)	450,000		517,241	assumed 3@ USD 150K
Ground Support Equipment		100,000	100,000	assumed some of existing GSE used for FW to be utilized for RW
IT Infrastructure		500,000	500,000	needs to be identified and priced to be estimated accurately
Disaster resource planning		250,000	250,000	needs to be identified and priced to be estimated accurately
Roof top helipads		3,000,000	3,000,000	assumed 2@ CAD 1.5M
Ground helipads		3,000,000	3,000,000	assumed 10@ CAD 300K
Hangar in Saskatoon (Design & Build)		2,500,000	2,500,000	To accommodate 3 FW, 2 RW and maintenance space. Assumed 20,000 sq.ft for hangar and maintenance & 10,000 sq.ft. admin space. $/sq.ft to be validated. Does not include land purchase, the price of which will depend on location.
Hangar in Regina (Design & Build) {per conversation with C. Olsen}			2,500,000	Depending on lease space availability; consider 10,000 sqft for 2 RW
Total Capital cost before consulting fees			**38,574,138**	
Consulting fee (legal, accounting, bank etc.)			1,928,707	5% of total
Capital project contingency			1,928,707	5% of total
Total Capital cost			**42,431,552**	

Notes:

1.There is a high probability that aircraft and other capital items will be purchased in USD, therefore F/X rate might impact the total capital cost. Based on GovSask analysis and hedging strategies external to SaskHealth a fixed rate of 0.87 was provided as an input constant.

2.There are different alternatives for financing: government funding, bond issues, long term bank loans etc. The type of financing and interest rate will impact the amount of interest.

3. The hangar was assumed to be designed and built. Other alternatives can be considered, such as capital lease or purchase of an existing hangar. This decision will impact operating as well as capital costs.

4. Aircraft purchase price is subject to type of aircraft, **selected options**, inflation and increases in manufacturers' prices.

Projected Operating Costs

Total Flight hours	1,500	
No. of Hulls	3	
No. of bases	2	
Annual inflation rate	2%	
F/X	0.87	
Fuel current price $/L	1.23	based on Ornge's average FY09 price
Fuel L/Hour	303	L/H as per Conklin & de Decker, plus (based on our experience, an additional 30% to account for demands of an aeromedical program

			explanation / assumptions / comments		Cost per year	
Maintenance & miscellaneous flight expenses	699	USD / Flight hour	as per Conklin & de Decker		$ 1,205,724	
Fuel costs *	636,525	CAD	based on fuel burn rate, price per L, and number of flight hours		$ 636,525	
						1,842,249
Pilot salaries & benefits	12	pilots @	$	100,000	$ 1,200,000	
First Officer salaries & benefits {per conversation with C. Olsen}	8	FO's @	$	80,000	$ 640,000	
Aviator On going Training	20	pilots @	$	12,000	$ 240,000	
Aviator uniforms	20	pilots @	$	1,000	$ 20,000	
AMEs	5	AMEs @		100,000	$ 500,000	
Insurance per Hull	2%	of hull cost	as per Conklin & de Decker		$ 534,483	
Liability Insurance			to be verified		$ 30,000	
Admitted Liability (based on number of seats)	700	USD per seat	as per Conklin & de Decker; 4 seats per hull (2 medics, patient and escort)		$ 9,655	
Dispatcher			current FW resources will be used		$ -	
						3,174,138
Nurses salaries & benefits	13	nurses @		100,000	$ 1,300,000	
ACPs salaries & benefits	9	ACPs @		100,000	$ 900,000	
Medics training *	$ 38,276.92				$ 38,277	
Travel						
Drugs & Med suppliers			Costs related to the sum of travel, drugs and medical supplies			
Other suppliers & equipment (medical waste, uniforms, etc.)			other supplies, equipment and office supplis are approximated (in sum) as 15%		$ -	
Office suppliers			315000 of operating expenses of the current fixed wing prorgam costs (15% of 2.1 MM)		$ 315,000	
						2,553,277
Additional admin/back office staff	2	FTE: allocated charge assuming current rates from MGS, fixed wing opertaions			$ 230,000	
Regina Hangar rent					$ 200,000	
Hangar insurance	$ 10,000	per hangar		2 hangars	$ 20,000	
Roof top Helipad insurance (property only) *	1800	per helipad			$ 3,600	
Ground Helipad insurance (property and liabilty) *	5360	per helipad			$ 53,600	
Land Lease of Saskatoon hangar	2,000	per month			$ 24,000	
Travel					$ 20,000	
Communications		inclusive of potential satelite phone charges (approx. $1,200 per month)			$ 32,000	
Disaster resouce planning	25000	per year			$ 25,000	
Professional fees (Legal, Audit fees)					$ 150,000	
Admin and Maintenance (property tax, utilities, building maintenance)					$ 200,000	
						958,200
						8,527,864
Operationing cost contingency	5%		{per P. O'Byrne}		$ 426,393	
						8,954,257
FY #2						**9,133,342**
FY #3						**9,316,009**
FY #4						**9,502,329**
FY #5						**9,692,376**

Notes:

The annual increase in fuel price may differ from the annual inflation rate. The assumption is that the government will fund all unexpected increases in fuel price that exceed the annual inflation rate.

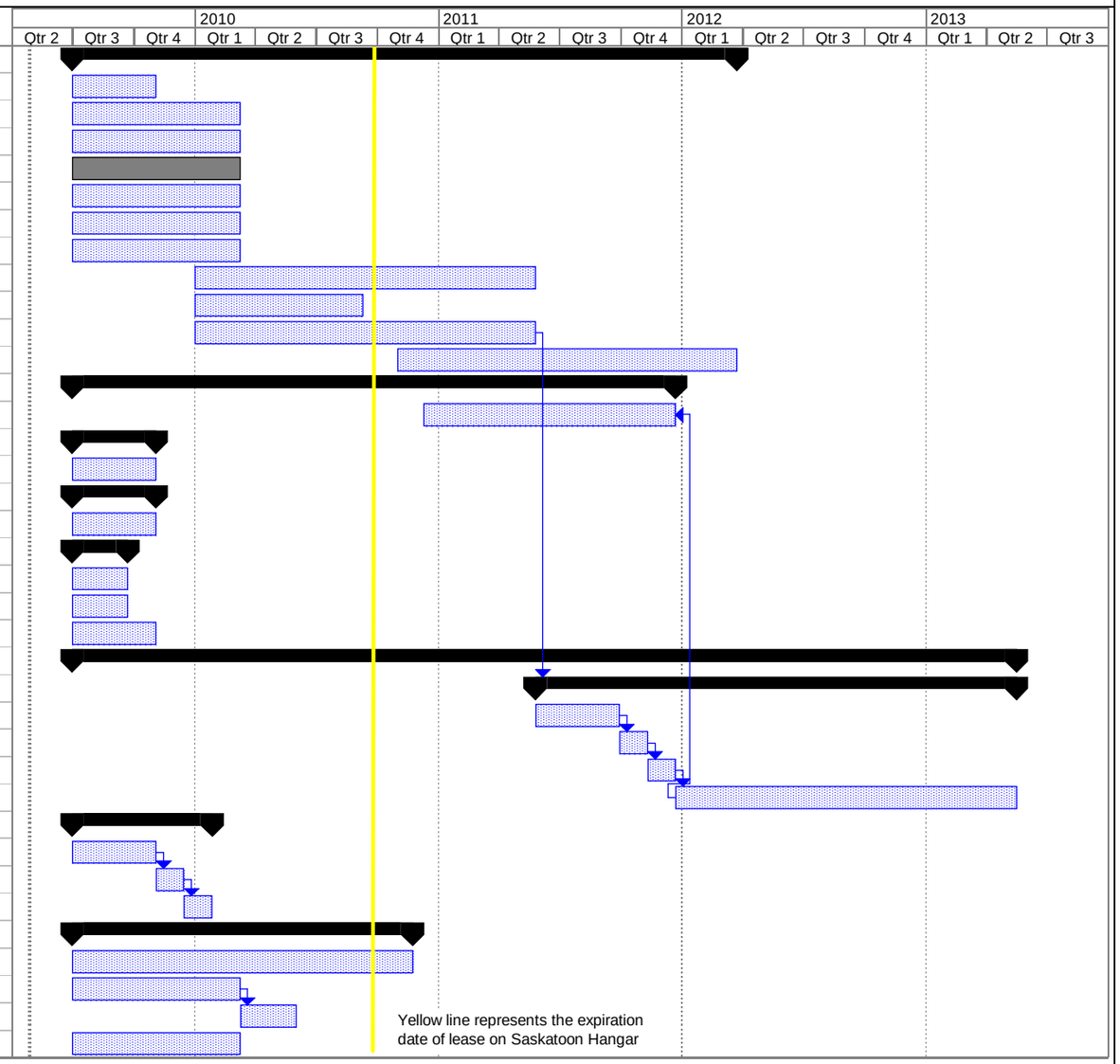
Medical staff training costs were approximated based on coverage of wages and cost of training programs for the following specialized rotor wing training: i) water escape training; ii) wilderness training; and iii) specific rotor equipment (rotor a/c proficiency, pt extrication for on scenes, stretcher loading. IF hover exit training were to be included an additional $30,000-$70,000 should be budgeted; variances are dependent on class size (dominant cost is hourly cost for helicopter).

Property insurance premiums are based on approximate capital costs as listed on accompanying capital cost spreadsheet. Liability based on rural setting, if not associated with a hospital.

The above AME staffing model assumes cross functional training of staff between fixed and rotor; rather than dedicated rotor

Scenario 1: Base in Saskatoon

ID	Task Name	Duration	Predecessors
1	**Implement medical/operations recommendations**	**713 days**	
2	Define the 'most responsive physician' role	90 days	
3	Implement strict online medical control	180 days	
4	Implement strict CME requirements for nurses and paramedics	180 days	
5	Bring paramedics and nurses under common management	180 days	
6	Update the job descriptions of all medical staff	180 days	
7	Update the manuals and reference materials	180 days	
8	Develop and thoroughly document the initial and recurrent medical training programs	180 days	
9	Develop a rotary wing health and safety strategy	365 days	
10	Incorporate PACC into the provincial EMS dispatch system	180 days	
11	Develop a rotary wing research and procurement plan	365 days	
12	Implement strict standards for Standing Agreement carriers	365 days	
13	**Implement aviation recommendations**	**647 days**	
14	Hire and train medical personnel to staff the rotary wing aircraft	270 days	28SF
15	**Shorten the flight crew duty day**	**90 days**	
16	Hire additional pilots	90 days	
17	**Implement dual pilot operations**	**90 days**	
18	Hire additional pilots	90 days	
19	**Implement 24/7 maintenance**	**60 days**	
20	Hire additional maintenance engineers	60 days	
21	Set up dedicated flight planning room	60 days	
22	Rationalize the organizational and accountability structure	90 days	
23	**Implement a rotary wing program**	**1012 days**	
24	**Acquire rotary wing assets**	**515 days**	**11**
25	Develop RFP for rotary wing assets	90 days	
26	Evaluate RFP responses fro rotary wing assets	30 days	25
27	Negotiate with rotary wing vendor	30 days	26
28	Receive rotary wing assets	365 days	27
29	**Secure a rotary wing service provider, including maintenance**	**150 days**	
30	Develop RFP for rotary wing service provider	90 days	
31	Evaluate RFP responses for rotary wing service provider	30 days	30
32	Negotiate with rotary wing service provider	30 days	31
33	**Prepare provincial rotary wing infrastructure**	**365 days**	
34	Build new hangar in Saskatoon	365 days	
35	Identify key locations of helipad/heliport construction	180 days	
36	Secure permits for helipad/heliport construction	60 days	35
37	Construct helipads/heliports	180 days	

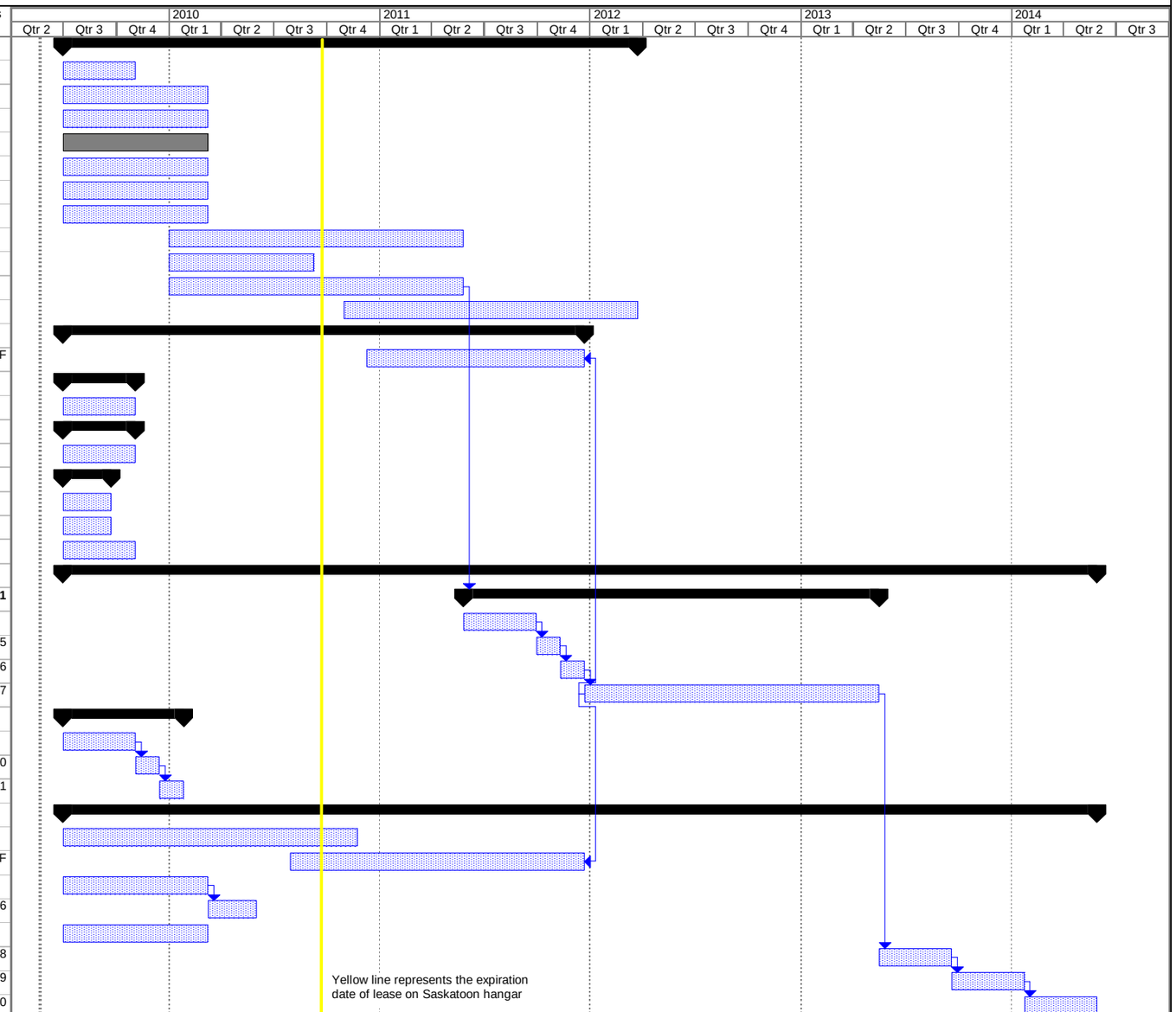


Project: Scenario 1 Base in Saskatoon
Date: Mon 4/27/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Scenario 2: Bases in Saskatoon and Regina

ID	Task Name	Duration	Predecessors
1	**Implement medical/operations recommendations**	**713 days**	
2	Define the 'most responsive physician' role	90 days	
3	Implement strict online medical control	180 days	
4	Implement strict CME requirements for nurses and paramedics	180 days	
5	Bring paramedics and nurses under common management	180 days	
6	Update the job descriptions of all medical staff	180 days	
7	Update the manuals and reference materials	180 days	
8	Develop and thoroughly document the initial and recurrent medical training programs	180 days	
9	Develop a rotary wing health and safety strategy	365 days	
10	Incorporate PACC into the provincial EMS dispatch system	180 days	
11	Develop a rotary wing research and procurement plan	365 days	
12	Implement strict standards for Standing Agreement carriers	365 days	
13	**Implement aviation recommendations**	**647 days**	
14	Hire and train medical personnel to staff the rotary wing aircraft	270 days	28SF
15	**Shorten the flight crew duty day**	**90 days**	
16	Hire additional pilots	90 days	
17	**Implement dual pilot operations**	**90 days**	
18	Hire additional pilots	90 days	
19	**Implement 24/7 maintenance**	**60 days**	
20	Hire additional maintenance engineers	60 days	
21	Set up dedicated flight planning room	60 days	
22	Rationalize the organizational and accountability structure	90 days	
23	**Implement a rotary wing program**	**1282 days**	
24	**Acquire rotary wing assets**	**515 days**	**11**
25	Develop RFP for rotary wing assets	90 days	
26	Evaluate RFP responses fro rotary wing assets	30 days	25
27	Negotiate with rotary wing vendor	30 days	26
28	Receive rotary wing assets	365 days	27
29	**Secure a rotary wing service provider, including maintenance**	**150 days**	
30	Develop RFP for rotary wing service provider	90 days	
31	Evaluate RFP responses for rotary wing service provider	30 days	30
32	Negotiate with rotary wing service provider	30 days	31
33	**Prepare provincial rotary wing infrastructure**	**1282 days**	
34	Build new hangar in Saskatoon	365 days	
35	Acquire hangar space in Regina	365 days	28SF
36	Identify key locations of helipad/heliport construction	180 days	
37	Secure permits for helipad/heliport construction	60 days	36
38	Construct helipads/heliports	180 days	
39	Commence operations in Saskatoon	90 days	28
40	Commence pilot program in Regina with staged aircraft	90 days	39
41	Commence operations in Regina with resident aircraft	90 days	40



Project: Scenario 2 Bases in Saskatoon
Date: Thu 5/21/09

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Appendix F: other provinces' approaches

A brief overview of other provinces' rotary wing transport medicine programs and equipment can help provide a context for the roll-out of a Saskatchewan program. The following table gives a brief outline:

Province	Aircraft type and range	Annual flight hours per hull	Operating model	Notes
Alberta	BK117 (120nm) and AW139 (250nm), 3 operational and 1 backup	660 hours	Contracted maintenance and pilots	Funded almost entirely by donations. Operated by a Board of Directors. Bases in Edmonton, Grande Prairie and Calgary.
B.C.	S76A (150nm) and Bell 412 (100nm), 2 operational	800 hours	Contracted maintenance and pilots	Aircraft operate only within a 100nm radius of Vancouver.
Nova Scotia	S76A (150nm)	500	Contracted maintenance and pilots	Operated by the Provincial Government.
Ontario	S76A (150nm) and AW139 (300nm with long range tanks), 8 operational and 4 backup	700	Contracted maintenance and pilots	Private non-share capital charity with a performance agreement with the Ontario Ministry of Health
Saskatchewan Scenario 1	Medium twin (125nm), 1 operational and 1 backup	500	TBD	
Saskatchewan Scenario 2	Medium twin (125nm), 2 operational and 1 backup	500	TBD	

X. Appendix G: Ornge team biographies

Mr. Frederick Potter BSc.F, OMDP ATPL ADR

Chief Operating Officer – Ornge Air

Mr. Potter has been involved in aviation for over 35 years, learning to fly in 1970 and working as a bush pilot throughout northern Ontario and along the shores of Hudson and James Bay. He has flown numerous types of aircraft from DC3's to PC 12's and operates his own twin engine aircraft today.

Mr. Potter joined Transport Canada/NavCanada in 1974 as an air traffic controller (ATC) where over a 30 year ATC career he held an unprecedented 11 air traffic control endorsements across the country including Regina and Saskatoon. He retired as the General Manager of Airport Operations for Saskatchewan, Manitoba and Ontario. Mr. Potter's responsibilities included all of the ATC and flight service station units in Saskatchewan; the provision of their service, as well as a redesign of that airspace to insure efficiency. He developed a strong relationship with all of the private and commercial stakeholders in that provision of service.

Mr. Potter was seconded to become the first Dean of Aviation at Confederation College where he headed up the $22 million Aviation Centre of Excellence Project, included design / build of the new facility. Rick is Transport Canada approved as the executive accountable for the Flight Training Unit, Aircraft Maintenance Organization, Aircraft Training Organization and the project management office authorized Aerospace Engineering division.

After five years at the College, Mr. Potter accepted the challenge of designing a Provincial Aviation Strategy for Ornge. The fixed and rotor resources for the province were evaluated, integrated and optimized for efficiency and patient centric service on a province wide basis. This has led to complete fleet renewal, a revision of infrastructure and contracting models and a more accountable method of service provision.

Mr. Steve Farquhar

Vice President, Operations

Mr. Steve Farquhar began his career in 1982 with Toronto Emergency Medical Service. In 1991 he joined the air program where he earned certification as a Critical Care Flight Paramedic. He went on to serve as the Advanced Life Support Coordinator for the Peterborough Base Hospital program before returning to the Ontario Air Ambulance Base Hospital Program to oversee the newly created Critical Care Transport Program. Steve was appointed Director of Operations for Ornge in 2004 and is now the Vice President, Operations.

Mr. Farquhar has played significant roles in setting up the Emergency Medical Assistance Team and been instrumental in various major projects undertaken by Ornge including setting up and transforming the Operations department of Ornge. He has served on a number of provincial committees including the Contact Centre Integration Committee, the Integrated Air System Technical Committee and Child Health Network Expert Panel on Pediatric Transport at the Hospital for Sick Children in Toronto, Ontario.

In addition to a bachelor's degree in Health Sciences, from the Charles Stuart University School of Public Health, Steve Farquhar has undertaken many educational programs at the Sunnybrook and Women's College Health Science Centre, University of Toronto and Centennial College.

Mr. Peter Fenwick MBA, BSME, CHE(c)

Vice President Strategic Marketing and Business Development - Ornge

Mr. Peter Fenwick is a senior health care executive with extensive experience in corporate strategy development and execution, merger integration management and leadership, sales and marketing, and process improvement. He has a comprehensive understanding of health systems - delivery, administration, governance and policy. Experienced in Clinical IT systems implementation/ integration, requirements development he has hands-on functional experience in business development, strategic planning, distribution channel innovation, and customer experience measurement.

Mr. Fenwick has had progressive career movements over 15 years in health care technology, IT & related services industries with international experience in the USA and Europe. He joined Ornge in September having been with the GE Healthcare (Canada) Executive Team since October 2004.

He holds an MBA from the joint Kellogg-Schulich program and is a Queen's University Mechanical Engineering graduate.

Richard Yelle
Regional Operations and Medical Affairs Manager

Richard Yelle has been directly involved in health related care for over a quarter century as a active practitioner (RN & Critical Care Flight Paramedic), post secondary educator (College faculty & administrative positions) and other various leadership roles.

In the past seven years Richard has been working for Ornge as a Regional Operations and Medical Affairs Manager, The bulk of the activities involved, but not limited to evaluating, developing, implementing and administering processes, procedures and policies including evaluation instruments. Prior the latter position, Richard spent 15 years within the Ontario College System.

Richard holds diplomas in both Nursing and Ambulance & Emergency Care programs from Fanshawe College (London ON), a certificate from the Manitoba Emergency Nursing Program from the Winnipeg Health Sciences Centre (MB), a Baccalaureate of Arts from Laurentian University (Sudbury ON) as well as Master of Arts In Education from the University of Central Michigan (Mt. Pleasant, Mich),

Richard's bulk nursing experience involved over 15 years working in various emergency departments. Until recently was active in teaching the Trauma Nursing Core Course (TNCC) and was an examination committee member of the Canadian Nurses Association Emergency Nursing Certificate or ENC(C).