



**PETITION TO THE SECRETARY OF TRANSPORTATION
TO CONDUCT RULEMAKING TO PREVENT INCIDENTS OF
EXTREME ON BOARD TEMPERATURE CONDITIONS
ON COMMERCIAL AIRPLANE FLIGHTS**

Submitted by the Association of Flight Attendants-CWA, AFL-CIO

July 2, 2018

Summary

Pursuant to § 553(e) of the Administrative Procedure Act (5 U.S.C. ch. 5, subch. I § 500 *et seq.*), the Association of Flight Attendants-CWA, AFL-CIO (AFA) hereby petitions the Secretary of the U.S. Department of Transportation (DOT) to conduct rulemaking to establish operational temperature standards on commercial airplanes. These standards should apply to all passenger airplane flights operated by U.S. commercial airlines, as well as by foreign airlines flying into and out of U.S. states and territories. The need for the DOT to enact a rule to set comfortable cabin temperature standards, which will help to ensure provision of safe and adequate transportation by commercial passenger airplane operators, is clearly in the public interest.

Background

For years, AFA has heard from flight attendants that regulations are needed to prevent incidents of extreme temperatures on commercial airplanes. Flight attendants ensure the safety, health and security of all occupants in the cabin. We accomplish our duties in spite of chronic understaffing exacerbated by significant increases in security duties since the tragic events of 9/11/2001. The resulting economic pressures that buffeted the airlines have led to flights that now often average (during peak travel months) in excess of 85% passenger seat occupancy rates.¹ High occupancy rates contribute to increased discomfort and stress, adversely impact the emotional and physical health of passengers and crew, and, ultimately, increase risks to operational safety and security.

In recent years, there have been numerous incidents of extreme temperature conditions on passenger airplanes that have intensified the problems created by in-flight crowding. Several of these incidents have been significant enough to warrant national media reports. Just last summer, one of these took place in Denver, CO in June 2017, about which the Associated Press (AP) wrote that an infant “sweltered” in an “oven with wings” before being taken away in an

¹ Airline load factors for scheduled domestic and international travel grew from 73.48% in 2003 to 83.5% in 2017 (calendar year averages), with domestic-only peaks of 87% during June and July of 2017, based on Bureau of Transportation Statistics data available at <https://www.transtats.bts.gov/TRAFFIC/>

ambulance for treatment; fortunately, doctors “determined the baby suffered no lasting effects.”² Weeks later, the mother of the infant spoke to ABC News and told the network that she was speaking out “in hopes that another mom or parent never has to go through this ever again.”³ Also noted in the above AP story were two earlier incidents from the summer of 2013. In the first, several passengers “fell ill as their plane sat on the tarmac in the blazing desert heat in Las Vegas.” The second occurred a month later when “more than 150 ... passengers were forced to sweat it out for 2½ hours in Phoenix after a maintenance problem knocked out air conditioning on the plane.”

Of course, media reports of temperature events represent the tip of the iceberg; nearly all incidents, many of which are reported by airline crewmembers to their employers and/or government agencies, receive far less public scrutiny. In Appendices 1 and 2, examples of such reports are listed. Appendix 1 includes ten reports obtained from a database search of the NASA Aviation Safety Reporting System (ASRS), a confidential, voluntary program that allows crewmembers to report incidents without fear of retaliation by their employer or the Federal Aviation Administration (FAA).⁴ Appendix 2 provides a sampling of flight attendant reports.

In addition to reviewing reports from crewmembers, AFA has conducted multiple surveys of cabin temperature and humidity during hot summer months. In each survey, AFA selected and trained a number of our member flight attendants and provided them with personal, digital temperature/humidity probes to obtain accurate measurements in the cabin as they worked over periods of several weeks. Two of these surveys are summarized in Appendix 3. These data show clearly that unhealthy levels of “heat index,” which is a measure of “how hot it really feels when relative humidity is factored in with the actual air temperature,”⁵ occur too often in the cabins of commercial aircraft.

No Existing Cabin Temperature Requirements

Last summer, despite years of extreme cabin temperatures experienced by passengers and crewmembers, no DOT or FAA rules were in place to require airlines to prevent incidents such as the one involving the infant taken from the Denver airport tarmac in an ambulance following his exposure to life-threatening heat. In the year since, no regulations have been proposed to prevent the occurrence of similar incidents.

This is not to imply, however, that there are no cabin temperature regulations at all. There is in fact exactly one relevant regulation that addresses some aspects of cabin temperature conditions: 14 CFR § 25.831 is an FAA rule that specifies standards for the design of aircraft ventilation systems. In particular, 14 CFR § 25.831(f)(2) requires no more than a 5 degrees F. difference between the cockpit and the cabin, but does not specify an acceptable range of temperatures in

² *FAA Doesn't Specify How Hot Is Too Hot in a Grounded Airplane*, Associated Press, July 15, 2017 (available at <https://www.nbcnews.com/business/travel/faa-doesn-t-specify-how-hot-it-can-be-grounded-n783346>).

³ Jeffrey Cook, *Mother of infant who overheated on plane: 'I thought I was going to lose my son'*, ABC News, July 13, 2017 (available at <http://abcnews.go.com/US/mother-infant-overheated-plane-thought-lose-son/story?id=48608930>).

⁴ NASA ASRS, <http://asrs.arc.nasa.gov/index.html>. The reports were obtained from a search of the ASRS database for all report synopses containing the word “temperature” among 14 CFR Part 121 flights operated since January 2013.

⁵ National Oceanic and Atmospheric Administration National Weather Service, *Heat Index*, no date (available at <http://www.weather.gov/safety/heat-index>).

either the cabin or the cockpit, and only addresses the design of the system by the manufacturer, not its operation by the airline. This means that there are currently no operational temperature standards that apply to the actual airplane environment for passengers and crews. Our petition shows evidence of the necessity of DOT regulatory action to prevent actual consumer harm.

With respect to non-regulatory measures, the FAA does provide limited guidance on cabin temperatures to airlines in Advisory Circular (AC) 121-35. This AC states that “[a]ir carriers should be aware of possible health hazards to passengers and crew and make every effort to ensure that aircraft cabins are well ventilated at all times.” While AC 121-35 recommends (but does not require) deplaning aircraft if there is no ventilation for 30 minutes, it does not address situations when existing ventilation systems are functional but inadequate, as may occur in airports located in very hot or cold climates.

Related Governmental Actions

One specific scenario that sometimes leads to extreme cabin temperature conditions is the extended delay on the tarmac. Some of the negative implications of these incidents have been mitigated by the DOT tarmac delay rule (14 CFR § 259.4) which, with a few exceptions, prohibits aircraft in domestic flight operations from remaining on the airport tarmac for more than three hours before allowing passengers to deplane, and aircraft in international flight operations from being delayed on the ground for more than four hours before allowing passengers to deplane. The rule also specifies measures to ensure passengers have access to food and potable water (14 CFR § 259.4(b)(3)) and that lavatories are operable and medical attention is available (14 CFR § 259.4(b)(4)). The intent of these health and comfort measures in particular is summarized in § 259.4(e)(3), which requires that airlines retain records regarding the “actions taken to minimize hardships for passengers.” Still, limiting a tarmac delay to either three or four hours does not prevent cabin occupants from being overheated if the outside conditions are hot and the cooling being provided from the supply air is inadequate.

The tarmac delay rule was first proposed by the DOT in an Advance Notice of Proposed Rulemaking in November, 2007.⁶ Subsequently, in December, 2008, the DOT published a Notice of Proposed Rulemaking (NPRM), *Enhancing Airline Passenger Protections*.⁷ In this NPRM, the DOT stated that the proposal “does not address ventilation, because we have no basis at this stage to assess the adequacy of ventilation or to require potentially significant modifications to aircraft.”⁸ As a result, the final tarmac delay rule, promulgated in December, 2009,⁹ failed to address temperature or ventilation standards.

In February, 2012, Congress enacted the “FAA Modernization and Reform Act of 2012.”¹⁰ Section 42301 of this statute requires air carriers and airports to submit emergency contingency plans to the DOT Secretary for review and approval. Among other things, these plans must describe how carriers will “provide adequate food, potable water, restroom facilities, *comfortable cabin temperatures* [emphasis added], and access to medical treatment for passengers onboard an aircraft at the airport when the departure of a flight is delayed or the disembarkation of

⁶ 72 FR 65233, Nov. 20, 2007.

⁷ 73 FR 74585, Dec. 8, 2008.

⁸ *Id.*, p. 74590.

⁹ 74 FR 68983, Dec. 30, 2009.

¹⁰ PL 112-95, Feb. 14, 2012.

passengers is delayed.”¹¹ By specifically requiring plans to provide comfortable cabin temperatures, it appears that Congress may have viewed the DOT’s decision to not address ventilation (and therefore temperature) in its December, 2008 NPRM as an oversight in need of correction.

In 2014, the DOT Inspector General (DOTIG) published an audit report¹² as an update to an earlier report and also to “examine the impact of flight delays and cancellations on air travelers.”¹³ Among its numerous observations regarding actions taken by the DOT, airlines, and airports to address long flight delays, the DOTIG noted¹⁴ that the DOT had neither defined nor required comfortable cabin temperatures, despite the 2012 statutory requirement discussed above. To address various regulatory and enforcement issues the DOTIG report provides seven specific recommendations; the last of these addresses comfortable cabin temperature:

7. Define comfortable cabin temperature and include the requirement in DOT regulations. In the interim, issue guidance to the industry that defines comfortable cabin temperature.¹⁵

Proposal for Rulemaking

Extreme temperatures clearly impose hardships on passengers and crewmembers. In addition, since February 2012, Congress has mandated that carriers have emergency contingency plans to provide comfortable cabin temperatures. To address the lack of temperature requirements, a revision to the tarmac delay rule may be one way to regulate cabin temperatures, at least for aircraft while on the ground. The best approach will be to promulgate a rule to limit on board temperature extremes during all phases of flight. Most temperature extremes are seasonal and occur during ground operations, although once an airplane is uncomfortably hot or cold on the ground, in some cases the airplane’s environmental control system may have difficulty mitigating extreme temperatures even after takeoff and during flight. Crewmembers have also reported to AFA extremely cold conditions onboard, both on the ground (depending on the season and airport station) and near the cabin doors inflight when seated near doors with imperfect seals.

Regardless of the rulemaking method chosen, AFA strongly recommends that the DOT adopt the reasonable cabin temperature limits specified in a standard developed by Standard Project Committee 161 of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). This standard, ASHRAE 161, *Air Quality within Commercial Aircraft*, was developed through a consensus process by a committee that included members from aircraft and component manufacturers, airlines, and crewmember and passenger groups. First published in 2007, ASHRAE 161 has undergone two subsequent revisions, in 2013 and 2018. The current

¹¹ *Id.*

¹² Office of the Secretary of Transportation Office of Inspector General, *OVERSIGHT WEAKNESSES LIMIT DOT’S ABILITY TO ENSURE PASSENGER PROTECTIONS DURING LONG, ON-BOARD FLIGHT DELAYS*, Report Number AV-2015-001, October 9, 2014.

¹³ *Id.*, p. 2.

¹⁴ *Id.*, p. 3.

¹⁵ *Id.*, p. 12.

version of the standard, ASHRAE 161-2018,¹⁶ recommends the following temperature ranges for commercial aircraft:

- Target range inflight and on the ground: 65 – 75°F.
- Maximum allowed temperature on the ground: 65 to 80°F. (with an allowance for a maximum temperature 85°F. if all in-flight entertainment are operating on)
- Maximum allowed temp. inflight: 80°F.

The ASHRAE standard also defines maximum surface temperature differentials, both for seated occupants and for galleys located adjacent to doors, in order to avoid cold localized areas. Unfortunately, despite the fact that ASHRAE 161 was first published in 2007 as an industry consensus standard, the FAA has failed to encourage its adoption by airlines, and no airline has stepped up to implement the standard's reasonable and appropriate cabin temperature operational limits.

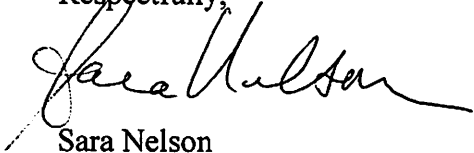
Therefore, to address the lack of regulatory limits on temperatures in the cabins of commercial aircraft and to ensure the safety, health, and comfort of airline passengers and crewmembers, which is in the public interest, AFA petitions the DOT to:

- 1) Exercise its rulemaking authority under 49 U.S.C. Subtitle VII, including, but not limited to, 49 U.S.C. 41712 and 42301, to propose and promulgate regulations that adopt the cabin temperature standards published in ASHRAE 161. These standards should include, but not be limited to, the provisions in ASHRAE 161 Section 5 General Requirements and Section 5.2 Temperature, and apply to all commercial passenger flights operated by U.S. commercial airlines, as well as by foreign airlines operating to and from U.S. states and territories.
- 2) Issue guidance encouraging airlines to adopt the cabin temperatures standards published in ASHRAE 161 until a final rule is issued.
- 3) Establish an advisory committee to conduct ongoing reviews of airplane cabin environmental data and conditions and assist and advise the DOT in proposing rules and standards to ensure the highest levels of safety, health, and comfort for airline passengers and crewmembers.

¹⁶ *Description accessed May 30, 2018 at <https://www.techstreet.com/ashrae/standards/ashrae-161-2018?gateway_code=ashrae&product_id=2001169>.*

Thank you for your prompt, thoughtful consideration of this petition. We invite the DOT to review the data contained in Appendices 1 - 3, which show clearly the significance and pervasiveness of extreme airplane cabin temperature incidents, as well as the resulting adverse impacts to public health and safety. We look forward to working with the DOT and the commercial aviation industry to support efforts to improve regulation of airplane cabin temperatures.

Respectfully,

A handwritten signature in black ink, appearing to read "Sara Nelson", written in a cursive style.

Sara Nelson
President

Attachments: Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions
Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions
Appendix 3: Data Summaries from Two Cabin Heat Stress Surveys

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1479695 (1 of 10)

Time / Day

Date : 201709

Local Time Of Day : 1201-1800

Place

Locale Reference.Airport : ZZZ.Airport

State Reference : US

Altitude.MSL.Single Value : 10000

Environment

Flight Conditions : Mixed

Light : Daylight

Aircraft

Reference : X

ATC / Advisory.Center : ZZZ

Aircraft Operator : Air Carrier

Make Model Name : B767-300 and 300 ER

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Flight Phase : Climb

Airspace.Class E : ZZZ

Component

Aircraft Component : Aircraft Auto Temperature System

Aircraft Reference : X

Problem : Malfunctioning

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Flight Deck

Reporter Organization : Air Carrier

Function.Flight Crew : Captain

Function.Flight Crew : Pilot Not Flying

Qualification.Flight Crew : Air Transport Pilot (ATP)

Experience.Flight Crew.Total : 11000

Experience.Flight Crew.Last 90 Days : 100

Experience.Flight Crew.Type : 6000

ASRS Report Number.Accession Number : 1479695

Human Factors : Situational Awareness

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Detector.Person : Flight Crew

When Detected : In-flight

Result.Flight Crew : Landed As Precaution

Result.Flight Crew : Diverted

Assessments

Contributing Factors / Situations : Aircraft

Primary Problem : Aircraft

Narrative: 1

On climbout, cabin **temperature** began climbing [and] we were unable to control **temperature**. All zone **temperature** indicators eventually read 99 with actual conditions well above. Aircraft side panels were boiling hot. No EICAS messages displayed. Contacted maintenance control for assistance in trouble shooting situation - USELESS. Unable to control **temperature** and concerned about the extreme heat decided to divert to [an alternate airport].

Synopsis

B767 Captain reported diverting to an alternate airport after the cabin **temperature** rose to dangerously high levels and could not be controlled.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1460721 (2 of 10)

Time / Day

Date : 201706
Local Time Of Day : 1801-2400

Place

Locale Reference.Airport : ZZZ.Airport
State Reference : US

Environment

Light : Night

Aircraft

Reference : X
ATC / Advisory.Center : ZZZ
Aircraft Operator : Air Carrier
Make Model Name : A320
Crew Size.Number Of Crew : 2
Operating Under FAR Part : Part 121
Flight Plan : IFR
Mission : Passenger
Nav In Use : GPS
Nav In Use : FMS Or FMC
Flight Phase : Climb
Airspace.Class A : ZZZ

Component

Aircraft Component : Aircraft Cooling System
Aircraft Reference : X
Problem : Malfunctioning

Person

Reference : 1
Location Of Person.Aircraft : X
Location In Aircraft : Flight Deck
Reporter Organization : Air Carrier
Function.Flight Crew : Pilot Not Flying
Function.Flight Crew : First Officer
Qualification.Flight Crew : Air Transport Pilot (ATP)
ASRS Report Number.Accession Number : 1460721
Human Factors : Physiological - Other
Human Factors : Troubleshooting

Events

Anomaly.Aircraft Equipment Problem : Critical
Anomaly.Flight Deck / Cabin / Aircraft Event : Other / Unknown
Detector.Automation : Aircraft Other Automation
Detector.Person : Flight Crew
When Detected : In-flight
Result.General : Maintenance Action
Result.Flight Crew : Diverted
Result.Flight Crew : Landed As Precaution
Result.Aircraft : Automation Overrode Flight Crew

Assessments

Contributing Factors / Situations : Aircraft
Primary Problem : Aircraft

Narrative: 1

On climbout we received an ECAM for COND ZONE REGUL FAULT. Initially, only the primary channel had failed. Shortly after this the ECAM reoccurred and both the primary and secondary channels had failed. We sent an associated MRM code. With no ECAM steps to complete, we referenced the QRH and found that the notes indicated we should be able to maintain a reasonable cabin **temperature** in this configuration, albeit on the cool side (pack outputs of 68F and 50F were expected, per the notes). Flight attendants were notified and kept us up to date on cabin conditions and passenger mood. Maintenance was notified and asked for ideas on how to regain control of cabin temp (dispatch was copied). No ideas or reset procedures were available.

During cruise, both pack output temps steadily decreased and the cabin **temperature** continued to

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

drop. This was unexpected to me due to the QRH notes and seemed to indicate a triple failure, including all redundant modes. After evaluating the cabin **temperature** and passenger mood, combined with the observation that both pack output and cabin temps would likely continue to drop, we decided to divert and notified dispatch and ATC. We did not declare an emergency since cabin temps did not appear unsafe, albeit they were definitely uncomfortable. The selected station seemed the best option due to maintenance, passenger services/connections, and proximity along route of flight.

On descent we encountered a new, unknown problem. A very loud sound of continuous rushing air was heard throughout the aircraft, but no new ECAMs or status messages appeared to indicate what the problem was. Communication on the flight deck became very difficult due to how loud it was. I notified ATC and dispatch of our emergency and this new, unknown issue. At first I was concerned about pressurization, but studying the systems pages revealed that pressurization was functioning normally and the bleed air/conditioned air status had not changed (other than pack output temps continuing to decrease way below QRH values, as previously noted). The loud air noise varied with thrust lever position. The cabin **temperature** was also dropping faster than before.

The Captain performed a successful overweight landing and we taxied to the gate without further issues. The passengers were deplaned and re-accommodated in a timely fashion. The Captain and I remained behind to fully brief the maintenance team on all that we had encountered. I would like to commend the professionalism of all parties involved, especially our flight attendants.

Synopsis

A320 First Officer reported an issue with the packs that caused the cabin **temperature** to drop to uncomfortably cold. During their divert, the aircraft filled with loud rushing air making communication difficult.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1358051 (3 of 10)

Time / Day

Date : 201605

Local Time Of Day : 1801-2400

Place

Locale Reference.ATC Facility : ZZZ.ARTCC

State Reference : US

Environment

Work Environment Factor : Temperature - Extreme

Aircraft

Reference : X

ATC / Advisory.Center : ZZZ

Aircraft Operator : Air Carrier

Make Model Name : Airbus 318/319/320/321 Undifferentiated

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Component

Aircraft Component : Air Conditioning Distribution System

Aircraft Reference : X

Problem : Malfunctioning

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Cabin Jumpseat

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

ASRS Report Number.Accession Number : 1358051

Human Factors : Other / Unknown

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Deviation - Procedural : Published Material / Policy

Anomaly.Deviation - Procedural : FAR

Anomaly.Deviation - Procedural : Security

Detector.Person : Flight Crew

Detector.Person : Flight Attendant

Were Passengers Involved In Event : Y

When Detected : In-flight

Result.Flight Crew : Overcame Equipment Problem

Assessments

Contributing Factors / Situations : Aircraft

Contributing Factors / Situations : Human Factors

Primary Problem : Human Factors

Narrative: 1

Flight deck requested two flight attendants to remain in the forward galley with a cart out while the flight deck door remained open for almost 2 hours during the flight due to extremely low **temperature** in the flight deck.

Flight attendants did agree that **temperature** was very low and complied with flight deck request, but after the flight agreed that the situation was very unsafe and could have created a dangerous situation.

[Suggest] divert flight. If the pilots were really that uncomfortable by the low **temperature** that they were willing to jeopardize safety, then the flight should have been diverted and the problem fixed or the plane grounded.

Synopsis

Flight Attendant reported the cockpit door remained open for about two hours in flight at the request of the flight crew because of the very low **temperature** in the cockpit.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1288279 (4 of 10)

Time / Day

Date : 201508
Local Time Of Day : 0601-1200

Place

Locale Reference.Airport : LAS.Airport
State Reference : NV

Environment

Work Environment Factor : Temperature - Extreme
Light : Daylight

Aircraft

Reference : X
ATC / Advisory.Tower : LAS
Aircraft Operator : Air Carrier
Make Model Name : Commercial Fixed Wing
Crew Size.Number Of Crew : 2
Operating Under FAR Part : Part 121
Flight Plan : IFR
Mission : Passenger
Flight Phase : Takeoff

Component

Aircraft Component : Pneumatic System
Aircraft Reference : X
Problem : Design
Problem : Malfunctioning

Person

Reference : 1
Location Of Person.Aircraft : X
Location In Aircraft : Flight Deck
Reporter Organization : Air Carrier
Function.Flight Crew : First Officer
Qualification.Flight Crew : Air Transport Pilot (ATP)
ASRS Report Number.Accession Number : 1288279
Human Factors : Fatigue

Events

Anomaly.Aircraft Equipment Problem : Less Severe
Anomaly.Flight Deck / Cabin / Aircraft Event : Illness
Detector.Person : Flight Crew
When Detected : Aircraft In Service At Gate
When Detected : In-flight
Result.General : Flight Cancelled / Delayed
Result.General : Maintenance Action
Result.Flight Crew : Returned To Departure Airport

Assessments

Contributing Factors / Situations : Aircraft
Contributing Factors / Situations : Company Policy
Contributing Factors / Situations : Human Factors
Contributing Factors / Situations : Weather
Primary Problem : Aircraft

Narrative: 1

My fatigue was a culmination of multiple factors. I had initially woken up at XA:30 PDT to catch my commute to LAS. I arrived at around XE:30 PDT, but my show time was not until XH:10. On the first flight we experienced a Tail Temp High annunciation on takeoff. As per the QRH, we shut down the APU [auxiliary power unit] and continued. The resulting maintenance on the ground resulted in a deferred APU. The **temperature** was in the high 80's/low 90's and the airplane was very hot inside. Complicating this was the fact that the station does not have an air conditioning cart. Also, during boarding, the stations GPU overheated and shut down, resulting in a power loss to the aircraft and halted the operation of the packs, which up until this point had been running off of air from the start cart. This resulted in a further delay and a hotter airplane. The airplane was hot enough that the flight attendants noted that the passengers were becoming unruly. The end solution was to wait until the stations GPU had cooled down, then quickly start one engine. This resulted in a further delay,

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

and an even hotter airplane since we had to close the door and taxi away from the ramp to start the other engine.

Upon reaching LAS, the captain and I tail swapped to a different airplane for our next turn. On this flight in the new plane, we also had a Tail Temp High annunciator on takeoff. This time the light did not turn off. As per the QRH we shut down the APU, and returned to LAS with the left engine at idle power. The lack of airflow from the left engine, the lack of APU, and the QRH-directed operation of the packs in "HP bleed off," resulted in a very hot cabin again. It was hot enough to give a passenger heat stroke, so we had the paramedics meet us at the gate.

It was very apparent that after such a long day, early morning, delays, extreme heat, and multiple mechanical failures, I was not fit to fly another turn.

Obviously weather cannot be controlled, and the nature of commuting makes days longer. But I believe that a long and complicated day could have been made shorter and easier by having appropriate and correctly operating equipment such as a GPU and air conditioning cart at the outstation, as well as a more thorough examination/maintenance program regarding our bleed air systems, could have prevented this. Two occurrences of the same problem to the same crew in two different airplanes on the same day is too much of a coincidence to ignore.

Synopsis

Air Carrier First Officer laments the inability of his aircraft's cooling system to function on very hot days and the lack of properly functioning ground equipment that will take its place. On this day, two different aircraft experience Tail Temp High annunciations requiring the APU to be shut down and ground equipment that cannot handle the task on the ground.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1274854 (5 of 10)

Time / Day

Date : 201506

Local Time Of Day : 1201-1800

Place

Locale Reference.Airport : ZZZ.Airport

State Reference : US

Altitude.AGL.Single Value : 0

Environment

Light : Daylight

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : B737 Undifferentiated or Other Model

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Flight Phase : Parked

Cabin Lighting : High

Component

Aircraft Component : Aircraft Cooling System

Aircraft Reference : X

Problem : Malfunctioning

Person : 1

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : General Seating Area

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

Qualification.Flight Attendant : Current

ASRS Report Number.Accession Number : 1274854

Human Factors : Fatigue

Human Factors : Physiological - Other

Person : 2

Reference : 2

Location Of Person.Aircraft : X

Location In Aircraft : General Seating Area

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

Qualification.Flight Attendant : Current

ASRS Report Number.Accession Number : 1274849

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Flight Deck / Cabin / Aircraft Event : Other / Unknown

Anomaly.Deviation - Procedural : Published Material / Policy

Detector.Person : Flight Attendant

Were Passengers Involved In Event : Y

When Detected : Pre-flight

Result.General : Maintenance Action

Assessments

Contributing Factors / Situations : Aircraft

Primary Problem : Aircraft

Narrative: 1

Boarded aircraft at the start of our trip. Aircraft was rather warm, I thought it's [an older B737] in the summer, it should cool down once we get going. The aircraft never cooled down; people were complaining and fanning themselves. Get to [destination] and 135 passengers boarded. We had a delay for over an hour. We did a water service. People were fanning themselves and complaining about the **temperature**. Captain switched from ground power to APU. It still was hot. Passengers said hot air was coming out. We continued to fly that aircraft. The entire flight we had passengers yelling and cursing at us because it was hot. I called the captain and he said he would have

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

Maintenance come look at it. We get to [destination] and passengers were furious. We had 44 of them continuing on. Several folks talked to a CSS. Passengers deplaned as Maintenance worked on the broken air conditioning. Several of the thru passengers were upset that we were taking the same aircraft out. Maintenance said they fixed the air so we boarded. Once again the crew and passengers were all sweating bullets. The air was not fixed at all. I called the Captain again and told him it was still outrageously hot. He said we would get an aircraft swap. Flew to [destination], still on the hot aircraft and swapped it out. Dramatic difference between the next and previous aircraft. Four legs on the hottest aircraft I ever been on. My crew and I were exhausted, not to mention sweaty. The passengers said they were writing in and were beyond upset. A few mentioned to contact OSHA. Needless to say it was an embarrassing situation. I apologized profusely.

Preventative Measures: Believe the flight attendants when they say aircraft is too hot, and do something about it a lot sooner than after our fourth leg.

Narrative: 2

[Report narrative contained no additional information].

Synopsis

Flight attendants reported the cabin **temperature** in their older model B737 was uncomfortably warm.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1198976 (6 of 10)

Time / Day

Date : 201408

Local Time Of Day : 1201-1800

Place

Locale Reference.Airport : ZZZ.Airport

State Reference : US

Altitude.AGL.Single Value : 0

Environment

Light : Daylight

Ceiling : CLR

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : MD-80 Series (DC-9-80) Undifferentiated or Other Model

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Flight Phase : Taxi

Cabin Lighting : Low

Number Of Seats.Number : 140

Passengers On Board.Number : 140

Crew Size Flight Attendant.Number Of Crew : 3

Component

Aircraft Component : APU

Aircraft Reference : X

Person : 1

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Door Area

Cabin Activity : Boarding

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

Experience.Flight Attendant.Total : 25

Experience.Flight Attendant.Airline Total : 25

Experience.Flight Attendant.Number Of Acft Qualified On : 4

Experience.Flight Attendant.Type : 40

ASRS Report Number.Accession Number : 1198976

Human Factors : Physiological - Other

Person : 2

Reference : 2

Location Of Person.Aircraft : X

Location In Aircraft : General Seating Area

Cabin Activity : Boarding

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

Experience.Flight Attendant.Total : 35

Experience.Flight Attendant.Airline Total : 13

Experience.Flight Attendant.Number Of Acft Qualified On : 5

Experience.Flight Attendant.Type : 60

ASRS Report Number.Accession Number : 1198977

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Flight Deck / Cabin / Aircraft Event : Illness

Anomaly.Deviation - Procedural : Published Material / Policy

Anomaly.Ground Event / Encounter : Other / Unknown

Detector.Person : Flight Attendant

Were Passengers Involved In Event : N

When Detected : Pre-flight

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

When Detected : Taxi

Result.General : None Reported / Taken

Assessments

Contributing Factors / Situations : Aircraft

Contributing Factors / Situations : Company Policy

Contributing Factors / Situations : Weather

Primary Problem : Aircraft

Narrative: 1

There was no APU operative. Cabin **temperature** was incredibly high. Window shades open, air vents not open. Requested ground air. Never felt it. Cockpit did not seem to care. I got catered late and was rushing to set up what I could for beverage service. I was sweating profusely. Set up what I could, and then performed safety demo and checks. Went to jumpseat and passed out lost consciousness on jumpseat due to heat. I was hot, dizzy confused and then blacked out. I could not perform my safety duties. We crew members should not have to work under such extreme conditions. Several [passengers] felt ill, and I was not in shape for any type of emergency. I drink plenty of water, and was drenched in sweat. Not a good look for an FA performing Safety Demo. If the carrier cannot provide a safe environment, then change procedures for safe cabin **temperature** for boarding.

Narrative: 2

Flight was an MD80 that did not have a "working" APU [and] the plane was NOT hooked up to external air. While the FO went out to check on the getting external air hooked up, the agents boarded a full flight. [Passenger's] were asking for aircraft but there was no relief. It was very stuffy on the ground. About 20 minutes after takeoff the airplane felt comfortable. While waiting for our return flight/plane, FA Number 2 told me he almost passed out on the jumpseat. In my opinion, we never should have boarded until we had external air (of course having a working APU would have been even better).

Synopsis

Two MD80 flight attendants describe boarding a flight in high ambient **temperature** conditions, without any air conditioning. One Flight Attendant reportedly passed out on the jumpseat during taxi.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1192689 (7 of 10)

Time / Day

Date : 201407

Environment

Work Environment Factor : Temperature - Extreme

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : B777 Undifferentiated or Other Model

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Flight Phase : Cruise

Component : 1

Aircraft Component : Cargo Pit Compartment

Manufacturer : Boeing

Aircraft Reference : X

Component : 2

Aircraft Component : Fuselage Bulkhead

Manufacturer : Boeing

Aircraft Reference : X

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Crew Rest Area

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant In Charge

Qualification.Flight Attendant : Current

Experience.Flight Attendant.Total : 29

ASRS Report Number.Accession Number : 1192689

Human Factors : Communication Breakdown

Human Factors : Physiological - Other

Communication Breakdown.Party1 : Flight Attendant

Communication Breakdown.Party2 : Other

Analyst Callback : Completed

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Flight Deck / Cabin / Aircraft Event : Other / Unknown

Detector.Person : Flight Attendant

Were Passengers Involved In Event : N

When Detected : In-flight

Result.General : None Reported / Taken

Assessments

Contributing Factors / Situations : Aircraft

Contributing Factors / Situations : Company Policy

Contributing Factors / Situations : Human Factors

Contributing Factors / Situations : Manuals

Contributing Factors / Situations : Procedure

Primary Problem : Company Policy

Narrative: 1

On this flight and on several B777 flights recently with the Lower Lobe Crew Rest (LLCR), we have experienced extreme heat in the bunkroom radiating from the cargo area. On this flight and several other flights recently, the bunk room floor, and walls were hot to the touch and the radiant heat was too much for the crew rest area to be properly cooled even with the **temperature** set as cold as it would go. This affected 3rd break worse than the other breaks as the heat had radiated into the bunkroom more and more throughout the flight. The flight attendants on 3rd break, myself included, were unable to rest well due to the heat. I discussed the issue with the flight deck crew.

It is my understanding that a procedural change may have occurred. At our Air Carrier X [prior to the merger] the Cargo Heat was not always set to 'High.' From what I understand this was the

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

procedure [before the merger] at Air Carrier Y and has now been mandated for ALL flights [since the merger]. This may be well and good at Air Carrier Y, since they have the Overhead Area Crew Rest (OACR). But, as many planes in the Air Carrier X fleet have the LLCR, this radiating heat can become a problem. As this has not been experienced on all flights I have been on, perhaps it may have something to do with the location and/or number of cargo pallets as well. However, the issue does need to be addressed. On five flights in the last two months, I have personally experienced this phenomenon.

Callback: 1

Reporter stated that since the merger, the new procedure from their combined Air Carriers mandated an increase in Cargo Heat **temperatures** in the Forward Cargo compartment. That heat radiates into the Crew Rest bunk area and even with the Crew Rest thermostat down to the coldest setting, the compartment was very hot. He notified the pilots and the Cargo Heat was lowered from the Flight deck, which did help.

Reporter stated he was wondering if more or less freight pallets in the Forward Cargo compartment could have an effect on the **temperature** due to more pallets could absorb the heat. On B777s with the increased **temperatures** in the lower compartment, no one is getting adequate rest. He has not yet received any response from his Air Carrier addressing the excessive heat concerns. He has 29 years of flight experience.

Synopsis

A Flight Attendant reports how a mandated company policy change that increases the **temperature** in the Forward Cargo Compartment has affected flight crew rest periods on some of their B777-200 aircraft. The bunk room floor and walls were hot when touched, caused by heat radiating from the cargo area, even with the thermostat at full cold.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1189295 (8 of 10)

Time / Day

Date : 201407

Local Time Of Day : 1201-1800

Place

Locale Reference.Airport : PHX.Airport

State Reference : AZ

Altitude.AGL.Single Value : 0

Environment

Light : Daylight

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : Regional Jet 900 (CRJ900)

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Flight Phase : Parked

Component

Aircraft Component : Air Conditioning and Pressurization Pack

Aircraft Reference : X

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Flight Deck

Reporter Organization : Air Carrier

Function.Flight Crew : Captain

Function.Flight Crew : Pilot Flying

Qualification.Flight Crew : Air Transport Pilot (ATP)

ASRS Report Number.Accession Number : 1189295

Human Factors : Physiological - Other

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Flight Deck / Cabin / Aircraft Event : Other / Unknown

Anomaly.Deviation - Procedural : Published Material / Policy

Detector.Person : Flight Crew

When Detected : Aircraft In Service At Gate

When Detected : In-flight

Result.General : None Reported / Taken

Assessments

Contributing Factors / Situations : Aircraft

Contributing Factors / Situations : Company Policy

Contributing Factors / Situations : Weather

Primary Problem : Ambiguous

Narrative: 1

We picked up the aircraft with the left pack MELed due to causing smoke in cabin and cockpit a few days earlier. We had flown this plane two days prior and were not looking forward to the heat. We were scheduled to keep the plane for three legs. We were full leaving with a jumpseater in the cockpit. The **temperature** in the cockpit started about 37C and only cooled to 32C in flight. We landed and had rampers hook up ground air. We deplaned and started preparing for our round trip. When we received the release I noticed that on the first page our destination airport was listed under TALT with no airport listed under DEST. Also the numbers for PLD, PZFW, MZFW, and MLDW were all shifted to the left under the wrong headers. Oddly the second page of the release (the seconded copy) had no errors. I showed it to my First Officer and discussed trying to get another release, thinking it was just a glitch. He went to the gate to start the process. A few minutes later the Gate Agent pulled up the release on her computer and I looked it over and everything looked as it should be. When it printed out it was the same as before with some lines skewed to the left out of their correct columns.

I called Dispatch again and they were going to email the release to Operations for a different print

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

out. While on the phone with Dispatch I asked if our destination had a ground AC cart. He said that they did not. I pointed out that we were single pack and the cooling off just the APU might not be enough. In the FOM it states 1) Pre-flight Preparation NOTE during airplane operations when the flight compartment and cabin **temperatures** are above 30C (86F), the air-conditioning packs or the low pressure ground conditioned air supply must be operating in order to maintain EFD **temperatures** within a range that prevents a display shutdown. Consideration should be given to the ground conditioning air as the preferred source. I questioned the choice of sending an aircraft with single pack to an outstation without a ground AC cart. The Dispatcher put me on hold and when he came back informed me that there were no other planes to swap into and still get the plane out on time. We had just started to board the airplane. I asked how this slipped through the cracks. It was the second slip in two days with the same Dispatcher. The night before was the 72 hour check expiring at midnight and departure after midnight.

We received a new release that was printed in Operations and was correct. We departed with a full plane and the cockpit temp of 35C and the cabin temp of 28C. The cabin temp cooled during flight to 27C and the cockpit never got below 30C. After landing we kept the APU running for the entire 1 hour 15 minute scheduled sit. The outside air temp was 26C. The cockpit temp at departure time was 35C. Because the sun started to set as we were departing the cockpit did start cooling down on the way. I believe it made it to 27 before landing and shooting back up to over 30 after we blocked in. The plane was then scheduled to go to AUS, single pack. Three legs in an aircraft with the cockpit **temperatures** between 90 and 100 degrees really takes its toll on the pilots.

The single pack problem, fix it. Make sure all stations that the aircraft is going to have ground AC carts. Single pack in the summer could be dangerous to passenger and crew. Maybe spread the misery and limit two legs to crew having to fly a single pack aircraft in the summer. The release problem, I do not know why but it could be a computer/printer problem. I left a copy of the release with the gate agent with the errors highlighted to show to her Supervisor. I hope someone can figure it out.

Synopsis

CRJ-900 Captain laments being assigned an aircraft with an inoperative pack to fly three legs. The cockpit **temperatures** rarely goes below 90 degrees.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

AGN: 1114392 (9 of 10)

Time / Day

Date : 201309

Place

Altitude.AGL.Single Value : 0

Environment

Work Environment Factor : Temperature - Extreme

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : Commercial Fixed Wing

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Mission : Passenger

Component

Aircraft Component : Aircraft Cooling System

Aircraft Reference : X

Problem : Malfunctioning

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : General Seating Area

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

ASRS Report Number.Accession Number : 1114392

Events

Anomaly.Aircraft Equipment Problem : Less Severe

Anomaly.Flight Deck / Cabin / Aircraft Event : Illness

Anomaly.Inflight Event / Encounter : Other / Unknown

Result.General : Physical Injury / Incapacitation

Assessments

Contributing Factors / Situations : Aircraft

Contributing Factors / Situations : Staffing

Contributing Factors / Situations : Environment - Non Weather Related

Primary Problem : Environment - Non Weather Related

Narrative: 1

[I] worked 3 short legs on this [aircraft]. [Another Flight Attendant] and I were both extremely hot throughout the day. The APU was run on the ground on each leg, shades closed and air vents open as well. Our pilots made it as cold as possible. The [other Flight Attendant] was very ill, vomiting in the bathroom many times throughout the day from the high heat. Passengers were complaining throughout the day. I had a moderate headache and in the middle of the night began to run a high fever. I have chills, sweats, severe headache, tiredness, nausea, a rash, and fever. I spent majority of the night awake and sick. I was unable to complete my duty day the following day because of these symptoms and needed to be replaced. I worked an additional leg while feeling very ill in effort to not delay the flight or crew. I was treated in the hospital. I was diagnosed with heat exhaustion and dehydration and was given multiple bags of fluid to rehydrate. Today, I was seen for my follow up appointment with [company medical]. The Doctor was positive that I had not only been exposed to high heat conditions but to a toxic chemical/substance as well. He believes the high heat exacerbated this toxic exposure and is treating me accordingly for toxic exposure.

Synopsis

A Flight Attendant described feeling ill after several legs with the cabin **temperature** very hot and that other Flight Attendant was vomiting during the encounter.

Appendix 1: NASA ASRS Reports of Extreme On Board Temperature Conditions

ACN: 1111080 (10 of 10)

Time / Day

Date : 201308

Place

Locale Reference.Airport : LAX.Airport

State Reference : CA

Altitude.AGL.Single Value : 0

Environment

Work Environment Factor : Temperature - Extreme

Aircraft

Reference : X

Aircraft Operator : Air Carrier

Make Model Name : B757-200

Crew Size.Number Of Crew : 2

Operating Under FAR Part : Part 121

Flight Plan : IFR

Mission : Passenger

Flight Phase : Parked

Person

Reference : 1

Location Of Person.Aircraft : X

Location In Aircraft : Cabin Jumpseat

Cabin Activity : Boarding

Reporter Organization : Air Carrier

Function.Flight Attendant : Flight Attendant (On Duty)

Qualification.Flight Attendant : Current

ASRS Report Number.Accession Number : 1111080

Human Factors : Physiological - Other

Events

Anomaly.Flight Deck / Cabin / Aircraft Event : Other / Unknown

Anomaly.Deviation - Procedural : Published Material / Policy

Anomaly.Ground Event / Encounter : Other / Unknown

Detector.Person : Flight Attendant

Were Passengers Involved In Event : Y

When Detected : Aircraft In Service At Gate

Result.Flight Crew : Overcame Equipment Problem

Assessments

Contributing Factors / Situations : Procedure

Contributing Factors / Situations : Weather

Primary Problem : Procedure

Narrative: 1

I called ramp service for an air conditioning truck several minutes into the boarding process. After another 15 minutes I called again. Passengers were complaining and I had started sweating profusely. I usually would not allow boarding to start, but at the beginning of boarding the **temperature** was about 79 degrees and I thought air conditioning was on the way. About halfway through boarding I started to feel nauseous and had to go out on the Jetway where it was cooler. That made a total of 3 times leaving my duties to ask for air conditioning. The pilot finally arrived and turned on the APU. He told me that boarding should not have started at that **temperature**.

Synopsis

When ramp personnel failed to obtain the requested air conditioning equipment the cabin **temperature** rose so high during passenger boarding the Flight Attendant reporter needed to exit the aircraft for relief. Ultimately a pilot arrived and started the APU to provide relief.

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

This appendix includes summaries obtained from actual written reports by flight attendants of extreme temperature conditions. Names, specific dates, airports, and airlines have been redacted to protect the identities of the reporting employees.

April 2017:

Following meal service, the flight attendant in the mid galley was continuously answering passenger call lights, most coming from rows 17-22, passengers freezing, requesting that a flight attendant from first class walk through as well, who also agreed the area was much colder.

The pilot made an announcement to explain that they were unable to control the cabin temperature. Female passengers came to the mid galley screaming at the flight attendants accusing us of freezing them on purpose, that we don't provide blankets, etc. We explained to them again as the pilot had just done.

Passengers seated in row 21 were very cold the whole flight, noted that in Australia complimentary blankets are provided and were surprised when told that it cost \$10.00 after she paid for her airline ticket. She didn't pay to be so cold, felt there is obviously something amiss with the temperature control on the flight and felt under the circumstances blankets should have been provided.

Other passengers seated across the aisle in row 21 said in all the years they have flown on AIRLINE they have never felt so cold and uncomfortable, repeated several times that this was the coldest flight ever. Both passengers were bundled in jackets as they were so cold and in pain.

Flight Attendants confirmed attempts to adjust the temperature with no success.

Pilot said he wrote up the incident and notified maintenance.

May 2017:

When the flight attendants came on the aircraft it was extremely hot in the cabin as there was NO air conditioning circulating throughout and when the pilots arrived minutes later (during boarding) maintenance arrived with an apparent issue.

Recap: The air conditioning was not on at the designated time prior to the departure time. Captain did all he could to keep the aircraft cool and also notified the lead flight attendant that the cabin would eventually have no air conditioning running again prior to the aircraft push back and until on its own power. An announcement was made informing the passengers. Passengers were greatly inconvenienced as the heat for many was extremely uncomfortable and one flight attendant called the lead flight attendant saying a passenger wanted all window shades closed to help keep the sun and heat out. The flight attendant was advised that all window shades must be raised/open during any surface movements and the aircraft would be pushing back soon (but we didn't know exactly when.)

June 2017:

Mechanical on tug (not aircraft) during push back. 90 degrees Fahrenheit with no air conditioning in plane. Lots of children and elderly on board. Passengers were already upset at how hot it was in the plane right before push back. After push back, Captain announced that we would be delayed which upset more passengers, some wanted to deplane. Captain reassured passengers that aircraft was safe and the problem was on the tow.

Because of how hot it was we did do water service. As we were in the aisle passing out water, many passengers had their phones out to record us and everyone that was upset. Captain allowed all doors to open for some ventilation. FAs all guarded their assigned

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

doors. At this point parents with their children, some elderly, and others who could not take the heat anymore stood in the galley area for air.

Captain then tried again to push back and to close doors and secure cabins. But something else went wrong. At this point passengers had had it and most of the children on board were crying because it was so hot (no air conditioning still). We opened all doors again and guarded them. A couple of parents removed their younger children's shirts and some even shorts because they were so hot. Captain called and said we will try again and to secure and close cabin. We had everyone back in their seats even though they were very upset.

Third push back was successful but air conditioning did not kick in right away. We were able to successfully take off and at 10,000ft Captain and crew agreed to comp alcohol to those over 21. FA crew agreed to comp chocolate/snacks to kids to calm them down.

After service, as we cleaned up, many passengers thanked us for all our work and said they understood it was out of our hands and not our fault.

July 2017:

When the pilots and flight attendants boarded the aircraft the cabin temperature was extremely warm and the air conditioning system wasn't running. The cabin's temperature never cooled and the 1L Control Panel displayed temperatures all throughout boarding and taxi time in the mid-high 80's. Some passengers seated in rows 17-24 were seen fanning themselves. We had two medical situations, one during taxi time – we ended up returning back to the gate after the MEDICAL CONTRACTOR was notified and the other while the aircraft was adding fuel. The weather and temperatures during summer months is extremely hot and unsure why the cabin isn't kept comfortable when on the ground and during the short turnaround times.

July 2017:

When crew arrived at gate 30, we were told by the Captain of a 1 hour advisory. Later we were advised of plane/gate change. Within minutes, agent called us to go ahead and board the a/c. We entered the plane and although it had been cleaned it was not catered. Additionally, the interior temperature was at 83 degrees F. I advised Captain and asked for assistance with cooling the cabin. Captain responded there was nothing he could do about this because bags were being loaded and (I think he said) we were not connected to an APU. Despite the terrible heat we boarded, closed the cabin, began our taxi and took off. After reaching 10,000 ft. altitude, the temperature in the cabin read between 87.8 - 90.5 degrees F.

July 2017:

When we (crew) boarded the plane, it was hot. I mentioned to agent that plane is hot, and should not board passengers until plane had time to cool down. Agent said that APU does not work, but they'll connect it to the AC truck, which they did, but it never cooled the plane much. Agent told me he made an announcement that boarding will be delayed ten minutes to give plane more time to cool down; after that, passengers started to board. With more bodies boarding, the plane was getting hotter. People were complaining, and didn't understand why it could not be cooled down. Pilot made announcement that we are hooked up to AC truck, as our APU is not working, and assured them that once we start moving temperature will drop.

When we were pushed out of the gate, pilots were having no success starting engines. Now away from the gate, and no AC truck, and full flight body heat, everyone was very

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

uncomfortable, sweaty, and short tempered. Some people said they felt dizzy, others said they are about to pass out.

I got a call that a passenger had collapsed in the aft galley, and that they're giving him O2. I went to the aft galley, and saw a man lying on the floor, and two FAs were tending him. The pilots were informed and requested medical help. A few minutes later, medics came on board and carried the passenger to the ambulance. As they were carrying him down the stairs, another passenger was brought up to the front with a panic attack, and was crying. The medics took her along as well. This was done while we were on the tarmac. When we went back to the gate, the agent made an announcement that if anybody is feeling sick they should go to medics, and a total of seven more people did.

August 2017:

We boarded when the temperature was over 100 degrees. The cockpit crew were in undershirts. FAs had sweat dripping from every pore. We complained, and they said APU was still malfunctioning, 1 pack was out, and they had hooked up a cold air hose to the front and rear of aircraft. The entire crew complained and we were told we would board passengers in a hurry and leave. The passengers were sweating and started becoming ill as well. One had a migraine that never went away the entire trip. It took over 3 hours to cool the aircraft in the air. This was a very unsafe 2 hours on an uncooled aircraft; we were forced to spend hours taking care of the ill passengers and crew.

September 2017:

The plane was warm when the crew boarded. As passengers arrived the temperature continued to rise. The outside temperature was around 100 degrees and the pilots immediately became aware of the issue. The hope was that the plane would cool off after the engines started and after departure. This never really occurred as the cabin temperature remained very warm. Our best guess was at its worst it was around 90 degrees and as the flight continued it eventually got down to a little over 80. I was in constant communication with the captain. We went back and forth as to whether or not to return to departure airport. It was a tough choice as the cabin temperature could have easily posed a hazard. We decided to continue and passengers remained uncomfortable and on the edge of potential sickness the whole flight.

September 2017:

A/C was extremely HOT. The cockpit temperature indicator read at 90 degrees throughout the cabin. We were on the A/C for a long time prior to and after boarding due to the inoperative APU and other pilot concerns. We only had approximately 50 passengers and they were complaining about the heat.

Once in the air, the A/C cooled off a bit but when we arrived, it was raining so we got wet as we had to transition to [another airplane] for our return deadhead flight. On the flight home, I began feeling chills and by the time we landed, I felt the onset of a headache as well as ear & body aches. Unfortunately, I was affected by the drastic temperature changes in that short amount of time and ended up getting sick. I was told that this A/C has had this APU/AirCon issue for a while.

November 2017:

After takeoff the temperature in the cabin became uncomfortably warm. We notified the pilots to cool the cabin.

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

During the first beverage service a passenger stated he was feeling ill due to the high temperatures. We gave him an ice pack and he declined any other assistance. After completion of the first service we immediately began a second service. I was on the beverage cart alone at this time. Another passenger (in a window seat) told me he didn't feel well. I asked the middle and aisle seat passengers to get up so the ill passenger could go to the lavatory. FA C was in the aft galley serving drinks so I sent the ill passenger to her as I couldn't leave the cart unattended. The ill passenger was ashen and felt feverish to the touch. He stated he felt as if he was going to lose consciousness. FA C had him sit immediately and put cold compresses on his face and neck. He did not vomit. Very shortly thereafter he recovered and stated he was hungry and thirsty. FA C gave him liquids and food.

A third passenger was then observed to be sweating profusely and looked ill. This passenger was traveling with her mother, who told me that her daughter was on her way to have extensive testing done for seizures. The high cabin temperature was causing the daughter to become ill. I gave her a cold compress and ice water. A few minutes after I had completed the service, the daughter came to the aft galley looking pale. We had her sit immediately and got ice on her neck and chest as her skin was very hot. She felt nauseous so we prepared vomit bags for her. After about 15 minutes her temperature began to normalize and she was able to take her medication. She then returned to her seat and we asked the pilots to arrange a wheelchair for her upon arrival. We continued to monitor her for the remainder of the flight. She was stabilized but weak so I gave her mother some snacks and beverages as they had to wait in the terminal for a while before their transportation would arrive.

During the time that the third passenger was seated in the galley, another woman came to the lavatories stating she was having a severe migraine due to the heat. She was traveling with her husband and we gave her water for her medication. After she took her medication and stood for a bit her symptoms subsided and she took her seat.

December 2017:

The temperature outside was 15 to 25 degrees. Upon our arrival, the doors were opened. During ground delay, I asked the flight deck crew to turn on the heat on three different occasions and they would not do it. So I had to sit on the aircraft in freezing temperatures for almost an hour and my resistance lowered due to the cold. I had just had a complete physical before the trip and my health and vitals were normal and 100%. Upon my return to [home base], I was experiencing chills and not feeling well. I ended up having to go to the ER, where they admitted me for 3 days.

January 2018:

There was no heat on the plane. Once we got to AIRPORT the flight attendants found out they were keeping the aircraft the whole day. One flight attendant was wearing layers. I am concerned about their safety as well ... they were scared to speak up. ... The captain made a PA that if it makes you feel any better it is warmer in the cabin than it is in the cockpit.

April 2018:

We had been delayed due to an aircraft swap. The FA's went down to the airplane. I went back up the jetbridge before boarding and told the agent it is warm on board and with a full cabin, it would only get hotter. I asked where the pilots were; they were not on the ground yet. I then asked if we could have someone qualified come onboard and turn on

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

the cabin air from the APU, since ground air was not cooling the cabin. The agent assured me she called someone, so I agreed we could start boarding. As the cabin filled the aircraft got warmer. We were finally about 95% boarded when the temperature became unbearable. Then it got worse. Ground staff unplugged the air and disappeared. We had all 4 doors open and there was no breeze outside to come through, no pilots, no means of communication with ANYONE at the station, and a passenger having such a panic attack she eventually got off the flight. The cabin temperature was over 90°F. I had to call scheduling to have them get someone there ASAP because I was on the verge of having everyone deplane until we could get the cabin temperature down to a safe temperature. We went through with water, our pilots eventually arrived, but we should not have been in this potentially dangerous situation.

May 2018:

Flights: 3 different airplanes, 3 different flights

Temperature in cabin: max 91, min 88

Per the ground crew in AIRPORT all three air carts were broken.

Why is this not standard that when we pull into a gate they hook the air up immediately?

We had to do damage control on one flight because of computer error on the ACARS [aircraft communications addressing and reporting system] that took one hour to fix with passengers on board in the extreme heat. Did a water service to help with the passengers that were not feeling well due to the heat. Children, adults, elderly informed, all complaining.

May 2018:

There was a fuel spill on the tarmac. We were delayed due to the fuel cleanup and another mechanical issue. It was also very warm on the aircraft and the fumes got stronger. At one point outside air was circulated through the cabin, which intensified the odor. I became disoriented and experienced a headache and tingling in fingers and toes. Medical advised that I was not cleared to work the trip.

May 2018:

Three separate flight legs, no APU, temperatures were almost 90 degrees. We had people getting extremely overheated. We also had a mechanical and passengers had to sit on the hot plane. This was not safe for crew or passengers. We had to pass out wet paper towels to try to help with the heat.

June 2018:

Our plane was on a congested runway waiting for takeoff for approximately 1.5 hours due to weather delays. The cabin temperature rose considerably, passengers complained of feeling hot and faint. Another flight attendant and I felt faint as well.

The situation was reported to the captain, who switched on the second engine. After several minutes, the temperature did not drop. The lead flight attendant confirmed that cabin temperature had reached 83F and she was unable to lower it on the Flight Attendant Panel.

Passenger complaints grew as they became more uncomfortable; some said they needed fresh air as they were feeling sick. Shortly thereafter, the captain returned to the gate and gave permission to open the aft doors to allow fresh air into the cabin.

It was later learned that the aircraft air conditioning had been logged as inoperative prior to takeoff. The flight was cancelled.

Appendix 2: Flight Attendant Reports of Extreme Cabin Temperature Conditions

June 2018:

Temperatures got above 88 degrees. We were stuck on the aircraft with passengers for over 2 hours with these temperatures. This is not humane or safe for anyone. Main cabin door was open. I felt as though we were all being held hostage. Window blinds all closed except one missing and all vents opened.

Data Summaries from Two Cabin Heat Stress Surveys



Association of Flight Attendants-CWA, AFL-CIO

Heat Index (HI)

■ Background

- www.wpc.ncep.noaa.gov/html/heatindex_equation.shtml
- A measure of how hot it feels when relative humidity is added to actual air temperature

■ $HI = -42.379 + 2.04901523 * T + 10.14333127 * RH - .22475541 * T * RH - .00683783 * T * T - .05481717 * RH * RH + .00122874 * T * T * RH + .00085282 * T * RH * RH - .00000199 * T * T * RH * RH$

- T = temperature (deg. F)
- RH = relative humidity (%)

Heat Index (HI)

■ Potential Heat Disorders

Category	Heat Index	Possible heat disorders for people in high risk groups
Extreme Danger	130°F or higher (54°C or higher)	Heat stroke or sunstroke likely.
Danger	105 - 129°F (41 - 54°C)	Sunstroke, muscle cramps, and/or heat exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity.
Extreme Caution	90 - 105°F (32 - 41°C)	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Caution	80 - 90°F (27 - 32°C)	Fatigue possible with prolonged exposure and/or physical activity.

Heat Index (HI)

Health Warning Categories

		HEAT INDEX °F												
		RELATIVE HUMIDITY (%)												
Temp.		40	45	50	55	60	65	70	75	80	85	90	95	100
110		136												
108		130	137											
106		124	130	137										
104		119	124	131	137									
102		114	119	124	130	137								
100		109	114	118	124	129	136							
98		105	109	113	117	123	128	134						
96		101	104	108	112	116	121	126	132					
94		97	100	103	106	110	114	119	124	129	135			
92		94	96	99	101	105	108	112	116	121	126	131		
90		91	93	95	97	100	103	106	109	113	117	122	127	132
88		88	89	91	93	95	98	100	103	106	110	113	117	121
86		85	87	88	89	91	93	95	97	100	102	105	108	112
84		83	84	85	86	88	89	90	92	94	96	98	100	103
82		81	82	83	84	84	85	86	88	89	90	91	93	95
80		80	80	81	81	82	82	83	84	84	85	86	86	87

Category

Extreme Danger

Danger

Extreme Caution

Caution

Measuring Device: Thermohygrometer



Pocket Humidity/Temperature Pen Carried by Flight Attendants

**Built-in sensors provide simultaneous readings
of relative humidity and temperature**

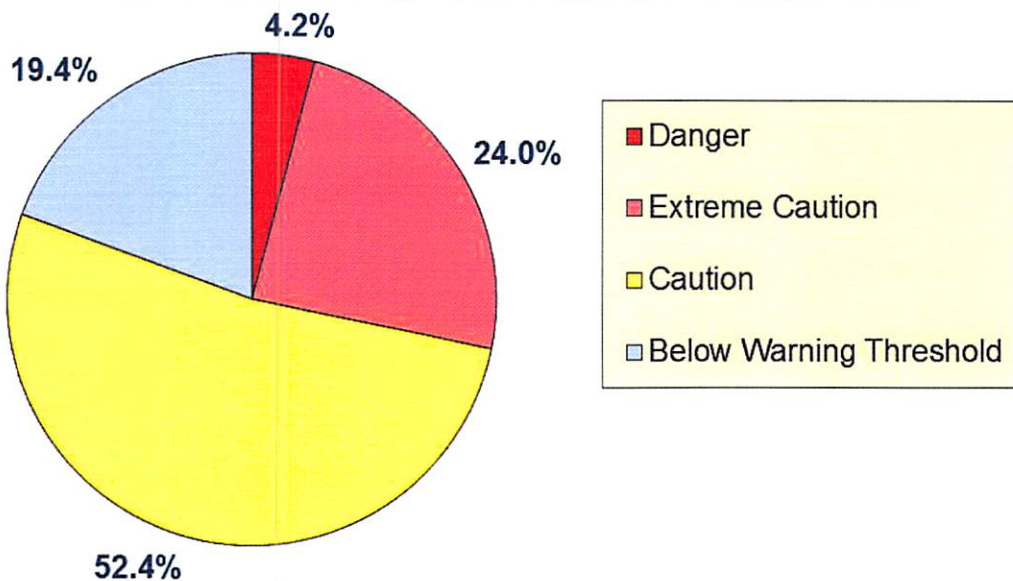
Humidity: 20 to 90% RH ($\pm 5\%$ RH)
Temperature: 14 to 122°F ($\pm 2^\circ$ F)

Airline 1 Heat Stress Survey

- August – September 2006
- Southern U.S. and Caribbean
- ATR-72 Turboprop

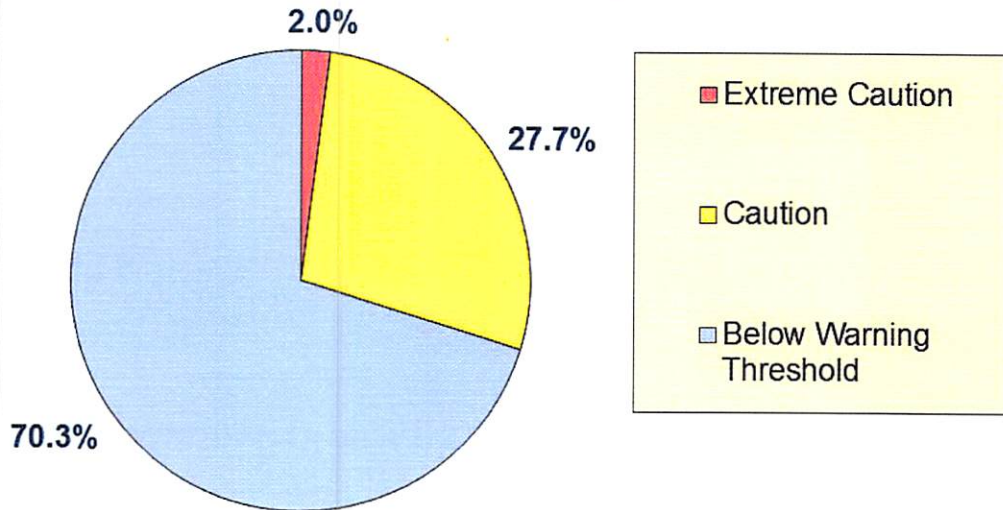
Airline 1 Heat Stress Survey

Warning Levels by % of Flights, Pre-Departure



Airline 1 Heat Stress Survey

Warning Levels by % of Flights, Top of Descent



Airline 1 Heat Stress Survey

■ Sample Comments

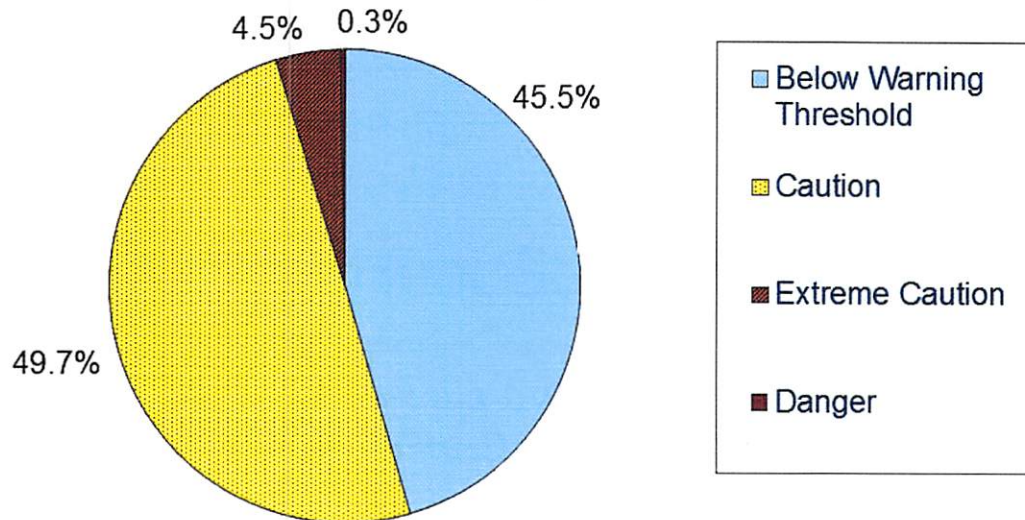
- FLIGHT RETURNED TO GATE AFTER TAKEOFF DUE TO EXCESS HEAT IN COCKPIT
- PAX COMPLAINING ABOUT HEAT, AIRCART BROKEN
- HOT! PAX COMPLAINING AND CHILDREN USING CD'S AS FANS
- TAXI AND TAKEOFF TEMP STAYED AT 95 F
- COCKPIT WAS UNBEARABLE 97F BOARDING AND TAKEOFF
- EXCESSIVE SWEATING/TAXI 90F/PAX ALL FANNING THEMSELVES

Airline 2 Heat Stress Survey

- June – July 2010
- Primarily Western U.S.
- Two Aircraft Types
 - Canadair Regional Jet
 - Dash-8 Turboprop

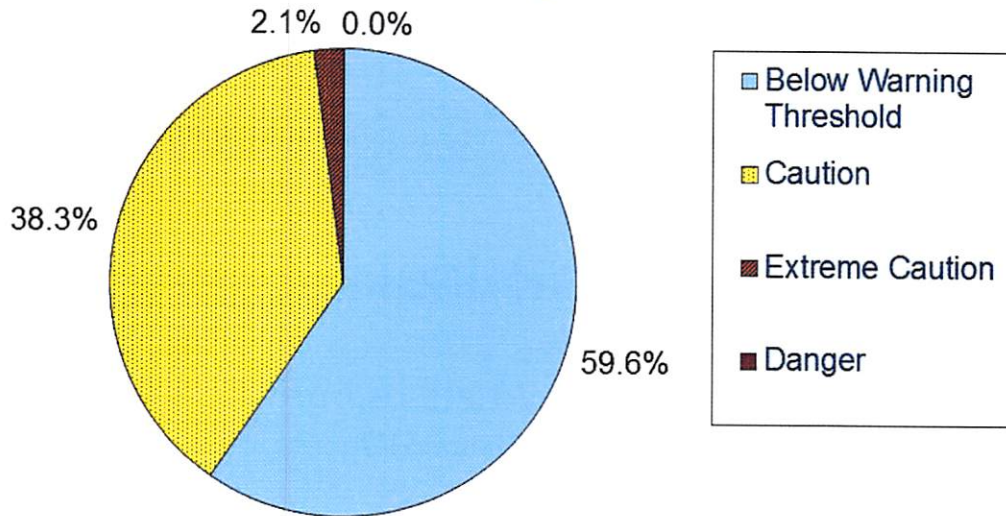
Airline 2 Heat Stress Survey

Warning Levels by % of Flights CRJ Pre-Departure



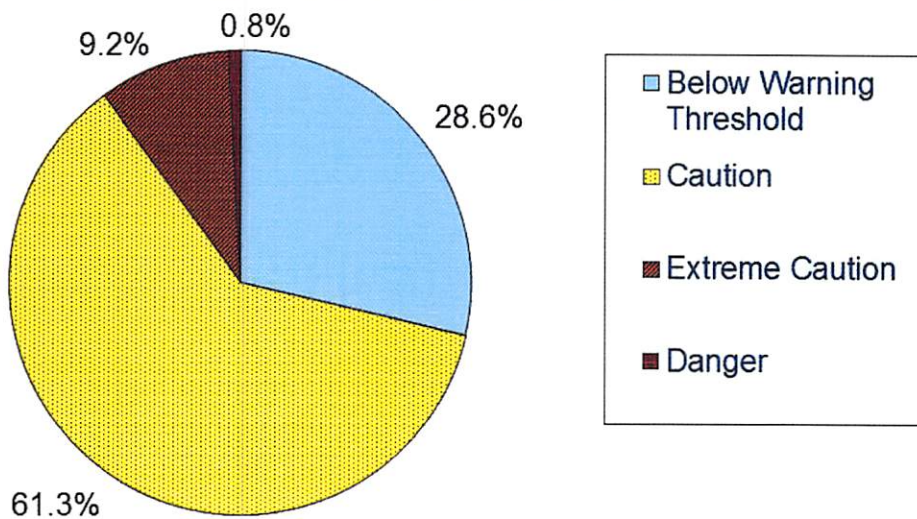
Airline 2 Heat Stress Survey

Warning Levels by % of Flights CRJ Inflight



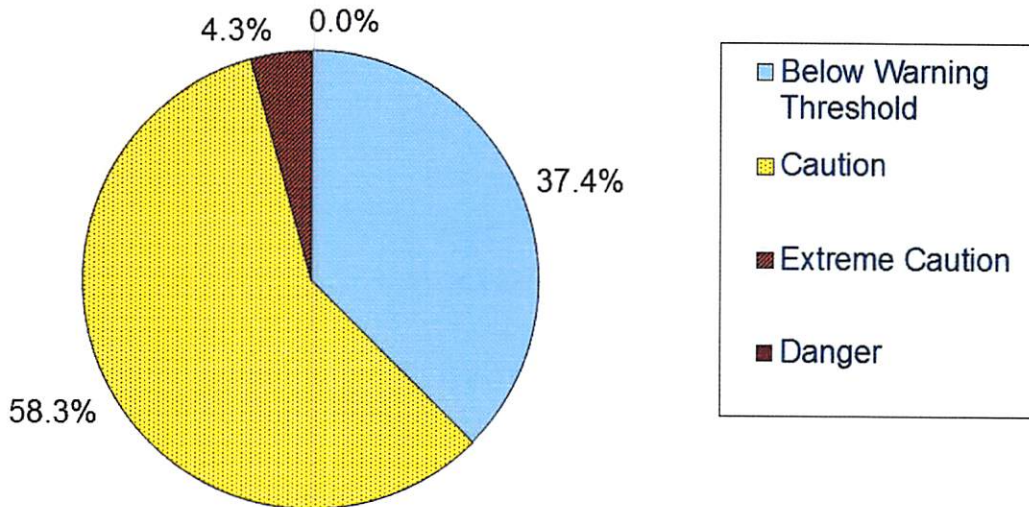
Airline 2 Heat Stress Survey

Warning Levels by % of Flights Dash-8 Pre-Departure



Airline 2 Heat Stress Survey

Warning Levels by % of Flights Dash-8 Inflight



Airline 2 Heat Stress Survey

■ Sample Comments

- APU BROKE ON TAXI OUT OF GATE AREA
- A/C CART NOT CONNECTED SOON ENOUGH
- PROFUSE SWEATING. UNBEARABLE HEAT AND HUMIDITY - PASSENGERS STRESSED AND HOT!
- SERVED ICE WATER TO PASSENGERS AS THEY BOARDED
- VERY HUMID ... TOOK OVER 30 MIN FOR THE GALLEY TO COOL DOWN
- AIRCRAFT GOT HOTTER AFTER CART PULLED, NEVER COOLED DOWN
- AIRCART QUIT WORKING WHILE BOARDING