



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 17, 2018

Attachment 2 – Air Canada Personnel Interview Summaries

OPERATIONAL FACTORS/HUMAN PERFORMANCE

DCA17IA148

Interviewee: Mr. Samuel Elfassy

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 8, 2017

Time: 0856 EDT¹

Present: Shawn Etcher, Sathya Silva – NTSB; Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Mr. Elfassy was represented by Ms. Louise Hélene Senecal – Litigation Counsel Air Canada Airlines

He has been with the industry for 30 years. He started with Wardair in 1988, where he was a ground school instructor for both pilots and flight attendants, regulatory affairs, senior director of safety and manager at Air Canada. His current position is the vice-president of Safety which he was promoted to in July of 2017. Prior to his promotion he was the Managing Director of Safety, Environment and Quality for 7 years and Director of Flight Technical prior to that.

His responsibilities include, oversight across the system including safety performance and environment, employee health and safety, flight safety, business continuity, security compliance, and risk management.

He reports to the president and CEO². He considered their working relationship as “very good.” When he got into his current position, the previous position had the same portfolio, but now he also manages security.

His job was not a Monday through Friday nor a 9 to 5 type job. There were matters he maintains awareness of throughout the day. During the course of the week there are various standing meetings. On every Wednesday, there is a safety review meeting where operational team reviews safety events that have happened during the week. Tuesday was an all executive meeting where they review the week’s events. Most of his time during the day is spent on tactical issues and then involves medium/long term safety issues.

A good portion of his time, which he estimated to be between 50% and 75% of his time, was spent with flight safety.

He was made aware of the incident flight on Monday morning when he arrived at work. The information came from his Director of Safety Data and Research, who was the on-call safety person Sunday night. He received an email that was sent out about 2230 on Sunday night but first saw the email on Monday morning. The incident was reported to the on-call person via a call that came in from the TSB.

¹ Eastern Daylight Time

² Chief Executive Officer

Once he found out about the event he immediately needed to understand the circumstances and the reason for the delay in reporting. He wanted to understand the status of the crew first and make sure they were held out of service. He also wanted to get the status of any data in order to protect it. He immediately pulled the flight crew out of service and protected the data. He notified the president and appointed a flight safety investigator.

He was not involved with any of the interviews of the crew. The flight safety department falls under his area of responsibility and he appointed a flight safety investigator to the incident.

He was briefed orally that the flight crew was on approach into SFO and inadvertently lined up on a taxiway and went around about 400 feet. They approached the airport again and the second landing was uneventful. The crew didn't notify the company right away and went for crew rest. The next morning the crew advised the duty pilot. The duty pilot was provided the information and the senior director of line operations determined that the crew would be allowed to operate the flight back to Toronto and then be held out of service upon their return. Flight ops management was advised that weekend of the circumstances.

There was notification internally of the event. The event was categorized as a reportable event and they made sure the written and verbal reports were captured.

He was advised Monday morning of the events that occurred over the weekend.

All employees and management were aware of the safety reporting policies at Air Canada which were placarded in all work places.

They have an SMS³ in place and it is well understood what the reporting methods are. For flight crew, the reporting is online through the iPad. Other employees file a written report which goes into their central depository. The reports are confidential and deidentified which they pledge in their policy. Employees can submit anonymously.

Pilots have the option to share it anonymously and they can copy their pilots' association. It is up to the pilot.

He recalled that over 10 years prior they had an Embraer land on the wrong runway in DCA.

Taxiway alignments are reportable and he would expect to hear about one, but he heard nothing in the past like the SFO event. Sometimes pilots may line up on the wrong runway and correct it.

Pilots are required to notify the company about go-arounds. Although he was not sure of the number, they do track declared go-arounds. The reasons vary and run the full spectrum from ATC related to unstabilized approaches.

He currently has upwards of 60 employees in his area of responsibility including security. Without security, he had 53 people. Specifically, for safety areas with employees. The flight ops safety

³ Safety Management System

department has 6-7 people including those who do flight safety investigation, risk management, safety management, FRMS⁴, and a dedicated QA⁵ position.

He relies on discussions to determine staffing and they look at overall performance. He relies on individuals to determine the staffing needs. He could not provide an opinion as to how performance is going with respect to the amount of resources available, but suggested that that question is better asked to the VP of Flight Ops.

Air Canada does not have a parent company; it maintains a main line operation. Air Canada has an Air Canada Rouge leisure identity but Air Canada does have oversight on Rouge flight safety. Rouge has a separate air operator certificate, but Air Canada does have oversight on the Rouge operation.

The fatigue policy is a duty and obligation in the FOM⁶ which speaks about fitness for duty and that pilots must be well rested, otherwise they need to declare that they are fatigued. They also submit a fatigue report, which they have mechanisms in place to monitor. He does not see the reports when they come in but sees a general narrative of the reports that come in on a quarterly basis.

With regards to expectations of flight safety investigator, as soon as he appoints an investigator in charge (IIC) he expects everyone that has been notified to support the IIC. If any immediate concerns are identified, the IIC brings it to his attention. Actions are taken to address safety deficiencies as the investigation unfolds. About halfway through the draft report they will have a safety report roundtable, where they share information collected to-date – essentially, a draft report. When the final report is issued, his expectation is any branch that has a recommendation associated with the report to respond as to whether they can adopt it or not, and explain why. That is also entered into their Hazard and Risk Registry.

The roundtable consists of the specific divisions involved as parties to the investigation and can include senior leadership, standards, procedures, training etc. In this case, it is a flight operation case so the roundtable would include the VP, standards, Chief Pilot, and Training.

Air Canada's safety program involves various components. They have a large reporting mechanism in place and a risk management team in corporate and individuals in each branch that measure and monitor risk. They follow an SMS program and have a quality assurance process as well, which audits individual branches evaluating documentation to performance indicators. A large part of the safety program was the Flight Data Analysis (FDA), which is data analytics, where they monitor performance of their aircraft, and "gate keepers" engage with pilots. He considers it a robust program. They conduct surveys every other year of employees regarding their understanding of safety reporting and confidence around safety reporting. They also focus on health and safety and employee injuries. Safety performance were presented as reports to the board, reports are reviewed, and information is analyzed and provided back to all employees.

⁴ Fatigue Risk Management System

⁵ Quality Assurance

⁶ Flight Operations Manual

He rates the overall safety culture at Air Canada as strong. Employee survey also found safety culture to be “very strong” among employees. The strengths in the program were confidence and understanding of reporting as well as Air Canada being a learning organization. It would vary depending on the branch. It is well understood that individuals are not subject to discipline if they report. The employees understand what “just culture.” There was some confusion over the non-punitive reporting. A weakness in their safety program is in defining what “on-time performance” is, and that it does not compromise safety performance. It is an ongoing communication challenge.

The night of the event, or the following Sunday, word went out to maintenance department to retrieve the data card from the incident aircraft. The card was full, however, and so the only data regarding the incident came from the aircraft’s digital FDR. Maintenance has a log that identifies when cards are due to be removed. All Airbus and Embraer aircraft in the fleet have actual cards and the B777 and B787 can provide wireless downloads.

There is no requirement tactically for the Safety branch to be conducting risk assessment. The SOPs⁷ were built using risk management methodology. If employees are following the SOPs then they are following the risk assessment. The company was not immediately looking at assessing risk for airports under construction. Their risk assessments don’t necessarily deal with daily operation, but rather changes in leadership, adding a new route. New technologies or procedures require a risk assessment within the branch, and would also involve consultation with subject matter experts (SMEs).

They have not followed up with any changes since the incident as he is very careful in communicating a change that could be associated with the event and could compromise the investigation. To protect the investigation, they have not issued any changes yet. They rely on the IIC to identify immediate risks, and he hasn’t identified any at this time.

The safety event review occurs weekly. Each division analyzes their own lists and they all discuss it together on a quarterly basis. Stakeholders are present such as training, procedures, etc. in addition to the corporate and branch safety boards.

The reporting for the event worked as intended. Though they lost critical pieces of information due to the delay in reporting. There is a time requirement detailed in their regulations in which to report an issue. Pilots must report issues to dispatch as per FOM “without delay” when a go-around occurs. Typically, pilots would call dispatch.

In the present case, if the event had been reported immediately, they would not have done anything differently if the report included a go-around at 400 feet to an uneventful landing. However, if the report had included details about being lined up for a taxiway, he would have expected the crew to be held out of service, they would quarantine aircraft info and the crew, advise the TSB, and pull the data card from the aircraft.

He was not sure why the event was not reported immediately. They have a very healthy reporting culture. On a yearly basis, they have between 6,000-7,000 Air Safety Reports (ASR) coming from

⁷ Standard Operating Procedures

flight crews. There is trust in those safety reports. His experience is that pilots are not shy about filing safety reports.

His promotion took place about 10-14 days after that event. Before that they did not have a VP of flight safety. The promotion was not something that was a result of the event. Discussions were occurring well prior to the event.

Dispatch does not conduct safety risk assessment on a tactical level. SOPs used by dispatch and pilots were built using risk assessment methodology.

There was bulletin that Captain Doyle put out to the pilot group, which speaks to overall acceptance of risk and risk awareness. This communication did not address reporting. The risk assessment process has threat and error management within the training, CRM⁸ for flight crew, which is the 10-model and details on how to avoid mismanagement the threats.

If there is an event that is in active investigation they will not be brought up during their weekly meeting, "open mic."

Events are categorized based on the amount of threat to the organization. They utilize the red, yellow, and green methodology. All events are categorized by dispatch after being reported by pilots. Dispatch has been trained to issue categories. Events can range from flight attendant injuries to go-arounds.

He could not recall if a category message was sent out or not for this event.

Other reportable events include those related to flight safety such as rejected takeoff, configuration issues, bird strikes or unstabilized approach. Administrative type events such as delayed crew van and other events related to layover, hotel, and travel would not be reportable.

He has received a factual account from the IIC of what took place.

There is a consolidated report of A320 performance issues by the FDA⁹ team that is looked at by the chief pilot and flight operations leadership. Issues are also captured in the hazard registry.

They have a decision tree when it comes to determining if something is disciplinary or not. This guidance resides in the SMS manual.

The onboard data card captures about a thousand parameters and they track the cards so when it gets full it stays full and does not store additional info. The decision of when a card would be full is based on a time period.

His understanding was that the card from the incident aircraft would have been full for the incident flight. Pulling the card is a maintenance function. They have a contract service provider in SFO.

⁸⁸ Crew Resource Management

⁹ Flight Data Analysis

They have card readers distributed throughout Canada, but not necessarily in the United States. There are rules regarding when the cards are to get pulled, but he was not aware of the details.

If an event is investigated by the TSB, Air Canada will have a parallel investigation and assign an internal IIC. However, he can also choose to conduct an internal investigation if the TSB is not involved. It is left up to him to decide to investigate. He also consults with other individuals including the CEO. The decision is based on if he's not satisfied with the internal investigation or whether there is an excessive amount of threat.

It's a hand full of events throughout the year that they conduct a formal investigation; maybe two or three. That is to assign an IIC and come up with specific recommendations. However, they also have independent investigation within the branch.

Any event that comes through will have some level of investigation but will depend on the severity of the event. There is guidance documenting what level of investigation there should be in their safety management system manual.

Some common examples of ASRs include a mistuned radar altimeter, missed approaches, or altitude busts. It's a full range of events.

There is a focus on a stabilized approach. They are monitoring unstabilized approach rate vs. go-around rate. They focus on stabilized approaches, landing and runway events in addition to runway incursions.

Managing director is a senior leadership position. He does not see a need for a replacement in that position. He's essentially doing the same job, but the VP was an officer of the company.

On the weekly telecon, the "open mic", there are well over 100 folks within Air Canada that are on that call. Any group that has a stake in an event must come prepared to discuss what has been accomplished. Sometimes it is required to carry over the discussion to another meeting. For the event, the experts would be flight operations but maintenance, inflight, and airports should also come prepared. They expect investigations on reports to be completed within a week.

On the Sunday night, the TSB had called the director of corporate safety. He would like to think that he would have known about the incident on Monday morning from flight operations if the TSB hadn't called and that they would have conducted the investigation just the same.

"Open mic" discussions are communicated back to the employees via each branch. The meeting is based on current risks.

The VP maintains a website "repository" of safety trends where employees can refer to. They are able to track website traffic going into the website. There are a healthy number of people visiting on an average month. They rely on the branches to communicate details on the website so that employees know about it. They also use bulletins and town halls within branches.

He has not noticed any increase in reporting of safety events for SFO after the incident.

His investigators consist of two main people. One person is on his team and reports to him. The other is an A320 captain off on medical leave who is trained as an IIC. He has other IIC qualified personnel but likes to use one of his two since accident investigation is a “perishable skill”. The one in Flight operations reports to the director of safety and training.

Depending on the nature of the investigation they would release them to the corporate safety department so there would be no restriction to look at anything.

They had an internal investigation on a runway excursion and recommendations were made to flight ops.

He has a group of individuals in the Flight Data Analysis (FDA) team.

VP of flight ops is on his level within the corporate structure and they interact a lot. It’s a good working relationship. They interact most days on various issues. VP of flight ops is a post holder in their certificate as operations manager.

Safety owns SMS, but the VP of Flight Operations enforces it.

Interview concluded at 1024 EDT

Interviewee: Captain Eddy Doyle

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 8, 2017

Time: 1035 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Doyle was represented by Ms. Louise Hélene Senecal – Litigation Counsel Air Canada Airlines

He started flying in the Canadian Air Force where he did his training from 1980 to 1989. He then came to Air Canada. He took a LOA in 1992 and flew for two or three different charter companies over three years. He also flew wet lease in India. In 1996, he came back to Air Canada instructing on the CRJ200 and was a chief instructor and chief pilot in the airplane. He was responsible for introducing the EMB 175 and 190 to Air Canada. He then moved to director of operations and then became Vice President of Flight Operations. He was a managing director of flight operations for 3 years which was changed to a Vice President position about 18 months ago.

Has about 12,000 hours of total flying experience and was type rated in the CT 114 jet trainer in the Air Force, flew the P3, flew VIP squadron Convair 580, Second Officer in the Boeing 727,

First Officer (FO) in the Boeing 757, FO and Captain(CA) in the Airbus A310, CA in the CRJ, CA in the Embraer, CA in the Airbus A330, and is a CA on the Boeing 787.

His duties as being the operations manager of the company and he oversees and is responsible for director of training, standards department, flight dispatch, and load. He has operational control over crew scheduling and crew planning (Operational Control), and Cabin Safety. Those do not include administration control.

Under operational control they can call the department to change pairings. They have limits on how long pairings can be, layovers, etc. They have soft rules also for maximum number of legs and duty considering circadian rhythms.

He reports to the CEO of Air Canada and the relationship is “good”. They used to have a COO until about May of this year. The reports of the CEO include VP of Maintenance, VP of Safety, and Manager of the SOCC. Other departments such as crew manning and inflight report to the president of airline passenger operations who also reports to the CEO.

He spends more time with the VP of Maintenance, Inflight, and Safety. They see each other every Tuesday with the other VP’s. The working relationship is “good.”

He heard about the event through senior director of flight operations which came through an email from duty pilot stating that they were taking the pilots off line to interview them. By Monday morning, the crew had been interviewed by the chief pilot and corporate safety.

He was not aware of the event until Sunday and details were that they had lined up on the wrong runway and went around about 400 feet. He equated 400 feet altitude to be about one mile from the runway. He did not become aware of the severity of the incident until Monday. Throughout the day on Monday it was determined that it was a lot more critical than initially thought. He thought the initial report came from Transport Canada through one of the directors.

There were 26 or 27 permanent pilots in management functions; that are part of the seniority list. He has 7-8 people in dispatch. They also have non-pilots in management functions, but was not certain how many. He estimated about 60 employees who work for him, including another 100 check pilots. They have about 3,500 -3,700 pilots and about 500 -600 of those are working for Air Canada Rouge.

He felt they were staffed adequately, they have been growing over the last few years. They could always use more people as the company is growing. They were looking into separating the Director of Safety and Training in into two different roles. They are also looking at having more in dispatch oversight as they grow. They are considering more duty pilots for assignment in the SOCC¹⁰. The reason for separating training and safety was because as they get more aircraft types, they get more work. They are growing and having the B737 coming on line in the next few months and then the C-Series from Bombardier in 2019.

¹⁰ System Operational Control Center

They hire pilots internally, they have a person from human resources assisting but the rest are done with pilots or ex-pilots. He does not conduct interviews or hire personally but the directors will do so. The senior director of fleet and standards, Manager of training, and director of operations conduct the hiring. The chief pilot is not usually involved in the interview. The chief pilot of the airline is also known as the director of fleet and standards.

They have a chief pilot for each aircraft type. All of the fleet chief pilots are based in Toronto except for the chief pilot of the A330 who is based in Montreal. They have managers at the bases. Some of them are pilots and are there to help pilots with personal issues, time off, scheduling, pay issues, and to coordinate to get the pilots in for interviews with the chief pilot if needed.

The fatigue policy is that if a pilot feels fatigue the flying is dropped and they can pick up other flying within the month. They have about 20 cases of fatigue calls per month.

If a pilot kept calling in fatigued then it may raise a flag. A pilot accrues about 12 days of sick leave a year. If the company finds that a pilot calls in fatigued a lot, it would raise a red flag, and they may bring him in for an interview and refer them to the medical department.

There are no punitive results for sick or fatigue calls. If a reserve pilot calls in fatigue there is no impact to their salary since they have a minimum block guarantee. If a pilot not on reserve calls in sick it would come out of their sick time at a pay rate of 90% of their salary. If a pilot is sick more than 30 days they are put into long term disability.

Pilots are paid an hourly wage and are guaranteed an hourly requirement per month. The minimum hours vary from month to month.

A pilot must have a minimum of 2,000 hours to be hired. They find they have a lot of applicants with the majority coming from the feeder airlines. He classified the rate of pilots from the feeders as about 90%. They hire some pilots from the outside. When they opened their hiring to the outside, within a week they had 700 applicants apply with degrees and other high qualifications.

Sterile cockpit procedures changed from top of descent to when below 10,000 feet.

There is safety culture within the team and they put a lot of attention on it in the last few years. There is always room for improvement but he rated it as "good." The airline is putting emphasis on stable approaches and stable landings and have been working with a human factors contractor in the last 18 months. They put a lot of emphasis on approach ban and they changed their rules so that they are aligned with what other countries use. They tested procedures in the simulator.

The ASRs are sent through corporate safety; he gets deidentified data. They use them for root cause analysis for where the errors were introduced. They work with the chief pilots to communicate data and develop procedures. They have been conducting trials on taxiway errors and trying to correlate if there were more errors on single engine taxi errors.

They have three areas of focus: navigation errors, taxiway errors, and lateral and vertical, or altitude errors classified as high risk. They present the information quarterly. They try to

communicate crosscheck to the pilot group. An example he provided was when the Boeing 787 was in heading mode when it should be in LNAV¹¹. Through investigation they determined it was likely to occur when the pilots were storing the clipboard in the high/top position, and inadvertently hitting the heading mode button. They have not seen improvement but it is still ongoing. They have communicated this issue with other airlines that are configured in the same way in Europe, but he is not sure what has been done. This occurred about 6 months ago.

They saw a trend with the Boeing 767 a few months ago with the pilots violating an altitude on a STAR into Toronto.

They had a lot of problems with taxiway errors in Calgary due to unexpected taxi route. They worked with West Jet. They introduced that they send the link to the airplane for a “watch out for taxiway errors” and the trend clearly improved. They are doing the same for LAX and send an unstable approach message alert via data link to inform crews of the possibility. They will monitor the ASR trends after implementation.

They have not had any recent reports from SFO when it comes to runway alignment issues.

With regards to ASRs, if it’s a serious event the pilot is to report it to dispatch. From there an email will be sent to various departments. He gets lots of email every day. The ASRs could be proactive reports like “we saw something” like a controller’s tendency to do something specific.

The ASR gets filed and goes to corporate safety and they do their own review of it. Unless it is urgent they will probably gather the data but not be investigated further. He is not involved in that decision.

For the incident flight, he would have expected the flight crew to go through dispatch as soon as possible as it is in the company manual policy. The reason it is there is that it could be valuable information to other airplanes. There is a list in the company manual for reportable events. For every go-around the pilot is required to inform dispatch.

When dispatch gets that information, they send an incident report, which goes to most people in flight operations and corporate safety. The list is quite long for who gets it. Depending on the severity, the chief dispatch may contact the duty pilot and the duty pilot would use his judgement and decide if they need to talk to the crew right away, or not.

The duty pilot will make the decision; an example he provided was a go-around due to the weather being below what was required, then they may not contact the crew. Another example would be an engine failure, in that case the duty pilot would reach out and contact the crew.

The crew is required to contact dispatch “as soon as practicable, or as soon as possible.” This would mean to fly the aircraft first; it could be calling during cruise (if something happened on takeoff), or when parked and duties are done. He would not expect the crew to wait until after crew rest to report. He did not think they had a definition for the term “as soon as practicable.”

¹¹ Lateral Navigation

They used to have a policy of within 24 hours for an ASR but he is not sure of the current policy. The requirement is reviewed, but not very often. He is briefed on a regulation change like this but not involved with decision making.

His initial understanding of the incident was that the crew were not lined up on the proper runway. And that they had realized their error at 400 feet and did the go-around. For him it was later Monday when he heard rumors of the severity as it was reported to be much lower. He sometimes takes outside reports with a grain of salt and relies on the internal information instead.

Has not seen an uptick in lining up on other landing surfaces reported since the incident.

They reissued a bulletin reminding pilots in general to pay attention to the top three risks / errors as well as stable approach. They reiterated that if you are not comfortable with an approach to go around.

They have about 3,000 pilots working for the mainline Air Canada. 2,000 are based in Toronto, 800 are based in Vancouver, 450 are based in Montreal, and about 50 are based in Winnipeg. The Winnipeg pilots are only A320 pilots. Toronto was the main hub with managers and chief pilots.

Most of the training is done in Toronto with a bit in Vancouver. Anything technical is centralized in Toronto. There is 1 chief pilot and 1 non-pilot manager in Montreal.

The pay is guaranteed but changes based on summer to winter. It is much more cyclic than the United States. Block pilots get a certain guarantee and are scheduled +1, -6. Reserve pilots do not get a block guarantee. In a 75-hour month, they may guarantee 68 hours.

There are silent hours where you don't need to answer the phone, the rest of the day would be on reserve. They have a soft rule where a reserve pilot's duty can only be moved up by 5 hours for circadian disruption.

If pilots call fatigue, they must make it up later in the month. They go to first priority to pick up a flight later. Pay may be cut if flying time is not made up.

They allow for controlled rest in the cockpit. Usually overseas flights take advantage of this. They limit the time to 30 minutes to not get into deep sleep. A few years ago, there was someone who slept more than 30 minutes. They do not collect data when it came to controlled rest. It has been policy for a while, he can't recall when it started. Controlled rest can be taken anytime during the flight and it is up to the pilot. A pilot may use controlled rest to feel "refreshed" and may choose to take it even if he/she isn't feeling fatigued.

For stabilized approaches, the aircraft must be fully configured by 1,000 feet and on speed by 500 feet.

When flying an ILS¹², the missed approach altitude can be set after the glide slope is captured. With a non-precision approach, the missed approach altitude can be set after crossing the final approach fix altitude. By 1,000 feet, the missed approach altitude should be set.

They expect one ASR for a crew. Expectation is for the captain to do it, but there is nothing stopping each pilot to file one. They encourage all pilots to file ASRs.

P2P is a pilot to pilot support program, which could be used by pilots to get help re:events.

He did not personally know the incident crew members.

He was not sure if there were any requirements on cockpit lighting as a countermeasure to fatigue.

There is a concern around the industry on stable approach. Very few unstabilized approaches result in go-arounds. There's a barrier against aborting landing. They did some surveys and found that people don't listen to their gut feeling (to paraphrase). They address that in recurrent training as well as the "get there itis". Recurrent training is from April to March.

They are looking at the smart landing system from Honeywell to test it in the Airbus A330 simulator. It monitors a stabilized approach, and will warn if aircraft is lined up with a taxiway.

He could not recall any A320 fleet trends in the ASR data.

They do not have two separate criteria for stable approach and stable landing.

The interview of the crew was conducted by corporate safety.

The localizer was to be tuned for the FMS¹³ Bridge Visual approach. Would expect at some point to line up on heading 281 at a few hundred feet.

The approach must be stable below 500 feet but if not, they can go around. They started doing drift training, for crosswinds, in the Airbus A320 so it relied on the pilot to do further monitoring.

There is no requirement to not be able to land if there were no nav aids to back up the visual approach. Air Canada's policy is to use approach aids as much as possible.

The interview concluded at 1208 EDT

Interviewee: Captain Tim Wells

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 8, 2017

Time: 1310 EDT

¹² Instrument Landing System

¹³ Flight Management System

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Wells waived representation.

During the interview, Captain Wells stated the following:

He was currently a line captain on the B787. He's been an approved check pilot (ACP) on the A320 for 5 years. He conducts LOE's, line checks, OEs, type certifications and instrument ratings which would be valid for 90 days. He also qualified to do first look maneuvers and maneuver validations. He checked captains and first officers. Prior to his current position, he was doing line indoctrination for about 1.5 years.

He flew Cessna 182 and 185 amphibious aircraft in Manitoulin Island. He then flew Cessna 185's on floats and skis and Beavers on skis at Pickle Lake. In British Columbia, he flew Navajo's single pilot for Loomis and Purolator. He flew a Dash 8 in Halifax and St. Johns Newfoundland. He also flew a Dash 8 for Air Nova. On March 6, 1996, he joined Air Canada. He started flying CRJ's as an FO for 8 months and was a captain on the CRJs for 3 years. He flew the A320 as an FO, the A330/340 as a FO, and the A320 as a captain for the last 9 years. In March/April 2017, he transitioned to be a captain in the B787. He holds approximately 20,000 hours. He could not recall how many hours he held on the A320. He has only been a check airman on the A320 since about 5 years ago. He does about 3-4 simulator checks per month and 3-4 line checks per month. He has given unsatisfactory results and the nature of those included people who were transitioning to the Airbus and had difficulty descending the aircraft and landing in addition to people not being used to the Airbus technology. On the Airbus, you can descend using managed descent or open descent. In the case that you come in tight, the pilot may need to take over the aircraft manually.

He has done checks on both of the incident pilots. He would recognize them but did not know them personally. He gave the captain a check in 2014. They went to SFO and he had notes that the captain's preparation for the approach could have been better, and he was debriefed on being prepared for the approach. The approach has lots of different notes to go through. He didn't recall which approach was conducted but thought with near certainty it was the Bridge Visual.

It is a heavy workload approach. Ideally, ATC would put you on the arrival and keep you there but SFO issues lots of speed restrictions and it can be difficult to descend. In preparation for SFO, he would thoroughly brief the approach and do a thorough threat briefing. These are things you can anticipate with SFO.

The notes on the approach plate help pilots generally as long as they read them. The notes could be more thorough and could be expanded to anticipate some of the challenges at SFO such as that ATC may keep you high and have a reminder to configure the aircraft early. The company does send datalink messages with advisories and he believes those help. He thinks that pilots discuss the messages as he does on his flights.

A go-around briefing is done on the first pairing of the trip.

The last time he flew into SFO was 6 days prior in the B787 in daytime.

With the bridge visual, you could put the ILS frequency in as a backup; have it hard-tuned. He believes that the ILS comes up automatically. After you cross the bridge, you would disconnect the autopilot and hand fly the aircraft. The PM would be doing other things such as setting the missed approach altitude and turning off the flight director.

With regards to putting the ILS in as backup, he said that it is encouraged but he doesn't know if it was a hard-fast rule. He doesn't recall if it was written anywhere, but believes that almost everyone does use the ILS as a backup.

Stabilized approach criteria consists of two gates. The first was at 1,000 feet where the aircraft must be on course laterally and vertically and flaps and gear must be deployed. At 500 feet, the airspeed must be stable, the landing checks must be done, the vertical speed and thrust must be stable. If these aren't met, you call "unstabilized, go around." In addition, if you are not set up to land within the touchdown zone you go around.

Procedures at Air Canada were to verify the correct landing surface by looking at runway markings and instrumentation. Visual cues are used mostly for the visual approach. Most fleets don't have HUD¹⁴s other than the B787.

In order to maintain situational awareness (SA), on the visual approach you would backup your assessment with navigation. Pilots try to make go-arounds a normal procedure but if you're at minimums, it could be abrupt. Go-arounds are non-punitive. 10-15 years ago it may have been different, due to 'old school' thinking. In the last few years, pilots have been encouraged that if anything is not right to go around. If a crew goes around, they must file an ASR within 24 hours and notify dispatch as soon as you can.

The A320 has different avionics packages. The only way you know whether the aircraft has GPS or not before a flight is because the flight plan says "P" or "H" for equipage. There is no change in workload if you're flying a plane with or without GPS.

He flew with the incident first officer 4-5 years ago and nothing stands out about the flight.

When he's checking, he is usually in evaluator mode and not in training mode.

He did CRM training 22 years ago. The company gives them CRM briefings and training every 8 months during LOE and they stress it during the line checks. CRM is also a debriefing point. Overall CRM at the company was very good.

When asked, he didn't know what should be improved at the company. With unlimited resources, the company could have more CRM and safety courses.

He really likes working for Air Canada and described the safety culture as "very good." He had never felt external pressure to fly. He had never called in fatigue or sick. If pilots did call in sick,

¹⁴ Heads-Up Display

the company would tell them to call back when they were better. He characterized morale as being good these days. In the past there were contract negotiations and cases where changes were implemented like single engine taxi that changed morale.

He had never seen anyone line up for the wrong piece of pavement on a check ride or on the line.

The datalink message that gets sent to pilots coming into SFO says something along the lines of “higher rate of unstabilized approach than other airports.”

The FMS routing ends at F101D. There is no RNP in the A320. Pilots would see the routing on the display. It would be on the HSI in magenta. He doesn’t see why anyone wouldn’t use the flight director. He would be 90% visual outside. He did not know if there would be a line on the nav display.

First look is an AQP¹⁵ term.

With SFO, its challenging. Problems probably come up with training.

Flight planning in Toronto is done in the flight planning room after customs. They must report to the airport 1 hour and 15 minutes prior to departure. He was not sure whether that means you have to be after customs at the report time. They do the brief in the flight planning room as it is easier. They look over the flight plan. Time is of the essence so they hit the highlights and take a deeper look enroute. They look at NOTAMs during flight planning but more realistically they would review them enroute prior to the approach briefing. Personally, he would have discussed the runway closure during the flight planning phase if it were him. During his last flight into SFO, he reviewed the NOTAMs prior to the approach briefing.

They’ve been implementing EFBs¹⁶ for the last few years. There’s a lot of information and sometimes way too much information. He is a bit old-school and it took a while for him to get used to it. There is a lot of information and they use them for everything, now. Overall, he does like it. He also felt that he could use two of the iPads instead of switching back and forth between windows.

If he were doing a visual approach, he would turn the flight director off as it could be giving misleading cues. In this case, once you set the missed approach altitude, the flight director will want you to pitch up to reach it. With regards to the flight director, there does not seem to be a clear policy, that it is up to the pilot flying whether it is engaged or not. Normally, one turns the flight directors off if you’re doing a planned visual approach.

If he could change anything at Air Canada, he would get higher pay. The training is pretty condensed and he understands that the company needs to compete, but he would give more training opportunities to pilots. The MTV¹⁷ and LOE¹⁸ can be very condensed and an extra day would be nice.

¹⁵ Advanced Qualification Program

¹⁶ Electronic Flight Bags

¹⁷ Maneuvers Training Validation

¹⁸ Line Operational Evaluation

The interview ended at 1425.

Interviewee: Captain Donald Rodney Graham

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 8, 2017

Time: 1500 EDT

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Graham waived representation.

During the interview, Captain Graham stated the following:

He was currently a subject matter expert (SME) on the Boeing 737. Previously, he was a check airman on the Airbus aircraft. They were working on getting the B737 Max up and running and have been working on it for 30 months. They plan to train the trainers, then do the check rides on them.

He started flying in Jan 1977. He flew commercially as flight instructor and ran a flight school. He then did charter work for a foundry. It was business aviation and a commercial operator. He did training, checking, and operations. He got involved with the paperwork. He then got hired by Transport Canada in a time where only the military people got hired there. He worked in air navigation services. He then became an Air Carrier inspector during deregulation. He did 45 rides per month, did PPC's and upgrades. He was a superintendent for check pilot standards and did airline inspection as a principal inspector. Then Air Canada started hiring and he joined in 1998. He started flying the DC-9. He then worked in safety audits, Flight Data Analysis (FDA), corporate safety. Then, he became general manager of corporate safety and started SMS¹⁹ and LOSA²⁰ certification and was the first LOSA certified pilot. He was the director of training, the company chief pilot, and then became a check pilot of the Airbus and was currently working on checking the checkairman on the B737.

He held type ratings in the Gulfstream G2, Gulfstream G3, Mitsubishi MU2, Citation, DC-9, Airbus and approximately 20 more ratings. He spent 17 years on the Airbus aircraft.

It was not uncommon for pilots to have difficulty adapting to / learning to fly Airbus. "It's an easy aircraft to fly, but a hard aircraft to know." The most issues people have had were with the automation. E.g., thrust levers not moving, pilot's controls not being linked. It is the "what's it doing now?" element.

He did a line check on the incident first officer during the incident first officer's upgrade to captain. The incident FO had had a previous upgrade check ride, which was unsuccessful. Graham was

¹⁹ Safety Management Systems

²⁰ Line Operational Safety Audit

conducting the second check ride after the first unsuccessful check ride. For the AQP, all data is de-identified but he recalled an email he wrote regarding the flight. He had written an email to the senior flight instructor with the subject line “UNSAT QOE” sent Friday, March 17, 2017 at 6:17 pm. He read the email to the interviewers with the following details:

The captain was unsuccessful during QOE on the 15th and 16th of March. He was pleasant and prepared for Leg 1 which was from Toronto to LGA. His flight planning was good. On the way to LGA there was a delay at LGA. The captain was not familiar with the FICON²¹ system and contaminated runway procedure. He had not conducted an approach brief which included briefing a potential go-around, nor activated the approach. There was an unexpected thrust increase and the incident first officer did not respond. Standard call “go around – flaps” was not used. He had to be pretty much walked through the approach. At no point did Rod take control, but it was close. Leg 2 was from LGA to Toronto. There was good CRM on this leg and the captain conducted all PM duties. Leg 3 was a deadhead Toronto to LGA. Leg 4 was a flight from Ottawa to Toronto which was the next day. The captain did not initiate the push back. Leg 5 was from Toronto to Fort McMurray (YMM). They were doing an NDB 07 approach. The weather conditions deteriorated. He had missed the cold weather corrections to minimum descent altitudes. He also lost situation awareness and he noted this when the incident first officer stated he wanted to do a straight in to the runway but was actually pointed 180 degrees away from the runway. During this recovery and vector back, ATC asked whether they wanted a left or right downwind back to the airport. The first officer stated he wanted a left downwind but turned the wrong direction. He notified ATC that they were on a right downwind. The incident first officer was well aware that his performance was not up to Transport Canada required levels. Leg 6 from YMM to Toronto was line indoctrination. They discussed his gaps in training due to family sickness. Graham stated he flew his most proficient leg when he was not being checked. The incident first officer freely admitted that he gets very nervous. He took the news that the ride was unsuccessful very well.

He felt that this was a confidence issue. The incident first officer fixates on the current/near term; future was good but he could get behind the aircraft if anything came up. His CRM was good. On the first leg to LGA, the incident first officer just had less familiarity with the app. He forgot to activate the approach which resulted in a thrust increase. All he had to do was reduce throttle, but he did not respond until prompted. The incident first officer had to be walked through the go-around however he did not take control of the aircraft.

He knew it was a second attempt (to upgrade) for the incident first officer, but he didn’t know why. The incident first officer indicated that, inbound to Toronto, he had missed a hard altitude constraint of 8000 feet on the STAR and that was termination of the ride.

He had done the FMS Bridge Visual approach into SFO. When asked how it was in terms of workload, he stated that it was “unique” and that he “couldn’t give a cut and dried answer”. Flying in, you know you’re going to be busy. They’ll bring you in high and will break you off of the STAR and ask you where the bridges are. You’ll come in offset and will have traffic to your left. He stated that after 5 hours in cruise, it gets you back into being a pilot. Puts you on a higher awareness.

²¹ Field Condition

He could not recall ever going into SFO without backup navigation when on a visual approach. He referred to page 2 of the approach. He stated that they would generally set up the ILS frequency as a backup to the visual. He interpreted the verbiage on the approach plate as saying that tuning in the ILS is optional. He does use navigational aids on visual approaches because it's easy to land at the wrong airport and that has happened before. He did not believe there was a requirement at Air Canada to use navigation aid backup to visual approaches, but thinks there was something in the FOM previously.

When asked about assignments, he stated that he gives his days off and the schedulers form a schedule around those days off. This LOE came up quickly as the incident FO had failed his other checkride.

He described a stabilized approach with a 1000 ft. Nav Canada gate and a 500-foot Air Canada gate where speed needed to be established. He would have set the MAP after 1200 feet on this approach.

He had flown into SFO at night and stated he would not have flown the visual approach any differently at night.

When asked to clarify how the incident first officer could get "behind the aircraft," he brought up the speed increase when flying into LGA where the incident first officer did not respond to the thrust increase. He also described the situation awareness problem coming into YMM. If they were high and needed speedbrakes, He had to prompt him. The flight into YMM was clear and visibility was 50 miles and they had airport in sight about 40 miles out.

When flying the Airbus, both flight directors are either on or off. Guidance from Air Canada on when to use flight directors is "always or whenever possible." You try to keep the guidance on as long as you can. If the ILS was up, you could keep the FD on; if you were flying a visual approach, you would turn them off as the FD commands could be opposite to what is desired. He would come in on the NAV and switch to ILS when the localizer was alive with the dogleg at 1200 feet. They wouldn't have to with the visual approach, but he likes the vertical guidance at SFO, especially with the visual illusions such as the black hole. He expected the incident FO to be familiar with the black hole illusion given how much he had flown in the North.

He liked working for Air Canada. He enjoys aviation and the airlines and the different opportunities to do various things. He enjoys being a check pilot. The B737 introduction is causing some frustrations but he still classified it as good.

He characterized the safety culture as "pretty good." When he started SMS, it became non-punitive. There were challenges with the previous chief operating officer who had left the company earlier in 2017. He characterized morale at the company as good. It depended on the hiring and when new aircraft are brought on. He had never felt any external pressure to fly. He had never called in fatigue. He had taken one sick day in 20 years. The company response to it was good. He thinks that currently their response is very good.

He characterized the incident first officer's CRM as good. He seemed engaged, but was "not quite there." He had had personal issues but had said that those were behind him. After the first leg of the trip, he had called the chief checkairman about the flight. He couldn't determine whether the performance was due to nerves, the individual, or extenuating circumstances. He expected that with the incident first officer's line indoctrination training as a captain on the MU2, that it was not normal to be having the issues he was seeing during that let.

At SFO, he would use ILS for both vertical and horizontal guidance.

Pat is the senior flight instructor. He didn't think it would be easy for the incident first officer to go back to the right seat "onboarding." The incident first officer had apparently been sent to medical after his first unsatisfactory checkride. When asked if he had concerns with the first officer flying in the right seat after two unsatisfactory checkrides, he said that he would be concerned with the first officer flying with a new captain and that is why he sent a memo to Pat. The danger with that kind of individual is that when you get someone who seems engaged and who has good CRM, but then something happens and the "lights go out", it could be even more dangerous. He asked the incident first officer about it at dinner. He considered sending the incident first officer to the medical department but found out that management had already sent him after the first unsatisfactory checkride. The incident first officer stated he had issues at home and also had a brother who was flying at Cathay Pacific. The incident first officer is articulate and has a sense of confidence, "but when the switch turns, there's nothing there."

The incident first officer was a good pilot monitoring. Nothing negative stood out.

He had given 4 unsatisfactory checkrides (total) in the A320. He described that the incident first officer had excellent CRM with the entire crew including the flight attendants. He was quite open and enjoyed flying. Graham rated his CRM as high average and considered CRM to include the entire operation not just cockpit CRM.

For a visual approach, the pilot flying is always outside, and the pilot monitoring is inside and outside.

He didn't believe that the incident first officer's behavior was due to task saturation. He considers task saturation to mean when someone is juggling too many balls and drops them without realizing they dropped them. This was not really what he was seeing with the incident first officer. There were no emergencies, significant weather, or traffic. It almost appeared like he hadn't let go of what he was thinking about before.

There was weather going into LGA on the one leg, but it was not significant. They were out of the clouds 10-12 miles back and the approach was not in IMC.

He was frustrated with the company as they were slow to get FDA and GPS on the aircraft. When he was the chief pilot, he fought many battles with financial over safety programs.

He described CRM as one box and SA as another. CRM was good and SA was a disaster. The incident first officer was not confrontational or stressed. The incident first officer didn't ask any

questions that indicated SA or question any instructions, like why ATC kept asking for intentions. ATC kept offering radar vectors and the incident first officer didn't question why they were doing that. In LaGuardia during the flap overspeed, he didn't acknowledge the increase in thrust which Graham expected an immediate response from. He thinks that if he hadn't intervened there would have been a flap overspeed definitely. He is unsure about how long the incident first officer would have let the condition go. He also sensed gaps and defined gaps as slow answering of questions. He had not noticed a situation where the incident first officer lost SA and recovered it again. When asked what kind of questions the incident first officer was slow at responding to, he stated the landing distance application, cold weather altitude correction of flight path angle. The incident first officer asked something about the FMA and what he's seeing on the NDB approach that were understanding-based. He thought that if the incident first officer had been in the right seat, he should know this information. It showed that he was very relaxed because he was asking questions, but he didn't consider it appropriate for a line check. His responses to memory questions were good, such as with a rejected takeoff and engine failure, loss of pressurization. He forgot a go-around briefing.

He would review NOTAMs during flight planning and asterisks NOTAMs on the flight plan. He would also look at NOTAMs about 45 minutes out from landing when setting up the approach. They would also discuss it during the threat assessment, however he felt that the fact that 28L was closed would likely have reduced the threat because you wouldn't get TCAS warnings there wouldn't be a tendency for ATC to keep the flight further to the right.

In the last 1200 feet of the bridge visual approach, he would expect the pilot monitoring to make sure they are on speed and trajectory and that the aircraft is stable. He'd expect the PM to be focusing inside and outside of the aircraft.

He hasn't flown into SFO in the last 6 months. His last flight was in April 2017.

The transition to electronic flight bags will be difficult. They need training on this. There is not an SOP for this so the company won't be able to check how pilots are using it until a line check which could be months away. This has not been addressed. He wished that they had oral exams for training as he finds those more effective.

He described the following things that he would improve at Air Canada if he could. The company is now run by finance and sometimes forgets that it is an airline. They went through bankruptcy, hired Boston Consulting Group, and cut a lot of people. The culture has been to cut more people and now there are not enough people. The training budget has decreased. There was a case where they wanted to change the footprint of training without looking at the data they have.

The chief pilot, operations manager, and maintenance report to the government. The culture at the top of the company is to cut programs and people. He doesn't think the problem related to the accident was not related to Airbus. There have been increasing cases of pilots not holding centerline. This was not related to a junior pilot program so something else is wrong. They had tried to get one fourth of the training people to be newer first officers. He would also like there to be an oral exam during training. Cuts were made and GPS equipage on the aircraft was affected. The reasons he was given for the cost cuts for GPS was that it would cost money, and you'd have

to put a hole in the aircraft and it would require downtime. They didn't mind those reasons when implementing inflight entertainment systems which got through in 5 months. He believes that the monetary aspect of the company is a problem.

The interview concluded at 1640.

Interviewee: Captain Scott Tuck

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 9, 2017

Time: 0945 EDT²²

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Tuck waived representation.

During the interview, Captain Tuck stated the following:

He was a captain in the A320 at Air Canada based in Toronto. He has been a check airman since 2003 in the Airbus. He's been a line check airman for 14 years and been flying the Airbus for 15 years. He started in 1998 as a first officer.

He went to aviation college in Thunder Bay and earned his private pilot certificate and instrument rating. He worked for Bear Skin Airlines flying a King Air for 3 years. He was promoted after 6 months to captain. He flew Metro for 6 years. In 1995, he joined Air Ontario as a first officer on the Dash 8. Back then, that was the only way to get into Air Canada. He worked for 10 months on the Dash 8 and then became a first officer on the DC-9 for 2 years. He was a first officer on the Airbus for 10 months. He then flew as a captain on the DC-9 and did training and checking on the aircraft until it got parked. He then became a captain on the Airbus. He flew reserve for one year and then became a check pilot. He hopes to become a 787 captain this week.

He's done about 400 checks and about 40 captain upgrades. He has given unsatisfactory results. The problems he sees in new hires is that the Airbus may be their first jet and they have poor landings, for example if they had never encountered a crosswind in the aircraft before. The problems he's seen in pilots transitioning to the Airbus is performance on the 2 engine go around. There are issues with poor SA, overspeeding flaps or gear and resulting in an undesired aircraft state. For captain upgrades, he doesn't like to do too much prompting. Technically, the OE is an evaluation only without instruction. He does not ask many questions unless there's hesitation on an emergency or something similar. For a recurrent check, he'd fly a minimum for 2 legs. For captain upgrade, they fly minimum of 4 legs, but the company likes to see 5 or 6. They used to want flights into New York, Chicago, or St. Johns, Newfoundland due to the difficulty of those airports, but now the company is fine with whatever pairing gets arranged.

²² Eastern Daylight Time

He conducted the command final for the incident first officer's captain upgrade. It was a 6-leg trip. On the leg from Toronto to Ottawa, the incident first officer was about to bust an altitude restriction and was not flying appropriately in order to make the restriction. He informed him of the impending altitude restriction of 8000 feet. Tuck took control of the aircraft because they ended up in an undesirable aircraft state. They usually would have flown a managed descent for that approach.

They were 40 miles from LEPUX at 8000 feet and 220 knots. 5 to 6 miles prior to LEPUX they were cleared to 5000 feet. The incident first officer pulled the altitude knob and dialed in 5000 feet missing the 8,000-foot altitude restriction. He could have saved it if he had pressed the V/S button to level the aircraft. Instead, he set the FCU altitude to 12000 feet and pulled the knob so the aircraft went into open climb and the engines began to spool up. The incident first officer then cranked the FCU altitude knob back to 0. The Airbus engines take a few seconds to go full throttle from idle so he took control of the aircraft. The entire event took 5-7 seconds. He gave him control back afterwards and they had an uneventful landing. They had a 45-minute turn before leaving for Halifax. After the parking checklist was complete, he told the incident first officer that the result of the check was unsatisfactory. He then got a new pilot to fly the leg with him to Halifax.

Other issues during the trip included an event in Saskatoon. They were on downwind and about to blow a speed restriction of 200 knots within 10 miles and 3000 feet agl. They also had an MEL incident where a seat in the back of the aircraft wouldn't sit up straight. The FA offered to not seat people around that seat and the incident first officer agreed without referencing the MEL. Tuck had to prompt him to reference the MEL. The MEL event gave him a grade of 2, and the speed event gave him a grade of 2, but the undesirable aircraft state event got him a grade of 1. He was doing fine until they were going into Toronto. Tuck was taken off guard by the decision to use open descent to descend as the incident first officer was doing fine until then.

He does see pilots use open descent often and feels that its due to a lack of understanding of managed descent. This however, is not a thing he would normally see when the upgrade candidate had been flying in the right seat of the aircraft for a while.

Sometimes in Toronto if they clear you unrestricted, you can use open descent.

The last time he flew into SFO was June or July this year and it was daytime. It had been a while since he had flown into SFO during night time. During the most recent flight he had come in twice in 2 weeks. One was during visual conditions and the other was when there was 700-800 foot overcast ceiling and they had flown the ILS. On the visual, ATC tends to keep aircraft high, but pilots should be prepared for that. There is also some terminology that is different that could confuse a new pilot when ATC says, "descend via." He would not use an idle descent in SFO. He treats the FMS as a second officer. For the approach, you have to hand fly from or above the minimums however prior to that point, he would use the automation. He said it was easy to define the runway and it had never been an issue.

The notes for the airport advise you to hard tune the ILS frequency. He considers this a requirement. He would press the ILS push button to get the information on his PFD and would use the information more for high/low information than for localizer. He would definitely tune in the

ILS for this approach, but it wouldn't be an unsatisfactory result if a pilot didn't do that during a check.

The check trip with the incident first officer was from Toronto to Saskatoon to Ottawa where there was a layover. The next day was from Ottawa to Toronto to Halifax, however the check was terminated in Toronto.

The flight from Toronto to Saskatoon had the following notes. He had written that the flight planning was good. The ramp check was good. It was slightly slow but acceptable. His emergency review was good. They were late on the push back which indicated less SA as he was not aware of the schedule time. If they were late, they can file a "hawk eye" and tell them that the delay was due to crew. During the descent into Saskatoon, there was a runway change. They were planning on conducting the NDB 27, however there was a mild wind and landed on runway 09. As mentioned prior, he busted the speed at 230 knots on downwind.

From Saskatoon to Toronto, the flight plan had virtually no taxi gas and it was snowing and icing. He had to prompt the incident first officer about that and to request more gas which showed poor SA. This is where they had the MEL event. The incident first officer was PM during this flight and PF for the other 3 legs.

When he flew into SFO, they reviewed the SFO NOTAMs during flight planning. The closed runway was mentioned in the NOTAMs. He was considering that there were possible delays. They typically depart the ones in SFO and that could change. They would also make sure they had enough holding gas.

On version 4 of the iPad there is a way to highlight on the iPad. He prefers the paper over the iPad for flight plans.

For the threat briefing. The PM would discuss the threats. The threat briefing should have trapped that 28L was closed. It was the PM's responsibility to do the threat briefing but either pilot does it in real life.

The incident first officer did a nice briefing with the crew. It was a bit over the top as it took too much time and they were late. He considers SA to be part of CRM.

The flight with the incident first officer occurred on Feb 28 and March 1.

In the U.S. ATC says, "descend via" and in Canada "cleared to 6k" and expects pilots to comply with restrictions.

Unsatisfactory results are not common. He estimates he has given between 10 and 20 unsatisfactory results.

He holds approximately 18,619 total hours, 9000 on the airbus, 8200 of which were as captain.

He was asked to walk through the FMS Bridge Visual into SFO. ATC would give them a descend via clearance and ask them to advise when the bridge and field were in sight. He would report the bridge and field in sight. They would get cleared the FMS bridge visual runway 28R. He would set 1200 feet on the FCU. Once he passed ARCHI, he would press the altitude button. He would expect PM to be making sure 1200 is set. He would press the altitude button and the PM would call the boxed items on the FMA. He would also be managing speed and the PM would be rogering all of the speed and altitude inputs. There is a 275 bearing toward the airport. On the ND²³, there is a green line on the ARC showing the FMS course. He would also press the push button so that the constraints would also be shown on the display. Pressing the ILS push button is on the in-range checklist so they would have done that about 10000 feet and 30 miles out. The DYAMD arrival is a green line. Using NAV they would fly to TRDRW at 6000 feet. For the NAV display range, he'd want 20 miles and change to 10 miles around GAROW. He wouldn't reduce range any less than that.

He thought that it was immaterial whether he had the GPS or not as it was not required for the approach.

At SAMUL, he would disconnect the autopilot. He would give tower a call and set final flaps. They would have a speed restriction through SAMUL. After autopilot disconnect he would intercept the final approach course and turn flight directors off. He would set missed approach altitude normally at SAMUL. He would usually disconnect the autopilot and then set the missed approach altitude.

If the approach was done in idle descent, it would increase workload, as each altitude would have to be set by the crew. Its "busy" going into SFO and there is a note that a specific DME they were to go into TA mode on the TCAS. The FCU altitudes are the ones that protect the altitude restrictions. They would have to identify, verify and call out each altitude. It's already busy at that time in the approach. There's traffic alerts, tower communication, wake turbulence etc.

ATIS always transmits that they are flying the Quiet Bridge Visual. The fixes are different and the altitudes are different. They would have to build the quiet bridge visual in order to fly it. He would set it up on descent.

He found the incident first officer to be a "nice enough guy." He seemed worried and nervous. Some nervousness is normal during a check. It's possible the nerves caused his errors, but he would have expected the nerves to subside by the 2nd day and they didn't. It was odd for him to suddenly change is mind a set an open descent on the approach into Toronto. He said the errors could be due to nerves, lack of understanding, or lack of situation awareness.

He classified Air Canada as the NHL of flying. He liked flying there and had done very well at the company. He feels that improving the safety culture is the primary goal of the company and the intent is there. There have been 3 incidents on the Airbus and that shows they need to improve something. It could be the training footprint. When he was transitioning into the B787, he was given a footprint and a schedule and questioned whether it was enough. He also thought it would

²³ Navigation Display

be good to hire FO's to be instructors versus contractors. He also questioned whether these decisions were made because of money.

The company has made reporting easier than ever and gives indemnity unless a pilot deviates willingly. He feels that ASRs are not filed on unstabilized approaches because the crews know it would be an ok landing.

When asked to characterize morale, he stated that he's happy. There have been some people that have been laid off twice. There was some ill will with Rouge as there were two different pensions and contract items between the companies. There was also a time where there was a lack of retirement for a few years and people weren't upgrading which contributed to poor morale.

The iPad version 4 came out in the last few months. There's no way to charge the iPad in flight. Captains get a battery and are expected to share it with the first officer. They don't use it enroute. It is nice to have the first 6 to 7 pages of the flight plan printed out as it is more work to use the iPad to refer to those pages.

For an equipment bid, they are awarded and given a training date. Candidates get ground school, procedures training on a fixed base simulator, a maneuvers training validation (MTV) in which they are allowed repeats, and then does 8-9 simulator training sessions. This is followed by an LOE and LOFT and 2 repeats. For a PPC on the A320, there is 50 hours of line indoctrination, 2 command simulations. The final line indoctrination pilot recommends the candidate for the line check.

The line check is either pass or fail and he doesn't rate whether it is up to first officer standards. The check he did with the incident first officer was the most uncomfortable line check he's done as he had to take control. It was an easy call but awkward.

He has given performance assessment checkrides (PAC) which all initial hires have to do. He's done 1-2 of them. Pilots get line indoctrination for 50-70 hours. If they don't get recommended for the line check after that, then they get a PAC to recommend for a check ride. If the PAC checkairman is unable to recommend, then the chief pilot decides forward action.

He recommended that the incident first officer should get a simulation session where they could focus on SA with the FCU and managed vs open descent.

The first impression he had of the incident first officer was nervousness.

He defined situation awareness as being aware of surroundings and using all resources including flight attendants and dispatch.

His last approach into SFO was an ILS. The week before, the ATIS had advised using the Quiet bridge visual, but they were cleared for the FMS bridge visual.

He has seen map shifts on takeoff but none during landing or approach.

They get the ATIS on the ACARS and print it. It includes taxiway and runway closures. The first officers' standards are the same as captain's standards.

The 10.10 has company charts with airport information.

If he could, he would change the command process. Currently, they only have the command evaluation line check, the 50-line check, and final line check. The only line of defense is with the airman recommending during indoctrination. This could be 50 hours where the candidate may not have encountered any issues inflight. He would change the training footprint and think about training versus checking.

When coming in for a night visual versus a day visual, the night would include lights. At night he would fly it differently than during the day and "cheat" and fly the ILS to the runway.

The interview concluded at 1157.

Interviewee: Peter Murnaghan and Geoffrey Charabin²⁴

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 9, 2017

Time: 1208 EDT²⁵

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Mr. Murnaghan and Mr. Charabin waived representation.

During the interview, Mr. Murnaghan and Mr. Charabin stated the following:

Mr. Charabin: He was not aware of the incident until Monday morning. He had received a phone call from flight operations management to investigate ACARS messages. When he checked, there was nothing related to the incident. He was instructed to categorize the event as green. He filed the event, categorized it green, stated it was an ATC irregularity and a Go Around. The filing said the following - ACA 759 on 7th July, Toronto -SFO, Fin # 220, A320. Late Filing. Called to advise – lined up with wrong runway, came back around, captain to "was to file an ASR." - He didn't notify the duty pilot and sent the event out on the wire on Monday morning.

Mr. Murnaghan: He dispatched the flight out on his shift on the 7th. The flight had arrived in SFO after he had left work. He had heard from the crew on the 8th during his next shift just after 3pm. The report sounded innocuous as it was reported 16 hours later. The captain stated that they identified a missed approach, lined up with the wrong runway, and came back around. The captain

²⁴ Mr. Murnaghan and Mr. Charabin participated via teleconference.

²⁵ Eastern Daylight Time

asked to talk to the duty pilot so he routed him to the chief of the day for dispatch to hand him over to the duty pilot.

Mr. Charabin: On Monday, he was searching for the phone conversation and looking for any more details the captain gave dispatch. Normally the crew sends an ACARS or calls the controlling dispatcher. The event seemed innocuous. Typically, pilots tell dispatch after the flight once the doors are closed. He could not find any ACARS messages from the crew.

He classified the report as green as there was inherent danger but it was not fully defined. It could have led to danger for the passengers. It would get elevated to yellow if there was a passenger injury such as abrupt movement causing passenger injury. A red report is a loss of aircraft. A white report is a nice to know reportable event. Green is the most common category.

If he had known they had lined up with the taxiway, he would have elevated the category to yellow. He would have had to tell management and there would have been an automatic call between the crew and the duty pilot, so that the duty pilot could get the story straight. The decision to pull the CVR is a subjective call. He decides with the duty pilot to tell maintenance to pull the CVR. This is a decision they would always discuss with management of flight ops and corporate safety.

The training to categorize is OJT training. Sometimes the method of reporting changes and there is training associated with that.

The reporting system is done electronically and sent “out on the wire”

The duty pilot is not onsite, he is on call.

Mr. Murnaghan: He was asked whether the pilot asking for the duty pilot indicated the severity of the incident. Initially it didn’t strike him as out of the ordinary. 75% of guys don’t ask. Because of the late notification, he took it as an incident that wasn’t as serious. Sometimes pilots elect to call the duty pilot first.

Mr. Charabin: He would have expected a call to the duty pilot if the crew thought it was necessary. Normally with a go around they would do it when they blocked in. This could be a minute to an hour after a flight.

Mr. Murnaghan: For a missed approach, some crews send an ACARS message before the second approach. Since this crew waited until after they got to the hotel on the next day it wasn’t particularly alarming. He would have expected some indication the night of the event given what he knows now about the event.

Mr. Charabin: He takes information from dispatchers and disseminates information to management. It is his responsibility to categorize events, not the dispatchers. It is possible to change the categorization of an event after it gets first categorized. They have an internal cheat sheet. This sheet is also in the red manual, publication 400. It is also on a clip board next to the phone. Corporate safety would know if there was a category change.

He believes Kurtis Scheirer, who is his boss, instructed him to categorize the event as green. When asked if it was typical to be instructed to make a categorization, he stated that something had to go

out to management in order to get the ball rolling. He clarified that he was not instructed to categorize the event as green, it was his decision. He was not aware of whether this incident's category has been changed since the initial reporting.

Mr. Murnaghan: He was asked his impression of the phone call. He said that it took place around 3:30 pm, and that he was very busy at the time. The captain sounded very routine, innocuous and there was not a lot of detail, and nothing out of the ordinary. In this case, it wasn't a very serious event, so he just passed the captain over to the Chief. He didn't really think about it after that.

Mr. Charabin: They can tell in their voice whether a pilot is distressed or neutral.

The interview concluded at 1254 EDT.

Interviewee: Paul Andreas MacDougall

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 9, 2017

Time: 1302 EDT²⁶

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain MacDougall waived representation.

During the interview, Captain MacDougall stated the following:

He was currently an ACP on the A320 and had been doing the job since February of 2017.

He was in the Royal Air Force for 14 years. He left the Royal Air Force and flew at Canada 3000. He also flew the B 757. He was the chief pilot on the B767. He flew the Embraer for 1.5 years. He flew the Airbus for 7 years. He spent 5 of those years as a captain. He holds approximately 13,000 total hours and 5,000 hours in the Airbus A320. He held approximately 3000 – 3200 hours as captain on the A320. He has been with Air Canada for 20 years.

In the beginning of March 2017, he checked the incident Captain. It was within the first 5-10 checkrides he had ever given. The trip was from YYZ- SFO during nighttime, SFO-Vancouver, one deadhead, and a Vancouver – Toronto. The flight into SFO was at night. He couldn't recall anything specific, but was 90% sure they did the FMS Bridge Visual to 28R. He had been in and out of SFO during about 40 trips. SFO was challenging due to the altitude restrictions and it was difficult to fly a stabilized approach. The Quiet Bridge Visual was always advertised on the ATIS, but you always get cleared for the FMS. The flight to SFO was unremarkable and there were no significant issues.

He doubts that he has ever seen anyone doing an open descent into SFO. There are so many altitude restrictions it would make him uncomfortable. Once you get on final approach, there may be some

²⁶ Eastern Daylight Time

conditions in which you would want to use an open approach to get altitude down and speed back at the same time. Initial portions (of approach) would always be flown as managed approach. If they did try open descent, he would want to know why they wanted to use it and understand what kind of protections to prevent risks like altitude “busts” they will use when using it. The managed descent was nicer. Workload increases with open descent as there is much more involved. When pilots are flying manual versus on autopilot the workload for the pilot monitoring would increase, as well as for pilot flying. The danger with open descent was getting distracted. When the PF does an open descent, the PM workload changes to ensure that altitude constraints were met. The PM was more involved than when the PF was hand flying and would take away from the Pm focus. The PM would manipulate the FCU when the PF was hand flying and that increases the workload as well.

He would backup the FMS bridge visual approach by tuning the ILS with raw data. It is a good suggestion but he didn’t interpret that it was mandatory to tune in the ILS as a backup during this approach into SFO. When asked if it is a requirement or suggestion, he would say a good suggestion, though he’s sure that there is lots of debate on that right now (after incident). He can’t recall if it is mandatory.

SOPs state to set the missed approach altitude by the FAF which would probably be F101D on the bridge visual. If they were flying in managed descent you could do it earlier. If flying in open descent, you’d wait until 1,200 feet. Between SAMUL and F101D, he would turn off the autopilot and then call for FD off. It was a classic black hole approach at night with the runway at the end of it. He would then look on the FCU to see if the ILS was selected. Each pilot is responsible for their own display as they turn onto final.

He had flown into SFO two nights after the incident. He could see 2 concrete slabs of the runways. In order to verify if the runway alignment was correct, he would verify with the ILS and noting the ILS 28R written on the bottom of the PFD until they were close enough to read the runway numbers; however, at night the runway numbers cannot be easily seen from a mile or more. The air traffic control frequency was quiet the night he went into SFO.

Energy management is a challenge when coming into SFO. They bring you in too fast and too high. Most pilots are hesitant to tell ATC that they are “unable” to take a speed restriction. Pilots were afraid to be penalized (vectored, etc.) and thought that ATC knew best since they were being vectored for a reason. ATC may be viewed as “your dad.”

He has had 2 unsatisfactory results in the past month. One was an OE on a new hire who had trouble with takeoff power management and trouble landing. The other was a captain upgrade candidate who was particularly nervous. They were flying an NDB and he selected RNAV²⁷ in the FMS. They went over the flaps 2 speed limit as they accelerated in the descent. He put his gear about 10 miles back. It felt more like a line indoctrination instead of a check ride. He also had confusion with MELs.

²⁷ Area Navigation

He had talked with the incident captain about family and kids. He found out that the incident captain was big into flight simulators. the incident captain seemed pleasant. He doesn't remember any negative interactions with the incident captain.

When coming into SFO, he could see both runways a few miles out as he maneuvered to final. It was really good visibility and the area was nice and bright. He could not recall if the moon was out or not.

Working for Air Canada was the best aviation job in the country. When asked about the safety culture, he stated the following. He was the fleet manager for the Embraer and in the last 10 years he feels that the company has a huge overemphasis on money and cost control. He had told management he needed help in his department but it didn't really matter. The preoccupation with money has caused the flight ops staff to shrink significantly. There were known problems that were ignored because of money. When asked to provide a specific example, he recounted that in standards in 2000 there were 8 pilots and now there are 3 and there are more aircraft now. The flight operations management and support staff now don't necessarily have a clear aviation background. Certain positions are being filled by first officers because they can be paid less. Also, technical programs were stifled because of money. They were either delayed or not implemented well. For example, the A320 GPS project has been ongoing for 10 years.

When asked about morale, he stated that in 2003, Air Canada went through chapter 11. There was a change in the company and a new CEO in 2009. In 2012 there was some contention. Since 2013-2014 there has been a shift. The company is making money and there is a less acrimonious relationship with the union. It is the first time ever that he feels like he's not in danger of losing his job. There has also been movement in seniority recently.

He felt the incident captain was friendly, easy to get along with, not overbearing but not super passive either. He had difficulty recalling what he was like when he'd met him.

When asked if there are differences among Air Canada's fleet of A320s, he thought that there was a fleet "mish mash" of Airbus airframes and there were SOP concerns across the board. He thought it was a real issue in terms of training. Training was done in specific type of Airbus aircraft, but there are lots of different types of equipment in the same type aircraft. He doesn't feel that the company gives this issue its due. There are 3 different training manuals. The company training doesn't adequately address or train these differences. The newer aircraft have GPS, this year they started putting GPS in older aircraft.

When asked if having no GPS increases workload for pilots, he said yes. The airline has all sorts of restrictions for non-precision approaches because some aircraft don't have GPS. Now they can't fly some of these approaches anymore unless you have another way (e.g., DME) to measure position. But in day to day operations, there not much difference, other than doing GPS NAV accuracy checks in older aircraft. In newer aircraft, these systems are integrated.

The non-GPS aircraft are restricted to non-precision approaches. They also have to do accuracy checks. These take 15-30 seconds each. They're not a big deal. They do these during takeoff, climbing through 1,000 feet, during cruise, prior to approach, or if nav accuracy is low.

When asked, he has seen minor map shifts that were not significant. Anecdote: when flying ILS into Victoria BC on non-GPS aircraft, and into Edmonton, when go by FAF, all of a sudden, it would say that you are left of course and out of fuel. The FMCG manufacturer said that “your FMCG’S are so old, that we’re not even going to try to fix it”. So now there is a note in their Jeppesen chart advising of this phenomenon.

When asked how often does Airbus require a pilot to do GPS accuracy checks, he said that it does after takeoff, climbing to 10000 ft, if over any non-radio coverage areas, prior to approach, and if MCDU gets message re: NAV accuracy low. Happens in oceanic areas like going down to Caribbean. Sometimes on ILS approach, it will say “NAV accuracy downgrade”. He thinks that it would be unlikely to happen when flying into SFO.

He will brief an instrument procedure even for a visual approach 90% of the time. He’d then have the FMGC²⁸ fly an instrument approach. It’s not common to not have a backup. He’s never done the quiet bridge visual approach into SFO.

The incident crew might have flown the VOR for arrival or visual. The fact that tuning the ILS was written in the notes to the approach means it’s a good idea. If the company didn’t write it there, they’d be risking a problem. Using ILS also tells you where you are on the glide path.

When asked if the note (to tune the ILS 28R) was written there changes a pilot’s behavior, he responded that it did. If a crew didn’t tune it in, they would obviously be risking a problem.

When asked if there are any quirks with ILS on A320, he responded nothing other than the NAV accuracy downgrade at between 5 and 1 mile back. He doesn’t know why it does that. In terms of presentation and performance, it works well.

If he could change anything, he’d look into flight operations to assess if they have enough people to do the job and increase staff in maintenance and standards. structure to make sure there is enough experience in management; that maintenance is putting enough effort into maintaining the fleet not just to meet minimum, but to be ahead of the curve. Why are these accidents / incidents (with the A320) happening now, when Air Canada has been flying the A320s for 20 years? What is changed / new? There is rapid expansion (500-700 pilots have been hired in the last few years. They’ve also had 3-4 chief pilots for the A320 in the past 3-4 years. He’d also improve SOP design. It is not currently designed for pilots. Things aren’t highlighted.

The interview ended at 1428.

Interviewee: Gordon Cousineau

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 9, 2017

Time: 1450 EDT²⁹

²⁸ Flight Management Guidance Computer

²⁹ Eastern Daylight Time

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Cousineau waived representation.

During the interview, Captain Cousineau stated the following:

He was a retired Air Canada pilot and was a contracted instructor for Air Canada. He retired in 2006 after 20 years with Air Canada. He was in the air force for 20 years. He then flew for Canadian Airlines and Korean Airlines prior to joining Air Canada. He's done 120-150 sim sessions per year for 2 pilots at a time and 12-13 sessions per month. He's a validator and does check rides with line pilots for FO-FO, initial training, and CA-FO. He has given approximately 3 unsatisfactory checkrides. In some checks, it is ok to check and repeat if they are working to a training standard. There have been a few pilots who have been removed from line flying. One example of an unsatisfactory checkride resulted from a pilot having difficulty identifying a switch, which was illuminated. In "IRR, inter reliable session", 4-5% of items are repeated. The repeated items were not a safety issue with piloting the airplane but what he called "sloppy."

He flew with the incident first officer recently and did 2 sessions during his upgrade training and 2 sessions when he was requalifying as an FO. He did an extra session with him for the captain upgrade. He was told that the incident first officer needed more instruction and that he should develop something challenging. The scenario included a hydraulics problem and a flap problem. The incident first officer performed acceptably. He received all 3's on his grading sheet which were all acceptable except for one 2 in captain operation. It is not often that you see upgrade candidates needing extra training. Grading is done on a scale from 1-4.

On April 8-9 2017, the incident first officer returned to being a line pilot, the 2 grades came from TA/RA, low energy go around procedure. He couldn't recall why the 2 but it wasn't 100% correct. The incident first officer told him that he had terminated the upgrade course and he returned for FO requalification. In order to return to the line, he had to make up the training he had missed while doing the captain upgrade training. During the return to the right seat, the FO performed above average.

He described his definition for a stabilized approach: To be set up on final, fully configured, at the appropriate speed, on appropriate glideslope. At 500 ft. Also have 1000 ft gate.

When asked how the transition to electronic flight planning (iPads) had gone, he described the people who come in for training to be more proficient in the iPad than he was. There is a learning curve for learning the iPads. The approach charts are easy to access but the SOP's are more cumbersome to access. The paper was easier to reference.

He clarified that the incident first officer's return to line check was above average and the recheck was above average.

When asked about company morale, he stated that there was no morale problem at Air Canada. They had the best job in the world. He could not speak to the safety culture as he was retired from Air Canada, and he only sees the pilots during objective sim rides.

For captain-captain training, 4 sessions are required. There are 2 guys in the simulator who are current in the aircraft. The training is compact and it is difficult to enhance the training. He could use one to 2 more sessions to complete training and he thinks the candidates could use more ground and 1-2 more sessions in the procedures trainer as well.

For FO-FO training, they do get an extra session but feels like they could use one more session. It's easier for the instructor and easier for them.

The company has incorporated spot changes to the point where you couldn't complete everything in four hours. There is also PRM training they train at SFO in the simulator for parallel runway operations. In 2012, they incorporated this PRM training into its own session. Prior to that it was a spot change.

In January, they implemented an option for an extra session plus the normal 2 session loft. Specifically, in the FO-FO course, people do take the extra session from time to time.

His first impression with the incident first officer was that there was nothing unusual and he remembers a heavy English accent. He said he terminated the captain upgrade training due to family issues. Cousineau could not recall any other time where someone terminated upgrade training.

There have been no changes to training procedures since the incident.

They do not train for the FMS bridge visual into SFO in any training scripts.

They fly the profile in NAV. The crossing altitudes are the pilot's responsibility so they should be maintaining the vertical profile. Managed mode would respect the altitude crossing restrictions. At 4.4 miles from the airport, he would disconnect the autopilot. After he reviewed the chart, he stated that it was a requirement to put in the ILS frequency as a backup. He would recommend anyone flying an arrival to fly in managed descent. It reduces workload because the autopilot would manage the altitude.

If he could change anything, he would revise the training syllabus. It is difficult to get pilots through with the flow currently. The training managers and coordinators are not line pilots, nor do they have experience at Air Canada, nor do they have experience on the aircraft. So, it has become difficult to get answers to questions where before they could ask someone and get answers immediately because management had experience in the aircraft.

Air Canada has had Airbus culture for a while and now they are retraining pilots in the Boeings. He considers the training overall to be "pretty successful" and that it is doing its job.

When asked if he had any questions, he said that he doesn't know much about the accident, and he still doesn't. When he saw everything on television the previous week, he realized how close it was. When shown photos of runway 28 and the taxiway, he thought the distances were accurate.

He thinks that the taxiway looks quite wide and further commented that there were no blue edge lights.

The interview concluded at 1532 EDT.

Interviewee: Peter Jaworski

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 9, 2017

Time: 1545 EDT³⁰

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC); Mr. Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA) – Technical Advisor to the TSBC

Captain Jaworski waived representation.

During the interview, Captain Jaworski stated the following:

He was a check pilot on the A320 at Air Canada for the past 5 years. He was also a QAE on the A320. He started flying 30 years ago flying various aircraft with small airlines. He got involved with line indoctrination. He joined the regional carriers and went to Canadian Airlines International and joined Air Canada with the merger on March 8, 1998.

He holds between 8,000 and 10,000 hrs in the A320 and over 15000 hours total. He gives approximately 160 check rides per year, maybe 800 total. He's had about 20 unsatisfactory results due to knowledge, SA, and performance issues. They operate with a standard grading scale and go through the grading course.

He flew with the incident first officer when he was going for his captain upgrade in February. He did his command simulator sessions. Day one of the training starts with 1.5 hours before training where they talk through tools, managing the environment, and processes. This part is a two-way conversation. Day 2 of the training is the command LOE. In the simulator, they fly 2 legs unscripted and the instructor gives all the help/guidance possible. On day 2, the simulator session is just like a flight. The result is either SAT or UNSAT without grading. This is only an internal check.

He recalls that the incident first officer was a weak candidate. They had a great conversation in the briefing. He believes he position froze the simulator to give guidance. He knew the incident first officer was nervous, but everyone is nervous. Throughout the flight, he was still nervous where people usually relax after about an hour in the simulator and performance normally goes up. There was a long debrief and the incident first officer was really appreciative. Leg 1 of the simulator flight was from Vancouver to Victoria where he got a dual FAC fault. The second leg was from Vancouver to Toronto. Day two of the training was "leaps and bounds" better. With the 2 legs, he saw the command process improving. Leg 1 was Ottawa to Toronto where he got a dual

³⁰ Eastern Daylight Time

electrical fault. On leg 2, between Montreal to Ontario, he got a right cargo door failure and a right engine fuel leak. He passed the check, but was the weakest that Jaworski had ever passed.

If he had failed the incident first officer, he would notify the senior flight instructor who would discuss with the candidate. Typically, it would require more line indoctrination and another command sim. The emails for unsatisfactory results are very detailed.

The incident first officer was using all of the tools to solving problems but he took a longer roundabout way to get there. With the 2nd leg, he picked up the gauntlet with those failures. He handled the workload well. He remembered during approach. He was unhappy with situation awareness. The incident first officer took a turn to take time to get ready during the approach.

The partner in the simulator is an FO. It would either be a volunteer FO or they may put two candidates in the simulator at the same time.

The incident first officer had strengths in CRM, monitoring and providing feedback, workload management, and communication.

He defined a stabilized approach as the letter of the SOPs, knowing exactly where you are. At the very latest, you would assess at 500 and 1000 feet per the SOP but pilots could go around earlier.

He liked working for Air Canada since 2000. He described Air Canada as safety conscious. They have FCRs and ASRs for reporting and doesn't feel like pilots hesitate to report things. He considers morale to be generally positive and there is always the 10% that are always unhappy.

At one point, he would have improved communication between the company and pilots but now that was good. He thought that another day in the simulator wouldn't hurt for all training programs.

For flight planning, they meet either after customs or before customs. If it's a transporter flight, the pilots meet past customs. If it is a domestic flight, they'll meet in the regular crew room. They are expected to be at customs 1:15 minutes prior to departure.

The incident first officer passed his check ride because there were no violations, no limitation exceedance, his command decision making was good and he did not put anyone at risk. The weaker parts were that he was more nervous than most, more slow/methodical at making decisions. He did not know why the incident first officer had extra nerves. He described the incident first officer as keen, open minded and someone who wanted to learn and advance.

Pilots have filed ASRs for go around. Technically they don't have to file one but it is requested within 24 hours.

Generally, right to left seat transitions bring better performance. Usually FO's find challenges in the airbus and have trouble with SA and workload management to an unsafe state.

He defined situation awareness as the state of the aircraft, where it is in space, range, and time allotment.

The interview concluded at 1630 EDT.

Interviewee: Captain June Hughes

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 10, 2017

Time: 0808 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC)

Ms. Hughes was represented by Ms. Louise Hélene Senecal – Litigation Counsel Air Canada Airlines

She was the assistant chief pilot in the Airbus A320 aircraft.

She started flying while still in high school and went to the university where she completed her degree in Business Administration and Aviation. She subsequently went on to obtain her Master's degree in aviation. She started flying in southern Ontario on small airplanes and conducting medical evacuations. She then flew a Lear Jet for about a year. When she was hired at Air Canada, she was an Embraer first officer (FO), then an Airbus A320 FO, a captain on the A320, manager of line operations for about 3 years and has been in her current position for about 1 year.

Her daily work activities included answering emails, responding to queries, policy and SOP development, working with manufacturer guidance and looking at Airbus procedure changes to determine if or how they needed to be complied. She also follows up on reported events as the fleet specialist and will contact crews as required to see if policy was followed or if it needs to be amended. She does oversee training and script development as well as the development of standards policies.

She reports to the Airbus chief pilot and they have a 'good' working relationship. She does not feel there are many challenges other than day to day workload which is "quite a bit" volume wise.

She does not have anyone reporting to her.

When it comes to day of issues the pilot would report to the base manager as the chief pilots deal more with fleet specific issues.

She will interview pilots if there was a violation of policy or procedures and assesses disciplinary action. However, the day to day reporting is done at the base.

Each situation, when it comes to policy issues, is different and they have not noticed the same type of issue over and over. Presently they have airplanes departing LAX on one of the runways and the SID does not depict a right or left turn. They had crews turning right instead of left. They are working on changing the guidance to the pilot as well as forwarding the information to Jeppesen to have it published on the plate.

When they interview the crew if the act was not intentional they do not take disciplinary action. If a crew has an error or at fault it may result in additional training.

They have had a case that was discussed when a captain did not comply with the policy and they were contemplating demoting the captain to an FO; however, it was not fulfilled as the CA left on medical leave prior to a decision being made. She described the situation as one where the company had the expectation for a flight to be conducted from Toronto to LaGuardia. Once airborne the captain did not feel comfortable proceeding to LGA even though the conditions were VFR. They asked him to go to EWR for the alternate, but the captain elected to return to YYZ.

The captain has his own reasons; however, they felt the captain should have asked for YYZ as an alternate if that was going to be his decision.

The captain has responsibility along with the dispatcher. The captain has to be okay with fuel, destination and alternate otherwise consult with dispatch, all prior to departure. Before accepting the flight plan, the captain has to be ok with the dispatch filed flight plan prior to departure.

The captain accepted the flight plan and the routing as filed so Air Canada's expectation was to complete the flight. There was confusion on an app that Air Canada provides to pilots for landing distance and the captain was unaware of additional factors used in determining the landing distance. His concern was that he did not have enough runway at LaGuardia. He had not verified the landing distance until airborne.

The app they use was ACPT (Aircraft Performance Tool). There had been issues with that captain in the past. She had met with him before, because there was a report of inappropriate passenger announcements from pilots. The prior issues help build a profile of the pilot when assessing current issues.

If a crew has a safety concern the normal process is to fill out an ASR which is handled by corporate safety and answered accordingly. She does not have access to ASRs, but corporate safety will deidentify them and send her the report or excerpt for details. If it was an issue that was reported to dispatch she can also follow up with the crew; however, that was only if they contacted dispatch.

Since the event there have not been any changes, but there have been discussions about the event. The approach the crew was following was continued on the second page, so there was discussion of condensing the information to one page or make a note on the first page that the information continued to another page. Also, there is discussion of rewording the procedure. The procedure is to tune in the ILS but not fly the ILS. They are looking at procedures to fly the glideslope or if it is just for lateral localizer guidance.

Her expectation is that the crew would be required to tune the ILS; however, that policy was developed prior to her being in her current position. It was also a consistent with requirements for other procedures.

She has flown into SFO before and flown the FMS Bridge Visual approach. She said the ILS pushbutton could be selected at any time when the crew was setting up for the approach. If she was the pilot flying (PF) she would press that button around 10,000 feet while they go through the approach set up.

She would not expect all crews to push it at 10,000 feet, but would expect it to be pushed by the time they would be turning final. There is no harm done by pressing the ILS button early.

The FMS Bridge Visual could be flown as either a managed approach as it is programmed in the FMS. On a managed approach, the pilot would use FMS guidance primarily and the localizer would ensure not crossing into the closely spaced parallel approach.

The decision to fly it as a managed approach would depend on whether the altitude restrictions are coded in the FMS. If the altitudes were not it would be flown in open descent to make sure they did not descend below any of the mandatory altitudes. If its coded properly in the FMS, then they recommend crews to fly it as managed.

If crews selected the last altitude of 1,200 feet and they are not in the managed descent mode then the different step downs will not be adhered to. In open descent, the pilot is the manager and will manually have to change altitude. In managed descent mode, it is less workload for the pilots.

If she were to fly the FMS bridge visual, at ARCHI intersection they would expect to be at 8,000 feet. At 24 miles, she would probably slow to 250 knots or whatever was assigned and anticipating slowing in 10 to 15 miles. They would be flying a managed descent. Approaching 4,000 feet at the GERAD intersection, she would consider slowing to 200 knots. Prior to the JANEY intersection she would have flaps 1 called for and the pilot monitoring (PM) would check speed and select flap 1. Past JANEY, she would call for flap 2, landing gear down, and by that time she would go to manage speed. She would target to be fully configured by the San Mateo bridge and reference the localizer to verify that they had not crossed over into the other parallel approach. The localizer should be coming centered by that point. She would also make sure they meet the stable approach criteria by 1,000 and 500 feet.

She would expect the PM to anticipate final flaps selection around SAMUL, watch the speed, monitor that she was close to the target altitude, and watch for traffic. She also would expect the PM to verify the correct runway, monitor and communicate with air traffic control, cross check and verify everything on the PFD. She would also verify that 3,000 was set in the altitude selector for the go around altitude at SAMUL.

They would not normally be in open descent inside the final approach fix as they would not be flying the ILS that way. The crew could be in open descent to the last fix. If they waited until the last fix there would still only be 1,200 set in the altitude selector and the go around altitude could not be set until then.

Once at the end of the approach the airplane would revert to a basic vertical speed mode due to being at the end of the approach in the FMS and would no longer be in open descent mode.

As a PF, most of her time would be looking outside. As PM, her attention would be more split between outside and inside.

By 1,000 feet, the landing flaps must be selected. By 500 feet the aircraft would have to be established on the localizer and glideslope and within 10 knots of their target speed. If she was on a visual, she would ensure that they were on the PAPI. There is nothing specific in their stabilized approach policy for a visual approach except that descent must be 1,000 feet per minute or less.

She thought the last time she flew into SFO was a daytime approach about 2 years prior.

SFO is a special FAA Qualification group 2 airport and there is guidance in the FOM of what the crew is expected to do in order to fly into SFO. One option was to go into SFO within the previous 12 months and the other option was to go through the procedure in the airport briefing pages; the briefing is a self-briefing. Air Canada does not keep track of the briefing and the onus was on the captain to do the briefing if they have not been there within the previous 12 months. It was not a crew scheduling responsibility. She was under the impression that it was a special category due to terrain around the airport, but there could be a variety of reasons.

If she had an FO that has not been to SFO before, she would make sure the briefing was done well in advance and that they both reviewed the 10-10 pages.

The traffic volume into SFO depends on the time of day. In her experience, she had not been vectored extensively when she flew into SFO. She could not recall if they were cleared to descend on the arrival with no restrictions or if it was a descent via the arrival.

She has interacted with the incident crew. She knew them both prior to the incident and she had flown with the captain once when she was an FO. Due to her role as manager of line operations, she interacted with the captain due to a professional standard issue about not wearing his tie in public.

She knew the FO because she helped him once with booking for company travel and then she heard about him during his command upgrade after his two failed check rides. She met with him after the second failure. They reviewed the training history, and they discussed the assessments of the line indoc captains to make sure it was a fair assessment. She then came up with recommendations if the pilot elects to continue with training. It is the pilot's decision whether to continue training or not. After the third failure, it is considered to be their first strike. After the first strike, they would go back to their previous position and would be unable to bid for an upgrade for 3 years. After the three years they can bid captain again and if they fail that time it's considered a second strike and they are permanently frozen as an FO with no ability to upgrade.

After the first failure, they can go back to their previous position, the second failure is considered a strike. She erroneously told the FO that he would not get a strike if he discontinued training and due to that they arranged an MOA³¹ because of her error. In the FO's record, he has no strikes. She could not recall if he would be frozen for 3 years or not according to the MOA.

³¹ Memorandum of Agreement

When she met him, he was pleasant, but thought there was a little disconnect of his perception of his performance versus what others were saying. For someone with his experience in the Airbus, he was surprised about some of the remarks as one instructor said his knowledge was “abysmal” and expected more training from Air Canada for the FO. There was a surprise of the expectation of self-study on the part of the pilot. They do not have a guideline, but expect the pilots to know the SOPs or at least know where to look something up. They expect FOs and captains to have a similar knowledge base. She could not recall the specifics on the abysmal comment.

During his upgrade, the FO was given additional training and the concerns were addressed. If the concerns were addressed in training and he performs as expected in training, he would continue.

All the concerns were discussed in the meeting to make sure the overview of his training history to date would have been reviewed at that time.

During the initial footprint of someone going from the right to left seat, there are 8 simulator sessions and each session must have the exercises completed to a specified minimum standard. These standards are specific to each script. During one of the sessions the exercises were not completed and the incident first officer required an additional session.

During the FO’s upgrade, after the simulator sessions, there was an IFR checkride which he completed successfully. He conducted line indoctrination which went “ok”, and then went back to the simulator for command training which included 2 more simulator sessions. Typically, when pilots have trouble completing the upgrade training, the failure is in the command sim sessions. The incident first officer had an unsatisfactory command final line check, which was the last step of upgrade training. He was then scheduled for a second check which was also unsat. She had talked with him following the second unsat. She will be copied on the emails regarding additional training, but does not contact the pilot until after the second unsat. She could not recall the nature of the errors made during the unsatisfactory check rides.

If there was something inconsistent with the pilot actions they would be required to get additional training. She did not think they had a footprint of what it would take to go from a failed left seat attempt to the right seat but it would be input from other instructors and would be individually based. The instructors would be provided with the individual pilot weaknesses that need particular attention. She expects to get a briefing from the senior flight instructor.

She felt that the training at Air Canada was effective. This was the only airline training she had been exposed to, so she couldn’t benchmark a comparison with other airlines.

They do get feedback from pilots wishing they had more simulator time. Extra sessions depend on the circumstances. Some additional simulators are available for practice sessions which pilots can do on their own. They do occasionally change the training foot print. It had happened in the past where they had added additional simulator days to a training program.

She loves working at Air Canada and feels that they are “very safety oriented” and that there is a big focus on safety, which is promoted in emails and letters. She does believe that pilots know

there was a safety focus but not sure they understand the safety reporting. Pilots also think that if they file an ASR that she would have access to it, which she did not.

She recalled the flight she had with the incident captain. The flight was straightforward and a short flight to Ottawa (YOW) at night in the winter. He was “fine” to fly with and it was her first time meeting him which she felt was straightforward. There was nothing notable and everything was as expected. She enjoyed flying with him but it was brief as they had flown to Toronto, Ottawa and back. The flight was about 5 years ago. She could not recall why she remembered the flight with captain, and thought it could be because of his last name.

Pilots do take advantage of extra simulator sessions. Generally, the simulators are available after 10pm. They can call the day of and schedule the simulator online. She has heard in the past that there was not enough time to complete the training. They try to edit the session to allow more time and can also move things around. She didn’t think it was normal to get “pushed against a wall.” She hadn’t heard complaints about timing from instructors.

There are 2 special requirements airports. San Diego, and Burlington, VT, which is commonly used as an alternate for Montreal. They had not incorporated the special airport safety briefing into simulator training.

She believes the reason for unsatisfactory results to be common in the command simulation is because there is usually self-induced pressure. The role of the FO is not to be too helpful in those sessions. The scripts are the same as before but with more distractions on the ground. They aim to use a line FO to help with upgrade training, but as a last resort they will use a captain with right seat qualification.

She holds 4,000 hours in the Airbus and 200 hours of that is as a captain. She recently completed the upgrade process and described it as a good process. It is difficult not to pressure yourself. Not all airlines do command simulations, but she can’t imagine doing an upgrade without that as it’s possible to get an easy indoctrination without having any challenges come up.

She flies 2-3 days per month.

For a go around, pilots are supposed to submit an ASR and notify dispatch. The FOM has guidance for when this must be done and believes the language states “as soon as possible” or “as soon as practical.” She would personally have sent an ACARS message right after the go around to dispatch stating, “GA in SFO.”

They would have had to hard tune the ILS into the system during the approach.

They have an “open door policy”, but people usually see her when they are stressed as they are interviewing because of a problem. At the base level, as manager of line operations, she received many drop ins. The day- to- day interaction does not occur with pilots at headquarters.

Pilots can file reports beyond 24 hours after the occurrence and routinely do. Sometimes pilots want to file a paper report at the base or they don't hit send on the IPAD or they may be waiting for a convenient time.

During the command simulators, they want to simulate a captain being paired with a new FO.

Her interaction with the captain she would classify as "neutral". The FO's first face to face meeting was after the 2nd unsat and she described him as a "nice man."

To requalify as a FO, he had two simulator sessions which coincided with his recurrent training simulator sessions that were due.

They could terminate a pilot after multiple "strikes". If the pilot went for a checkride with additional training and they were still unsuccessful the pilot could be terminated.

They discussed the FMS Bridge Visual into SFO with all the chief pilots. They will fly the update to the approach chart in the simulator with standards pilots. This is the first time she's encountered changing a published approach since she's been in her position.

When the company interacted with the crew, they did not have many details on the event as it occurred Saturday morning and the crew did not contact the company until later in the day. They met the crew on Monday morning and discussed what happened. At the time, they were informed by the crew that they went around at about 400 feet. The incident crew did not realize that they were aligned with a taxiway until very late in the approach.

The details did not come out until they reviewed the summary report from TSB. At the end of the meeting the crew was informed that they had overflow aircraft. Their response was shock and surprise. After the meeting, she reviewed what they had said.

The FOM states all available NAVAIDS should be used for an approach.

Generally, they encourage the use of automation as much as possible but the pilot can disconnect automation as long as they notify the other crewmember. They can generally take the auto-thrust off.

FDA statistics are different for each fleet and about 8% of the flights classified as unstable approaches; however, typically only 1% of those flight actually go around. It is not necessarily that the unstable approaches aren't reported, only that they do not go around.

She has the authority to pull pilots for more training if necessary.

When asked to elaborate on the self-briefing on the class 2 airport she could not recall if the crew had to do it prior to departure or just enroute. The self-briefing is conducted by reading specific airport information which was available in the iPad and included the 10-10 pages.

In order to address the unstabilized approach issue, they try to enforce stabilized approach criteria. There is a stable approach working group at Air Canada. The group is trying to change the policy in order to get more compliance. They plan to make a final gate at 200 feet where the airplane should be stable and if not stable then it's a mandatory go-around. They think 200 feet is a target that people will buy into. They are seeing data that shows pilots try to salvage an approach. There was a no disciplinary action in most cases, but if it was deemed an intentional violation of the SOP then there could be discipline. It is the FDA gate keepers that follow up with the crew to get details on the unstabilized approach.

They would call the crew on the phone and see if they remember the approach. If the data showed that the crew had exceeded something similar previously, then management would bring them in for a meeting. The meeting could result in more training, especially if a pilot knowingly did an unstable approach. She had not encountered that type of situation during her time in her current position. She has talked to pilots about events, but could not recall if there has been any discussion on unstable approaches.

An example would be to call both crewmembers and ask why neither called unstabilized, go over the SOP and then bring them in for more training. There would also be a discussion with the director of training and the union, then they would determine if and/or what disciplinary action would be needed. Disciplinary action could be in the form of days unpaid or permanent or short-term demotion. There is no guidance for disciplinary action and it is not something that comes up all the time.

The self-briefing for specialized airports was written in the FOM.

She was notified by email about the event; but could not recall when that occurred; sometime Saturday or Sunday. She was on holiday at that time and was unable to review what happened until right before the meeting on Monday.

Her understanding of the event was that it was a go-around due to being lined up on the taxiway. She could not recall, but thought the crew stated they did not see airplanes on the taxiway and she thought the first time the crew knew that there had been aircraft on the taxiway was during the briefing. She did not think the crew realized that runway 28L was closed.

When asked whether Air Canada had a "green on green" policy with respect to crew scheduling, she responded that it did. The crew scheduling department would have more information on that in their software, but she thinks that "green" is defined as having less than 100 hours on type. The FOM describes limits for new FO's flying with new captains.

The interview concluded at 1006 EDT

Interviewee: Captain Paul Douglas Arends

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: 8/10/17

Time: 1024 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC)

Captain Arends was represented by Murtaza Mohamedbhai – Air Canada Pilots Association both were present via teleconference call

During the interview, Captain Arends stated the following:

He was an Airbus A330 captain based out of Montreal. He is not a check airman at this time but was prior to transitioning to the A330.

He stated he was 57 years of age, and started flying in his early 20's. He was a chief pilot for a small airline, prior to being hired by Air Canada. He was a B737 captain and an A320 captain. He flew the A320 for 20 years was also a check pilot on the A320 for the past 4 years. He became a captain on the A330 in March of 2017. His date of hire at Air Canada was Sept 6, 1988.

He had done 4-5 checks per month over 12 months equating to a few hundred total checks. He had not given any unsatisfactory checkrides.

He holds about 25,000 total hours, 15,000 in the A320, and about 7,000 as a captain in the A320.

He flew with the incident first officer on January 5, 2017 during his captain upgrade. He didn't recall the flight but referenced the grading sheet he filled out at the time that the company had provided. It was a standard upgrade LOE and there was nothing outstanding. There were a lot of 3 grades with a few 2 grades. One was a brake fault that both pilots got a 2 on. The incident FO received a grade of 2 on a go-around under 'manual flying', but the reasoning was not represented in the computer notes for the event. The category was under manual flying the airplane. There was also a grade of 2 for FMS programming; however, he could not recall any additional details on for that rating.

The leg pairing, in the simulator, would have been YOW to YYZ. His notes indicated that he was checking 2 captains, both doing upgrade training and the pilots would swap seats for the other leg. He was grading both captain applicants during the simulator event.

He "loves" working for Air Canada. He also felt that the safety culture at Air Canada was their "prime objective" and their "highest priority."

He felt that morale was "quite high" but they did have ups and downs during his career and could change week to week. Overall, he felt it was "very very good"

His opinion is that the company is hiring younger, smarter, and brighter pilots. They have good attitudes and are up to date on the electronic information. He noticed this trend even more in the A330.

When asked if line check airmen ever communicate amongst themselves, captain Arends said that they have an annual fleet meeting, and the Senior Check Pilot communicates issues to them with regards to issues of note / training emphasis / grading, so that they can have bigger picture.

When asked what he would do if he had a safety concern with a pilot, he stated that if we were a check airman flying in the seat, he would observe over several legs. Most line checks involve several legs and you can see different things. They discuss it with the candidate, and the candidate gets more opportunities to perform. Over 2-3 legs, he would be looking for improvement. He doesn't provide a lot of guidance during checks, he just checks and does seat duties.

The check with the incident first officer was a Q-LOE in the simulator.

When asked what would result in a grade of a 2 versus a 3; he stated he could not recall. Grades of a 2 would have been debriefed with the candidate.

When asked how the incident FO interacted with the other candidate; he stated he could not recall.

For stabilized approaches, there are 2 gates but he thinks of it as a flow from the top of descent to the gate. In the case that stabilized approach criteria are not met and a go-around is not initiated, the candidate would receive a grade of 1, and it would have to be debriefed and run again. The stabilized approach procedures are in the SOPs.

SFO can be very challenging. They usually land straight in for 28L or 28R. When things are VFR, its typically not an issue but with wind, the approach can be difficult and you have to be on top of your game. It had been 1 – 1.5 years since he had been to SFO. The traffic is close and you have to be careful and make sure you are staying on your profile. ATC also gives a lot of speed commands. It would be a “handful” on the best of days.

Usually a visual approach can be “a handful” as there are a lot of lights and close proximity to the other approach. He has not been in there for a year or more. There was a lot of traffic and you “have to be on your game” going into there. He further stated that a flight could be flying at 200 knots and then told to slow down and classified it as a busy airport with lots of traffic.

He would tune in the ILS. When reading the approach chart, he said that it was a requirement as the notes do not say “recommend tune in ILS.” All of the other items on the page are required, why wouldn't this one be.

He had never seen a map shift on the A320.

The interview concluded at 1131 EDT.

Interviewee: Captain James Alexander Musselman

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 10, 17

Time: 1138 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC);

Captain Musselman was represented by Ms. Louise Hélene Senecal – Litigation Counsel Air Canada Airlines

He is the senior director of fleet and standards which was also known as the chief pilot. He has been in his current position for 3 years in the upcoming September (2017).

He received his private pilot certificate at 17 and went to Sioux college earning his commercial, multi-engine license. He worked as an instructor in college. He was an FO for an aviation company flying a twin otter, then flew as a captain on an MU2, and was hired at Air Canada in 1987 as a second officer on the Boeing 727. He flew the B727 for 6 years before he was laid off. He was an air traffic controller for 2 years during the time he was laid off and then in 1995 came back as captain on the CRJ for 8 years. He was a check pilot in the CRJ. In 1999, he was hired into management as the senior check pilot and has been in management in various capacities ever since. He flew the Airbus for 4 years as a captain and then the Boeing B767 as a captain for 10 years. From 1999 to 2009, he held various position including as a senior check pilot, manager of line operations, in 2009 he became the director of flight operations for the airline for 1 year, then director of standards, safety and quality, then 3 years ago he became the senior director of fleet and standards.

He has about 11,000 hours total flight experience and 1,000 hours in the A320. He had 2,500 hours prior to being employed at Air Canada. He had a little time flying in the right seat of the A320 but was qualified as a captain from the beginning of his time in the A320 and most of his time was as captain.

Flight standards reports to him which is 3 pilots on each fleet type, The FOM is part of his responsibilities and includes policies and procedures. Training is delegated to the Director of Training who reports to him along with the chiefs of each fleet. The Director of Training reports to the VP of Flight Operations. His department discusses changes to SOPS, MELS, QRH, etc. He also oversees the flight tech department which is run by the director of flight technology. Within that there are various engineers including aircraft engineers, performance engineers, manager of flight technology, an EFB manager, manager of advance technology and ATC. His team also documents management and control.

He also liaises with Transport Canada personnel.

His daily activities included working with the chief pilots for SOP development and meeting with standards committee for changes to the policy and procedures manuals. He discusses flight technology programs including the EFB program.

They have procedural meetings, meet with technical department, and liaisons with ATC. An example of his interaction with ATC was when he was working with Halifax for their upcoming construction of a displaced threshold.

He was also on the Transport Canada fatigue risk working group. He attends to many emails every day on various topics. He receives information from the safety department. He has contacted ATC due to his experience being a controller. He also goes across the country talking with airport personnel on approach lighting after a previous event they had. On Wednesday mornings, he attends the safety review meeting and the flight ops safety board.

He reports to the vice president of flight operations.

He has about 7 personal the report directly to him but has about 30-35 that are under his command and could report to him.

His working relationship with the vice president of Flight Operations is “good”. A challenge is that he must make his case when he needs to spend money. He feels “generally” he has been successful with getting the resources he needs.

He does interact a little with the ASR and he get copied on deidentified reports. When they have events that are reported by dispatch, he discusses that with the fleet chief. He can get into AQD system to look at deidentified reports but it is not easy to navigate.

He does not get involved directly with interviewing pilots and is usually briefed afterwards.

He was aware of the SFO event. It happened while he was on vacation. He saw an incident reported by flight dispatch on Sunday evening about a go-around and that the pilots had lined up with the wrong runway. Then, he saw an email from the A320 chief pilot, he thought, on Sunday night stating that the crew needed to be held out of service while they investigated it. On Monday, he started becoming aware of reports on the news about the event.

He first thought it was a go-around and that it had lined up on the wrong runway which he felt was a concern but the gravity of the concern was not known until Monday when he got to work. He also was becoming aware of increasing seriousness of the event when he saw the email from the chief pilot that the crew needed to be held out of service.

Later Monday he heard from colleagues, and in the media, that there was more to it than first suspected Monday afternoon, the chief pilot debriefed him on the crew interview.

He flies actively once per month. He gets phone calls from pilots, and sometimes pilots stop by his office when they are in the training building.

He was part of the hiring board for pilots which included a few directors that reviews files and makes decisions on who to hire, but he was not involved with any interviews personally.

Training issues are usually dealt with by the director of training. He doesn’t hear about first failures but if there were subsequent failures he has more awareness and it is usually during extreme cases that he would get involved with a decision.

He has been involved in disciplinary cases. Mostly those are administrative issues such as no shows or drinking. However, he does not do that much anymore.

As a checkpilot he had failed pilots, but that was years ago. He estimated doing a couple of hundred checking events and less than about 20 were unsatisfactory.

When asked if there were any performance issues on the A320, he said that they have a top three events that they monitor at Air Canada. These are altitude excursions, GNF, and taxiway excursions. He does communicate with line pilots via chief pilot updates, training, increased awareness, and safety alerts on the flight plan. The Airbus has a share of the events and one thing they keep an eye on was SOP compliance and they looked for the root cause analysis. He feels they are a little weak with the 5-Why method and the ASR reports do not always have the information needed. Corporate safety handles that, and there could be lots of information if staff could call everyone involved in an event. He further stated that he would love to have a database for root causes. They have identified that as an issue for improvement, and he has made a case to Corporate Safety to get more resources for that.

LOSA occurred in 2013 and they received the results in 2014. The LOSA data indicated that they have some SOP issues, including over-proceduralization, and as a result they have tried to communicate the procedural changes clearly and explain why the change in procedure.

When asked how a pilot would know if there was a change in procedures he stated that the chief pilot were to communicate the changes and the reason for the changes. When pilots used to use paper, they would see each change and now electronically that has been a little bit of a challenge. They are trying to simplify ways to review the updates.

The LOSA revealed that their human factors are weak. They do not have any human factors specialists in-house, they have personnel trained in HFACS but no experts. They believe the errors they are seeing are related to human performance.

They have hired Presage Group who does human factors consulting. They ran a global go-around study previously. They've been working with the group for about 2 years and are now reporting the results. He feels they are close to breakthroughs.

He loves working at Air Canada and has been there for over 30 years in this upcoming May. He has a passion, loves the opportunities and wants to see Air Canada do well. He described the safety culture as very high. They have a good reporting culture but have issues with regulatory protection. They are getting a lot of reports but he felt that they do not have the amount of data they probably need. The unions tell the pilots to be careful with what they say on ASRs.

Rarely would a pilot be in certificate trouble for busting a regulation s if he filed an ASR. Normally they investigate it internally through their SMS and he has not seen enforcement from the regulators.

Pilots are concerned when filing ASRs that if they were in a subsequent event, that during the investigation someone could go back and look at all their reports in the past. Pilots would rather

put in a minimal report for the record to meet the requirement. He knows it is a problem and they have brought it to the minister and to Transport Canada's attention. They are "stuck" with it for now.

He really likes the U.S. ASAP reporting system. He feels that the system they have reduces the accountability for the actions.

Air Canada has lots of collaboration with other airports and organizations worldwide. They haven't discussed the event with SFO yet because they don't want to influence an investigation, though they are still flying there every day, and have talked to United Airlines safety department about what they said to SFO Regarding the possibility of leaving the runway lighting on when a runway is closed. If there was something they could do to change things, then he would talk to SFO.

When asked how changes to SOPs are handled, he replied that it could be difficult to see changes with electronic flight bags (EFBs), to make changes more obvious to pilots, one method would be to upload it as early as possible as a "coming soon"-type document. Then, when the date of effect comes, post a bulletin about new changes. Pilots can also check "changes" document (also on EFBs). If an SOP change was important enough, company will put crew alert on flight plans. If he gives updates, it takes 3 weeks to take effect so they have time to review. They publish bulletins with major changes, he expects the pilots to review those before flight.

When asked how the company knows if pilots receive the changes, he said that they can see if pilots are having trouble with their devices. He gets a log of what iPad devices aren't receiving information. They have the ability to check when things are viewed but they don't actively do that. They can also check if and when a training module is accessed online by a pilot during training.

They can fairly easily incorporate changes into training. Every 8 months, they prepare the next cycle of script. In the short term, they can incorporate oral changes. It is harder for a simulator change and they would need a few months to do that. They have a service agreement with Transport Canada for 90 days, however they could provide review within a few weeks at the fastest.

They communicate regularly with the Transport Canada principal operations inspector (POI) about 6-8 times per month. They have a good working relationship. The POI asked to get information on the investigation. They have an excellent POI and technical team lead (TTL).

When asked if he sees the way they do ASAP in the U.S. being transferred to Canada, he thinks that they would have trouble because of a perception of lack of protection / immunity. If they had regulatory protection, then it would be ok.

With ASAP, the procedure for entering events into the system is different. The understanding is if there is negligence then the FAA can violate. He foresees challenges for Canada to implement such a system. He thinks pilots can think that it is a "get out of jail free" card and can't back up with facts. He also thinks that the union and pilots will have a lot of trouble with it and feel like they are taking away immunity.

The HF contractor asked to interview the incident pilots. They have been told “no” so far. He is not sure if they are bringing in-house human factors in corporate safety but he wants them to. He feels they could support even more than one person in human factors.

Morale is “generally good” they had a 10-year negotiated contract a few years ago. There is lots of growth and feels most of morale is good.

He had never known nor flew with the incident crew.

The company doing the HF consulting has asked to interview the pilots and the Safety department said no during an investigation. After the investigation is complete they were hoping to interview them but have not yet.

He was not aware that the incident first officer had had 2 unsats and had failed his upgrade until the incident. The briefing he received on the incident was that the crew had to deal with thunderstorms enroute, were given the approach, set up visually for the approach, lined up on the right side, and at some point, on the approach, they felt they were not lined up with the runway and went around at about 400 feet. The pilots reported it after they talked to the union. They knew that the crew was going to be held out of service.

When asked if he had any sense as to why crew reported things the way they did, he did not, and did not want to speculate. Air Canada’s policy, and what they try to hammer into their pilots, is that it is important to alert them as soon as possible so that they can make any changes as soon as possible.

He does not know why the crew initially reported the incident the way they did. He felt it was disappointing it took so long to hear about it. He had not seen the ASR the incident crew reported.

When asked if Air Canada had learned anything from the Transport Canada working group on fatigue, he responded that they had modified their shift pairings to consider circadian shift and accommodate sleep wake cycles. They have since started having less than 18 hours of rest or more than 30 hours of rest. They have done studies on the YYZ to Narita flights. They have considered the augmentation. If over 9 hours there will be 3 pilots, if over 14 hours of duty or if the flight is to land after 3am there may be 4 pilots. Going to Narita, for the 8 months of peak season, they staff 4 pilots both ways. For the rest of the year they staff 3 pilots on the way there and 4 on the way back. They collected data after this change and received less fatigue reports on that line.

Sometimes developing an agreement with the union could impact the ability to implement fatigue changes.

When asked, he qualified the working relationship with ACPA on safety as “good”. The politics can be a challenge but generally the relationship is good. It is possible to get change with time.

The overall percentage of unstabilized approaches at Air Canada is 2 – 2.5%. The industry average is 3%. The A319 fleet is the worst as pilots have more difficulty slowing the aircraft. At 1,000 feet, the unstabilization rate is 8% and at 500 feet, the rate is 4.5%. They are doing a study currently on

this. Go-arounds in the Boeing 777 are down to 1%. The A320 unstabilized approach percentage is 2.5%.

If an aircraft was lined up with the wrong surface, it would not be stabilized as the criteria state that they must be lined up laterally and vertically.

They conduct threat based briefings.

The interview concluded at 1257 EDT.

Interviewee: Captain Daniel Warren Smith

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: 8/10/17

Time: 1310 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC);

Captain Smith was represented by Murtaza Mohamedbhai – Air Canada Pilots Association both were present via teleconference call

He is a captain and check pilot on the A320 based in Vancouver (YVR). He has been checking for 4 years.

His aviation career began after he went through flight school and began flying in the bush in Manitoba for a couple of years in various aircraft on floats and skis up to a single Otter. Later worked for a telephone company in Vancouver flying Citations for 5 years. His date of hire was in 1988 with Ward Air which merged with Canadian Airlines and then was bought by Air Canada. During the time with Canadian he took a 6 year leave of absence and flew Boeing 747 with Japan Airlines for 2 years, then flew A310/300 as a captain for Emirates for 4 years. He returned to Air Canada and then flew for Nippon Cargo flying a B747 from SFO. He came back to Canadian after the merger in 2001 when it was Air Canada. In 2003 to 2004 he was an FO in the A320 then FO on the B767, followed by a captain on the A320 in 2009, couple of years later did 2 years with IOE TC in AQP. Then started checking following that.

He has about 6,000 hours on the A320 and over 20,000 hours total time. He has over 4,000 hours as captain in the A320 less than 2,000 hours as an FO.

He had checked the incident first officer in April 2017. He could not recall much about that check. Since April he has checked 43 pilots and some of which were in the simulator. He flew with at least 3 FO's since then and he pretty much did not know any of the pilots. Typically, when he goes to work every trip is a checking event and does recurrent line checks in the aircraft. They have lots of check pilots so it could be many years between seeing individual pilots.

He would not have been able to identify the incident first officer. He had no notes on the FO and he put all the grading in ATLAS which was done online. He only has access to it for a couple of months, he looked in ATLAS when he was told he was being interviewed; however, because it was unavailable to him he had to request a copy of the grade sheet from the company.

He was on a two-day pairing with a YVR FO. He typically only sees pilots within his own base. He was then asked by scheduling that there was an FO that needed a OE check on the 2nd day of the pairing. He met him in YOW then they flew to YYZ then Calgary, then YVR.

He had graded him a 1 on landings and provided a reason code that it was because he “performs flare”. He further elaborated that it was a rough landing. The FO flew the first 2 legs. The first leg was a rough landing. A 1 means it must be repeated. The flight to Calgary was given a landing grade of 2 so it was satisfactory. He also provided 2 grades of 2 with notes of “be sure SOPs are completed for all phases of flight” and SOP for callouts. He could not speculate what the 2’s was for but that was how it was graded at the time. Everything else on the grade sheet was graded as a 3.

The philosophy at Air Canada regarding grading format had, since April, changed and now they start at a 4 and work down. They had 4 before but that was only for “exceptional” performance.

He speculated that the other 2s were minor issues when it came to SOP callouts but could not recall for certain.

He was made aware that he was coming back and needed a return into the right seat checkout. He did remember that his basic knowledge of the aircraft system and memory items were “very good.” However, that was all he could recall.

He likes working for Air Canada “very much”. He feels that the safety culture was proactive. Given that he is in the checking department, it would be more on the proactive side. In April, they started with the threat and error model and he felt the company was conscious about safety. They are proactive about threats versus reactive. He classified it as “very positive”

Morale is pretty good. Pilots are happy, there’s lots of movement and early career captains.

He has never given an UNSAT on a checkride.

Vancouver is a more senior base. There have been complaints about length of training, but he thinks it was being addressed. He knows the A320 course was trimmed down because some people in the company didn’t need as much time while new hires needed more time. He had a check with a younger captain and was very impressed.

He doesn’t see a lot of people coming back to their original seat after upgrade training. He swaps seats on a weekly basis so understands the differences in performance between seats. He stated that the incident first officer’s performance could be due to having flown so long in the captain seat, but he wouldn’t know for sure. He couldn’t tell if it is a regular occurrence or not.

He flies into SFO once per month in the daytime. Typically, they overfly the airport and bring them in for Runway 28L. He has never gotten the FMS Bridge Visual or the Quiet Bridge Visual. He always sets up the ILS for 28L. It's only if you are coming from Toronto that you get the FMS bridge visual. As long as ATC hasn't kept you high, it's not particularly difficult. However, if you were kept high, it could be a difficult approach. He knows as he was based in SFO when he was with Nippon Cargo. You don't know what you're going to get from ATC in San Francisco or how high they will keep you. You've "got to be on your toes."

If we were flying just a visual approach, he'd have auto-pilots off, flight directors off and be looking out of the window.

He hadn't seen a mapshift lately. It had been a few years. It does happen on the Airbus.

The reason for the change in grading was that they are looking at it as the philosophy has changed at Air Canada and if everything was done correct and no errors they would grade it as a 4. Prior to the change, the baseline grade was a 3 and unless someone did an "atta boy" job for a 4, they would be graded a 3. The philosophy was that if an error was made it comes down to a 3; if the error isn't trapped and mitigated it could come down to a 2; if it was not trapped and resulted in an undesired aircraft state, it could come down to a grade of 1. Their goal was to simplify the training.

In April, the check pilots got together to discuss check pilot duties and they had a session in grading. Since April there are probably a lot more 4's than what there used to be. When the incident FO was checked, it was still the 3-grading scale.

He likes the new grading scale and agrees with the change. Typically, a pilot will not see the actual grade but they will debrief a 1 or a safety concern. The grading was done on line and not in front of the pilot candidate. With the new rubric, it is much easier to explain the grading to the pilot. The old way was more subjective and the new way is more error based.

With the threat and error that they have there are some explanations within their EFB. As a pilot comes up for recurrent training. Most debriefing is around CRM and the threat and error model. Sometimes he must introduce it to the pilot in the simulator as they may not have been introduced to it.

The FO did not flare enough in time which resulted in a "firm landing." It wasn't hard enough to get maintenance involved and he had to see that that was not all of the landings he does.

He could not recall any impression on the first officer.

The interview concluded at 1401 EDT

Interviewee: Randall Perrett

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 11, 2017

Time: 0900 EDT

Present: Captain Shawn Etcher, Dr. Sathya Silva – NTSB; Captain Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Ms. Beverley Harvey, Dr. Missy Rudin-Brown - Transportation Safety Board of Canada (TSBC)³²

Mr. Perrett was represented by Jean Francois Bisson-Ross.

During the interview, Mr. Perrett stated the following:

His title was Director of Corporate Safety, Investigations and Research at Air Canada. He had been in this position since May 1, 2012. He started his career in military officer training and entered the college system. He did air navigation training and flew mostly tactical missions which included a few tours with a few different squadrons including a tour at Maxwell AFB and a squadron flying C130's on SAR missions. He joined the flight safety department at Air Canada in August 1998. In 2000 he joined the "flight safety world" for about 10 years. He then joined safety and FDA. He spent 22 years in the Air Force and retired as a Lieutenant Colonel.

His was responsible for making sure the safety reporting system was established and operated. Air Canada took a hard look at safety and structure. He had made an integrated safety team that was interconnected with the branches, a group on safety reporting, and investigators that helped investigate major events.

He reported to the VP of Safety and managed the weekly safety review.

Daily duties included reviewing any safety items from overnight if he were not the one on call. He would look over significant events and usually there would be a series of events that came up. He did an organizational assessment. He would constantly look at projects to make the process better. He would work any safety items that came up during the day. He stated that they always have to look at what was happening and identify risky behaviors and correct those behaviors.

Typically, the crew would report a safety issue to dispatch who would then put that information in the system to the duty safety on call. Mandatory reporting items would be given to TSB. The cabin reports were also filed with his department. An example was if the crew busts an altitude, the crew would report it to dispatch as it was mandatory, then dispatch would take the information and enter it and notify the on-duty safety person. His department would follow up to determine why it was happening, any trends, and the nature of the event. If there was more information needed then they would reach out to the department with the deidentified information to get a response. Every report that was filed got a response. Some responses were not as in-depth, but others were more involved. For example, bird strikes were a hazard but they were monitored. Reporters only get feedback for reports that are not used only for statistics such as bird strikes.

Industry data showed there were always issues with automation in the Airbus fleet and Air Canada had similar issues with the A320 regarding the "what is it doing now?" question. The equipment and the aircraft are old. He would love HUDs on every aircraft. The B737 MAX would be coming on line in October and would eventually replace the A320 fleet. It is hard to win the argument to update an old fleet when a new fleet was coming it to replace it.

³² Ms. Harvey attended the interview via teleconference.

He stated that GPS for a carrier like Air Canada was pretty much essential. For example, when there was a tsunami in Japan, the companies that were producing the GPS systems that would retrofit the A320 fleet were hit hard, and so Air Canada was unable to replace the GPS. It isn't that they didn't want to, but they couldn't. There were many non-precision approaches in Canada. With GPS, they could do different approaches and the operation would be improved by this capability. Crews would work with what they had, but they were looking for ways to strengthen. He had heard pilots complain about not having GPS in all aircraft.

ASR trends depended on the fleet and airport. They received issues with TCAS, airspace, and congestion. They have issues with bird strikes and speed control in the Caribbean. They have issues with weather and lack of airspace in China. They also see trends on the ramp and in the back of the plane.

The A320 was the "work horse" of the airline and they are doing a lot of flights a day. The exposure rate for the A320 crews was higher for things such as technical issues since the fleet was older. There were also airspace issues such as callsign confusion.

San Francisco airport could be problematic to fly into due to weather, ground/arrival delays, and construction. The crews are not reporting about SFO a lot, but they have reported that ATC was a handful as they were busy.

Flight data analysis went live in 2004 after Air Canada went through chapter 11. FDA program survived the bankruptcy. The program was set up to keep all data and not to get rid of anything. They developed their own analytical software for advanced analytics and data mining. The biggest pilot concern was pilots wanted to know why the data was being collected, what was being done with it and who had access to see it. Confidentiality was assured but it was also tied to the pilot-to-pilot program so they could have the "gate keepers" to talk to the crew if they don't respond. Technically, they did have the ability to hold pilots on the ground if they don't participate, but they try to work with the union.

The pilot-to-pilot program consisted of management, medical officer and 1 other. These 3 people would have meetings or discussions with a pilot, but the pilot was not required to participate. A confidential process was set up to debrief the crews and pilots. The gate keepers gave the crew the ability to do the entire process remotely and they didn't have to come in unless they wanted to.

In the 10 years of the program they had once when a pilot did not want to participate and went to last step. Some pilots did not understand the purpose, but pilots were now more comfortable with the capabilities since there had been a number of steps that were provided to the pilots with confidence. There was concern of "big brother" watching everything. During the Halifax event, there was one pilot who was uncomfortable with the program but he eventually liked it.

They had around 33,000 flights per quarter and could not look at everything, but the algorithms and trend analysis was robust. The trends depended on the fleet type but overall, the trends in FDA were speed control, unstable approach, ATC configuration and ATC contributing to unstable approaches. These hit a number of different areas and not just flight crews. In Toronto, they

identified that there was a dip in runway threshold 24. They worked with the airport to identify the reason and fix it.

Prior to the incident flight they had a few issues with runway alignment. Two of them were still under investigation with the TSB, but were weather and go-around related. They were not widespread and usually were related to a runway excursion. They were looking at alignment issues in the FDM and are going back through 10 years of data since the data would clearly show a misalignment but haven't found any other cases so far. He did not feel they had procedural issue, but a human factors issue. Cases of alignment issues were "very rare". An example he used was in Mexico where there was a side-step maneuver for one of the approaches. That side-step would show if they were misaligned or not, however, if someone were lined up with the wrong surface and continued the data would show it. Usually this was related to malfunctions in the navigation or because pilots were not using the navigation.

When asked if there were any reports of fatigue amongst crews coming from Toronto to the west coast, he stated that the fatigue program was managed by flight operations reviewing fatigue reports along with crew scheduling, and then the fatigue safety action committee analyzing where issues were coming from. His role was to provide the SMS umbrella, providing confidentiality and to ensure the reports were not inappropriately used. The day to day reports did not go to him or the safety group. Flight operations and ACPA would work together on fatigue issues.

When asked if there were any reports of CRM as an issue, he stated that CRM was a big issue identified in the LOSA. The LOSA audit in 2013 had concerns about the briefings being "canned briefings" and not including aspects of individual day/flight information. It was acceptable but not going above that. As a result they better documented the briefing process and LOSA helped them to look at what they had and the opportunity to improve. They did more CRM training and incorporated threat briefings.

When asked to go through the reporting process associated with the incident, he reported that his understanding of the incident flight was the crew delayed reporting until the next day, but he did not know why. The incident captain reported to dispatch and the duty pilot about a runway misalignment and go-around. The duty pilot talked to the chief pilot and director of flight operations who decided to allow the crew to fly home and meet with them on Monday. The first he heard of the incident flight was from an email from the TSB around 2200 the Sunday after the incident flight. There was no safety report on file. The incident airplane had flown after the incident flight. He arrived at work on Monday at 0715 and flight operations knew about the incident and were going to discuss it at the safety round table but didn't want to contaminate the investigation. The TSB allowed the round table to take place, but restricted the data that would be used at that point.

The FDA data was pulled from aircraft every 8-10 days. There was a risk of losing data at 12 days since the card would be full. They pulled the data card for the incident flight on the 13th day and it was full. They captured half of the flight from cruise Toronto to SFO. There was not DFDR, QA data or CVR data from the incident flight. This is managed by maintenance. There was a FDM daily report notifying maintenance with airplanes were captured, coming due, and overdue. Air Canada deliberately set up the data recording system about 14 years ago to stop recording data

when the card was full instead of writing over data. The target was to pull data every 10 days and pull 7 cards per day. The download locations were Toronto, Montreal, Calgary, Vancouver and Victoria since all airplanes flew into one of those locations every 2-3 days. There was no reason a plane couldn't get data downloaded every 10 days. He had no idea why the incident aircraft had made it 13 days since the data was last downloaded but it could be because it became lower priority in the maintenance actions.

There was no safety report on file when he was notified by the TSB regarding the incident flight on Sunday. The captain said he sent the ASR on Saturday. The iPad was used to send ASR and could be saved or synced. If the iPad was not connected when sync was selected then the report would not be sent until the pilot re-synced once connected to Wi-Fi. They reached out to the incident crew and the ASR was "just sitting in the system". The ASR was not received until Monday or Tuesday following the incident flight. The incident airplane had flown about 40 hours once they knew to get the data from the plane. On Sunday night, they tried to go through the system and didn't stop the plane from flying because after it has flown over 30 hours, the card is useless.

The categorization was defined in the flight operations manual and had a list of events populated by the TSB that were mandatory reportable events. It also had other significant events that they were trying to get the pilots to report.

They were trying to get the message out to the employees the importance of reporting the information as soon as possible. They don't need dispatch tapes.

Normally there was a safety on call person and there were 6 of them total. Normally his team would be involved on a call. If something came in that was significant, the on call person would call him and they would determine what the possible interests were and what needed to be done to gather data. The incident flight was the only time he could recall where TSB had notified him of the incident and there was nothing available. Had they not gotten the call from the TSB, they likely would have just continued operations as they did not have the ASR or any other data to know the event occurred. This would have been in the case that ATC didn't report it, and FAA regulatory affairs hadn't noted it, and the NTSB hadn't notified the TSB).

They inform the crew to tell someone if there is an event so they can ensure everyone is okay and if they need to look at the plane. They need to know so they can take the appropriate action.

The crew did not have to fill out an ASR as it is voluntary, but the FOM mandates when dispatch had to be notified. Dispatch then would call the safety-on call and they would determine the significance of the event. Operations makes the call, but safety and duty pilot would be involved. They could make a call without safety, but it is an exception.

If the incident had been reported as a runway misalignment, safety would probably be on the call. They would want to make sure the box was downloaded as soon as practical and they would reach out to the supervisor in the tower and want to talk to the crew. If the incident had been reported as an alignment with a taxiway, they would normally be invited onto the call. They would have heeled the crew out of service and pulled the box in San Francisco.

Normally they were involved with any call that had safety implications. Had they know the details of the incident flight they probably would have pulled the crew out of service and deadheaded them back to Toronto. They also probably would have downloaded the data from the plane as well to protect the data and give them the story. The duty pilot had the authority to have the incident crew fly back, but likely did not make that call. The crew called dispatch and then were referred to the duty pilot. Someone on his team should have been patched in on that call had they known the severity, but no one on his team had been notified.

There is a risk that people think that safety belongs to the safety department. That is a challenge that they have to beat. Some areas in the company understand while others don't necessarily prioritize safety.

The ASR was voluntary. They tended to get relatively good information most of the time. The SOPs were designed for safety and it was up to the crew to follow the SOPs to ensure safety. The safety team talks to new hires about safety and he encouraged them to go to the line to have safety discussions. He described taking donuts to the line to share with crews and start sharing stories to get a discussion going. It helped give the impression of having conversations about safety with nothing bad happening. He said getting the information was good and whatever it took to get the discussions going.

They looked at the risk rating which was not the same as likelihood. They worked with Rolls Royce to compare data and how that may or may not be related. They looked at trend lines and not numbers or scores such as SPIs or KPIs.

The FDM was used to identify unstable approaches and it provided a picture from 1,200 feet AGL to touch down through 60 knots on the highspeed taxiway to develop a trend, not only at 500 and 1000 feet. Configuration and speed were the typical factors. The stabilities could be seen as a little bit, "ugly" or worth of a go-around. Notice was given to flight operations which were what could be put on the flight plan to notify crew of unstable approaches at a particular airport. FDM tended to be the "real story" over FDR. The Flight Safety Foundation was doing work to survey pilots regarding unstable approaches. They were formulating risk into the mix to determine if there should have been a go-around or not. If a crew got unstable, it may not be unusual, but that crew should be prepared, think about it, and be ready to do a go-around.

The process to replace a data card was an easy process. It was simple and there should be no reason it could not be done. The hardest part of it was finding a ladder to access the panel with the card. They had money and funding to implement wireless downloads but that capability was lost when they went through chapter 11. Wireless capability was: 16 out of 25 for the EMB fleet, 42 A320s, 18 A319s, 15 A321s, 25 B767s, and all B787 had wireless download capability. The B737 MAX would also have wireless download capability. There were about 100-200 Airbus airplanes that don't have automatic downloads. Airbus offered 300 recorded DFDR parameters, but the company had 2,500 tracked parameters. That is why they were so "fussy" regarding when the cards were pulled.

They had the ability to determine if a map shift occurred if they were looking for it, but would be unlikely to "trip over them."

They had considered implementing landing systems to help a crew identify the correct landing runway. They anticipate retrofitting the B737 with dual HUDs.

He does not believe the pilots have a company phone. Often times a pilot had a sim card in their iPad to allow them to make calls internationally. Some fleets have SATCOM (not the A320) and it was unusual for no one in a crew to have a phone to use internationally to report a safety event. The cost for an international phone call could be expensed to the company and reimbursed.

There were known issues of a pilot trying to sync their iPad without connectivity and an ASR not going anywhere without connectivity. The pilot would have to sync again when the iPad was connected. The crews are aware of this issue and the maker of the application did not want to fix the sync issue, as the software was made for various applications, including low connectivity uses.

His team was not large. He had 2 people qualified for ground operations and they work together with flight operations. One of those two people do audits. He tries to separate these two functions intentionally.

The crews are required to report to dispatch when they have the opportunity and it would depend on the crew's workload, however, they were to report it as soon as possible either in the aircraft or on the ground. The idea is to "not delay" reporting.

His team likes to prove if an event was a "one-off" event and not assume that it is. He has not looked at the incident data. He felt it was inappropriate with the investigation going on.

He had 3 manager analysts, 3 gate keepers and one person who runs the computer program. The gate keeper was the conduit between safety and line operations. The gate keeper did do some analysis. Because there was no FDA data, the gate keepers cannot reach out to the crew in this case.

Airport construction at San Francisco was a threat, so there was a potential to have a safety related event. He would expect a crew to brief construction as a threat since it was at or near the runway and there were contractors on the field who could be part of a runway incursion via vehicle. There would also be different markings and taxiway closures. He felt that the crew would brief constructions as a threat during their threat briefing.

Typically they do not see unstable approaches on the wide-body aircraft. The narrow body aircraft tend to get "fit in" and have the potential of unstable approaches. Configuration and speed are the primary 2 factors in unstable approaches.

Of the 33,000 flights a quarter, there may be 1,600 "computer unstable" approaches and then they take those "computer unstable" for analysis to determine how many were actually unstable and should have resulted in a go-around. Normally there may be 40 out of all those that were medium/high risk, but that was just an estimate. It was the go around piece that they needed to work on.

There had been a drive for on-time performance. He felt that the CEO could send the right message, “if you’re not comfortable I’m not comfortable”. And if uncomfortable to fly the aircraft.

Interview concluded at 1123 EDT.

Interviewee: Bruce Campbell

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: 8/11/17

Time: 1140 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Robert Hendrickson, Christy Helgeson – Federal Aviation Administration (FAA); Bev Harvey, Missy Rudin-Brown - Transportation Safety Board (TSB) of Canada

Captain Campbell was represented by Jean-Francois Bisson-Ross – Counsel Litigation for Air Canada.

During the interview, Captain Campbell stated the following:

He was the Director of Training and Safety for Air Canada and had been in that position for 3 years in September.

He started in the Canadian Air Force through the ROTP program where he attended a regular university. He obtained an engineering degree from McGill University and flew the C-130 in the Canadian Air Force. He started flying in 1986 and left the Canadian Air Force in 1995. He did a lot of work with the United Nations and NATO. He was a tactical airlift commander and did flight test on the C-130. He was a production test pilot for Bombardier for 2 years on the CRJ. He was hired by Air Canada in 1997 as a direct entry captain in the CRJ. He quickly moved into the training department with his knowledge and background and became a permanent member of management in 2000. In 2000 or 2001 he became the base manager in Montreal (YUL) for CRJ pilots and he explained this position as being more administrative and technical. He then went to standards department on the CRJ and was a check pilot in that aircraft. He moved to the Embraer program to help them develop their manuals and training program. In 2007 he moved to the Airbus as a standards pilot and flew the A-330 and A-340. In 2008 he became a captain on the A-320. In 2009, due to financial stress of the company, he was involved with negotiations with the pilot group until September 2014 when he was promoted to the Director of Training and Safety.

Responsibilities in this position were development of pilot training, recruitment of pilots, interaction between safety and flight operations. He did not look at individual ASRs that were submitted by the Air Canada pilots. He received the deidentified reports and viewed them from a high level. He estimated there were 120-145 check instructors at Air Canada within the training department and an additional 100 contractor instructors.

The captain upgrade training was a typical transition course which included both ground school and simulator sessions. Instead of 25 hours of IOE they got 50 hours of IOE. About halfway through the course pilots received command simulator sessions to help captain candidates

“manage” command decisions. The first simulator session was LOFT and was more training in nature. The second simulator session was a LOE and considered a check ride. Once the IOE portion was complete, the captain candidate was recommended for the command OE. The candidate became a captain once they passed the command OE.

The A-320 training program had 3 home study days, 2 weeks of ground school and procedures trainers, and 7-8 maneuvers trainers’ sessions. All the CARs requirements were accomplished in the simulator and no credit was given for training received during ground school. Procedures validations had to be passed after the ground school before moving to the MTs and then to the MTV. Following this there were 2 LOFT sessions in the simulator followed by LOE. The IOE had to make the training recommendation in order for a candidate to take the command OE.

If there was an unsatisfactory result on the OE, the check airman would report back through the chief pilot to explain the deficiency and develop a plan tailored to that individual pilot before a retest was attempted. He stated that it was not common to fail a command OE. The command simulator sessions were typically the areas where pilots have difficulty. He was informed of failures for command upgrade training of the incident first officer at the time they occurred. He explained the process to become requalified to return in the right seat as a first officer after failing command upgrade training and stated it would be to complete anything missed within the normal training footprint. The incident First Officer had missed the first officer MTV and LOE, which were required items for minimum qualifications for the first officer. An additional OE was added to the MTV and LOE for the incident First Officer to requalify for the right seat. The MPV is a qualification on type (only validation) and was a check ride like a PPC and the MTV was a maneuvers training and validation. LOE was a simulator session that was run as a loft but was an evaluation. OE is conducted in the aircraft. He was informed about the plan regarding the incident First Office and he did not have any concerns regarding that plan since the weak items were going to be covered. He stated the weak items were non-precision approaches and situational awareness.

He stated that CRM had been modified greatly since he was first hired at Air Canada. The Swiss cheese model (Reason model) was used, but Air Canada switched to using the threat and error management (TEM) model. They gained exposure and found out what other airlines were doing. This change took a lot to convert over and they needed to gain experience. His team went to United Airlines, Delta Airlines and Jazz to see what they were doing for CRM. He also went to meetings at Lufthansa in Europe to see what was being done. LOSA information was also used as a source of information. The training program was developed based on all of this and was currently in the final stages of implementation. The training instructors were first put through the training in the first four months of the year for one day of training to introduce the new standards grading scale as well as new upcoming events in 2016 and 2017. Line pilots were introduced to the training during a one-day ground school in March – April 2016. The CRM recurrent training lasts between a few hours to half a day. He said this training program was being “beefed up” for 2017 and will run through a number of scenarios and review CRM theory. The training will include a combined 2-hour session with the flight attendants in addition to 2 hours within the pilot group. Each recurrent training session had a package that went out prior with CRM included as a topic. Half of the AQP grading was based on CRM on the simulator sessions and training.

New hire pilots were given a two-week indoctrination course about the company and CRM where CRM was about 4 hours of training. The introduction to command course was a 4-day program in the classroom that also covered CRM. The scenario based training referred to as “what would you do” was a full day and was based on safety data. They also covered the resources for captains. He was not sure how long was spent on CRM during the command course. CRM was also 50% of the grade for the transition course.

An “AQP 101” course was a required instructor course where they were taught CRM, adult learning and how to conduct briefings and debriefings. This training was lecture based. Each instructor would have to observe training and then be observed giving training. The CRM training in this course was 1 day.

CRM training in general is done by a facilitator who does some theory but is interactive.

He knew about the incident flight mostly from what he saw in the media and he had not received a formal briefing about the incident.

He stated a go-around was to be executed when not in a position to land and that could be many different things such as not being on the proper course, being unstable or not have the required visibility to land.

The results from the LOSA audit in 2014 showed a few things they needed to look at and some of those things were leadership and non-compliance issues. It was difficult to tell why they were having those issues from the data. He stated the non-compliance issues with the SOPs were due to pilots choosing not to comply. He went to the Flight Safety Foundation meeting and to WATS and saw a lecture by the Presage group who specialized in SOP compliance. There was an initial animation training video in 2017 from Presage to focus on compliance. This video explained the pilots only had a short time to listen to their “gut” otherwise they would rationalize the information. They described 9 constructs about why people don’t follow procedures and discussed improvements. There was also a video on fight/flight and rationalizing away the “gut feeling.”

Air Canada brought Presage in to help them with their human factors issues. Presage conducted a survey, and 4 working groups were established to discuss stable approaches, stable landings, SOP compliance and mentorship. They just got the report from the working group on SOP compliance. The “trial sims” in all the fleet aircraft were complete and the recommendations were forthcoming from Presage. An area of improvement was ensuring pilots understood the procedure and understood the importance of following SOPs as well as removing distractions from doing so. Further, they suggested adding leadership programs in the flight deck.

He stated some of their contract pilots were good and others were not as good – it was individually based. There was not contractor animosity. They try to use more recent ACA retirees for line stuff. Training had a good relationship with ACPA and that relationship had been developed quite nicely. The MTVs were not line oriented. There was a new chair for the ACPA training committee as of about 2 years ago and they have conducted a survey with pilots.

The feedback response rate was higher in TC (about 20%) than CQ (less than 20%). He asked his training managers to get up and walk around to talk to the instructors. This was to gather information about how the training was going. He stated he wanted the information and did not care if it came from the pilots or via the union (ACPA).

A half day was added to the recurrent ground school as part of the home study course (4 hours of LMS) because the training was new. This training was tracked and pilots had to show that training had been completed along with the exams.

A captain candidate pilot did not fail upgrade training very often. He knew the incident pilot had been up for OE since he was having problems with command. He stated that most pilots transition from the right seat to the left seat in the A320 don't have "hand or feet issues"; they tended to be command issues and situation awareness. For command, they get one issue scenario that is more normal and one issue that is time compressed.

The AQP data perspective had additional training opportunities in the A320 ground school. Issues past this point weren't seen as often. They added a day in ground school for new hire pilots. They also changed from PowerPoint to chalk/talk. Issues were seen for ATO new hires in the ground school phase. Some pilots saw issues with training as a bad thing and others did not. The training boundary guidance is a live document.

He stated that two additional training opportunities were within the normal training footprint for the incident First Officer. It was possible to change instructors or split candidates, but this occurred less than 10% of the time.

Fully implementing TEM training was in the final stages and his impression was they were good at identifying the threats but needed to better understand how to mitigate. They developed a page of common threats that listed a number of threats and that list could be used by a crew as a starting place to identify threats. This was a guide, not a complete list. That list was developed through looking at their data. The threat and error briefings were going better than the "rote" briefings had been previously. The next phase was the performance phase, but he did not know the details of that phase yet.

He said CRM from the captain perspective was setting the right tone with the crew and encouraging the flow of information. It was also to ensure the crew had a common understanding of known limits and to look after each other regarding workload management. He felt one of the most important piece was open communication.

He wanted to see what the working group had to say regarding implementing SOP concerns. He felt the SOP working group would continue to meet for a long time and that it was not just a "one time show".

The new hire pilots were provided with information prior to the indoctrination training. It was expected for them to go through this training prior to indoctrination training and that training was tracked on LMS. New hire pilots went through two-week indoctrination training with a focus on the FOM. Other items covered were weather, IFR rules, procedures, a visit to the operations center,

legal, FDA and safety lectures. There was an open book exam on the FOM after the first 2 weeks was completed and then the pilots were given their fleet assignments. There was 2-3 days of system and procedure home study followed by 2 weeks of simulator training that included 11-13 sessions. Throughout the aircraft course half of the grade was on CRM and the other half was procedural and manual flying. ETOPS training would be covered for aircraft that conducted overseas flights.

Once LOE was passed, they moved onto the line indoctrination which was a minimum of 6 sectors (point-to-point flights) and 25 hours. He explained that wide-body aircraft would have more hours in fewer sectors and that's why they have both a minimum sector and hour requirement. There was an evaluation after this. A new hire would come back 6 months later for a MTV and LOE then again after an additional 6 months for another MTV and LOE. During the first year, a new hire is on probation. The recurrent cycle after that was 8 months for simulator and annually for ground. The recurrent training involved flight attendants every 2 out of 3 training sessions.

Pilots were given the opportunity via email to fill out the training feedback survey, but they only got about 10-20% responses. The feedback they had gotten on the A320 was updating the ground school and training materials. They were also looking into a MCDU trainer.

The length of time it would take to make a change to training depended on the type of change. If there was incorrect information on a PowerPoint, a major change could take a few days. It could take a few months to develop a training scenario without Transport Canada approval as they must get the simulator right and test the scenario in each simulator. If you're changing a scenario with TC approval, it could take another 2 months. The agreement with TC was 60 days, but they were often good about getting a change approved in less time. A full A320 ground school would likely take about 4 months.

The probation period washout rate was less than 20%. The 6-month sim session was challenging for all pilots and everyone struggled a bit more with the first sim session after qualifying on type. Some of that was due to the fidelity of the simulator visuals. It could also be that pilots were getting back to abnormal scenarios. Most of the rest was from procedures and CRM and not flying skill related. Though, the go around with an engine failure was commonly failed as it was a difficult maneuver to fly.

Interview concluded at 1305 EDT.

Interviewee: Captain Kevin O'Brien

Location: Air Canada Operations Headquarters, Mississauga, ON, CA

Date: August 11, 2017

Time: 1326 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Transportation Safety Board of Canada (TSBC)³³

Captain O'Brien's legal representative was Jean-Francois Bisson-Ross – Air Canada Counsel Litigation.

³³ Participated via teleconference.

During the interview, Captain O'Brien stated the following:

His job title was Director of Crew Bases for Flight Operations. He was responsible for day to day operations at all four crew bases for Air Canada. The four bases were at Vancouver, Toronto, Winnipeg and Montreal. The managers of line operations reported to him. He stated his general responsibilities were to supporting pilots and those pilots' day to day operations. He reported to, the Senior Director of Flying Operations and that his supervisor reported to the Vice President of Flight Operations.

He went to an aviation college where he received a diploma before he started flying float planes in Northern Ontario then British Columbia. He flew various aircraft including a C421 and King Air on different contract across Canada as well as a 3-year contract in Africa. He flew as a Captain in a Bombardier Q-400 (-8) for Air Nova out of Halifax. Air Nova was a feeder for Air Canada. He then went to Air Canada and flew the DC-9, B-737, B 767, A-340, A-320 and Embraer. He was hired by Air Canada in 1999 and worked as a base manager and general manager of Western Canada before taking the Director of Crew Bases for Flight Operations position in May 2017. His role as director was to oversee the human resources side of the line pilots. Fatigue risk management, crew planning and scheduling and oversight over crew pairing and crew scheduling were also roles he had.

He was based and lived in Vancouver, Canada. His day started early. He would get daily reports from crew scheduling and touch base with the base management team and other branches. These ranged from pilot no-shows to commendations. There was a daily operations call. The 4 bases are hubs. He would also look at the synopsis from fatigue reports submitted by pilots. He would analyze pairings that had been constructed a few times and month in order to provide feedback on how the pairing was analyzed and built. One of his responsibilities was to support the line managers with any issues they had such as discipline issues. He had been involved in pilot bargaining and had not flown a lot. He would try to fly the line when possible. He had a supporting role of line pilots.

The number of fatigue reports filed per year at Air Canada was around 2 reports per 1,000 flights. They received about 600 in one year. Common issues were issues with flying on reserve, reports when pilots book off for fatigue and when pilots take controlled rest, they ask for a report. Fatigue reports were filed after a flight. The fatigue safety action group had regular meetings to look at any trends from these reports. He stated that fatigue reporting was non-punitive. Sometimes a scheduler will tell him that something suspicious but when he reviews these cases, he hasn't found any to be particularly suspicious. He explained that it was the pilots' responsibility to self-assess for fatigue in order for him/her to determine they were fit for duty.

He also explained that a reserve pilot has a minimum guarantee. For a block holder, he does have to make up fatigue book off. If it's one day, they can drop no credit. If they are mid pairing, they will review it and if there was an issue like a hotel issue, they will compensate the pilot. They applied the fatigue policy in a very practical manner. He stated fatigue reports were filed for taking controlled rest and that a controlled rest period was a maximum of 40 minutes. He stated filing a fatigue report was well known by the pilots at Air Canada and he felt it was an effective strategy.

He explained that a pilot taking controlled rest in flight did not mean that pilot was fatigued. It could be a way to take a quick break or rest from flying. Pilots who fly at night without augmentation could take controlled rest.

The reserve pilot duty rules were to be available on call typically from 5am until 9pm; however, the wide body pilot reserve duty time was slightly different. He stated a reserve pilot could not be on reserve for more than 5 days in a row and that the pilot had both guaranteed days and optional days off. A pilot could not be asked to work on their guaranteed day nor could they move their guaranteed day. The optional days could be moved and a pilot could ask their line operations manager to be released or rescheduled from reserve on certain days. He explained that “red-eye” flying had other duty times from these. He also explained the Canadian Aviation Regulation (CAR) duty time generally was 14 hours and there were contract rules in addition to these. There were also “soft” rules created by the fatigue safety action group and that a lot of the flying at Air Canada was governed by the “soft” rules. He explained a couple of examples of red-eye flying as well as examples of being assigned duty flying later in the evening and how it became more restrictive the later it was (assigned flying at 8pm versus 10pm). There was a two-part process to build a pairing and that the Jeppesen Optimizer created that pairing. The pairing analyst would send pairings to him and he would load those pairings into a bio-mathematical model. That model would produce a threshold and he would look at any pairings that were above that threshold to determine what to do. He works with ACPA to determine whether to send a pairing back. The pairings would be published to the pilots and would be bid based on the seniority based system per their collective agreement and the CARs. The pilots would be awarded a monthly schedule and could go to their respective line operation managers to ask for relief. They could do bid switching or ask management to drop a pairing. He said some of the flying was “left in open time” and the awarding process for that flying could be reassigned within a certain window. First priority goes to individuals with pay protection, second priority are those who need makeup hours like for fatigue, third priority is when they go through reserve steps. There were a total of 9 steps but now they’ve negotiated it down to 4.

The home-base rest period was typically 12 hours for pilots that were a line-holder as well as reserve pilots, however, that could vary if for operation overseas to 14 hours or if a pilot chose to reduce the rest down to 9.5 hours. The contract states 10 hours rest period at home base. A pilot could delay a start time of a flight in order to get more rest and it was the pilots’ responsibility to ensure they got enough rest to be fit for duty. He explained the reserve window for a reserve pilot was not considered as duty time under the CARs. The reserve pilots are obligated to answer the time and be available for duty. A duty time could be reduced to 10 hours if a reserve pilot received a call early (5am used as an example) as opposed to 12 hours for a call received later in the day. The pilot was expected to assess his/her fitness for duty for any flight that was assigned. His expectation was for a pilot to take a nap if he/she was scheduled for a late flight as well as to use “common sense”. He explained that a reserve pilots on call time window from 5am until 9pm looked like a “great big window”, but that is what their collective agreement and CARS allowed.

He stated someone had called in sick for the incident flight, but did not know how much notice the incident captain had been given before the incident flight. He also stated that a reserve pilot did not have to be at an airport any sooner than 2 hours prior to a show time (3:15 hours prior to departure time) and he did not know what time the pilot had called in sick for the incident flight

pairing. They normally award flights out at 10am and award in order of operational importance. If there's a flight leaving at 8am, they award that early so the pilot can prepare. They defined a red-eye as being on duty at 2am home base time. They also try to award these flights early because they are harder to get pilots for. The seniority level was top down. If someone was below them, they could pass on the flight. It is not often that they have to cancel flights because of staffing. More often, they substitute a different aircraft type in.

He explained different examples of normal awarding of flights and anything that feel outside that normal awarding window. Air Canada had evolved to evaluate regarding home-base since it was a more reasonable way to assess fatigue. He stated they did their best to ensure a pilot's rest period was protected as much as possible and that crew scheduling was very challenging. One mitigation to protect a pilot's rest period that had been more recently implemented at Air Canada was to not allow a start time to move ahead by more than 5 hours. Switching aircraft for a pairing was another way to manipulate a pairing if fatigue or scheduling was an issue. He stated that it was quite straight forward in practice.

The Air Canada contractual obligation was to have a 7% reserve pilot staffing, but 11% was the reserve staffing levels they tried to maintain. He stated 10% was not an unreasonable amount of reserve pilot's and it was not a low number. He clarified this was for the narrow body fleet and for wide bodies there are often more people on reserve. He also stated a typical build line overall was 70-85 hours, 83-85 hours was the peak in summer, would drop in "shorter seasons", rise slightly for holidays, varied between fleets and bases. The maximum flight duty time for a pilot each month was 85 hours as required by the union, reserve is maxed between 85-89, but a pilot could pick up overtime up to 118 hours flight duty time. In the summer months it's possible that there are 0 on reserve and the pilots who are completing training at that time are put on reserve when they complete their training. They set a DBM. It is all a balance.

He clarified that "book off" refers to a pilot not coming to work.

He stated he expected any pilot to report fatigue when he/she felt fatigued regardless for the reason. Fatigue reporting was explained in the flight operations manual (FOM) along with the ASR and hazard reporting. A proactive look was used to assess pairings using the SAFE Model. Air Canada had also worked with Safety FAST. He expects fatigue reports if they are booked off for fatigue for sure, if there was a potential fatigue hazard, and if there was controlled rest.

He was Co-Chair of the fatigue risk management task force and that task force wrote the manual for ICAO. The other Co-Chair was a member of the Union (ACPA) and there were about 9 people maximum total that participated with that task force. Other participants were from Air Canada and ACPA flight safety, occupational health, planning. The co-chairs met regularly 5-6 times per quarter. About four or five members of the task force would meet quarterly. The quarterly meetings looked at trending, pairing as well as recommendations. The group establishes rules. He explained that red-eye flying was heavily mitigated by the task force. The group was proactive with surveys and reports. The last survey was about 2 years ago and they would like to do surveys more regularly. They have better capabilities for running surveys now.

An example of a mitigation the working group put forward was red-eye flying allowing only two duties in a pairing. The example used was a pairing from Vancouver to Toronto could only be 1 leg with a restriction of less than 18 hours or more than 30 hours of rest. The crew would then be given only one leg to get back to the home base (Victoria). A red-eye flight was any flight that landed after 2am and was greater than 3 hours in duration. It used to be flights that departed west to east in the evening. If the redeye is the first duty day, they would get either less than 18 hours of rest or more than 30 hours. If the redeye is the second duty day, they would get 22 hours rest prior to operating a red eye.

Air Canada used to do stand-ups and pilots were showing fatigued after these pairings. An initial mitigation was to provide hotel rooms for the pilots for 3 hours, however, data showed this was not successful. Stand-up pairings were removed as a result. He explained examples of “1 and done” or “two-sleep opportunities” with the mitigations around these pairings.

They validate changes using the model or using pilot feedback. They also look at sick time for fatigue and fatigue reports. The model plus the three fatigue requirements equated to change.

Filing a fatigue report was well known, but was not mandatory. He had made several presentations on FRMS and he explained they cannot make change unless it was known. 3 years ago, he did a training module on fatigue for recurrent pilots and was now doing a session for initial new hires. He likened fatigue reporting to ASR reporting, except that ASRs have some mandatory reports. He stated he would like to see mandatory reporting for controlled rest, but it was just “suggested” to report it. They need a just culture.

He was asked what he would expect the other pilot to do he took controlled rest in flight. He said he expected the other pilot would be fine to take it and they would have a discussion about it. The other pilot would monitor the aircraft and would be expected to wake him for any reason. The pilots must inform the lead flight attendant of the controlled rest and the flight attendant would set a timer for 40 minutes, and then call the flight deck after 40 minutes since that is the maximum time allowed for controlled rest. The pilot taking controlled rest must take that rest in their pilot seat.

He stated he would suggest for a crew to take a nap prior to flight as a way to combat fatigue. If a pilot was unable to take a nap prior to a flight and felt fatigued then that pilot could book off fatigue. He explained that controlled rest could not be planned on prior to a flight if a pilot was fatigued as a way to combat fatigue. He expected a crew to sleep at normal times and do whatever worked for him/her to prepare for an evening flight. He stated it was better to get 8 hours of sleep rather than move the sleep pattern. Caffeine could be used as a strategy to combat fatigue and was effective in short bursts.

He suggested that the incident pilots should have napped prior to duty and if they weren't able to nap to book off fatigue. He said the pairing of the incident flight had been mitigated and the only other additional mitigation that could have been taken was to assign the pairing to a western based crew. He had looked at the pairing of the incident crew. The effect seen in the bio-mathematical model would not have alerted him that there was an issue with that pairing. The number associated with that pairing was around 4.6 and the threshold for mitigation was 5.0. A back-to-back pairing

could be mitigated by inserting 2 local nights of rest prior to operating the red-eye pairing; however, this would only reduce the bio-mathematical number from 4.6 to 4.3 and was not a huge decrease. He used the fatigue factor checklist developed by IATA and used it extensively. He was unaware of if/how the incident crew self-assessed his/her own fitness prior to the incident flight.

A pilot was considered to be released from duty 15 minutes after blocking in from a flight. Customs is expected to be cleared during a rest period if it took longer than 15 minutes to clear customs after blocking out from a flight. He stated that “commuting” was not covered by the CARS; only fitness for duty. It would be up to a pilot to ask for more rest time if it took a long time to get through customs and get to a hotel, but that Air Canada would accommodate such a request. Transportation could be considered in the middle of a pairing in order to determine when rest time started. He also stated it was reasonable to expect a pilot to live within a couple of hours of their assigned home base. Deadheading counted a duty time, but how a pilot chose to get to and from work was considered non-duty commuting time.

He was not aware of a fatigue report being filed by the incident crew.

He stated the culture at Air Canada was good and fatigue reporting was encouraged. The relationship with the pilot union was good and that was very important. He had seen an “uptick” in the number of fatigue reports, but suggested that was due to pilots being encouraged to fill them out rather than more fatigue occurring. They are making changes.

The interview ended at 1436 EDT.

Interviewee: Captain Bernard “Bernie” Lavell

Location: Teleconference

Date: August 24, 2017

Time: 1300 EDT

Present: Shawn Etcher, Sathya Silva – NTSB; Christy Helgeson – Federal Aviation Administration (FAA); Beverley Harvey, Transportation Safety Board of Canada (TSBC); Gordon Heieis – Accident Incident Investigator for the Air Canada Pilots Association (ACPA)

Captain Lavell was represented by was Jean-Francois Bisson-Ross – Air Canada Counsel Litigation.

During the interview, Captain Lavell stated the following:

His current title was chief pilot for the A319/320/321 for the mainline Air Canada. Air Canada also has a Rouge carrier which also has A319 which has their own chief pilot. He has been at Air Canada for 19 years. He started flying in the Canadian military where he flew a Canadair Tutor Jet and became an instructor in the Tutor Jet. He also flew the C130 Hercules and was an instructor on the C130. He spent 11 years in the military. He then flew charter at Air Club in the A310 for one year. He flew at Canada 3000 for 1.5 years flying the A320/330. He then joined Air Canada. He flew the A340 for 3 years. He flew the A320 as a first officer for 3 years. He flew the CRJ for 1 year. He flew the Embraer for 9 years as a captain and a check airman. He joined management

at that time as the manager of line operations. He described the manager of line operations as a chief pilot role of line operations. He was also in standards. Then, he became chief pilot on the A320.

He had approximately 12,000 hours total flight experience, 3,000 hours in the A320, and 350 hours as captain in the A320.

He described his responsibilities in his current role. They receive category incident reports from dispatch and he determines whether to look into them further. He monitors aircraft technical bulletins and oversees production of the aircraft operating manual (AOM). He assists with safety analysis with FDA. If there are training failures, he gets involved with interviewing the pilot; however, he was not involved with the incident first officer after his training difficulties. He has input into the training curriculum and the FOM. He coordinates duties with the check airmen. They receive approximately 2-3 incident reports per day, which include go arounds and TCAS events. They would look into an event further if there was any suggestion of SOP non-compliance. In a case of non-compliance, they would want to talk to the pilots to find out why. The pilots recognize the need for reporting and self-reporting. They are expecting a phone call from him when they report the event. The vast majority of pilots are forthcoming and quite receptive to talk to him. Typically, pilots file ASRs as well. He gets the deidentified safety report and corporate safety asks for input on procedural requirements.

He did not see a category incident report on the incident flight but would have expected to see one as a go around was a reportable event. The manual says the pilots should report as soon as possible. He would expect dispatch would have a report within a few hours. Below 10,000 feet, the pilots should be flying the aircraft so he expects pilots to report after they get to the gate. This was consistent with the training they receive in the simulators.

The FDA reports are aggregate trends so he does not get to conduct follow up. The trends he sees in the FDA data are related to crosscheck and verification such as missing altitudes, wrong taxi directions. This was a stable trend. The main problems they see were altitude deviations, taxiway errors, and gross navigational error. He described gross navigational errors as a crew departing and turning the wrong way after takeoff. Another example he provided was if a crew was cleared to a point and during the process of selecting the waypoint in the FMS or MCDU, they pass another waypoint, the list would move up and pilots would inadvertently press the wrong waypoint.

Pilots can report to the company in various ways. If they have a safety event, they would file an ASR. If they want to provide general comments they could call him or his assistant chief pilot. They could also email them or come in to talk face to face. They can provide feedback on the AOM and file admin reports. He or his team responds to every query. He has not received any concerns about the FMS Bridge Visual Approach into SFO.

When flying the approach, he would follow the guidance on the Jeppesen plates which includes 2 pages. One page was a text page with notes and the 2nd page was a normal Jeppesen page.

He would first bring up the route briefing manual. He would look at the approach plates and company pages and look at the special considerations. He would read the whole text page and load

the RNAV 28R approach into the FMS. They'd transition from the STAR to the approach around 8,000 feet and intercept the approach via nav mode. He would reference the Jeppesen plate. The ILS would show right of course and it would provide some glide slope information as well. The primary course information would come from the runway itself and the runway lighting. He would disconnect the autopilot at the F101D waypoint.

It had been several years since he flew into SFO, but it was a busy airport. He would keep the autopilot on as long as possible so he could monitor the flight. That would reduce the workload and he could focus on other things like visually identifying traffic and managing the aircraft.

He considered "tune" to mean that it was a directive to tune in the ILS frequency.

He would fly the vertical profile in vertical speed as it would provide a smoother descent. It would be a vertically selected descent. The altitudes would be put in the FCU. When flying in this mode, he would have to re-select the altitude with each waypoint. The PF would manipulate the FCU if the autopilot was on. If the autopilot was not engaged, the PM would manipulate the FCU.

At the F101D waypoint, the flight should be fully configured for landing. They would have identified the runway and backed up the visual with glideslope and localizer. They would then set the missed approach altitude. They would turn off the FD for a visual approach. The PM would be the one turning off the FD and setting the missed approach altitude.

They would have discussed what type of descent they would do during the approach briefing. There could be a situation where the aircraft may not be making the vertical profile and they would switch from managed descent to open descent to get down.

Vertically managed, which was a term he used, means that they are using ground based system such as the ILS. Vertically selected means that they select the vertical speed. The open descent mode goes to idle and adjusts speed to meet the FCU set altitude. There is no significant workload change between flying vertical selected and open descent.

He had not heard of mapshift occurring in the A320.

He had been in his current position for just over one year.

He heard about the incident event from an email from the duty pilot saying that the aircraft lined up with the taxiway and went around. He would have expected that the crew would have reported the event as soon as possible meaning upon arrival to use ACARS or the phone to advise dispatch of the event. Dispatch would have created a category incident report. He would then have heard from the dispatcher or from the duty pilot directly.

There are specifications in the AOM for the pilot duties in different automation configurations. When automation modes are changed or annunciated on the FMA, it would be called so that both crew are aware of the automation mode change.

He would expect a pilot to speak up if he were uncomfortable flying an approach in open descent mode.

He had dealt with the captain for scheduling issues when he was a manager of line operations. The scheduling issues were regarding requesting a trip drop. He had heard of the first officer because of emails over his recent training difficulties.

When he was a manager of line operations he had pilots call in fatigue. Pilots would call crew scheduling or call him directly. They are expected to file a report as well.

He had met the captain before in person and on the phone. His only impression of him was another pilot wanting to drop a flight.

The interview concluded at 1412 EDT.