

<VALLEY 101 THEME SONG>

KAILA: Welcome to Valley 101, a podcast from The Arizona Republic and azcentral.com where we answer the questions *you* ask about metro Phoenix. I'm your host, Kaila White. Today's episode is produced by Taylor Seely.

TAYLOR: Hey!

KAILA: Now, I'm gonna take a gamble here and bet that if you're listening to this show, you like it here in the Valley.

KAILA: Of course, it's easy to say that now, in January, when the weather is a blissful 65 to 75 degrees. It's *not* as enjoyable, in the summer...

TAYLOR: But hey, if you can't handle AZ at its worst, I say you don't deserve it at its best!

KAILA: True. Although I think a lot of locals *can't* in fact handle Arizona at its worst. I know a lot of people escape Arizona in June and July. August... September...

TAYLOR: That is, of course, unless it's too hot to fly.

KAILA: It doesn't happen often, but on occasion, when Arizona's hit temperatures over 118, some airlines have grounded their flights.

TAYLOR: And today I'm answering why that happens. This question came from Kimball Allen who lives in Scottsdale.

Kimball Allen: *This is my question. Why when it gets really in Phoenix, why can't airplanes take off?*

TAYLOR: Now the funny thing is, Kimball actually works FOR an airline.

Kimball Allen: *What is kind of hilarious about my questions is I actually work for an airline. I work for Alaska Airlines.*

TAYLOR: But here's the thing: he's not a pilot or flight attendant. He works in the call center. And he's just a little embarrassed to ask this question because he feels like he should know.

Kimball Allen: *You know it's very hilarious and I'm a little embarrassed that I work for the airline and I didn't know this answer! I'm going to get a lot of grief from my peers that I didn't know this answer.*

<VALLEY 101 THEME SONG FADES OUT>

1990-newscast:

From Arizona's largest and most respected broadcast news teams, this is KOOL NEWS 10.

<Music: Flat Top Fade [Main Track fade in]>

TAYLOR: Picture this. You're in Phoenix. [The year is 1990](#), ... Denim mini skirts are in style. The Deck Park Tunnel is about to open. Metro Center mall is in its last few years of actually being a mall and not a ghost town. Terminal 4 at Phoenix Sky Harbor is almost ready to open. All is well in the Valley of the Sun.

TAYLOR: Except... the sun. The date is Tuesday, June 26th. And the heat is record breaking. In the first half of the day, it's 120 degrees.

KTVK-1990-newscast

[5:02] News anchor: *With this unprecedented heat, the usually placid meteorologists are at least a little excited.*

TAYLOR: This audio is from a KTVK newscast that day.

KTVK-1990-newscast

Meteorologist 1: *Incredible heat. I. H. It's hot!*

Meteorologist 2: *Unbelievable. I never thought I'd see it, but it's here. [5:18]*

TAYLOR: Hours later, it would hit 122. And that's when you-know-what really hit the fan.

KTVK-1990-newscast [5:51] *For the first time ever, flights at Sky Harbor Airport were grounded because of the heat. Once the thermometer rose above 122 degrees, airlines began halting operations.*

TAYLOR: News clips show scenes of the airport, where frantic airline employees address large crowds of travelers. Remember: This had never happened before.

KTVK-1990-newscast 6:22 *We are holding off on boarding due to the temperature of 122 degrees, airplanes cannot take off.*

Music fades out.

TAYLOR: This was 20 years ago. But the memory of it hasn't faded. Often when Phoenix braces for high heat, you'll hear news stations hearken back to the 1990 closure.

Abc15-1990-reference [00:00 - 00:09]: *With record heat in the forecast, pilots and passengers are remembering what it was like here back in 1990, (begin fade out) when the Valley hit 122 degrees...*

TAYLOR: ... pondering whether it could happen again.

Abc15-1990-reference [00:12 - 00:20]: *So the question now, could it happen again? (begin fade out) ABC 15's Jason Valentine has that answer...*

TAYLOR: It did in fact happen again. **(or: It did.)** You might even remember most recently when flights were grounded in 2017 from the heat. Some were also grounded in 2013. But in each of these instances, it wasn't technically because it was too hot. What it actually came down to was insufficient data and safety precautions. [science music] When pilots fly, they're given performance data from the manufacturers of the plane.

Kenneth Wood: [00:11:09] *it gives you all the limitations of the aircraft, and that's provided at the site by AirBus and by Boeing, [00:11:15][6.3]*

TAYLOR: That's Captain Kenneth Wood. He's a pilot for American Airlines.

Kenneth Wood: [00:10:23] *We didn't have the performance data to be able to fly the airplane at that time. [00:10:27][4.8]*

TAYLOR: To clarify, pilots DID have performance data. The data just didn't go up to 122 degrees.

Kenneth Wood: [00:12:17] *It was the first time and the only time I'd ever known it happened. I mean, it was extremely hot and it made sense that, you know, it was just too hot to fly, [00:12:26][9.3]*

TAYLOR: But what information is even in the performance data? Well it includes guidelines.. on what *speed* the plane must attain, how the *flaps* should operate, what to do when the plane's weight varies, how an airport's elevation will affect the plane and more.

Take a listen to this local news clip from ABC 15, explaining:

Abc15-american-air-flights-grounded [00:38] *Four things have to work together for a plane to take off. Temperature, airport elevation, weight of the plane, runway length.*

TAYLOR: In Phoenix: when the temperature gets warmer, the air becomes less dense. And that matters because air density is needed to lift the plane off the ground. Here's another explanation, from Newsy.

Newsy [00:18] *Higher temperatures make for thinner air, which is harder to generate lift from. Without the denser air pushing it upward, a planes engines need to do more work to get it to takeoff speed. [00:28]*

TAYLOR: By "more work," they mean -- go faster. And *this* is where runway length and a plane's weight comes into play.

Kenneth Wood: [00:03:27] So to get the airplane to go faster at any given weight means that you would need more runway to attain that speed. Well, if the runway is not long enough. You would then have no option but to reduce the weight of the airplane. [00:03:46][18.8]

TAYLOR: Here's another way of thinking about it.

Kenneth Wood: [00:06:01] If you think of your car with you in it and accelerating vs. six people and a bunch of luggage in the back, it takes longer to get to an attained speed than just you on your own. The same principle applies to the airplane. [00:06:19][18.2]

TAYLOR: Pilots also have to take into account emergencies. (cue tense music)

Kenneth Wood: [00:04:55] There are two considerations, ~~as I say~~. One is that the runway is long enough to get the aircraft airborne and the other one for safety of flight reasons is that if you decide to reject the takeoff, you need to make sure you have enough runway distance available to stop the airplane. [00:05:14][19.4] (fade tense music)

TAYLOR: So... there you have it. It's really not an easy explanation because there are so many factors that play a role in a plane's ability to fly.

TAYLOR: What you can for sure take away is that it's not necessarily that planes can't fly in 122 degrees. It is true that there are some smaller, commuter planes that have temperature restrictions. But these are typically used for regional flights, where the distance is short.

TAYLOR: That was the case in 2017 -- American Airlines cancelled 60 regional flights. After that, the airline worked with the necessary agencies to calculate new temperature limits for the planes that needed it. This meant bumping up the operation threshold from 117.86 degrees fahrenheit to 123.8 degrees fahrenheit. So hopefully that means we won't have to ground flights for a long time.

TAYLOR: Instead, what you might be more concerned about are the Phoenix Sky Harbor employees who work on the tarmac in the summer.

Justin Frank: [00:16:07] My name is Justin Frank. I've spent years doing line service at different airports around [00:16:15]

TAYLOR: Justin Frank works at Phoenix Sky Harbor Airport doing line service for Cutter Aviation. He's also the brother of my colleague, BrieAnna. You heard her on last week's episode about Arizona's resources for adults with autism. But back to Justin!

Working on line service means he'll sometimes service the planes - like swapping out the oil or servicing the lavatories. He'll also transport luggage and equipment for various sports teams that fly in and out of town. And when it's 115 degrees out, it's, well... hellish.

Justin Frank: [00:02:01] *it's really hot out there and sometimes you can feel it through your shoes. [00:02:06][4.8]*

TAYLOR: If you remember, a couple episodes back, in our episode about the 5 Cs of Arizona, I told you about the urban heat island effect. That's where our environment is made hotter because our infrastructure - like concrete buildings and roads - absorb all that heat. And on the tarmac -- Justin said it's reached 160 degrees.

Justin Frank: [00:09:26] *you'll feel that radiating heat coming off of the ground. [00:09:32][5.9]*

TAYLOR: Unsurprisingly, there are moments when the heat affects outdoor workers.

Justin Frank: [00:03:30] *Like one guy passed out sort of or got really light headed and couldn't couldn't move anymore [00:03:38][8.1]*

Justin Frank: [00:04:52] *And one of the guys just past kind of passing now getting light headed and just kind of had a. Move them over towards the loader and put the bolt loader in reverse and then and just take him down that way and then get them inside and cool off in that water and let's going better. [00:05:16][24.0]*

TAYLOR: To make conditions better, the company has provided employees with Camelbacks and wet towels. Airlines have also created shade stations with beverages and giant fans to cool off.

With those additions, it's still really hot. <Valley 101 theme music> So next time you meet someone who works the tarmac, give 'em a smile. And if you ever consider working there, maybe buy yourself a good water bottle. And you'll need a good pair of shoes.

<musical interlude>

KAILA: Hey it's me Kaila again. Wow, Taylor, I never would've guessed that the tarmac can hit 160 degrees.

TAYLOR: Oh I know! Me either. I will say as someone who's lived in Arizona her whole life, I actually know that feeling Justin described, of feeling the heat through your shoes. But if I've felt that pain - and I'm not even on the tarmac - I can't imagine what it's like for him.

KAILA: Right... It was also interesting how it's not actually that plane that can't handle the heat, but typically just needing information for how to navigate when that weather happens.

TAYLOR: Yeah! A whole lot of interesting information. I was thankful for Capt. Wood telling me all that... And by the way, if any listeners are traveling PHx to London any time soon, that's actually his route! So maybe he'll be your pilot.

KAILA: Well I am not going to London, but jealous of anyone who does. That's it for this week, listeners. As always, if you like our show, rate and review us on your podcast app. We so appreciate it. See you next week.