NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

June 2, 2011

GROUP CHAIRMAN'S FACTUAL REPORT

OPERATIONS/HUMAN PERFORMANCE GROUP

DCA11IA015

A. ACCIDENT

Operator:	American Airlines (AAL)
Location:	Jackson Hole, Wyoming
Date:	December 29, 2010
Time:	1138 Mountain Standard Time[1] (MST)
Aircraft:	Boeing 757-200, N668AA

B. OPERATIONS/HUMAN PERFORMANCE GROUP

Roger Cox
Senior Aviation Safety Investigator
National Transportation Safety Board
Washington, D.C.

Katherine Wilson
Human Performance Investigator
National Transportation Safety Board
Washington, D.C.

Robert Hendrickson
Aviation Safety Inspector
Federal Aviation Administration
Washington D.C.

Bob Aaron
Safety Pilot
The Boeing Company
Seattle, Washington

Rob Fogel
Safety Representative
Allied Pilots Association (APA)
Dallas, Texas

C. SUMMARY

On December 29, 2010, at approximately 11:38 AM mountain standard time (MST), American Airlines flight 2253, a Boeing 757-200, registration N668AA, overran runway 19 after landing at Jackson Hole Airport (KJAC), Jackson Hole, Wyoming. The airplane came to rest approximately 730 feet past the end of the runway in deep snow. There were no injuries to the 179 passengers and 6 crew members on board and the airplane received minor damage. The 14 Code of Federal Regulations Part 121 regularly scheduled passenger flight had originated from Chicago O'Hare International Airport, Chicago, Illinois.

D. DETAILS OF THE INVESTIGATION

[1] All times are Mountain Standard Time based on a 24-hour clock, unless otherwise noted. Actual time of accident is approximate.

The Operations/Human Performance Group was formed December 30, 2010, in Washington, D.C. Group Chairman for Operations was Roger Cox, NTSB, and for Human Performance, Katherine Wilson, NTSB. Other group members initially were Robert Hendrickson, FAA, Thomas Lange, Boeing, and John David, Allied Pilots Association (APA). On February 7, 2011, Captain Lange was replaced by Captain Bob Aaron of Boeing and Captain David was replaced by Captain Rob Fogel representing APA.

On December 30, 2010, the group began to gather flight and company documents and conducted interviews with the accident crew. The group reconvened on February 7, 8, 9 and 14, 2011, to conduct further interviews with American Airlines personnel.

1.0 History of the Flight

According to American Airlines (AAL) flight documents, the incident flight departed Chicago O'Hare International Airport (ORD) at 0841 MST on December 29, 2010. The planned time enroute to Jackson Hole Airport (JAC) was 2 hours 49 minutes and the flight crew stated in interviews that the flight was uneventful. Both pilots said that they had recent experience flying into JAC[2] and were aware of the typical adverse landing conditions that commonly existed there in the winter, such as slippery runway conditions, airplane loads that were full, and high takeoff and landing weights. The first officer (FO) said the airport was "a high emphasis airport" and "they had to be on their toes and be thinking of everything to get in and out of there safely." He said the captain had checked runway conditions before departure and again starting about an hour before landing.

The FO said that he was the pilot flying (PF) and that he and the captain had discussed the fact that AAL co-pilot minimum visibility for landing was 4000 feet or ¾ mile[3]. The FO said that he briefed the ILS (instrument landing system) Zulu Runway 19 approach in to JAC, page 11-2 of the Jeppesen charts, and that there were 10-7 pages for the airport that needed to be reviewed every time they flew in to JAC. The crew looked at this page about an hour from landing. He said the captain had been into JAC many more times than he had, and he did not have any concerns about landing on runway 19.

The FO calculated the landing reference speed (VREF) to be 131 knots based on a planned landing weight of 195,000 lbs, and he added the minimum 5 knots to VREF to obtain the planned approach speed of 136 knots. This speed increment was based on "negligible winds (about 40 degrees off runway heading at 6 knots). Using a special chart for JAC, which he called a "green card"[4], and considering braking action reports and reported Mu figures of 42, 42, and 39, the FO calculated their maximum allowable landing weight to be 198,000 lbs. The FO said that he determined that the flight was legal and safe to land, but that they could not "float" on landing. The captain said the chart showed they could land at a weight up to 198,300 lbs based on "good" braking action, but that if conditions were less than good, landing distance would be 7,100 feet[5].

[2] The captain stated that he had flown into JAC 300 to 400 times and the First Officer (FO) stated that he had been into JAC 4 times with the incident captain since mid-December.
[3] Runway visibility at the time of the approach was ¾ mile
[4] 757 Special Landing Analysis, Jackson Hole, AAL Performance Landing Manual , page 20.7
[5] The length of runway 19 at JAC was 6,300 feet.

The captain said they followed the normal arrival routing, were cleared to fly direct to the DUNOIR initial approach fix and to descend to 16,000 feet. Crossing DUNOIR they were cleared down to 13,000 feet and were cleared for the ILS approach. He then picked up the new ATIS and contacted the tower. He said they picked up a little icing and had engine anti-ice and wing de-ice on. He reported to tower at QUIRT and at FAPMO intersections. The FO configured the airplane before the turn at QUIRT. The speed brake was armed in accordance with the Before Landing checklist and the autobrakes were set to "Max." After completing the landing checklist, the captain noted that he could see the ground at 6,950 feet MSL. The captain said that when he sighted the runway he thought runway conditions looked good.

The FO said he planned to touchdown at 1,000 feet or less from the approach end of the runway, that he saw the runway about 300 to 400 feet above the ground, and that it looked like it was contaminated with snow. Once he transitioned to visual conditions he attempted to use the 1,000 foot marker as an aim point, and he believed he touched down firmly at about 800 feet past the threshold. He said when he tried to go into reverse, the levers moved slightly but he could not get the thrust reversers (TRs) out. On his second attempt to deploy the reversers, he told the captain that he could not get them into reverse. He said the captain took control of the TRs and told the FO to steer. The FO said he did not feel deceleration from the auto braking. He heard the captain say something about braking and he hit the brake pedals and went to max manual braking, but "the airplane felt like a sled." The captain confirmed that the flight landed as planned on "the first part of the runway," and that he told the first officer to recycle the thrust levers after they failed to deploy. The captain said he took control of the reversers and recycled the thrust levers 2 to 3 times and that both of them went to maximum manual braking but did not feel deceleration.

The FO said the TRs finally came out at about 2,000 feet or less remaining of the runway, and he could hear them operating but the deceleration was not normal. He saw the runway lights at the end and chose to go to the right because it looked smoother and he wanted to avoid hitting the lighting. He said there was about 3 feet of snow at the end of the runway where it had been plowed, and they impacted the snow, which stopped the airplane

Both pilots said the speed brake lever was armed during the flight, and it was still in the armed position after the aircraft stopped. Max autobrakes were set but were still in "max auto" after stopping. The captain said he did not check the "autobrakes" light during or after landing, and he did not look at the EICAS (engine indicating and crew alerting system) because he was looking out at the runway. The captain said he did not call out that the speedbrake was not deployed during landing, although the callout was part of the procedure. Both pilots confirmed that AAL policy was that speedbrakes should be deployed manually if they do not deploy automatically. The FO said that he noted the "left reverse isolation valve" and "auto spoiler"[6] messages were on the EICAS after the incident.

They secured the engines and the captain got on the PA (public address system) and told the flight attendants not to evacuate. The captain then got up and went in to the cabin to check on the passengers. They did not use the evacuation checklist in the Quick Reference Handbook (QRH),

[6] There is an "auto spdbrk' light on the overhead panel and an "auto spdbrk" EICAS message, but no "auto spoiler" message.

but they did use the "secure cockpit" checklist. The FO spoke to the tower to see if someone could assess the damage to the airplane. He said it took about 40 minutes to clear the snow around the airplane so they could deplane the passengers. The crew looked at the airplane themselves and did not see any damage. After that, he said the airplane was towed back to the pavement.

2.0 Personnel Information: Flight Crew

2.1. The Pilot in Command, Timothy Francis Kalcevic

Year of birth: 1950
Date of hire with American Airlines: March 1, 1979

Pilot certificates and ratings:
- Airline Transport Pilot
  - Airplane Multiengine Land
  - Commercial Privileges
  - Airplane Single Engine Land
  - Type Ratings: B-757/767, DC-9, GS-2
- Flight Engineer
  - Turbojet powered

Airman certificate date of original issue:

Airman certificate	**Original issue date**
Commercial Pilot – Instrument	November 14, 1973
Commercial Pilot – Airplane Single Engine Land	November 14, 1973
Commercial Pilot – Airplane Multiengine Land	November 14, 1973
Airline Transport Pilot – Airplane Multiengine Land	November 9, 1978
GS-2 Type Rating	November 9, 1978
Flight Engineer – turbojet powered	April 18, 1979
B-757/767 Type Rating	May 30, 1987
DC-9 Type Rating	November 24, 1987

Record of FAA certificate failures:

On April 8, 1979, Captain Kalcevic was disapproved for his initial Flight Engineer – turbojet certificate. He completed the simulator check on April 10, 1979, and the initial line check on April 18, 1979.

Medical Certificate: First class
Date: November 15, 2010

Flight time based on American Airlines records and crew statements:

Flight time	Hours
Total	19,645
Total time in type (B-757)	10,779
Last 24 hours (not including incident flight)	5.5
Last 7 days	22.5
Last 30 days	64
Last 90 days	142

Most recent training and check completion dates:

Part 121 training/checks	Date
Recurrent (9 month cycle)	March 30, 2010
Recurrent (18 month cycle)	July 22, 2009
Recurrent (home study exam)	December 6, 2010
Line check	September 14, 2010
U.S. Division Captain training	December 28, 2010

Record of FAA enforcement actions:

A review of FAA enforcement records showed that a warning notice, which was an administrative action, had been taken against Captain Kalcevic on October 15, 2008. The FAR cited was 14 CFR Part 91.9(A), "person operating aircraft must comply with operating limitations specified in the approved flight manual, markings, and placards." The record was closed on February 26, 2009.

2.1.1. The Pilot in Command's 72-hour History

The captain had 3 days off prior to starting duty on Tuesday, December 28, 2010. He went to bed on Sunday, December 26, 2010, about 2130 and awoke on Monday, December 27, 2010, about 0600. He went to bed Monday night about 2130 and awoke on Tuesday, December 28, 2010, about 0550. He went to bed Tuesday night about 2130 and awoke on Wednesday, December 29, 2010, about 0614. He said he usually fell asleep within 5 minutes of going to bed and normally slept 7 ½ to 8 hours. He said his schedule had been normal and he had not needed any special rest breaks.

He had rotator cuff surgery in November 2009, and turf toe surgery in December 2009. He had had no major changes financially or in his personal life. He felt he was healthier than average, and played basketball 2-3 times a week and went to the gym. He did not wear corrective lenses and his color vision was normal. He took 10 mg of Lipitor per day, and had taken 1 pill on Wednesday, December 29, 2010. He had no side effects from taking this medication. He also took vitamin supplements. He drank 24-30 oz of Diet Coke daily. He last had an alcoholic drink on Monday, December 27, and did not use tobacco.

His workload the day of the incident was "high/normal."

He had no concerns about working for AAL and had no external pressures from the

company to continue the flight.

Other pilots who flew with the captain said that he was "by the book", was open to suggestions and was not overly assertive. It was reported that the captain's briefings were thorough and complete. The captain had a lot of experience which he expressed to first officers.

2.2. The Second in Command, Todd Wesley Brann

Year of birth: 1962
Date of hire with American Airlines: January 16, 1992

Pilot certificates and ratings:
- Airline Transport Pilot
  - Airplane Multiengine Land;
  - Airplane Single and Multiengine Land
  - Instrument
  - B-757/767 type, circling VMC only
- Flight Engineer
  - Turbojet powered

Airman certificate original date of issuance:

Airman certificate	**Original issue date**
Commercial Pilot – Airplane Multiengine Land	November 22, 1985
Commercial Pilot – Instrument	November 22, 1985
Airline Transport Pilot – Airplane Multiengine Land	July 20, 1991
Flight Engineer – Turbojet powered	March 26, 1992
B-757/767 type rating*	May 24, 2005

*Circling approach – VMC only; limited to FAR 121.543 (B)(3)(i) operations at AALA

Record of FAA certificate failures:

On February 18, 1992, FO Brann was disapproved for his initial Flight Engineer – turbojet certificate. He completed the simulator check on March 10, 1992, and the initial line check on March 26, 1992.

Medical Certificate: First class
Date: April 5, 2010

Flight time based on American Airlines records and crew statements:

Flight Time	**Hours**
Total	11,800
Total time in type (B-757)	3,582

Last 24 hours (not including incident flight)	5.5
Last 7 days	16.5
Last 30 days	69
Last 90 days	171

Most recent training and check completion dates:

Part 121 training/checks	**Date**
Recurrent (9 month cycle)	September 15, 2010
Recurrent (18 month cycle)	September 15, 2010
Recurrent (home study exam)	October 12, 2010
Line check - JAC	February 3, 2006
U.S. Division FO training	December 28, 2010

A check of FAA records showed that no enforcement actions had been taken against FO Brann.

2.2.1. The Second in Command's 72-hour History

The FO was off duty and at home for the 3 days prior to the incident flight. His off duty time was "normal". On Sunday, December 26, 2010, he went to bed about 2300 and awoke on Monday, December 27, 2010, about 0730. Monday night he watched television and went to bed that night about 2200. He awoke on Tuesday, December 28, 2010, about 0730. On Tuesday, December 28, the first officer flew from his residence in Kentucky to his base at ORD. He landed about 1730 local time and went to his residence there. He watched TV and went to bed about 2145. He awoke on Wednesday, December 29, 2010, about 0630. He said his rest was normal and he felt good when he awoke that morning and was well rested. He said if he got about 6-7 hours of rest per night he was "good". He was looking forward to flying on the day of the incident and the next day and then having the next two days off. His show time on Wednesday, December 29, was about 0830 or 0840. He ate a meal on the flight from ORD to JAC and had two cups of coffee that morning.

In the past 12 months, he had not had any major changes, good or bad, to his health, financial situation or personal life. He considered his health to be good to excellent. He was required to have reading glasses available when flying. He said he received a waiver for his color vision when he was tested in the military but did not have a restriction for color vision on his FAA medical because he passed the necessary test. He did not have any hearing problems and did not wear a hearing aid.

The FO occasionally took Allopurinol for gout and last took a pill on Saturday, December 25, 2010. He had no side effects when taking the medication. He also occasionally took ibuprofen. He last had an alcoholic beverage on Monday, December 27, 2010, and occasionally smoked a cigar. In the 72 hours prior to the incident, he did not take any prescription or non-prescription medications. The first officer was not tested for drugs or alcohol after the incident.

He said during the incident flight approach, workload was normal, nothing unusual. He was

familiar with the area and they had discussed all of the issues. He was very comfortable up until the point of deploying the TRs and "then things went south". He said there were no distractions on the approach and it felt like a normal landing.

He did not have any issues working for AAL and his was main concern was them staying in business. He never felt any pressures to continue a flight. He got along with the incident captain "pretty well".

Other pilots who flew with the FO said he was conscientious, alert and had a good state of mind. He was rated as well above average. The FO was described as easy going, professional, relaxed, and as creating a good cockpit environment.

3.0 Airplane Information

3.1. Weight and Balance Information:

The following information was obtained from the AAL ORD-JAC dispatch flight log, which included the flight release, load plan, takeoff performance data (TPS) and final close out figures. Limitations were obtained from the AAL 757/767 Operating Manual.

	Weight
Empty Operating Weight	134,772 lbs
Passenger Weight (175 adult incl14 child)[7]	32,613 lbs
Baggage (59 x 30 lbs.)	1,770 lbs
Freight	5,400 lbs
Zero Fuel Weight	174,555 lbs
Maximum Zero Fuel Weight*	185,358 lbs
Fuel	41,600 lbs
Ramp Weight	216,155 lbs
Maximum Allowable Ramp Weight*	251,000 lbs
Taxi Fuel Burn	665 lbs
Takeoff Weight	215,490 lbs
Maximum Allowable Takeoff Weight*	250,000 lbs
Maximum Takeoff Weight (Flt Release)	219,800 lbs
Fuel Burn Enroute	21,812 lbs
Planned Landing Weight	193,678 lbs
Actual Landing Weight	194,055 lbs
Maximum Allowable Landing Weight*	198,000 lbs

***** Airplane Flight Manual Limitations

According to the AAL Weight and Balance Control Manual, standard winter adult passenger weight, including a 16 lb allowance for a carry-on bag, was 195 lbs. Standard child

[7] Four lap children identified on the manifest were not included in the weight and balance figures.

passenger weight, applicable to all children between 2 and 12 years old, was 87 lbs. AAL's Operations Specification A099, "Large Cabin Aircraft Passenger and Baggage Weight Program," provided a standard checked baggage weight of 30 lbs. Ramp fuel of 41,600 lbs was shown on the dispatch flight log with an "A" suffix. According to the AAL 757/767 Operating Manual, Performance-Loading, page 10.2, an "A" suffix indicates actual fuel onboard as reported by the flight crew via the ACARS MISC 53 entry. This was updated on the auto radio closeout to 40,935 lbs prior to takeoff. The takeoff weight was taken from the AAL final closeout report.

The maximum takeoff weight on the flight release was based on landing limitations, denoted by an "L" suffix on the maximum takeoff weight (MTOW) figure. Estimated enroute fuel burn was taken from the flight release, and was based on a planned flight time of 2 hours 49 minutes.

The takeoff center of gravity (CG) was shown on the load closeout report as 28.3 % of the mean aerodynamic chord (MAC), which was within the forward limit of 10.6% MAC and the aft limit of 36.3% MAC.

The fuel remaining reported on the ACARS message following landing was 19,500 lbs., and based on the zero fuel weight of 174,555 lbs, the actual landing weight was 194,055 lbs.

3.2. Approach Speed

The AAL 757/767 Performance manual provided B-757 landing reference speeds in a chart on page 20-1.

757 VREF Speeds - KIAS

Gross Weight 1000 Lbs	Flaps 20	25	30
140	119	111	109
160	128	119	117
180	136	127	125
200	144	135	133
220	151	142	140
240	158	150	148

At gross weights lighter than140,000 lbs, use VREF for 140,000 lbs.

Figure 1 Chart of B757 Reference Speeds

The 757/767 Performance manual says interpolation is required when using this table. Based on the airplane's actual landing weight of 194,055 lbs, the VREF for the planned flaps 30 landing was 131 knots.

The AAL 757/767 Operating Manual, Volume I, page 10.4, says under the sub-heading "Approach Speed," that the method for calculating the approach speed is to add one half of the reported steady headwind component (SHC) plus the full gust increment (GI) above the steady wind to the reference speed. The SHC can be determined using the Wind Component Chart in the Performance Section. The manual further says on page 10-5 under the sub-heading "setting command bug speed," that one half of the reported headwind component can be estimated by using 50% for a direct headwind, 35% for a 45° crosswind, zero for a direct crosswind and interpolation in between. It says the maximum command speed should not exceed VREF + 20 knots when making adjustments for wind additives, and the minimum command speed setting is VREF + 5 knots. It says the gust correction should be maintained to touchdown while the steady headwind correction should be bled off as the airplane approaches touchdown.

Based on reported winds at JAC during the landing of 190 degrees at 6 knots, which were aligned with the runway heading, the SHC was 6 knots. Adding one half of 6 knots to VREF resulted in less than the minimum wind increment for calculating approach speed. The minimum approach speed was VREF + 5, and the calculated approach speed was 136 knots.

The incident FO stated in an interview that the VREF the crew used was 131 knots and the approach speed they flew was 136 knots.

3.3. Landing Performance

AAL summarized B-757 landing performance information for Jackson Hole on a single page entitled "757 Special Landing Analysis,"[8] which was located on page 20.7 in the AAL B-757 performance landing section of the Performance manual. This chart was referred to as "the green card" by the FO[9]. Data was presented in tabular form. The top part of the page provided runway and climb limited weights for dispatch, while the bottom part of the page provided required runway landing length for use in flight prior to landing.

3.3.1. Dispatch Landing Weight

According to the JAC "757 Special Landing Analysis" chart dispatch figures, the climb limited weight for dispatch would have been 247,500 lbs for a flaps 30 landing and a temperature 16°C and colder. The runway limited weight for dispatch was 198,300 lbs, based on flaps 30, winds calm[10], and a wet, 6,300 foot runway. Using the allowable headwind correction of 1000 lbs per knot, the runway limited weight would have increased to 199,400 lbs. However, both the climb and runway limited weights exceeded the structural limit of 198,000 lbs. The most limiting weight, and the weight used for dispatch, was the structural limit of 198,000 lbs.

3.3.2. Actual Landing Weight / Runway Distance Required

[8] See attachment 2
[9] Data specific to the 757 is printed on green in the AAL Performance Manual
[10] SHE 11 knots based on winds 220/13 at 1451Z

The JAC "757 Special Landing Analysis" chart showed that the required runway landing length for a landing weight of 198,000 lbs at flaps 30 on a "wet/good" runway was 6,300 feet, and on a "fair/medium" runway was 7,100 feet. The chart showed that for a landing weight of 190,000 lbs at flaps 30 on a "wet/good" runway, the required runway length was 6,060 feet, and on a "fair/medium" runway it was 6,870 feet. Interpolation between these figures to calculate the distances for a landing weight of 194,000 lbs showed a distance of 6,180 feet for the "wet/good" condition and 6,985 feet for the "fair/medium" condition.

The incident flight crew stated that they had assessed conditions at JAC before landing and determined that the runway was of sufficient length to land. The FO stated in an interview that the captain had been very active in finding out runway conditions in the morning and then about 45 minutes to an hour before landing he had talked to dispatch about landing conditions. He had estimated the landing weight to be 195,000 lbs, the winds to be negligible, and the mu readings acceptable. He was aware that another aircraft which had landed had reported good braking action. The captain stated in an interview that they had checked the landing distance chart for JAC and noted that they could land at a weight up to 198,300 lbs based on "good" braking action. He said that if conditions were less than "good," landing distance would be 7,100 feet. He recalled that the Mu readings of 43, 43, and 39 for the approach, middle, and far end of the runway respectively had been reported on the ATIS and confirmed by both tower and AAL JAC Operations and that he had seen worse conditions many times.

The AAL B-757/767 Fleet Captain stated in an interview that it was company policy for the pilot to use all available information to determine which runway condition column to use on the landing analysis chart. He said it was appropriate for the crew to evaluate the three Mu readings at JAC and to interpret them. He said the crew might base their decision on the use of the full length of the runway or on the first part of the runway, and he said that the far end of a runway can often be more slippery than the approach end.

Under the heading "Landing Performance Assessment Data" on page 50.1 of the 757/767 Performance manual, it stated:

> *"The FAA recommends the flight crew to confirm landing performance limits just prior to landing, using the actual runway conditions at the time of landing."*
>
> *"Flights are dispatched based on the assumption of wet or dry runway conditions at the time of arrival, regardless of any surface contaminants at the time of dispatch. If the landing conditions upon arrival are DRY/WET or GOOD braking, there is no need to do this assessment, because the requirements for dispatch are sufficient to assure adequate performance at the time of landing."*
>
> *"However, if conditions are determined to be less than GOOD braking (standing water, slush, snow, or ice), the flight crews should use the charts to confirm adequate runway length for landing. This assessment must take into account the meteorological conditions affecting landing performance (airport pressure altitude, wind velocity, wind direction, etc.), surface condition of the runway to*

be used for landing, approach speed, airplane weight and configuration, and planned use of airplane ground deceleration devices. Make the assessment with the most current weather and runway conditions as close as practical prior to beginning the approach."

Under the heading, "Runway Surface Conditions," on page 50.2 of the 757/767 Performance manual it stated: [11]

"Runway conditions can degrade or improve significantly in very short periods of time dependent on precipitation, temperature, usage, and runway treatment and could be significantly different than indicated by the last report. ***Flight crews must consider all available information, including runway surface condition reports, braking action reports, and friction Measurements.*** *Even though the analysis cannot be solely based on friction readings, if available, it should be part of the total consideration."*

"The flight crew must use the ***most adverse reliable and appropriate braking action report or the most adverse expected conditions*** *for the runway, or portion of the runway, that will be used for landing when assessing the required landing distance prior to landing."*

"One must consider the following factors in assessing runway conditions reports:

- *Age of the report*
- *Meteorological conditions present since the report was issued*
- *Type of airplane or device used to obtain the report*
- *Whether the runway surface was treated since the report*
- *The methods used for that treatment"*

"Flight crews are expected to use good judgment in determining the applicability of this information to their airplane's landing performance."

Under the heading, "Landing Data," on page 50.2 of the 757/767 Performance manual it stated:

"The Required Runway Landing Length data uses the FAR dispatch required runway length, for runway conditions ***Dry and Wet/Good, without credit for reverse thrust****. However for* ***Medium/Fair and Poor runway conditions****, the data is only based on expected landing distance,* ***with reverse thrust****, and a 15% margin.* ***It is imperative to understand the criteria used in calculating these tables to effectively use them in conjunction with good pilot judgment."***

[11] Bold in this section is original

Under the heading, "Correlating Expected Runway Conditions," on page 50.3 of the 757/767 Performance manual it stated:

> *"The correlation between different sources of runway conditions (e.g., PIREPs, runway surface conditions and Mu values) is an estimate. Under extremely cold temperatures or for runways that have been chemically treated, the braking capabilities may be better than the runway surface conditions estimated below. When multiple sources are provided (e.g., braking action medium, runway covered with ice and runway Mu is 27/30/28) conflicts are possible. If such conflicts occur, consider all factors including data currency and the type of airplane a PIREP was given from. Valid PIREP or runway surface condition reports are more reliable indicators of what to expect than reported runway Mu values."*

Under the heading, "Runway Friction Mu (μ) Reports," it stated:

> *"Mu values in the U.S. are typically shown as whole numbers (40) and are equivalent to the ICAO standard decimal values (.40). Zero is the lowest friction and 100 is the highest Mu friction. When the Mu value for any one-third zone of an active runway is 40 or less, a report should be given to ATC by airport management for dissemination to pilots. The report will identify the runway, the time of measurement, the type of friction measuring device used, Mu values for each zone and the contaminant conditions (e.g., wet snow, dry snow, slush, deicing chemicals)."*

A Braking Action Chart was provided on page 50.4 of the 757/767 Performance manual.[12] This chart was provided to flight crews as a guide to correlating braking action reports from different sources. It emphasized that runway mu values varied significantly, and that crews should attempt to ascertain the depth and type of contaminants to make an assessment of actual conditions.

3.3.3 Factors Affecting Landing Distance

The effect on typical landing distance by improper landing actions is shown in a figure on page 50.29 of the AAL 757/767 Operating Manual, Volume I, Approach – Landing – Go-around section.[13] The figure shows that for a typical landing with speedbrakes not extended and thrust reversers not deployed the landing distance increases by 1200-2800 feet, depending on runway conditions (excluding contamination).

3.4. Equipment and Systems

The following information is obtained from the AAL 757/767 Operating Manual Volume II.

[12] See attachment 3
[13] See attachment 4

3.4.1. Spoilers and Auto Speedbrakes

There are six spoiler panels located on the upper wing surface of each wing. Spoiler panels are used as speedbrakes to increase drag and reduce lift, both in flight and on the ground. The speedbrakes are controlled by the Speedbrakes Lever located on the control stand. The Speedbrake Lever has three marked positions, Down, Armed and Up. The Speedbrake Lever can be moved between Armed and Up. In the Armed position, when the landing gear is fully on the ground (not tilted) and the throttles are at idle, the Speedbrake Lever is driven aft to the UP position and the spoiler panels are fully extended. On the ground when either reverse thrust lever is moved to the reverse idle detent, the Speedbrake Lever is driven aft to the UP position and the spoiler panels are fully extended. The Speedbrake Lever does not need to be in the Armed position. The EICAS caution message "SPEEDBRAKES EXT" displays and the "SPEEDBRAKES" light illuminates if speedbrakes are extended when the flaps are in a landing position and radio altitude is 800 feet or below.

The "AUTO SPDBRK" light illuminates and the EICAS advisory message "AUTO SPEEDBRAKE" displays to indicate a fault is detected in the automatic speedbrake system which may result in the loss of automatic speedbrake extension. The speedbrakes can still be operated manually. The "AUTO SPDBRK" Light may illuminate and the EICAS advisory message "AUTO SPEEDBRAKE" may display momentarily when the Speedbrake Lever is moved to the Down position after the speedbrakes have been deployed automatically. Both the light and the message will extinguish when the panels are retracted. The "SPOILERS" Light illuminates and the EICAS advisory message "SPOILERS" displays to indicate that one or more spoiler pairs are inoperative.

3.4.2. Thrust Reverser System Description

Each engine has a hydraulically actuated fan air thrust reverser. Reverse thrust is available only on the ground. The reverse thrust levers can be raised only when the throttles are in the idle position. An interlock stop limits thrust to idle reverse while the reverser is in transit. The electronic engine controls (EECs) control thrust limits during reverser operation. When the reverse thrust levers are pulled aft to the interlock position the autothrottle disengages and the auto speedbrakes deploy.

When the reverser system is activated the reverser indication (REV) is displayed above each digital EPR indication in amber when the reverser is in transit and in green when the reverser is fully deployed. The reverse thrust levers cannot be raised to the maximum reverse thrust position until the interlock releases. Pressing the reverse thrust levers to the full down position retracts the reversers to the stowed and locked position. When the reverser reaches the stowed position, the amber REV annunciation disappears.

On the ground, the "L or R REV ISLN VAL" EICAS advisory message is displayed when a fault exists in the reverser system. If this fault is detected above 80 knots during takeoff, or in flight, the message is inhibited until after landing. An electro-mechanical lock prevents uncommanded reverser deployment in the event of additional system failures.

3.4.3. Autobrake System Description

The auto brake system provides automatic braking at pre-selected deceleration rates for landing. The system operates only when the normal / reserve brake system is functioning. Antiskid system protection is provided during auto brake operation. The AUTOBRAKES Light illuminates and the EICAS advisory message AUTOBRAKES displays if the autobrake system is disarmed or inoperative. Five levels of deceleration can be selected for landing. However, on dry runways, the maximum auto brake deceleration rate in the landing mode is less than that produced by full pedal braking. After landing, autobrake application begins when both throttles are retarded to idle, and the wheels have spun up. Auto brake application occurs slightly after main gear touchdown. Deceleration is limited until the pitch angle is less than one degree, then deceleration increases to the selected level. The deceleration level can be changed (without disarming the system) by rotating the selector.

To maintain the selected airplane deceleration rate, auto brake pressure is reduced as other controls, such as thrust reversers and spoilers, contribute to total deceleration. The system provides braking to a complete stop or until it is disarmed. Auto brake disarms if pedal braking is applied, if either throttle is advanced after landing, if the Speedbrake Lever is moved from the full up position after the speedbrakes have deployed on the ground, if DISARM or OFF position is selected on the Auto Brakes Selector, if the is an auto brake fault or if there is an antiskid fault.

When the auto brake system disarms after landing, the Auto Brakes Selector automatically moves to the DISARM position, the AUTO BRAKES Light illuminates, and power is removed from the auto brake system.

4.0 Airport Information

4.1. Jackson Hole Airport

The Jackson Hole Airport is located approximately 10 miles north of the town of Jackson, Wyoming, at an elevation of 6,451 feet above mean sea level (MSL). The airport is situated in the Snake River Valley, and is surrounded by steeply rising terrain in all directions. The steepest mountains to the west rise as high as 13,770 feet MSL. According to the Jackson Hole airport board, the airport is served by six major airlines and had 8,040 commercial air carrier aircraft operations in 2008. The airport's only runway, runway 1/19, is 6300 feet long and 150 feet wide, and is composed of asphalt with a porous friction course (PFC) overlay. Runway 19 has an ILS, two RNAV[14] and one VOR/DME[15] approaches and runway 1 has two RNAV and one VOR/DME approaches. The runway 19 slope is 0.6% downhill.

4.2. Airport Approach Plates and Information

4.2.1. Runway 19 ILS Approach

The incident crew used Jeppesen approach plates. The Jeppesen JAC airport information page 10-9A showed that that runway 19 had high intensity runway lights (HIRL), a medium

[14] Area navigation
[15] Very high frequency omnidirectional radio range (VOR)/distance measuring equipment (DME)

approach lighting system (MALS), and a precision approach path indicator (PAPI) with a 3.0° angle, and that the useable runway length landing beyond the ILS glide slope was 5,171 feet.

The Jeppesen JAC 11-2 page, ILS Z Rwy 19, showed straight-in landing minimums as a decision altitude of 6,651 feet (MSL), 200 feet above touchdown, with a visibility required of ¾ mile.[16]

4.2.2. AAL Airport Information Pages

AAL provided specific information about JAC to crews on special airport information pages. These pages were the 10-4 and 10-4A on noise abatement, the 10-7S, T, U, and V arrival pages, and the 19-01, 19-02, 19-03 and 19-04 overview pages.[17]

Excerpts from these pages included the following remarks:

- Mountainous terrain in vicinity of airport.
- Check minimum IFR altitudes and grid MORA's.[18]
- Use EGPWS[19] in terrain display mode (TERR) for enhanced situation awareness.
- Mandatory review of airport qualification pages.
- Braking action – mu meters.
- Gradual rising terrain to the north of runway 19 threshold may create the illusion of being low on final.
- High altitude airport with short runway.
- Expect turbulence on approach. Seat flight attendants prior to descending below 15,000' MSL.
- Monitor ground speed due to high TAS[20] at altitude. Recommend initiating IFR approaches at 180 knots for turn radius protection.
- Moderate or greater icing may occur if IMC[21] over Jackson Lake north of airport.
- Touch down within the first 1000' of runway.
- Last 1500' of runway may be slick due to frozen snow melt.

4.3. Automatic Terminal Information Service (ATIS)

JAC had an ATIS operating on frequency 120.52. The last two ATIS recordings before the incident landing were:

"Jackson Hole airport information Victor (V) at 1745 Z, wind 230 degrees at 10 knots, visibility ¾ mile with light snow, sky conditions 400 foot (AGL) broken layer, 1000 foot overcast, temperature -4 (C), dew point -7 (C), altimeter setting 29.16, landing and departing runway 19, ILS 19 in use , runway 19 mu 45/54/32 at time 1710Z by Saab friction tester. Runway conditions thin loose snow

[16] See attachment 8
[17] See attachment 9
[18] Minimum off route altitudes
[19] Enhanced ground proximity warning system
[20] True air speed
[21] Instrument meteorological conditions

over patchy snow and ice. Pilot report at 1737 Z by a Challenger 30, runway 19, first 2/3 braking action good, last 1/3 braking action poor. Hazardous weather information for northwest region available from flight watch or flight service. Braking action advisories are in effect."

"Jackson Hole airport information Whiskey (W) at 1815 Z, wind 190 degrees at 6 knots, visibility ¾ mile with light snow, sky conditions 400 foot (AGL) broken layer, 1000 foot overcast, temperature -5 (C), dew point -7 (C), altimeter setting 29.14, landing and departing runway 19, ILS 19 in use, runway 19 mu 43/43/39 at time 1810Z by Saab friction tester. Runway conditions thin loose snow over patchy snow and ice. Pilot report at 1737 Z by a Challenger 30, runway 19, first 2/3 braking action good, last 1/3 braking action poor. Personnel and equipment working in vicinity of runway. Hazardous weather information for northwest region available from flight watch or flight service. Braking action advisories are in effect."

5.0 Organizational and Management Information

5.1. American Airlines, Inc

According to its website, American Airlines, Inc., the principal subsidiary of AMR Corporation (AMR), was founded in 1934. All of American's common stock is owned by AMR. At the end of 2008, American provided scheduled jet service to approximately 150 destinations throughout North America, the Caribbean, Latin America, Europe and Asia.

In addition, American has capacity purchase agreements with two wholly-owned subsidiaries of AMR, American Eagle Airlines, Inc. and Executive Airlines, Inc. (collectively, AMR Eagle or the AMR Eagle carriers), and two independently owned regional airlines, which do business as the "AmericanConnection" (the AmericanConnection® carriers). The AMR Eagle and AmericanConnection® carriers provide connecting service from eight of American's high-traffic cities to smaller markets throughout the United States, Canada, Mexico and the Caribbean.

American, AMR Eagle, and the AmericanConnections® airlines serve 250 cities in 40 countries with, on average, more than 3,400 daily flights. The combined network fleet numbers approximately 900 aircraft. American Airlines is also a founding member of the global **one**world® Alliance. Together, oneworld members serve nearly 700 destinations in over 150 countries, with 8,500 daily departures.

5.2. Operations Management Organization

The B-757/767 Fleet Support Team consisted of a Fleet Captain, a Fleet Training Manager, a Program Manager, a Fleet Specialist, a Ground School Supervisor, and a Performance Specialist, according to the AAL Flight Manual, part 1, page 10. The Fleet Captain and Fleet Training Manager were interviewed during the investigation.[22] The team was responsible for the operating and performance manuals, checklists and quick reference guides, and related messages and guidance.

[22] See attachment 1

The incident crew members were supervised by a Managing Director of Flight and Chief Pilot in the Chicago (ORD) base, shown in the AAL Flight manual, part 1, page 8.

5.3. Operational Procedures

Operational procedures are discussed in the AAL 757/767 Operating Manual, Volume I. Relevant excerpts are presented here.

5.3.1. Approach Briefings

Under the heading "Approach Briefing" presented on page 15.8 of the 757/767 Operating Manual, Volume I, Climb – Cruise – Descent section, it stated:

> *"The approach briefing is completed prior to top of descent, to the extent possible, to minimize distractions in high-density operations at lower altitudes. The Captain will conduct whatever briefing is appropriate to the situation (e.g., poor weather, inexperienced crewmember, special qualification airports, etc.). The Captain may delegate the briefing to the F/O (Pilot-Flying).*
>
> *Each pilot is responsible for reviewing the applicable approach chart. Set-up for the instrument approach, if available. Crosscheck the Jeppesen page against the FMS data for the arrival, approach and missed approach.*
>
> *The approach briefing shall include as a minimum:*
> - *Identify the landing runway*
> - *Identify the back-up approach, if available.*
>
> ***NOTES***
> - *For visual approaches, runway changes do not require a new briefing.*
> - *The back-up instrument approach need not be briefed.*
>
> ***Instrument Approach or Night VMC Approach Briefing***
> *The approach briefing shall include as a minimum:*
> - *Airport and approach name*
> - *Page number and revision date*
> - *Briefing strip information*
> - *Weather minima - Visibility, RVR, and Ceiling, whichever is applicable.*
>
> ***For All Approaches***
> *Other considerations, if appropriate:*
> - *Runway specific engine failure profile*
> - *Weather considerations*
> - *Runway surface conditions*
> - *Terrain considerations*
> - *LAHSO and / or SMGCS procedures*

- *Any other variables associated with the landing / missed approach*
- *Alternate airport and routing*
- *Initial turn off and taxi considerations.*

5.3.2. Before Landing Procedure

The AAL 757/767 Operating Manual, Volume I, Approach – Landing – Go-around section, page 10.6, Auto Brakes, said:

"Autobrakes, if operative, must be armed prior to landing when any of the following conditions exist:

- *Runway length 7500 feet or less – setting of 2 minimum.*
- *RVR less than 4000 or visibility less than ¾ mile.*
- *Runway contaminated with standing water, snow, slush or ice.*
- *Braking conditions reported less than good.*
- *For all cat II and cat III landings –autobrakes 3 or 4, if operable."*

"In addition, the use of Auto Brakes is recommended when landing with gusty winds or crosswinds. Auto Brake settings should be appropriate to the conditions: MAX must be used when minimum stopping distance is required (MAX Auto Brake deceleration rate is slightly less than that produced by full manual braking). After landing, intervene with manual braking as necessary to slow the airplane at the desired rate."

On the same page, under the heading "Spoilers," it states:

"*The Auto Speedbrake system, if operative, will be armed for all landings."*

5.3.3. Stabilized Approach

Under the heading "Stabilized Approach Requirements" presented on page 15.3 of the 757/767 Operating Manual, Volume I, Approach – Landing – Go-around section, it states:

"Significant speed and configuration changes during an approach can complicate aircraft control, increase the difficulty of evaluating an approach as it progresses, and complicate the decision at the decision point; e.g., DA, DH, MDA. A pilot must assess the probable success of an approach before reaching the decision point. This requires the pilot to determine that requirements for a stabilized approach have been met and maintained.

To limit configuration changes at low altitude, the airplane must be in landing configuration by 1000 feet AFL (gear down and landing flaps).

A stabilized approach must be established before descending below the following minimum stabilized approach heights:

- *IMC – 1000 feet AFL*
- *VMC – 500 feet AFL.*

Normal bracketing is defined as small corrections in airspeed, rates of descent and variations from lateral and vertical path. Normal bracketing is a part of any instrument or visual approach procedure. Frequent or sustained variations are not normal bracketing excursions and are not acceptable.

A stabilized approach with normal bracketing means the airplane must be:

- *At Approach Speed*
  - *Minimum: Approach Speed - 5 knots*
  - *Maximum: Approach Speed + 10 knots*
- *On the proper flight path at the proper sink rate,*
- *At stabilized thrust (spooled up).*

If the stabilized approach requirements cannot be satisfied by the minimum stabilized approach heights or maintained throughout the rest of the approach then the Pilot-Flying is responsible for executing a go-around. If the Pilot-Monitoring observes that the Pilot-Flying is not executing a go-around, he or she is responsible for directing a go-around. The directed go-around will be executed unless an emergency situation overrides this requirement.

5.3.4. Landing Procedure

A summary of the B-757 landing procedure is presented on page 50.1 of the 757-767 Operating Manual, Volume I, Approach – Landing – Go-around section[23]. The following information is noted:

- A note under the heading "Pilot-Flying" states "Close throttles within 2 seconds after touchdown or auto brake system will disarm."
- "Speedbrake Handle – Check Full Aft," and Call Out – 'Deployed' when spoilers deploy or 'No Spoilers' if the spoilers do not deploy (or fail to remain deployed), the Captain will manually deploy the spoilers."
- Under the heading "Pilot-Monitoring" it states "if the green reverse thrust annunciation (REV) is not displayed on either engine, call out – 'No reverse__engine." Call out – '100,' '80,' and '60' knots."
- Under the heading "Pilot-Monitoring" it states "Call out – 'Auto Brakes Off' if the AUTO BRAKES light illuminates during the landing roll."

5.3.4.1. Bounced Landing Recovery

[23] See attachment 5

Under the heading "Bounced Landing Recovery" presented on page 50.15 of the 757-767 Operating Manual, Volume I, Approach – Landing – Go-around section, it states:

> *"If higher than idle thrust is maintained through initial touchdown, the automatic speedbrake deployment may be disabled even when the speedbrakes are armed. This can result in a bounced landing. If the speedbrakes started to extend on the initial touchdown, they will retract once the airplane becomes airborne again on a bounce, even if thrust is not increased. The speedbrakes must then be manually extended after the airplane returns to the runway."*

5.3.4.2. Landing Roll

Under the heading "Landing Roll" presented on page 50.25 of the 757-767 Operating Manual, Volume I, Approach – Landing – Go-around section, it states:

> *"After main gear touchdown, initiate the landing roll procedure. If the speedbrakes do not extend automatically move the Speedbrake Lever to the UP position without delay. Fly the nose wheels smoothly onto the runway without delay."*

Under the heading "Speedbrakes," it says:

> *"The speedbrakes can be fully raised after touchdown while the nose wheels are lowered to the runway, with no adverse pitch effects. The speedbrakes spoil the lift from the wings, which places the airplane weight on the main landing gear, providing excellent brake effectiveness.*
>
> *Unless speedbrakes are raised after touchdown, braking effectiveness may be reduced initially as much as 60%, since very little weight is on the wheels and brake application may cause rapid antiskid modulation.*
>
> *Normally, speedbrakes are armed to extend automatically. Both pilots should monitor speedbrake extension after touchdown. In the event auto extension fails, the speedbrake should be manually extended immediately.*
>
> *Pilot awareness of the position of the Speedbrake Lever during the landing phase is important in the prevention of over-run. The position of the speedbrakes should be announced during the landing phase by the PM. This improves the crew's situational awareness of the position of the spoilers during landing and builds good habit patterns which can prevent failure to observe a malfunctioned or disarmed spoiler system."*

The AAL 757/767 Operating Manual, Volume I, Approach – Landing – Go-around section, pages 50.30, 50.31 and 50.32 state:

> *"Use of the auto brake system is recommended whenever the runway is limited, when using higher than normal approach speeds, landing on slippery runways, or landing in a crosswind."*

"Settings include:
Max Auto: Used when minimum stopping distance is required. Deceleration rate is less than that produced by full manual braking..
3 or 4: Should be used for wet or slippery runways or when landing rollout distance is limited. Requirement for all CAT II and CAT III landings, if operable.
1 or 2: These settings provide a moderate deceleration suitable for all routine operations."

"After touchdown, crewmembers should be alert for auto brake disengagement annunciations. The PM should notify the PF anytime the auto brakes disengage. If stopping distance is not assured with auto brakes engaged, the PF should immediately apply manual braking sufficient to assure deceleration to a safe taxi speed within the remaining runway. A table in the PERF section shows the relative stopping capabilities of the available auto brake selections."

*"**NOTE***
The Pilot-Monitoring should be alert for the amber AUTO BRAKES Light during the landing roll to announce 'Auto Brakes off' so that manual braking procedures can be initiated."

Regarding the use of manual brakes, it states:

"Distractions arising from a malfunctioning reverser system can also result in delayed manual braking application."

The AAL 757/767 Operating Manual, Volume I, Approach – Landing – Go-around section, page 50.34 states:

"After touchdown, with the thrust levers at idle, rapidly raise the Reverse Thrust Levers up and aft to the interlock position, then apply reverse thrust as required. The PM should monitor engine operating limits and call out any engine operational limits being approached or exceeded, any thrust reverser failure, or any other abnormalities."

"When commanding Reverse Thrust Lever deployment, move the levers from the stowed (full-down) position to the reverse idle detent smoothly and without delay (approximately 1 - 2 seconds). If transit time of the Reverse Thrust Levers from the stowed to the reverse idle detent exceeds 2 seconds, a L and / or R REV ISLN VAL advisory message and REV ISLN Light may illuminate."

***"NOTE:** Reverse thrust is most effective at high speeds."*

5.3.5. Evacuation Procedure

The Ground Evacuation checklist was in tab 14 of the QRH and was duplicated on the QRH

back cover.[24] The initial condition for the procedure was that a ground evacuation is required. A note at the beginning of the checklist stated:

*"This checklist may be discontinued prior to initiating the evacuation if a decision is made that evacuation is **not** the best course of action. If the decision is made **not** to evacuate and the Flight Attendants are anticipating an evacuation, command:*

"REMAIN SEATED, REMAIN SEATED."

The QRH Emergency/Abnormal preface section, page 7, Cabin Condition, states;

"The flight crew should ascertain conditions in the passenger cabin as soon as possible after completion of crew duties following any incident or emergency having a possible effect in the cabin (injury, panic, etc.). By interphone, determine condition of the passengers, Flight Attendants and cabin itself."

"Assess any problems that might have resulted from the incident and make any necessary PA's to assist the Flight Attendants in calming and reassuring the passengers. Contact ground station, requesting specific assistance needed on arrival."

Under "Airplane Condition," it states:

"Once crew duties have been completed following any incident or emergency that might involve damage to the airplane or the engines, a visual inspection of the affected area should be made, to the extent possible, to assess the damage or condition.

- *Attempt to anticipate any problems that could result from the observed condition.*
- *Make any necessary PA's to assist the Flight Attendants in calming and reassuring the passengers.*
- *Advise ATC and the company of the observed condition of the airplane, and request any specific assistance that might be needed upon landing."*

5.4. Training

AAL operates under the Advanced Qualification Program (AQP). The AAL AQP manual lists four training curricula for pilots – Indoctrination, Qualification, Continuing Qualification and Special Training. Recurrent training, a part of Continuing Qualification, operates on a 9 month cycle with curriculum alternating every 9 months. Sessions are identified as R9 and R18. Each curriculum may be divided into four segments: distance learning, ground training, flight training, and qualification, as applicable. Each segment may be further subdivided into modules and lessons for efficient instruction and testing.

5.4.1. Thrust Reversers

[24] See attachment 7

According to pilots interviewed, they received an asymmetrical thrust reverse scenario occasionally during training and it usually coincided with a single engine landing. The PM was trained to call "No reverse" and indicate which reverser did not deploy. If the PM failed to make the call out, it would be debriefed.

5.4.2. Auto Spoilers

According to the B-757/767 Fleet Training Manager, failure of the auto spoilers during landing was not a programmed training event but was left to the discretion of the instructor or check airmen under what was known as a "variable event"[25].

5.4.3. Special Airport Training

JAC was listed as a special requirements airport in the AAL Flight Manual, Part 1, Section 3 "Crew Qualification and Responsibility". Pages 20-21 of the manual provided a chart of special qualification airports and their requirements. It showed under "airport familiarization requirements" for JAC that:

- Flight Crewmembers must have reviewed the approved photo pages and Ops Advisory pages (if published) in Flight Manual Part II.
- The Captain must have reviewed the software-based Airport Familiarization program for this airport prior to initial entry

Under "qualification requirements" it said:

- Equipment experience requirement: The Captain must have had 75 hours as PIC in aircraft type and the FO must have had 75 hours in aircraft type unless the PIC was a Check Airman.

The JAC familiarization video was approximately 5 minutes long and depicted the "most demanding scenario possible" when flying in to JAC, specifically the "VOR/DME runway 01 approach with a visual landing on runway 19". The video was a computer animation of a flight approaching JAC including ATC and aircraft transmissions. A narrator instructs on airplane performance, when to descend and/or turn, noise abatement, ground visual references to assist the approach, and visual illusions. The video also instructs pilots to land in the first 1000' of runway and advises that the last 1500' of runway may be slick due to frozen snow melt. The maximum tailwind when landing was 5 knots. Braking action must be good or better to land with a tailwind and autobrakes (minimum 3), if operative, should be used.

The captain said that he had watched the video, but that it was not required every year and he did not remember the last time he had seen it. The FO said that he had done an initial special airport qualification flight at JAC with a check airman, and that he had not viewed the special airport video on the airport produced by AAL because he had flown in there every year. According

[25] According to the AQP manual, page 8-7, variable (elective) maneuvers are simply a sampling of all other proficiency objectives chosen by the instructor or check airmen, along with any other Fleet-specific training items determined by the Fleet Manager. Fleet-specific training items will be identified in writing with a copy to the APM.

to pilot interviews, pilots flying to JAC for the first time used to be required to fly in with a check airman. The pilots indicated their preference for flying to JAC for the first time with a check airman rather than watching a video, which they thought was only a good refresher. The AAL Flight Manual Part 1, Section 3 "Crew Qualification and Responsibility," page 17, stated that "Captains may request through their Chief Pilot, that a check airman accompany them into special airports. If a Check Airman cannot be scheduled, the Captain making the request should be removed from the flight and scheduled to deadhead in the cockpit for the purpose of observing the arrival and/or departure".

E. LIST OF ATTACHMENTS

Attachment 1: Interview Summaries

Attachment 2: 757 Special Landing Analysis Jackson Hole, WY

Attachment 3: Braking Action Chart

Attachment 4: Factors Affecting Landing Distance

Attachment 5: Landing Procedures

Attachment 6: Reverse Thrust Operation

Attachment 7: Ground Evacuation Checklist

Attachment 8: Airport Diagram and Approach Plate

Attachment 9: AAL Airport Information Pages

Attachment 10: Flight Release and Final Load Data

Attachment 11: ACARS Field Condition Updates