LTCOL (b) (6) Okay.

SGT (b) (6) It reflects all of the DODAC's that were provided.

LTCOL (b) (6) That is not my question. My question is: Is the document that Corporal (b) (6) prepared for you that reads "Yuma, Arizona" at the top and the four-part document that reads "Pallet Load Plan," do those reflect the same DODAC's and ammo quantities between the two documents? And if there is an inconsistency, what is it?

SGT (b) (6) I am going to go from top to bottom, if that is all right, sir?

LTCOL (b) (6) Sure.

MAJ (b) (6) I will give you a [indiscernible] if you want to make marks, little tick marks by it or anything like that.

SGT (b) (6) That's all right. Thank you though, sir.

MAJ (b) (6) You're welcome.

SGT (b) (6) Minor as far as the containers that they are in, but I would no way -- and I don't want to revolve -- or sorry -- but disregard the answer, but I wouldn't regard to this at all. This was just a simple draft for an idea of what the weight might be before we got it. I mean, that's --

LTCOL (b) (6) By "this," you are pointing to the four-part pallet load plan?

SGT (b) (6) Yeah, the colorful picture. But per what I utilized, because -- I used this.

LTCOL (b) (6) Okay. So what you are pointing to is the one that reads "Yuma, Arizona"?

SGT (b) (6) Yes.

LTCOL (b) (6) The loading -- how would you describe that? Packaging list?

SGT (b) (6) It's like an ammunition list, like a digest almost.

LTCOL (b) (6) Okay. And this is the one that Corporal (b) (6) provided you?

SGT (b) (6) Yeah. All I really used was the DODAC's, the descriptions, and the quantity so that I could get my actual.

LTCOL (b) (6) Okay. Are there any DODAC's on the list that Corporal (b) (6) provided you that are not on this four-part quad?

SGT (b) (6) Not that I can see from going from top to bottom.

LTCOL (b) (6) Okay. So based on these DODAC's and the class on the HAZDEC's, the 1.1E, you are saying the compatibility check would have been done at the ASP prior to this ammunition list being put on the pallet certified for road worthy from the ASP up to Cherry Point?

SGT (b) (6) I wouldn't say that I know, but I would most definitely assume so.

LTCOL (b) (6) Okay.

SGT (b) (6) I couldn't imaging personnel at the ASP loading ammunition without knowing if it is compatible that would --

LTCOL (b) (6) Over the road requirement, right?

SGT (b) (6) Any kind of requirement really. I don't think --

LTCOL (b) (6) When Corporal (b) (6) picked it up, does he sign for the ordinance from the ASP?

SGT (b) (6) I mean, I want to say -- again, I am not as familiarized with the ASP. I would have -- you would have to ask him that. I don't know how it -- really all I know is pre-stage. They help him band it. They load it up onto the truck. I have done it with the personnel there before, and then they review the documentation of what is being requested. I know that they do that a good while in advance. When you forecast the ammunition, they already have to review to make sure that it's good to go.

LTCOL (b) (6) Okay. Hang on. So when you told me a moment ago that the compatibility check would have been done at the ASP, that is your presumption, correct? You don't know that to be true because you don't work in the ASP; is that a fair

statement? You presume that it would be done, but you can't say for certain that it is done there, right?

SGT (b) (6) That's -- I would have to think back because it's something that definitely would have checked with to make sure that that was good.

LTCOL (b) (6) And then do you do another compatibility check between those DODAC's and those class numbers, the 1.1E for instance, with any publication that you referenced, as the Embark Chief for the Company, AFMAN, CFR-49, or anything else to ensure that those DODAC's are compatible before they are packaged and palletized for shipment on an aircraft?

SGT (b) (6) The packing instruction, that is given to me as well as the authorization.

LTCOL (b) (6) So you understand that those two things to be the same, the class number and the packing instruction?

SGT (b) (6) No. But the packing instruction is in regards to the class and division number for the round that I am looking up.

LTCOL (b) (6) Does the packing instruction reference any compatibility with any other DODAC's or any other -- excuse me -- not DODAC's, but any other class numbers, for instance, the 1.4G or the 1.1E --

SGT (b) (6) I would have to look back --

LTCOL (b) (6) Let me finish the question. -- or the 1.4S, is there a chart that you are aware of that references each of these class numbers and whether they are compatible with the other?

SGT (b) (6) Yeah. I have seen it. I just -- I would have to refer to it. I know --

LTCOL (b) (6) Did you refer to it before this particular pallet?

SGT (b) (6) Yeah. I know I did because we had a round that was coming with us that would have required a completely separate Lima pallet, and that is the round that they had removed. I believe it was mortars.

LTCOL (b) (6) Okay.

SGT (b) (6) And I actually created that Lima pallet and had to remove it because I found that the compatibility between the mortars and the rest of the rounds weren't able to be palletized on the same Lima, and I didn't find that with anything else.

LTCOL (b) (6) Okay. So based on your experience, the pallet as it was loaded on Y-72, all of those DODAC's and class numbers were compatible?

SGT (b) (6) Yes, sir.

LTCOL (b) (6) Okay.

SGT (b) (6) As far as I know, yes.

LTCOL (b) (6) Last question. Oxygen tanks, how are they transported? Are they half full? Are they empty? How much stuff is in there or do you even know that? No idea?

SGT (b) (6) I wouldn't touch it. I wouldn't mess that. I just -- I had them open it. I checked the package that was in. I made sure that that was the package that was made for the oxygen tank. And I mean that's -- it had the same, you know, it was made for it.

LTCOL (b) (6) Unlike the RZR's where you say, hey, it needs to be 50 percent or 75 percent full?

SGT (b) (6) Yeah as far as that. And it was small, small, small. I called up the APO and was like "What do I do about the oxygen?"

LTCOL (b) (6) Give me a description. 24-ounce beer can? Football?

SGT (b) (6) It was actually a pain to find because it was from medical, so it was even smaller than that. There was --

LTCOL (b) (6) Smaller than a scuba tank?

SGT (b) (6) Most definitely.

LTCOL (b) (6) Taller than that fire extinguisher?

SGT (b) (6) Yes -- well, I would say about where the instruction begin down to the bottom.

LTCOL (b) (6) Okay. So --

SGT (b) (6) And then you had the cap at the top; and of course I inspected the cap to make sure the cap wasn't leaking anything, and then I inspected around it to make that there wasn't any punctures just like I did with the containers because that is really what it is.

LTCOL (b) (6) So I don't have any more questions. I realize that was detailed.

SGT (b) (6) I really hope that I was actually --

MAJ (b) (6) You are very helpful. I have a got a couple more questions, if you don't mind.

SGT (b) (6) Yes, sir.

MAJ (b) (6) You are educating us.

SGT (b) (6) I don't want to seem like I am coming off as, like, hostile.

MAJ (b) (6) No, you are not at all. We are over here and we are trying to learn from you. Okay. The mortars you removed, did they have one of these numbers like this, one of these 1.4S, 1.4G? Do you remember what those were?

SGT (b) (6) I should have. It was early, early on, so I had to create a separate HAZDEC for it, and I don't even remember if I got to the HAZDEC before they were removed. I know that someone was like, yeah, these are going to have to go on a different Lima pallet.

MAJ (b) (6) Would be on email or something, that whole transaction? Can we find out what that was?

SGT (b) (6) That is not something that I would have.

MAJ (b) (6) Okay.

SGT (b) (6) But I know for a fact that they were rechecking that -- these are not --

LTCOL (b) (6) Were they HE mortars?

SGT (b) (6) I am pretty -- it was something large that just couldn't --

LTCOL (b) (6) Is that --

SGT (b) (6) It was ridiculous too because I was looking at it and it weighed like nothing, like 100 pounds. I was like, I am not using up a pallet position for 100 pounds. I would rather just remove them completely. Why spend -- that's -- I mean, we had that pallet position, but still that's --

LTCOL (b) (6) Are you saying that you would have -- had you had taken the mortars, you would have, based on the incompatibility, would have put them on a different pallet on the same plane?

SGT (b) (6) Most definitely.

LTCOL (b) (6) Or are you required to put them on a different plane?

SGT (b) (6) Didn't even get to that point to look it up. I just knew they weren't compatible.

LTCOL (b) (6) And so what does not compatible mean to you? It can't be on the same pallet?

SGT (b) (6) Yes. Actually, for specifically for those rounds, they weren't able to be on the same pallet with the other ammunition because I remember we had done planning that we were going to put them in pallet positon 5 and then have that one in pallet position 6 since it was a heavier load.

MAJ (b) (6) I want to make sure I understand the ICODES. I am a little fuzzy here. So this is what you presented -- this is what you all presented. You didn't initiate it. Somebody else initiated it.

SGT (b) (6) That one I sent him.

MAJ (b) (6) And you sent this to him, right, but you didn't initiate it. It had the whole Chapter 3 on there before you did it, right?

SGT (b) (6) Yes, sir.

MAJ (b) (6) Okay. And then you sent it. Now, my understanding is that you used this in order to help indicate what may be incompatible.

SGT (b) (6) No.

MAJ (b) (6) No, not all?

SGT (b) (6) Not even in the least.

MAJ (b) (6) So when you talk about red flag, what does that mean?

SGT (b) (6) Weight. My biggest thing with ICODES is most definitely weight. Everything in regards to whether it is compatible is, to me, HAZDEC's. So when I am thinking like -- when I am thinking ICODES, I am really think, like, "Can it fly with this weight being here?" And then that is almost in my eyes, like an extra, like, it is saying, okay, so this is what is in that, but this is so much more in depth that it's like -- this holds more as far as HAZMAT in my eyes. The data holds more as far as "What are the limitations of this aircraft and what can that aircraft handle?" So that's how I see ICODES; that's why I am very specific on making sure that --

MAJ (b) (6) From a weight and balance perspective?

SGT (b) (6) Yeah. That is definitely what is mainly for as well as, you know, getting cargo packs and everything; that most definitely is its main purpose.

MAJ (b) (6) Okay. And one more question.

LTCOL (b) (6) Okay.

MAJ (b) (6) ASP, the ammo tech put this all together? Is he part of the ASP?

SGT (b) (6) No.

MAJ (b) (6) That is Corporal (b) (6)

SGT (b) (6) He is with Hotel Company.

MAJ (b) (6) And that is Corporal (b) (6)

SGT (b) (6) Yes. But he put it together at the ASP with ASP personnel.

MAJ (b) (6) Okay. That's all.

SGT (b) (6) They were present for the creation of this pallet.

[The interview ended.]

[END OF PAGE]

INTERVIEW OF LANCE CORPORAL (b) (6) FROM 25 JULY 2017

[Interview began at 1222 on 25 July 2017.]

LTCOL (b) (6) Today is Tuesday, July 25th, and it's 1222. This is the Commanding General's Investigation into the crash of Y-72. I am the investigator, Lieutenant Colonel (b) (6) and we are investigating Lance Corporal (b) (6)

Lance Corporal (b) (6) do you see we are recording the interview?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) And do you authorize us to record the interview?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Thank you very much.

I want to start out, Lance Corporal (b) (6) just tell us in your words about what happened that day with the loading of Y-62 and Y-72.

LCPL (b) (6) Yes, sir. Before we do any of that, gentlemen, I would like to request my Commanding Officer in here.

LTCOL (b) (6) Okay. We are not going to have your Commanding Officer come in here because this is just an interview. There is no other -- by having other people in here, I think we affect the information that comes in.

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) We want to get it fresh from every individual, so it works that way.

LCPL (b) (6) I would -- I wish to say nothing without my Commanding Officer present, sir.

LTCOL (b) (6) Okay. We are going to end the interview for Lance Corporal (b) (6) at this point.

[The interview was stopped.]

[The interview began at 1243 on 25 July 2017.]

LTCOL (b) (6) Tuesday, July 25, 2017 at 1243 in an interview with Lance Corporal (b) (6) I am Lieutenant Colonel (b) (6) the Investigating Officer, for the Commanding General's command investigation concerning the crash of Y-72.

Lance Corporal (b) (6) do you see we are recording the conversation?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) And do you authorize us to record the conversation?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Okay. Lance Corporal (b) (6) just tell us about that day and what you remember about the Yankee flights.

LCPL (b) (6) It was Friday afternoon. I had just almost gotten done doing another joint inspection for a C-17. There was a few things that I still needed to do for it; but aside from that, it was my first time meeting Sergeant (b) (6) who was

an embarker for 2d Raider Battalion. We were in our operations officer where we handle operations for our flights and stuff, and I was sitting in there. He introduces himself. He gives me the paperwork for his joint inspection. It was going to be a fast joint inspection -- faster than the C-17 because it was only two ISU's and a RZR going onto the aircraft. So I go through some of the paperwork. I look at it just to get an understanding of what I was going to inspect and what was going to be in there so that way I wasn't going to get any surprises.

After I do that, I -- he weighs everything, the ISU's, the RZR's; and then after he gets done with that, he writes down his weights. So I have the paperwork. I hand him the paperwork. We go outside, and I inspect the first RZR and everything was fine with it. The fuel level was where it was supposed to be at, which was less than half a tank. There was no leakages. Everything was strapped down inside the RZR. Nothing seemed wrong with it. So he got some of the paperwork and they taped it on there, and then I came back out later after that to sign it; but before I did any of that, I inspected the ISU's, the integrity of the ISU's just to make sure that nothing was damaged on the ISU, the teeth of the ISU at that bottom, the -- all of the pins and hooks, d-rings. I made sure that all of that stuff was on there.

After that, I had them open both sides of the first ISU, which didn't have anything hazardous inside of it. I had them pull out a few things. A lot of stuff was personal gear that a lot of MARSOC personnel put inside of their containers and stuff. There were some tools. There wasn't anything that would cause a hazard or anything. So I go to the other side, the same thing basically. So when I got done with that one, I went on to the next ISU, which had the batteries and it had the aerosols -- the paint. I looked inside. There wasn't anything that they hadn't stated. So after I checked all of the HAZMAT and some of the other containers that were inside of the ISU, I go to the other side and they had a compressed oxygen tank in a black case, which they had a hazardous document for that. So I just wanted to make sure it was what they said it was.

After that portion of the joint inspection was done, the ammunition hadn't got there yet, so we went to the Ops office. We talked for a few minutes about what was going to happen on Sunday, about the transportation of the ammunition, about what time Sergeant (b) (6) was going to get there, about some of the paperwork, about the load plan; and Sergeant (b) (6) said something about the RZR being closer to the inside of the aircraft rather than the outside, and he said that he had spoken with the load master and that is how the load master wanted it because usually hazardous material should always be at the rear

of the aircraft just in case it needs to get dropped because it could -- let's say it was some sort of leakage that just popped up onto the RZR, well, you don't want to dump everything so you want to put the HAZMAT last, but that wasn't the case. That is how the load master wanted it. So I said if the load master is fine with that, I am fine with it. You spoke to him, so I take your word on that.

After that -- so I kept some of the paperwork, then the joint inspection for the day for that portion was done, but it wasn't completely done. Sunday comes, Sergeant (b) (6) brings the ammunition around -- I want to sat it was in the afternoon, after 12, and I am at the CALA waiting for it. It gets offloaded. We put it on pallets, and we weight it with scales that we provided to them. I was staged -- the ammunition tech, Corporal (b) (6) has the paperwork for it, and he explains to me this is that and this is this, and I look over it. They strap it down with -- it already had the banding wire on it, then we put the 5,000 pound straps on there, which there were like seven straps of that on there. It was all secured. All of the d-rings were used on each side of the pallet. So then after that, I look over it, everything is tight, and I -- Sergeant (b) (6) tells me that he didn't bring the hazard class stickers that are supposed to go on ammunition like if it's 1.1, 1.2, or 1.3. So I tell him it is fine. You don't have to put

them on today, but we can come back here early in the morning tomorrow and we can get all of that stuff on there -- the HAZDEC's, the placard, and the hazard class stickers. I will be here with because I was going to come look at it again. I have to be there for it to get loaded onto the aircraft anyways. So I don't think I missed anything else on that day.

So Monday morning, we are going by our usual business. Sergeant (b) (6) comes. He has the placard and the hazardous documents that have to go on the pallet and the class stickers that are supposed to go on there. Then, a man named Mr. (b) (6) comes and he -- he is part of the ordinance manager or something like that. I have never spoken to him. I didn't even know there was a billet for that. So he comes and he speaks to Sergeant (b) (6), and Sergeant (b) (6) and my squad leader tell me that I have to give him my joint inspector paperwork and my hazardous documents and the load plan for the aircraft. So I go over to him and I give him all of the paperwork that I had, and he looks over it and he says that there is some things that need to be fixed on there. And he tells me that the hazardous document, the packaging for the ammunition can was supposed to be steel instead of aluminum, so he wanted us to get -- he wanted for us to fix that. He also didn't like some things that were on the pallet itself. He wanted a top net on the pallet for more security of the

ammunition. He wanted the banding wire on there to have two crimps. He wanted proper shipping names and the UN numbers on the cans. And the light boxes, which is ammunition that has -- isn't full of rounds to be orange instead of saying light box, which is basically a box that has less ammunition than what a full box would have. So we did that. We didn't switch the ammunition cans from the -- we didn't put them in orange cans. It was too late. They were already strapped down with the banding wire and stuff, so we just left it as light boxes. But for next time, he said to just get that done, and I told him that I would.

So the C-130's had arrived, and I was getting all of the stuff that Mr. (b) (6) had requested me to do. They were here, and they started loading. So I wasn't specifically there for the -- I was on the lot, but I was too busy running around trying to grab all of the stuff that we needed for the ammunition pallet, so I didn't see if the RZR went on first, but I am pretty sure it did because that is how the load master wanted it. So I grabbed all of the stuff, and I gave it to a Gunnery Sergeant (b) (6) who took it back to the CALA. The ammunition tech fixed all of the stuff that Mr. (b) (6) had asked us to do. So Sergeant (b) (6) and I stayed back at the APOE. On the computer, Sergeant (b) (6) fixed whatever Mr. (b) (6) had asked. So then we got that printed out because

we thought Mr. (b) (6) was going to be there and he was going to go look over the hazardous document. When we got there, Mr. (b) (6) wasn't there anymore probably because had been waiting for us for over -- I don't know. He wanted us to be there at 12, but we couldn't be there at 12 because we still had to get a few other things done. So he looked at the pallet, and he said that the pallet was fine. Everything was good on the pallet. Everything that he had requested of us to fix was fixed. That is what the ammunition tech said. So he said that it was good to go, so I was relieved by that.

When we got there, we had the hazardous document that we thought that he was going to look over but he didn't. Sergeant (b) (6), myself, Corporal (b) (6) and Gunnery Sergeant (b) (6) -- I think that is his name. I am not too positive. But there was a gunnery sergeant. I don't know if it was Gunnery Sergeant (b) (6) or (b) (6) But he was -- they were all there. I gave the hazardous document to Sergeant (b) (6), and I said "Could you please look over this to make sure that it's fine and it's good to go?" because he is an ammo tech, and he said "Yes, it's fine." So we got it -- we put it on the ammunition pallet. We put the hazard classes on the boxes, and we got the placard on there. Then I had -- since we had to print over a few things, I had to get Sergeant (b) (6) signature on the hazardous document again because we had to fix

that. So he got everything signed for me, and the C-130 was still in the APOE pits at that time.

So I went back to the APO with Sergeant (b) (6) -- no, I think I went back to the APO by myself; and then afterwards, Sergeant (b) (6) and Gunnery Sergeant (b) (6) went back to the APO. I made copies of all of the paperwork to give to the aircrew. We give copies of the joint inspector's paperwork, the hazardous documents of everything that is hazardous inside of the aircraft, and the load plan just so that way they have copies and they can look at it. If they have any questions, they can question us about it. So I made copies of it, and I took it to the Ops -- the operations office. I got the passenger manifest, and I just stuffed it in there with the paperwork that I had from my joint inspection. Then I walk over to the aircraft and I see Gunnery Sergeant (b) (6) and Sergeant (b) (6) on their way back from the aircraft, and they tell me that they spoke to the load master about what had happened with Mr. (b) (6) just in case someone was to go out there and let them know what happened. They said that the load master said it was fine; that they will look at it when it gets into the aircraft. And I tell them "Okay, thank you for letting me know that." So I walk over to the aircraft, and then I speak with, I believe, it was the load master -- he was a gunnery sergeant -- and I gave him the paperwork. I let him know what was in there.

I tell him it's the load plan, the manifest, the hazardous documents, the joint inspector's paperwork, and then I told him that I knew that he spoke to the two gentlemen that just had talked to him about Mr. (b) (6) about the ammunition pallet. I asked him if he had questions to me about, and he said, no, and that was it. I tell him "Okay, thank you for everything." I leave, and the C-130 is still in the pits when I am on the way back to the CALA because I had to wait for the ammunition pallet to still be loaded into the C-130.

So when I get back, I am, like, what is taking for the C-130 to come over here? I thought everything was loaded onto it already. So someone radios over to our Bird NCO, which he -- that is the billet of the person who speaks to the APO from the bird, and they said that they were waiting for us to bring the ammunition pallet to the pits. We said, no, that the C-130 had to come to the CALA and pick up the ammunition pallet. And after a few minutes, the C-130 comes. Then (b) (6), the operator, come, he picks up the pallet and takes it to the aircraft; and after it gets loaded, we leave. I go back to the APO. I send up my paperwork to 2d MEF. I tell Sergeant (b) (6) and Sergeant (b) (6) that everything has been loaded onto the C-130 and that it was good to go. I spoke with the load master, and that was it.

LTCOL (b) (6) Let me ask you a couple of questions.

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) You said that -- I guess you were referring to Friday --

LCPL (b) (6) Yes.

LTCOL (b) (6) -- when the load came in and you go back to the ISU and you inspect it and you look on the -- you looked at the teeth on the bottom of the ISU, what does that mean?

LCPL (b) (6) The teeth -- so the pallet itself has the teeth on the pallet. It is basically what helps it get into the aircraft. So if a tooth is chipped on there, then it won't properly secure into the aircraft -- it won't secure to the aircraft compartment.

LTCOL (b) (6) Is it the part that goes on the rollers --

LCPL (b) (6) Yes.

LTCOL (b) (6) -- that comes up through?

LCPL (b) (6) Yes.

LTCOL (b) (6) I got you. Okay. Another question about what you did on Friday. You talked about the order of the placement into the aircraft of the ISU's with respect to the RZR.

LCPL (b) (6) Yes.

LTCOL (b) (6) So on the plane with three RZR's, I understand the RZR's backed in.

LCPL (b) (6) Yes.

LTCOL (b) (6) For the plane with one RZR, it was driven in forward.

LCPL (b) (6) I don't know. I wasn't specifically there for it.

LTCOL (b) (6) Okay.

LCPL (b) (6) I did not see it get loaded on.

LTCOL (b) (6) And then what did they put on after that? What was the next ISU put on?

LCPL (b) (6) I would have to look at the load plan because I forgot if it was supposed to be the HAZMAT one or the non-HAZMAT. It was the non-HAZMAT. So the one that -- this one right here -- so it was the RZR, the non-HAZMAT ISU, the HAZMAT ISU, and the ammunition pallet.

LTCOL (b) (6) Got you.

LCPL (b) (6) That is how the order should have been, but I don't know if they said we want the HAZMAT ISU first because I wasn't there. I was doing other things for Mr. (b) (6)

LTCOL (b) (6) But you indicated on Friday that -- you said something along the lines that that is the way it should be, but that they wanted it another way on Friday.

LCPL (b) (6) No. I said -- I didn't say that. I said that the -- so Sergeant (b) (6) said to me that how load plan was, and he said that the MRZR was going to get loaded on first, and that is not usually how we would do it or as an embarker

would. They would put all of the hazardous materials on last just in case something was to happen. Any leakages from the RZR, they would have to dump everything rather than just the RZR itself.

LTCOL (b) (6) I am with you.

LCPL (b) (6) So they -- that is how they wanted it.

LTCOL (b) (6) Okay. I see. So what you were saying is that that first pallet right here --

LCPL (b) (6) Yes.

LTCOL (b) (6) -- technically should have been up here and the RZR in the back so that you had the hazardous cargo in the back. I got you.

LCPL (b) (6) That's what -- if I was creating a load plan as an embarker that is what I would have done.

LTCOL (b) (6) Okay. That is what I was trying to make sure. I was confused by that. I appreciate that.

MAJ (b) (6) So this is more of what you would be used to seeing?

LCPL (b) (6) Yes. That is what I would have -- that would have been -- if I was the embarker for this flight, I would have made a load plan like that. But if the load master -- if I get in contact with the load master of the aircraft and he tells me to switch it around, I am going to switch it around for him because that's his aircraft and that is

his preference, and I am not going to say, no, to him just because he would probably be more experienced than I was.

MAJ (b) (6) That is just purely based off of HAZMAT, right?

LCPL (b) (6) Yes.

LTCOL (b) (6) Okay. You said that there was an ammo tech who fixed the load. Who was the ammo tech?

LCPL (b) (6) He is part of 2d Raider Battalion. His name was Corporal (b) (6) He was at the CALA the entire time because it was -- he was the ammo tech for that flight, and he -- by saying "he fixed the load," is he and the gunnery sergeant put the crimps on that Mr. (b) (6) wanted. They got the top net onto it, and they put the proper shipping names onto the ammunition cans.

LTCOL (b) (6) Got you. Who -- now, (b) (6) on Monday said he had a problem with the ammo pallet, and he listed the issue with the ammo pallet, and then these were re-fixed by the ammo tech, Corporal (b) (6) right?

LCPL (b) (6) Yes.

LTCOL (b) (6) But did (b) (6) come back and recheck the pallet after it was fixed?

LCPL (b) (6) Yes, he did. He was there. He told us, me and Sergeant (b) (6) to be there at 12, but we weren't there at exactly 12. We came, like, 15 minutes after that, twenty

minutes after that because he was still -- Sergeant (b) (6) was still fixing the hazardous document that he wanted us to fix, but Corporal (b) (6) and Gunnery Sergeant (b) (6) were there because they were waiting for Mr. (b) (6) and myself --

LTCOL (b) (6) Got you.

LCPL (b) (6) -- and Sergeant (b) (6) Sergeant (b) (6) was also at the CALA waiting for us too. So I wasn't specifically there when Mr. (b) (6) was over there checking, but he approved it through Gunnery Sergeant (b) (6) and Corporal (b) (6) and Sergeant (b) (6).

LTCOL (b) (6) Got you.

LCPL (b) (6) I am pretty sure Sergeant (b) (6) was there because Sergeant (b) (6) was waiting there for me to bring the hazardous documents because I had asked him to come to the CALA and just look over my hazardous documents.

LTCOL (b) (6) Okay. What are your specific qualifications?

LCPL (b) (6) I am joint inspector certified. I am load planner certified and HAZMAT certified, sir.

LTCOL (b) (6) Are they all current?

LCPL (b) (6) Yes.

LTCOL (b) (6) How long have you been doing this job?

LCPL (b) (6) I just got joint inspector certified in January.

LTCOL (b) (6) January. How about the other ones?

LCPL (b) (6) I have load planners since 2016 of June or July, and HAZMAT not long after that.

LTCOL (b) (6) And before you went off to those two schools to the load planner certification and the HAZMAT certification, how long had you been working do this job? When did you go to your MOS school?

LCPL (b) (6) I went in October of 2015, sir.

LTCOL (b) (6) Got you. So I think you have covered pretty much of the joint inspection process. Is there anything else you need to tell me about that?

LCPL (b) (6) I don't think so, sir. I don't think I missed anything.

LTCOL (b) (6) All right. Go ahead.

MAJ (b) (6) So did you see Sergeant (b) (6) put the stickers on the ammo?

LCPL (b) (6) Yes, I did. Yes, sir.

MAJ (b) (6) Okay. So before the ammo pallet was loaded on to the plane at the CALA, you physically walked over or you drove over and you saw it, you looked at it, it met the criteria?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay.

MAJ (b) (6) So he did actually bring them back on Monday like he said he was going to?

LCPL (b) (6) I am sorry.

MAJ (b) (6) All of the stickers. So Sunday --

LCPL (b) (6) Yes, he did.

MAJ (b) (6) Okay.

MAJ (b) (6) So from your experience working there, you guys don't have any procedure to work with the explosives safety officer, Mr. (b) (6) right?

LCPL (b) (6) No, sir.

MAJ (b) (6) You just -- this is the first interaction with him. So when he showed up, who did you inform that you met this Mr. (b) (6)

LCPL (b) (6) I wasn't the first person that he spoke to when he went in there.

MAJ (b) (6) Okay.

LCPL (b) (6) He spoke to Sergeant (b) (6) r, Sergeant (b) (6), and my squad leader, and I was in one of the bays when they came and grabbed and said "Where is your paperwork at?" and I said "In my locker." I went and I grabbed it for him because they said that he needed to see it.

MAJ (b) (6) Okay. Got you. Do you know if they told everyone up the chain of command that some unique person that they have never talked to before --

LCPL (b) (6) I think our sergeant spoke to our commanding officer, sir.

MAJ (b) (6) Okay. So on the load plan that we have, you have already talked us through page 1, which is the depiction of where everything is; page 2 clarifies it. Just so I am clear, on page 2, the section that says "HZ" is HAZMAT, right?

LCPL (b) (6) Yes.

MAJ (b) (6) So position 1, "Yes." Got it. We have doc HAZDEC for the RZR. Position 2 is "No." Position 3 is "Yes." Position 4 is "Yes," which is the ammo pallet.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) And on page 3 is where we do the sign-offs.

LCPL (b) (6) Yes.

MAJ (b) (6) So Sergeant (b) (6) signs it because he is the guy from 2d Raider Battalion, right?

LCPL (b) (6) Yes.

MAJ (b) (6) And then yourself, you certify that the load is good to go, you approved it --

LCPL (b) (6) Yes, sir.

MAJ (b) (6) -- and then you sign for the air terminal representative as well?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) And is that normal for you to sign both positions?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Does this person have to be JI? I am sorry. For the air terminal position, does it have to be a JI qualified person?

LCPL (b) (6) I think they just have to be load planner certified.

MAJ (b) (6) Load planner certified?

LCPL (b) (6) Yes -- or, not, actually, it has to be the air terminal representative. So I am pretty sure that the joint inspector has to sign off on this because they have to approve the load plan because they are doing the joint inspection. So if they see something about the load plan that they don't like that the embarker did or they make any recommendations, then they don't have to sign that.

MAJ (b) (6) Okay. But it is not uncommon for it to be the same person like you did right here?

LCPL (b) (6) It is not.

MAJ (b) (6) This is normal?

LCPL (b) (6) It is normal.

MAJ (b) (6) That you are the same person?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. And then when you take -- you said you reference -- you got all the stuff together, important

documents, you gave it to the gunny. Did he sign anything for you?

LCPL (b) (6) No, he didn't, sir.

MAJ (b) (6) Okay. And did you ask for his signature?

LCPL (b) (6) I didn't, sir.

MAJ (b) (6) Okay. So this is the just the original copy that you had, so all of the copies you guys have, there is no aircrew signing off that they have, you know, their little block; is that normal?

LCPL (b) (6) Yes, sir. I have never worked a flight that they would usually sign that.

MAJ (b) (6) Is that with all the units?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay.

LCPL (b) (6) It's just not something that -- it wasn't forced through the APOE. No one has ever told me "You have to get an aircrew member signature."

MAJ (b) (6) Right.

LCPL (b) (6) So I --

MAJ (b) (6) And there is nothing in your training -- your embark training that teaches you that that is a requirement?

LCPL (b) (6) No. I have never been told "This is a requirement for cargo to go inside of the aircraft. If you

don't get that signature, then the cargo can't go on." It never been said to me.

MAJ (b) (6) And for your record purposes, how long do you have to keep a load plan?

LCPL (b) (6) I think it is -- not saying a load plan, but mission folders that we keep with all of the aircraft information with our Wells reports, the load plans, the hazardous documents, the joint inspector's paperwork, anything else that would be received from that flight, we keep for fours, three years, I think. We package it in a folder, and we keep hold of it.

MAJ (b) (6) Okay. Is this something you usually get in advance, the load plan, from the individual or do you get it as they show up?

LCPL (b) (6) From the embarker, sir?

MAJ (b) (6) Right.

LCPL (b) (6) Usually, they have it when they get to the APOE and we do the inspection, sir.

MAJ (b) (6) Okay. And have you done much work with the 2d Marine Raider Battalion?

LCPL (b) (6) I worked with them two other times, sir.

MAJ (b) (6) Any issues working with them in the past?

LCPL (b) (6) No, sir.

MAJ (b) (6) Okay. Nothing has been wrong?

LCPL (b) (6) No, sir.

MAJ (b) (6) All right. Can you -- this is -- so I am going to show you the enclosure for the ammo piece of the HAZDEC's, pages 1 through 3. Can you show me and kind of explain what was changed on this if you recall exactly?

LCPL (b) (6) So I know that -- okay. So it says "steel can" right here. Before, it was "aluminum cans."

MAJ (b) (6) But they were actually steel cans?

LCPL (b) (6) So I asked Sergeant (b) (6), and he said that the can itself has a mixture of aluminum and steel. The majority of it was steel. So I -- because I was confused myself; and when I asked him that, I was, like, "Okay, that's something that I didn't know." So we got that fixed. And then I added -- we added some -- the authorizations, which were these. I don't know -- I don't think they were on there the first time, but just for a few of them. So I went back through them, and then I just added them onto there, and I think that was it, sir.

MAJ (b) (6) And what is an authorization?

LCPL (b) (6) Basically, provisions that you are kind of like supposed to look at it, like, so P-5 would be passenger aircraft only; P-4 would be cargo and aircraft only -- or cargo aircraft only, which would be these selections right here for that.

MAJ (b) (6) Okay. So like on page 2, what is P-4?

LCPL (b) (6) P-4 would be passenger -- it would be cargo aircraft only, sir.

MAJ (b) (6) Cargo aircraft only.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. And then nothing changed on the class, right?

LCPL (b) (6) No, sir.

MAJ (b) (6) All the classes stayed constant?

LCPL (b) (6) All the classes and the net explosive weights stayed the same, sir.

MAJ (b) (6) Okay. And this is the only HAZDEC that changed -- that you had to change before they took the load, right?

LCPL (b) (6) Yes, sir. It was just for the ammunition.

MAJ (b) (6) And did Mr. (b) (6) review this before it got loaded on the plane?

LCPL (b) (6) He looked at the other one, and he --

MAJ (b) (6) The previous one?

LCPL (b) (6) Yes. Which had the wrong cans that it was in, and we brought the other one to the CALA because we thought he was going to be there, but he had left.

MAJ (b) (6) Okay.

LCPL (b) (6) I had Sergeant (b) (6) look at it, and he said it was fine.

MAJ (b) (6) Okay. So your ammo tech, Sergeant (b) (6), did the oversight?

LCPL (b) (6) The CLC ammo tech. Yes, sir.

MAJ (b) (6) Right. Okay. Did -- while you made this, is Sergeant (b) (6) -- and it's clear that he signed it -- so he also made sure it was correct?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Let's see with that, you said there was -- in the second -- or in the third position, the second ISU -- yep, third position, second ISU, it calls for HAZMAT, and you said there was the compressed oxygen, 968 lithium batteries, and a bunch of 22, I guess, aluminum or paint aluminum, I am guessing spray paint, something along those lines. Is there a reason why these two HAZDEC's are not combined?

LCPL (b) (6) Yes. Because the lithium batteries and the paint were on one side of ISU; and the other side of this ISU had the compressed oxygen, and that is why. Because in the ISU itself, there is a wall in between that. So to specify which one had a certain HAZMAT, we put it on the wall of whichever one. So if the side of the lithium batteries one and the paint, we put this hazard placard on there. And then on the other

side, we put the compressed oxygen one on, and then we also put the class stickers on there too.

MAJ (b) (6) Okay. Just remind me again. So P-4 is what?

LCPL (b) (6) Cargo aircraft only, sir.

MAJ (b) (6) For the authorization, P-5 is what?

LCPL (b) (6) Passenger and cargo aircraft only, sir.

MAJ (b) (6) Okay. And so, you know, hopefully, you can -- you will show me because I know you can. In the AFMAN, you know, with these things, you separated -- they are separated inside the ISU by a wall --

LCPL (b) (6) Yes, sir.

MAJ (b) (6) -- where does it say that the separation of the wall constitutes compatibility with these items or are these already compatible to be in the same container?

LCPL (b) (6) I don't think they would cause any hazard to each other, sir.

MAJ (b) (6) Could you look that up? Could you show me how these are all compatible? I am not very good at this stuff. We have got an AFMAN right here.

LTCOL (b) (6) We don't know anything about the AFMAN, so we are trying to learn about all this stuff.

LCPL (b) (6) Okay.

MAJ (b) (6) I just know how to look at a load plan.

LCPL (b) (6) Okay.

MAJ (b) (6) You can scroll with two fingers like that if you need.

LCPL (b) (6) Okay.

MAJ (b) (6) Or if you want to search for something, you can do it over here.

MAJ (b) (6) Take your time, no rush.

LCPL (b) (6) Okay. So if I go over here, I see the UN number, lithium batteries including -- so that is 340, and then I would go to the special provisions over here and then the packaging paragraph, and that is where it would state if it was incompatible with Class 8 items or Class 2.2, and it didn't say any of that.

MAJ (b) (6) So it doesn't say that right there?

LCPL (b) (6) No. Well, this is just what the AFMAN says; but if you want --

MAJ (b) (6) Show him what it says.

LCPL (b) (6) So you would look at the paragraph that it was in, and then it -- so you would go to the paragraph itself and it would say whether it was compatible with that class or it cannot be put in the same place as that item.

MAJ (b) (6) So can you show me where these are compatible?

LCPL (b) (6) Where this would be compatible?

MAJ (b) (6) No. These three items together.

LCPL (b) (6) Okay.

MAJ (b) (6) Can you kind of walk the dog for me?

MAJ (b) (6) Would it just be that paragraph?

LCPL (b) (6) Yes.

MAJ (b) (6) I am sorry. It is kind of confusing. You can use two fingers and scroll up and down or you can type it up there.

LCPL (b) (6) Oh, okay. So this is the packaging instructions right here, and you can read through that.

MAJ (b) (6) Are you all done?

MAJ (b) (6) Yep.

LTCOL (b) (6) Wait a second. Okay.

MAJ (b) (6) So this right here, Protective Enclosures, for example, "fully enclosed wooden slated crates." So an ISU is clearly more than that wooden slated crate.

MAJ (b) (6) How is that -- that's for the actual --

LCPL (b) (6) That is for the packaging inside of the ISU itself, and it was in a plastic box; they were in a plastic box.

LTCOL (b) (6) They were all in a plastic box?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) How many were in each plastic box?

LCPL (b) (6) I did not get a count of how many were in each plastic box.

LTCOL (b) (6) How many plastic boxes were there?

LCPL (b) (6) I think there was two. I think there was two, sir.

LTCOL (b) (6) Two plastic boxes. How big were they?

LCPL (b) (6) They were pretty big, sir.

LTCOL (b) (6) All right.

LCPL (b) (6) They were like --

LTCOL (b) (6) Bigger than this couch?

LCPL (b) (6) No, no, sir. Like about that big maybe, and the height was probably like that.

LTCOL (b) (6) So they were about this high?

LCPL (b) (6) Um-huh. They were pretty big.

LTCOL (b) (6) And then they were square?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) And they were laid down into the pallet?

LCPL (b) (6) They were easily accessible in the ISU, so they were, like, right in front in the front, sir.

LTCOL (b) (6) All right. I am having an issue --

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) -- understanding this. I am picturing an ISU -- stand back there on the other side. I am one side of the ISU, you are the other side, it is eight feet. Okay.

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) So inside this ISU, eight feet, you open the doors.

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Where are the lithium batteries?

LCPL (b) (6) Right in front in the front, sir.

LTCOL (b) (6) Right in the front?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Okay. And they are four or eight feet wide? How wide is the box?

LCPL (b) (6) No, the box is not four. It was not that big. So like that big, and maybe like about that tall.

LTCOL (b) (6) Got you. So it is about three feet?

LCPL (b) (6) Yes.

LTCOL (b) (6) About three or four feet wide box, and about two to three feet tall?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Okay. Were they on top of each other, the two boxes?

LCPL (b) (6) I think they were right next to each other, sir.

LTCOL (b) (6) So they are next to each other, and you are telling me there is a wall inside the ISU. Right. So is the wall running this way when you open the doors?

LCPL (b) (6) No. It's -- so you open the doors, and the wall is like that.

LTCOL (b) (6) So you are just looking at half of the ISU --

LCPL (b) (6) Yes, exactly.

LTCOL (b) (6) -- when you open the first two doors?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Okay. So what you have is here in this -- was it the left or right side?

LCPL (b) (6) It was on the right side.

LTCOL (b) (6) It was on the right side. -- are two stacks of lithium batteries?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) You closed those doors, and you walked around the other side, you opened it, and that is where the --

LCPL (b) (6) -- compressed oxygen was, sir.

LTCOL (b) (6) -- compressed oxygen was?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Where was the paint with respect to the two boxes of lithium?

LCPL (b) (6) It was next to them, sir.

LTCOL (b) (6) So the paint, and how was the paint packaged?

LCPL (b) (6) It was closed in a box, sir.

LTCOL (b) (6) How big was that box?

LCPL (b) (6) It wasn't that big. It was like about that big.

LTCOL (b) (6) Maybe two feet by --

LCPL (b) (6) Probably like -- yes, two feet by like two feet.

LTCOL (b) (6) So it's a big square of two feet by two feet by two feet. The two lithium boxes of lithium batteries are here, and then you have a two foot box of paint -- spray paint right here?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Was the paint in a cardboard box?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay.

LTCOL (b) (6) Okay.

MAJ (b) (6) Okay. I understand the packaging part. Where does it say what is not compatible code-wise with it? Do you know what I mean?

LCPL (b) (6) Yes.

MAJ (b) (6) So that explains that piece. Thank you very much.

LCPL (b) (6) I think if it was incompatible, it would state that it was not incompatible, sir.

LTCOL (b) (6) Let me ask you this.

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) If I gave you unlimited time, you could find it, I am sure. When you do this and you do the JI, are you sitting down and you are pulling out the AFMAN, you are cross-comparing the HAZDEC's to HAZDEC's or -- is that what you are doing?

LCPL (b) (6) I am looking to see if all the remarks on it are correct. I look to see if the class that it is under is correct, the UN number, how many, the packaging instructions, the authorizations.

LTCOL (b) (6) What else?

LCPL (b) (6) This information right here: if it was going to the correct location, the airport departure, the serial numbers -- but they didn't have -- this is supposed to be the TCN's; but since it was going within the United States, it didn't have to have a TCN reference on it. The co-signee, which would be the representative from the battalion that it was coming from or whoever, and the shipper information.

MAJ (b) (6) But you are checking for compatibility, right?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) So when Sergeant (b) (6) created this, he checks all that as well, correct?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Because he is the one generated it. So when it comes time and you and Sergeant (b) (6) sit down and you do

this JI on it on, I believe it was Friday, did you guys both sit down with the AFMAN and he walked the dog for you to show where they are compatible or how did you guys determine it was compatible?

LCPL (b) (6) I looked at it, sir, and it didn't say anything about it being incompatible.

MAJ (b) (6) And how did you verify that?

LCPL (b) (6) Through the AFMAN. I just -- I looked at the references on it.

MAJ (b) (6) So you don't have like a cheat sheet that you are using to cross-talk --

LCPL (b) (6) No.

MAJ (b) (6) -- or anything like that?

LCPL (b) (6) No, sir.

MAJ (b) (6) So how long do you think it would take to do that on average for just this, these three things?

LCPL (b) (6) It depends on how much stuff was on it. So this probably wouldn't take long, sir.

MAJ (b) (6) Okay. So can we do that?

LCPL (b) (6) Yes.

MAJ (b) (6) Can you show me?

LCPL (b) (6) I am not timing you. I just want to understand --

LTCOL (b) (6) We are learning a lot from you. Thank you.

MAJ (b) (6) -- where it all comes from and how this whole thing works.

LCPL (b) (6) So this is the provisions that it had for the lithium batteries. So it had -- so I looked at this, but I thought I saw A5-11, where did I see that at? Okay. So I think I saw it on the AFMAN over here. It doesn't give you any information on whether it is compatible or incompatible; but if it was to not be put together or if it would be incompatible, then it would be put in there, sir. So if two items can't be put together, it would be stated on there.

MAJ (b) (6) Okay. There is not like a chart that you use that flows across?

LCPL (b) (6) No. That is only for ammunition, sir.

MAJ (b) (6) Only for ammunition?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. So there is nothing that says that, you know, a Class 9 and a Class 8 aren't incompatible with a Class 2.2, nothing says that?

LCPL (b) (6) Yes, sir. If it was incompatible and it wasn't supposed to be together, then it would state that you may not put these two items in the same ISU or it would have to separate by ISU.

MAJ (b) (6) And the fact that the batteries were in a thick plastic container, it meets the criteria for the packing? The packaging requirement for lithium batteries?

LCPL (b) (6) Yes, yes, sir.

MAJ (b) (6) Okay. And can -- you said that P-4 is a passenger only plane.

LCPL (b) (6) Cargo aircraft only, yes, sir.

MAJ (b) (6) Or cargo. I am sorry. So in reference to a C-130, is that how a C-130 is viewed?

LCPL (b) (6) Yes.

MAJ (b) (6) Is that how your understanding of the AFMAN is?

LCPL (b) (6) Yes. Cargo --

MAJ (b) (6) No matter what they are carrying, it's a cargo plane.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) So if they -- having passengers onboard, does not constitute an issue with that?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. I don't have any more questions on this particular one. Does you guys?

MAJ (b) (6) Not on this one.

MAJ (b) (6) Now, the ordinance -- Major (b) (6) I think you have actually got a good bead on how you want to go down that road.

MAJ (b) (6) Yeah. It's -- we are going back to compatibility here.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) So we all know the load, so the ammo was in the back there, and we know why it is in the back. So now I just want to talk about compatibility --

LCPL (b) (6) Yes, sir.

MAJ (b) (6) -- with the ammo. So if you could educate me on that.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) All right. So knowing you are a HAZMAT Marine, so is there anything, like, when you look at the ammo HAZDEC's, is there anything that jumps out at you that you know from -- that you remember from HAZMAT School where they were like, Hey, if you see this, you need to double check. You need to really dig on this. Is there anything like that?

LCPL (b) (6) Yes. The hazard class is really important.

MAJ (b) (6) Okay.

LCPL (b) (6) So when I looked at the compatibility table on the CFR-49, the table lists some -- what is compatible or what needs to be separated by pallet or what cannot go inside of

the aircraft with each other at all no matter what. And that is what I look it with the hazard class.

MAJ (b) (6) Okay. Is there anything on here that met hat criteria?

LCPL (b) (6) No, sir.

MAJ (b) (6) Okay. Not even -- I mean, so all of this ammo can be packed together on one pallet?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Where is that chart? Can you walk me through that chart? It is in the AFMAN; isn't it?

LCPL (b) (6) It is not in the AFMAN.

MAJ (b) (6) It's not?

LCPL (b) (6) It is in the CFR-49.

MAJ (b) (6) Okay. But there is information in the AFMAN about --

LCPL (b) (6) I don't think the AFMAN has information ammunition, but --

MAJ (b) (6) So far, this is the only pub that we have, so I am just going to type in one in particular.

LCPL (b) (6) Okay.

MAJ (b) (6) So this right here, it talks about explosives, and here is your designators right there as well and you classes.

LCPL (b) (6) When I certified this, I didn't use the AFMAN for it. I used the CFR-49. Whenever I do ammunition, I don't use that AFMAN for that. I use the CFR-49.

MAJ (b) (6) Is the CFR more restrictive than the AFMAN?

LCPL (b) (6) No. It is the same -- I believe it is the same thing as that, but I don't -- I never used the AFMAN for it. I just -- when we did the HAZMAT course, when we were certifying ammunition, we always used the CFR. So that is just how I have always used it. I have never looked at the AFMAN for ammunition.

MAJ (b) (6) Okay.

MAJ (b) (6) Is that because it is an easier pub to read?

LCPL (b) (6) For me it is because I do have -- I am more used to doing it, so that is how we did it in the course.

MAJ (b) (6) But during the course, did they say you could do it through the AFMAN?

LCPL (b) (6) I don't remember. I don't think they ever brought the AFMAN up for that, sir.

MAJ (b) (6) What is your ordinance -- Sergeant (b) (6) does he use the AFMAN or does use the CFR when he does his stuff?

LCPL (b) (6) I don't know, sir. I don't know what he uses.

MAJ (b) (6) Okay.

MAJ (b) (6) Is there an authorization in here that would say "must be on a separate aircraft" or "it must be on its own aircraft"? There is nothing in there?

LCPL (b) (6) No, sir.

MAJ (b) (6) Where does it say in the CFR that it has to be on its own aircraft? In the chart?

LCPL (b) (6) So it is just -- the HAZMAT table that you were looking at earlier where it has the packing instructions and the authorization, if you go to those paragraphs and read through them that is where you can find that, sir.

MAJ (b) (6) Okay. I want to see just while were are -- since this is the only document that we have, I want to take a look at this real quick. That is not what it was. The ones that we had were 0006, which is that one right there. So under special provision, cargo aircraft only, packing subparagraph A5.12.

LCPL (b) (6) I think you would have to write -- what is it? UN --

MAJ (b) (6) -- 0006. And you can type it in up top if you want.

LCPL (b) (6) So then you would go to this paragraph A5.12.

MAJ (b) (6) Okay.

LCPL (b) (6) So this -- I don't know why it is not coming up. I typed it, but --

MAJ (b) (6) That was actually it. You were on the right page. So this -- so there is A5.13 and A5.12.

LCPL (b) (6) Okay.

MAJ (b) (6) Package and boxes or drums under packing not required, so they were in one of these, I guess, either --

LCPL (b) (6) A wooden box.

MAJ (b) (6) A wooden box. Okay. Yeah. And it is there. Is there a quick way to check on compatibility?

LCPL (b) (6) For ammunition?

MAJ (b) (6) Yeah.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Is it the CFR?

LCPL (b) (6) Yes.

MAJ (b) (6) Okay.

MAJ (b) (6) That is the CFR-49?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) If I were to pull up the CFR-49, you could talk me through all that right now?

LCPL (b) (6) I have notes written on my CFR-49, but I could show you if it was compatible or incompatible.

MAJ (b) (6) Is there a particular section you need?

LCPL (b) (6) It would be the ammunition capability table, sir.

[Personnel were trying to locate CFR-49 via Internet search.]

MAJ (b) (6) If I were to ask one of your guys to bring over your book, would they know where it is at?

LCPL (b) (6) Yes. It is in my locker.

MAJ (b) (6) Okay.

LTCOL (b) (6) I am going to pause this.

[The audio recording was paused.]

[The audio recording was started.]

LCPL (b) (6) So this is just for Class 1.

MAJ (b) (6) Class 1, okay. It's Class 2, I think.

LCPL (b) (6) It's Class 1.

MAJ (b) (6) It is Class 1?

LCPL (b) (6) Yes.

MAJ (b) (6) They all should be Class 1, I think.

LTCOL (b) (6) And we have got the CFR-49 pulled up electronically right now.

LCPL (b) (6) Okay. So if I go to 1.1E right here, which was Class 1, 1.1E, I go to the G, which is right here, it would have a "6" right there. So then I would have to reference that "6," and that is what I was telling you gentlemen that I had written down on my CFR-49; that is what I would reference.

MAJ (b) (6) Okay.

LCPL (b) (6) So is it okay if we just wait for the CFR-49 that I have?

MAJ (b) (6) My question with that is: Are you just going to look at a note or are we actually going to pull up the actual reference to the "6"?

LCPL (b) (6) I can look for the reference.

MAJ (b) (6) Because if you are just pulling up a note, you know, that is just your memory of what is correct.

LCPL (b) (6) Yes. So "6" means explosive articles incompatibility Group G, other than fireworks and those requiring special storage may be loaded and transported without articles in compatibility Groups C, D, and E provided no explosive substance are carried in the same rail car. So it is compatible as long as it's not -- other than fireworks and those requiring special stowage. So if it is not a firework, then it is compatible.

MAJ (b) (6) What constitutes a firework?

LCPL (b) (6) Fireworks themselves --

LTCOL (b) (6) Go back down to that note again.

LCPL (b) (6) Yes, sir. So these were just cartridges for weapons with the E and then -- which one did we look at?

MAJ (b) (6) When you say they are cartridges for weapons, so --

LCPL (b) (6) Just regular ammunition rounds.

MAJ (b) (6) Okay. But they -- are they not HE rounds? They are explosive rounds, right?

LCPL (b) (6) Yes.

MAJ (b) (6) Okay.

LCPL (b) (6) Fireworks, I believe it would say fireworks here, sir.

MAJ (b) (6) Okay. But you are not sure?

LCPL (b) (6) I am pretty sure that it would say in the proper shipping name "fireworks."

MAJ (b) (6) Okay.

LCPL (b) (6) I have never worked with fireworks themselves, but those would be part of the proper shipping name, sir.

LTCOL (b) (6) Can I read that again one more time?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) We are talking about Note 6?

LCPL (b) (6) Yes.

LTCOL (b) (6) And we are talking about the -- any potential conflict between items G or E, right?

LCPL (b) (6) Yes.

LTCOL (b) (6) It means "explosive articles in compatibility Group G, other than fireworks and those requiring special stowage" -- so take those out -- "may be loaded and transported with articles of compatibility Group C, D, and E

provided no substances are carried -- no explosive substances are carried in the same rail car."

LCPL (b) (6) Rail car would probably be for rail transport, sir. The CFR refers to rail, vessel, and cargo aircraft.

MAJ (b) (6) That is on page 731 of the CFR.

MAJ (b) (6) In school, did you guys have a lot -- you went over all of this stuff with ordinance in particular or is ordinance kind of a subsection or how did that work?

LCPL (b) (6) It was a two-week course. The CFR-49 is this thick, so it has -- so it's a lot of referencing and knowing what you read, the majority of the time. They didn't go through every single little thing on there, but they went through specific things so like ammunition and hazardous materials and stuff like that and the compatibility table; that is one of the biggest things that you have to look at when you are certifying HAZMAT, sir.

MAJ (b) (6) So if you were to run into a question, because you are a brand new JI doing it for seven months, who would you go to if you have a question?

LCPL (b) (6) To the other joint inspector, which would be Corporal (b) (6) and then before that, I would go to Corporal (b) (6) He was with us, but he recently just got out. There is also Corporal (b) (6) who is at the armory now; but I know that if

I did have any questions, I could go to him. We all got certified at the same time, but I just --

MAJ (b) (6) Okay.

LCPL (b) (6) Except Corporal (b) (6). When he was there, I would the majority of the time, ask him.

MAJ (b) (6) Okay. And all of the other JI's you have been dealing with since January, has there been any other issues with compatibilities or loads with any of the units or anything?

LCPL (b) (6) No, sir.

MAJ (b) (6) Okay. Any issues working with aircrew as far as them not wanting it or wanting more documentation or --

LCPL (b) (6) No, sir.

MAJ (b) (6) -- things changed, anything like that?

LCPL (b) (6) No, sir.

MAJ (b) (6) So this is like a one-off moment, it never happened before and you had to change something?

LCPL (b) (6) No, sir.

MAJ (b) (6) Okay. And I guess the last thing. With the P-4's, cargo only, what says in that manual that, you know, a C-130 can carry passengers and cargo at the same time, but it doesn't make it, you know, a passenger plane? Do you know what I mean?

LCPL (b) (6) Yes.

MAJ (b) (6) Is there a reference?

LCPL (b) (6) So I think that when it says passenger aircraft, it would be passengers like regular aircraft that is full of 100 passengers, which that would be considered a passenger aircraft. And then that stuff would get loaded onto the belly of the bird. I think that is what is referencing when it says passenger in aircraft.

MAJ (b) (6) Okay. So if I had a full C-130 load and had 80 Marines in there, would I still be --

LCPL (b) (6) You probably wouldn't be able to fit 80 Marines onto a C-130 with a full load. You would probably --

MAJ (b) (6) Well, I am not saying with a full -- if my load was mainly Marines and then I had some stuff on back ramp, am I still a cargo aircraft? Do you know what I mean?

LCPL (b) (6) Yes.

MAJ (b) (6) How did I -- where is the --

LTCOL (b) (6) When does a C-130 -- I understand your position as a cargo -- when would it become a passenger airplane and where is that authority we can look that up? What defines that?

LCPL (b) (6) I wouldn't know that, sir. I just know that if it was to be just a passenger aircraft only, then it would only have to carry just passengers, sir.

MAJ (b) (6) Passengers not associated with the mission?

MAJ (b) (6) So to your knowledge, everything is -- if there -- they have to, like, military; is that what makes it --

LCPL (b) (6) I think it would just have to be cargo aircraft and -- so for passengers, it would just have to be just passengers only with a load of HAZMAT, which wouldn't be authorized. And for cargo aircraft only would have to be a cargo flight, and the mission would be just for cargo, the importance would be the cargo to get to the destination.

MAJ (b) (6) Okay. So even though we have cargo that meets that criteria and we have Marines on the plane, it is still a cargo plane?

LCPL (b) (6) Yes, it would be considered a cargo aircraft.

MAJ (b) (6) Okay.

MAJ (b) (6) Let me look up the passenger eligibility real quick.

MAJ (b) (6) They don't make it easy, do they?

LTCOL (b) (6) This is tuff. Where would it -- do you have any idea which document would make a differential between a railway car and a plane?

LCPL (b) (6) They have -- on the CFR, they have railway, vessel, and cargo whenever you are looking at the tables.

LTCOL (b) (6) It defines those, railway, vessel, and cargo?

LCPL (b) (6) Yes. So I can show you right now actually. So it would vessel stowage over here, cargo, and we have vessels, cargo for aircraft, and passenger aircraft/rail.

LTCOL (b) (6) So passenger aircraft and rail would be considered together?

LCPL (b) (6) No, no, no. So passenger aircraft and rail would be -- it would have the limitations for it, like, for an item for here would be forbidden, it would tell you. For cargo aircraft only or passenger and aircraft, it would be forbidden. That is just an example I am giving you, sir.

LTCOL (b) (6) Okay. So walk through this chart with that ammo pallet with these numbers and show us how it applies.

LCPL (b) (6) Okay.

MAJ (b) (6) And our comment about your notes, you can use your notes as long as you can back it up. There is nothing wrong with that.

LCPL (b) (6) Well, this isn't mine.

MAJ (b) (6) Oh. It is not yours. Okay.

LCPL (b) (6) No.

MAJ (b) (6) Sir, can you read this paragraph real quick?

LTCOL (b) (6) Um-huh. So the way I read this, this says that it is not -- those guys were not passengers for purposes of this manual.

MAJ (b) (6) Yeah.

LTCOL (b) (6) It says that if they were to be passengers, then it would governed under the DOTSB.

MAJ (b) (6) But that's for this, contract air.

LTCOL (b) (6) I don't think this passenger -- I am not -- I don't know if this applies to that; it's a different definition. Does that make sense?

MAJ (b) (6) It does.

LTCOL (b) (6) Her document says passenger aircraft/railway, and that would actually kind of go to it -- well, I am not certain.

MAJ (b) (6) Yeah.

LTCOL (b) (6) I am just kind of -- off of my first read. All right. So let's walk through this.

LCPL (b) (6) So you would look at this 1.4S, cartridges for weapons.

LTCOL (b) (6) Help me here. What am I looking at? 1.4S, is this where I am looking right here?

LCPL (b) (6) No. Right here, sir.

LTCOL (b) (6) All right. So this is 1.4S.

LCPL (b) (6) Yes. The UN number, you would at that. You would look if it was allowable for passenger and aircraft or cargo, which it is allowed 25kg or 100; and then --

LTCOL (b) (6) Hold on. Cargo aircraft only, passenger aircraft, rail. All right. So we are saying we are using cargo aircraft only.

LCPL (b) (6) Um-huh.

LTCOL (b) (6) We haven't decided how to define those two things, and you are saying that for 1.4S -- pull up that chart over here so I can see the designations -- it is going to use 25 to 100kg depending on how we classify it. All right. Where is the --

MAJ (b) (6) Which chart?

LTCOL (b) (6) The chart that has the written classifications beside them. Here you go. That is it right there. All right. I just want to make sure we are reading this right. 1.4S, so then we come to 1.4G. Do you see 1.4G? There we go.

LCPL (b) (6) Sir, that would be in signals and smoke.

LTCOL (b) (6) Right. Am I bothering you? I am just trying to see how you do it.

LCPL (b) (6) No, sir. You are fine.

LTCOL (b) (6) All right. Here we go. There it is.

LCPL (b) (6) Right here, UN197.

LTCOL (b) (6) Okay.

LCPL (b) (6) So passenger or cargo aircraft --

LTCOL (b) (6) Forbidden.

LCPL (b) (6) -- forbidden.

LTCOL (b) (6) Seventy-five gram cargo.

LCPL (b) (6) Cargo aircraft only, and this was under cargo aircraft only right there, sir.

LTCOL (b) (6) All right. Let's do 1.1E.

LCPL (b) (6) So that is cartridges for weapons.

LTCOL (b) (6) Is this the one right here? Is this the right UN number?

LCPL (b) (6) UN006, yes.

LTCOL (b) (6) All right.

LCPL (b) (6) Okay. So I am confused right now because it says cartridges for weapons right here, 006, 1.1E, it says forbidden; but when we looked at it on the compatibility table, it was allowed.

LTCOL (b) (6) Okay. This is not the compatibility table is what you are telling me, right?

LCPL (b) (6) Yes, it is not.

LTCOL (b) (6) Or this is?

LCPL (b) (6) No, this is not. This is just a table --

LTCOL (b) (6) So there is a second table -- okay. So the way I understand it is you use this table out of the CFR to see how much or what they will allow --

LCPL (b) (6) Yes.

LTCOL (b) (6) -- on a particular type of vessel.

LCPL (b) (6) Yes.

LTCOL (b) (6) But then there is a second chart that shows if the cargo within the airplane is not compatible with each other, right?

LCPL (b) (6) Yes.

LTCOL (b) (6) All right. So this is where you look the first part up?

LCPL (b) (6) Um-huh.

LTCOL (b) (6) And then where do we get that compatibility chart to see what --

LCPL (b) (6) Well, on mine, I had a sticker on it, so I don't know exactly where it is at. I just trying -- I know it is somewhere back here, sir.

LTCOL (b) (6) All right.

MAJ (b) (6) I think you were closed to page 700; 731 was the reference previously. And that previous chart you were looking at was on page 221 of the CFR-49.

LCPL (b) (6) You said it was closed to 731, sir?

MAJ (b) (6) I think so. Yeah. Page 730.

LTCOL (b) (6) Do you have a paragraph number for that?

MAJ (b) (6) 174.81.

LTCOL (b) (6) 174.81. It's not in this book. That is 174, and that doesn't -- is that us?

LCPL (b) (6) Yes.

LTCOL (b) (6) Awesome.

LCPL (b) (6) So 1.1E -- so again, you would look over here and look to see if it was compatible with the S, the G, and the -- whatever other ones they had.

LTCOL (b) (6) E, S, G -- was there an F?

LCPL (b) (6) I don't think so, sir. No, there was no F, sir.

LTCOL (b) (6) All right.

LCPL (b) (6) So E, and you look at the G right here, it has a 6; and then no F; G, it was blank; and then S, which will be 4/5; 5 would be -- it means 1.4S, fireworks, may not be loaded on the same transport vehicle with divisions 1.1 or 1.2 materials. So again, that references to fireworks. Then 4 means --

LTCOL (b) (6) Go ahead. I am sorry.

LCPL (b) (6) No, go ahead, sir.

LTCOL (b) (6) 4 means see Section 177.835. We will look at that in a second. We will go through that.

MAJ (b) (6) Lance Corporal (b) (6) was that -- that was 1.4S; is that right?

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) Okay. We need to look at -- hold on one second. We need to look at 177.835G. Hold on. Don't go there yet. All right. And Note 6.

LCPL (b) (6) Note 6.

LTCOL (b) (6) Let's read this together.

LCPL (b) (6) Okay.

LTCOL (b) (6) It means explosive articles in compatibility Group G, other than fireworks and those requiring special handling, may be loaded, transported, and stored with other explosive articles of compatibility Groups C, D, and E provided that explosive substances such as those not contained in articles are not carried in the same transport vehicle.

LCPL (b) (6) I think that is what we read on the other one, sir, and it was -- the other one said rail vehicle.

LTCOL (b) (6) Yeah.

MAJ (b) (6) I think so. But you are saying that when you went to the first chart up on page 221 that there was a discrepancy --

LCPL (b) (6) Um-huh.

MAJ (b) (6) -- forbidden; is that right?

LCPL (b) (6) Yes, sir. That is what I saw on this, but this is -- I don't know how -- because I have a green one. I don't know what year it was published, sir. So when I use mine --

MAJ (b) (6) So this is a 2016.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Do you know what year yours is?

LCPL (b) (6) I think mine may be 2015, sir.

MAJ (b) (6) Okay.

LCPL (b) (6) That is the one that I got when I went to the course.

MAJ (b) (6) I see. Okay.

LTCOL (b) (6) When we get done with this --

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) -- I do need to see your version, okay?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) So would this be the most up to date probably?

LTCOL (b) (6) Yeah. Has a 2017 been published yet?

LCPL (b) (6) I don't know, sir.

MAJ (b) (6) You're not sure, okay. That is understandable.

MAJ (b) (6) Just one more time, can you look on the front there, page 221, where you helped me find the discrepancy because you might have solved the pub problem. Do you know what I mean?

LCPL (b) (6) Yes, sir. 221 you said, sir?

MAJ (b) (6) Whichever page it was exactly. I think it was 221. I was in the ball park. You were looking at it previously and said it didn't match or you said that it was interesting.

LCPL (b) (6) It is right here. It was page 213, sir.

MAJ (b) (6) I am sorry, 213. And that's for what type?

LCPL (b) (6) 1.1E, sir.

MAJ (b) (6) 1.1E, okay.

LCPL (b) (6) Yes.

MAJ (b) (6) And on what line is it saying that it doesn't jive?

LCPL (b) (6) The quality and limitations.

MAJ (b) (6) And is there another section? Because you said forbidden, forbidden in two places.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) What is the other place?

LCPL (b) (6) Right here. It is the quality and limitations, it is for both passenger and cargo.

MAJ (b) (6) Okay. So forbidden for passengers and cargo.

LCPL (b) (6) Yes.

MAJ (b) (6) Got it. And that is the chart -- the HAZMAT table on page 213; but if you go back to -- I think you were on page 730 -- it actually shows that it is okay.

LCPL (b) (6) It -- for the segregation of it, yes, sir.

MAJ (b) (6) Okay. All right. Got it.

MAJ (b) (6) What would the other shipment be? Truck or vessel?

MAJ (b) (6) Completely -- so I am not talking about the books anymore.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) You were probably one of the last people to talk to the gunny.

LCPL (b) (6) Yes, sir.

MAJ (b) (6) What was he like when you talked to him? Just overall, you know -- if you can remember -- I know it's a long time ago, and I know we have just been talking through boring publications. So can you just talk to like his demeanor? If you seen how he seemed at the time?

LCPL (b) (6) He seemed fine, sir. He was really nice. He smiled when I went over there.

MAJ (b) (6) Okay. There was no, like, fire up, you know, at the lance corporal, no knife hands?

LCPL (b) (6) No, sir.

MAJ (b) (6) Okay.

LCPL (b) (6) He just -- I gave him the paperwork. I told him what happened. He was like "It's fine. I will take a look at it when it gets here."

MAJ (b) (6) Okay. No questions -- he already knew about the ordinance issue, right?

LCPL (b) (6) Yes.

MAJ (b) (6) And he didn't have any questions or anything?

LCPL (b) (6) No, he did not, sir.

MAJ (b) (6) Okay. Anything else -- did anything else while your time out there with the C-130 crew -- the crew

members, anything else look out of place or people look frazzled? I know it probably wasn't the thing that was on your mind at the time.

LCPL (b) (6) No, not that I can think of anything, sir.

MAJ (b) (6) Okay. If I understand correctly, you guys showed up to work at 0300 that day; is that right?

LCPL (b) (6) I didn't. That was the other --

MAJ (b) (6) You didn't?

LCPL (b) (6) I did not. That was the other working squad's working week. That -- the night that everything happened is when I went into work at 0200, so that was Tuesday morning when I went into work at 0200.

MAJ (b) (6) Okay. So on Sunday, you are doing stuff. When did you leave work on Sunday? Can you recall?

LCPL (b) (6) Around 1600.

MAJ (b) (6) Okay. And you showed up to work on Monday when?

LCPL (b) (6) I want to say 0730 because that is the normal time.

MAJ (b) (6) Okay. And you stayed until?

LCPL (b) (6) Until probably passed working hours. I would say like --

MAJ (b) (6) What is that? I don't know what that is.

LCPL (b) (6) Like 1630, sir.

MAJ (b) (6) Okay. And you came back again at 0200 to start the next evolution?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. Is that because you are like the only -- one of two people that are JI's?

LCPL (b) (6) No, sir. We just had flights that night, passenger flights.

MAJ (b) (6) Okay. Got you. All right. And from a, you know, you are a young, hard charging Marine, do you feel like you are getting overworked at any point? Does the schedule -- are you getting rest compensation for these kind of weird hours, you know, that kind of stuff?

LCPL (b) (6) Yes, sir, we do.

MAJ (b) (6) Okay. So you don't feel overtaxed or --

LCPL (b) (6) Well, working at the APOE is overall it is going to be hectic and sometimes you do feel like you are rushed and stuff, but that is just how it is. Just last week, we had, like, six flights running off the same time, but we all work together and we all work as a team, and nobody screams at each other whenever it comes down to these missions. We try to get the mission done. So it is tiring sometimes, but we do get rewarded in the end with time off, and they let us go early or have us come in later on in the day depending on the hours that we work. If we were to come in at 0100 in the morning until

1200, then we would get cut right after those flights were done, sir.

MAJ (b) (6) Got you. But your sergeants take care of you, right?

LCPL (b) (6) Yes, sir.

MAJ (b) (6) Okay. And if you run into a point where, like, man, you just -- I can't do this right now, I need a break, is there some way you can -- are you comfortable to talk to your NCO's to be like, hey, I need like five minutes to clear my head or have you ever been in a situation like that?

LCPL (b) (6) I have never been in a situation like that, but I am sure that they would take that into account and look out for me, sir.

MAJ (b) (6) Okay. Great. Sir, I don't have any further questions.

LTCOL (b) (6) I just need you to show me that segregation table again --

LCPL (b) (6) Yes, sir.

LTCOL (b) (6) -- that had the Note 6 reference.

LCPL (b) (6) Right there, sir.

LTCOL (b) (6) Thank you very much.

LCPL (b) (6) No problem.

LTCOL (b) (6) I appreciate it. Does anybody got anything else?

MAJ (b) (6) No.

MAJ (b) (6) No.

LTCOL (b) (6) All right. Then we will end the interview.

[The interview concluded.]

[END OF PAGE]

LTCOL (b) (6) Okay. It's Tuesday, July 25th, 2017, at 1427. This is the 4th Marine Air Wing Commanding General's command investigation. I'm Lieutenant Colonel (b) (6) the investigator. And I'm speaking in interview with (b) (6) (b) (6) who is the explosive safety officer for Marine Corps Air Station Cherry Point.

Questions by Lieutenant Colonel (b) (6)

Q. Mr. (b) (6) do you see that we're recording this conversation?

A. Yes.

Q. And do you authorize a recording of this conversation?

A. Yes.

Q. Mr. (b) (6) please tell us about the events of July 10th and loading the cargo for Yankee 62 and 72.

A. Okay. We have to clarify, I did not -- we did -- I was not there for the loading of the cargo.

Q. I understand that.

A. Okay.

Q. But you were involved with part of the inspection process with the loading for the cargo.

A. I have oversight.

Q. Okay.

A. Not in -- not in the process.

Q. Gotcha.

A. Okay. And my oversight is explosive safety, such as them citing and placing ammunition in the wrong area.

Q. Gotcha. Okay.

A. That's my venue.

Okay. So the morning of the 10th at 7:00, 7:05 a.m., I went to the CALA, the Combat Aircraft Loading Area, okay.

Q. Um-hmm.

A. I went to the CALA to check on the ammunition that was delivered from Hotel Company, 2d MRB.

Q. Um-hmm.

A. All right. When I arrived at the CALA, the gate was closed and locked, which is not uncommon because that is a Level 2 Class security area.

Okay. I have venue over the CALA, because I do all the siting there as far as telling the aircraft where they park and where to put explosives for loading.

Q. Okay.

A. On that particular morning when I arrived, the gate was locked. I unlocked it, I entered the gate, and relocked it.

While driving towards the CALA, you encounter first the OSA, the Ordnance Staging Area. When I went to the OSA and as it became visible to me, I noted that there was no flag flying for a Bravo flag indicating there was an explosive op going on.

I also noted that there was not a fire symbol present indicating the type of hazard for a fire symbol. As I got even

closer, I noted a pickup truck sitting there with the motor running. I also noted that there was a lima 463 pallet sitting behind the truck and the OSA pad. And it was -- apparently had material on it that was strapped down.

I pulled up next to the truck and parked and sat there for a moment thinking that the guard would come out and challenge me. I was not challenged. After a few minutes, I got out of my vehicle and I went over to the flag pole and I raised the Bravo flag to indicate an explosive op was present.

I then went to the fire symbol board and flipped it to Fire Symbol 1, designating for a 1.1 hazard. Upon that, I went directly over to the lima pallet and looked at the lima pallet. When I looked at the lima pallet, I noted that there were discrepancies with the pallet.

After noticing that, I took pictures of it.

MAJ (b) (6) Sir, are these -- are these your pictures you took?

MR. (b) (6) Yeah, they look like them.

MAJ (b) (6) These are pictures we received from I believe a communication between you and MRB -- 2d MRB kind of showing the discrepancies that existed with --

MR. (b) (6) Yes.

MAJ (b) (6) Yes.

MR. (b) (6) Those are them.

MAJ (b) (6) Okay.

MR. (b) (6) So I took photos of -- of the discrepancies that I noted with the shipment.

And after doing that, I went back to the pickup truck and I knocked on the window. When I knobbed on the window -- it was the rear window of the pickup. It was a four-door truck -- a young man in civilian attire arose from the backseat. He rolled down the window and he asked if I could help me -- or if he could help me. And I said -- I told him who I was and I asked him if he was the ammunition tech for 2d MRB or what was his role. And he said I'm the guard that was assigned. I'm a critical skills operator.

Okay. I said all right, that's what I needed to know. And I said I'll catch you later and I left.

MAJ (b) (6) Can I -- can I cut you off for one second?

MR. (b) (6) Um-hmm.

Questions by Major (b) (6)

Q. So when you showed up you noticed, you know, the Bravo flag wasn't up and the fire switch wasn't -- or light wasn't on to the right position.

A. Um-hmm.

Q. Did you know there was a 1.1 there already because you had a HAZDEC earlier, or how'd you know a 1.1 was present?

A. I looked at the pallets.

Q. So you walked over to the pallets --

A. Yeah.

Q. -- you saw there was a 1.1 --

A. Yeah. But I knew --

Q. -- then you walked back to the flag pole and --

A. I knew there were supposed to be 1.1 on there.

Q. How'd you know that though?

A. Because Mr. -- what is it? I think it was Mr. -- or Sergeant (b) (6) --

Q. Okay. Yeah.

A. -- sent me an advanced shipment.

Q. Okay. So you had an idea --

A. They -- yeah. They always send --

Q. Did they do something like this?

A. That -- he sent this to me.

Q. Okay. This is the enclosure, it's color coded, it shows the pallet load plan, and everything that goes with that.

A. Right. And it also --

Q. It had, I'm assuming --

A. Yes. Right there.

Q. -- this piece which is the manifest list.

A. Yes.

Q. Okay.

A. And after reviewing this, even though he did not put HAZ class and compatibility on here, I know that a B546 is a 1.1E item.

Q. Check.

A. You know, after doing this for 30 years, you know these DODECs really well.

Q. Okay.

A. Yeah.

Q. So that was the first red flag for the day.

A. Well, the first red flag was that it was -- there was no flag. And then if there was no fire symbol, then there was not an active present guard.

Q. Yeah.

A. Which are all disturbing. And then --

Q. And did that Marine need to have -- since he's the guard, did he have ordnance with him to be guard or -- I don't know what the rules are.

A. He -- he should have had small arms with him and a handgun.

Q. Did he?

A. That I don't know.

Q. Okay.

A. That I don't know.

Q. Did you get his name by the way?

A. I did not get his name but when I looked in the back of the truck, there was green gear sitting there with stenciling on it that said Leach.

Q. Okay.

A. Which led me to believe that it belonged to Corp -- or Sergeant Talon Leach.

Q. Is that a Marine you know or --

A. No. I just learned of him from the -- the names that were posted through the news media.

Q. I see.

A. That was rather disturbing after meeting him.

Q. Gotcha.

A. Okay. After leaving the -- the CALA, I went back to the gate, locked the gate and left. I went back to the department safety office, the JSO, the Joint Safety Office, and I reviewed my photographs. I had sent -- I sent them to myself on my e-mail server and noted all the different discrepancies and I pulled them over and put them into paint and wrote down what was wrong with them.

All right. And the more and more I looked at that, the more and more I knew that something was a miff, because it did not meet the standards of the AFMAN and -- for an air flight.

Q. When you say that, what do you mean? What -- what in the AFMAN didn't match?

A. Well, if --

Q. I can give you your -- your photos back, sir.

A. Yeah. If you review the photos, the first thing to me that was obvious was that it only had four straps on it going

over the pallets.

Q. Okay.

A. There's a six strap minimum, if you don't use a cargo net. Okay. So that -- that alerted me right away.

Now the anti-sway or the shifting straps, I don't count those because you're actually supposed to have six over the pallets. The side shift, those are great to add on as a secondary measure. But the strapping, if you don't use a top cargo net, it's supposed to be so that if you flip that Lima 463 upside down, nothing falls off.

Q. Makes sense.

A. Okay. The next thing I noted, if you looked at the individual wooden pallets that you would note that the seals on the steel strapping -- the inch and a quarter steel strapping, only had one crimp on them. In all explosive operations when banding munitions to a pallet, you always use two crimps on the seal.

Q. Is that something that they do --

A. This being the seal.

Q. -- when they put it together?

A. When they put the -- when they put the boxes on the pallet and put the steel bands over it, then they crimp it twice.

Q. I see.

A. Yeah. Because it -- it changes its load tensile strength.

Q. Makes sense.

A. Okay. I also noted when I was looking at the boxes that the boxes were missing the minimum requirements. And what I mean by that is proper shipping name, United Nation's number, that -- that nature. I also noted that some of the boxes were marked as light but not marked light in accordance with the MIL-STD-129P.

Q. What does that mean?

A. The MIL-STD is a joint regulation that governs the preservation and packaging of all ammunition explosives.

Q. Okay.

A. And from the MIL-STD, it's a joint regulation so that it is actually a MIL-STD for all services. So if you build something to a MIL-STD, it's good for any service. And that's why they utilize it especially in this venue, because the AFMAN is almost itself a MIL-STD. All services use the AFMAN. And if you look underneath the AFMAN 20-424[sic], it'll go down, it'll tell you the Marine Corps order, the Army order, so on and so forth.

Q. And, sir, when you're doing all this stuff, are you referencing the AFMAN or the CFR-49? For what's the --

A. These here?

Q. Yeah. What's the controlling document?

A. Well, the CFR is gonna always take venue.

Q. Okay.

A. Because it governs transportation. And the AFMAN mirrors the CFR.

Q. Which is the -- so the CF -- which is the most restrictive?

A. Well, it depends. I've seen company commanders make the most restrictive document, you know.

Q. Okay.

A. But in -- in this case, the CFR and the AFMAN are hand-in-hand, they say the same thing. So there's not one that is more restrictive than the other because they say identical things.

Q. So when you're reviewing HAZDECs for this --

A. Uh-huh.

Q. -- are you referencing the AFMAN or the CFR or --

A. You would -- if you're dealing with a flight, now you're referencing the AFMAN.

Q. Okay. But just this --

A. There's three modes of transportation.

Q. Right. Okay.

A. Ground, air, and vessel. Air is covered by not only the CFR in a certain chapter --

Q. Okay.

A. -- and then it's covered by the AFMAN.

Q. Okay.

A. Okay. And then it goes even further down the road, because there's more AFMANs after that other one.

MAJ (b) (6) Okay.

LTCOL (b) (6) Let me pause it right quick.

MR. (b) (6) So the -- so the AFMAN basically reiterates the CFR-49 in the section that applies to air, all right. And then from the AFMAN, it can be broken down even further. And there's a lot of micro PUBs coming out of the AFMAN, and there's -- the AFMAN is full of attachments, but they are three times as easier to read than the Code of Federal Regulation because the Code of Federal Regulation, you will literally jump from the front to the back 30 times to look up one piece.

Q. Okay.

A. And -- and the CRF is very vague in a lot of areas. So there's -- there's a -- you have the AFMAN and -- and it can get even more complicated if you bring civilian air into it, then you got to go into the IATA.

Q. So --

A. And that's a lot of fun.

Q. Just so I'm really tracking, everything -- the AFMAN mirrors the CFR.

A. Um-hmm.

Q. But it -- in this particular case, could it -- it could be more restrictive than the CFR.

A. The AFMAN being more restrictive? It -- it can be because it gives commanders latitude.

Q. Okay. So an embark Marine should be using an AFMAN more than the CFR, per se.

A. Yeah. Yeah. Yeah, because -- and the AFMAN -- like, for like an airfield, the point of embarkation, that officer that runs that unit too can also imply -- or restrict and do other -- put restrictions on the Marine or the Sailor, whoever's doing the embarking, saying that not only are you going to follow the CFR and then the AFMAN, then I want things this way to my SOP.

Q. I see.

A. So that everybody does it standardized.

Q. Before -- before I -- before you leave today, can I get you to show me in the AFMAN, like, where we can cross-reference all these codes and stuff?

A. Oh, God. It's -- if you're ready for about a three-hour class.

Q. Sure. Yeah. I can do that.

A. Yeah. It's -- yeah. Do you have a copy of the AFMAN here?

Q. We've got a electronic copy, yeah.

A. Okay. It's -- I can show it to you in a nutshell and it'll make real sense to you.

Q. All right. Thank you.

A. Getting back to the -- the pallets, so we had already talked about it missing the minimum marking requirements. We talked about it being -- missing the light box markings correctly.

LTCOL (b) (6) Explain that a little bit. What does that mean?

MR. (b) (6) Now all services differ on light boxes. That's why the AFMAN will specifically call out the MIL-STD-129 for marking and labeling. And you're -- you're allowed to take a -- like a -- a label with an orange background and a contrast of black writing on it and put it on the container but you have to put it on all sides of the container if you do that.

So most military members will opt out and paint the entire can orange. And that's -- that's in the MIL-STD-129P. And -- and then take a black marking and write light box on it.

And there's controversy on the word "light box" because the Air Force decided a long time ago they're going to spell it L-I-T-E and the Army and the Marine Corps and the Navy says, no, that's not how you spell light. It's L-I-G-H-T. So there's controversy on that too.

LTCOL (b) (6) Light box meaning something that's --

MR. (b) (6) The box is not at its total capacity as designed.

LTCOL (b) (6) Gotcha. Thanks.

MR. (b) (6) So if a box of 9-millimeter is supposed to have 2,000 rounds and it only had a thousand rounds in it, it would be now a light box.

LTCOL (b) (6) Thank you.

MR. (b) (6) Yep.

The other things I had noted was that there was a coffee cup sitting on top of a pallet. Now why does that disturb me as the ESO? It's mainly because the OP 5 -- the NAVSEA OP 5 will tell you that you're not to eat or drink in an ammunition area or in an ammunition operation. Okay. And when I found a coffee cup sitting on the ammo that tells me they were doing that in fact or walked up there and threw it away on top of the pallet. One or the two.

And the reason for that being that wood treated ammunition boxes are chemically treated with preservatives and insecticides. And if -- if servicemembers tend to eat and drink during ammunition operations, they're ingesting these. And so now it becomes an industrial hygiene matter.

Okay. The other thing I noted about the shipment too, that a top net was not placed on the material. And of course, the top net is what would hold it to the pallet should the pallet be flipped.

Now when you go to a short stack, it's very difficult to get a top net on because of their size, but you can cinch them

up and then use additional strapping over the top net as required. And -- and that makes a big difference. Because then you're not gonna let even the smallest of boxes slip through the net. And that's why that top net's so critical.

Well, as I said, when I -- when I'd looked at all these deficiencies, I thought to myself there's -- there's no way that this material has had a JI on it yet -- or a joint inspection, I should say, which would be DD Form 2133. And that's a JI inspection.

LTCOL (b) (6) A DD Form what?

MR. (b) (6) 2133.

LTCOL (b) (6) Thank you.

MR. (b) (6) Yep.

So with that in my mind, I thought, you know, I need to go over to the APOE and see if they did do a JI on it and to see if it was done properly.

So I drove over to the APOE at CLC-21 here on the air field at Cherry Point and gained admittance and met a young Sergeant named (b) (6), and he took me to the office. I had asked him, you in charge and he said, no, it's Sergeant (b) (6) I said, well, can you take me to Sergeant (b) (6).

So he took me to the office and -- and got Sergeant (b) (6) for me. While I was waiting for Sergeant (b) (6) to show, Sergeant (b) (6) showed up and greeted me. I know Sergeant (b) (6) because he's the explosive safety

rep for CLC-21.

(b) (6) -- Sergeant (b) (6) then showed up and greeted me, and I asked her if the JI had been done on Hotel Company's ammunition; and if it has been done, I need to see the documents and who did the inspection. She said that Lance Corporal -- I think the name's right -- (b) (6) (b) (6) -- had done the inspection. So she gathered up (b) (6) and -- and had (b) (6) get the documents.

They returned with the documents and handed them to me. Well, I started reviewing the documents. The first thing I noted she -- the first document on the list was the HAZDEC. We refer to them as candy stripes. When I looked at the HAZDEC, I automatically knew there was something wrong with them. Now I had noted that in the packaging on the HAZDEC, it said that they were all 4B1 boxes -- or the vast majority listed on the HAZDEC were 4B1. 4B1 means it's an aluminum container.

Well, having been in the industry a long time, I know that there are very, very few items that are packaged in aluminum for the military. We use steel. So the packaging should be 4A1 or a 4C1 with a 4A1 inner pack.

Well, I asked Lance Corporal (b) (6) at that time if she knew the difference between aluminum and a steel container and how to tell the difference by reading the pop making, the Performance Oriented Packaging marking on the side of the container, and she didn't answer me.

Then I started to review -- well, at that time I had told them that they needed to correct their HAZDEC because they were wrong. There wasn't an aluminum container out there. After looking at the HAZDEC, I started to review the JI. I will say when I did review the HAZDEC, though, there were additional pages. One of them had oxygen on it, and one of them had lithium batteries on it that I -- that's what I remember.

When I started reviewing the DD Form 2133, I skimmed through it and I hit Block 12. And if you look in Block 12 on the last one, last column, that was for the ammunition pallet. And when you go down to hazardous material, I noted that it had a line drawn through it not a check mark meaning that it was nonapplicable.

So I couldn't asked the Lance Corporal, I said are you qualified to do a JI? Did you have Ammo 62 and Ammo 81? And she said yes. And I said, now how can you be qualified if you're gonna hand me a hazard declaration and a JI that says nonapplicable at the same time?

Questions by Major (b) (6)

Q. So let me get this straight, sir. So on this JI, so when they say this it's the final copy, this is what they gave us.

A. Okay.

Q. You're saying on Section 12, Row H, hazardous materials, preparation packaging, that they had an N/A put here?

A. Not an N/A, just a hash mark.
Q. A hash mark like they did right here?
A. Yes.
Q. So this is not the copy that you've seen?
A. This whole line was hash marks.
Q. The whole line was checked nothing.
A. From what I remember, yes, they were all hash marks.
Q. And that was on what date?
A. That was on the 10th.
Q. That was on the morning of the 10th. This was supposedly finished on the --
A. That says the 7th.
Q. -- the 7th.
A. I have a hard time gripping that too.
Q. Sure is interesting.
A. Okay. So --
Q. Did you see a finalized version of this before the cargo left?
A. No.
Q. No. Okay.
A. No, I didn't.
Q. So the last version you saw at Item H, Section 12H, was all tacked out?
A. Yes.

Q. Meaning no HAZMAT.

A. Yes. That's what --

Q. Do you know --

A. That's what I remember. And especially -- the only one I really concentrate on is that ammo pallet, you know, because the other areas aren't my venue.

Q. Do you know -- this is the HAZDECs that they gave us for the ordnance -- not all of them, but do you know, does this meet the criteria for the corrections that you had asked for?

A. Yeah. This looks -- this is corrected. This isn't the same copy that I had read.

Q. Okay.

A. Yeah. Yeah. This was --

Q. So had you seen this HAZDEC and this version of the JI, would you -- would anything throw you off or does this all look good now? According to this and to that, does that pretty much --

A. Well, I --

Q. -- like, yeah, that meets the letter, minus the fact that the date's screwed up?

A. Yeah. If -- if I reviewed this against the JI, I mean, only that one block would be applicable in that fourth column there. The only thing that I would not know by looking at this is if they got their packing instruction and their authorization, otherwise, their special provisions correct. Because this column

on the end, that's actually special provisions. But other than that, it -- it looks like it would be correct.

Q. Okay.

A. Yeah.

Q. Sorry for interrupting. Thank you.

A. Um-hmm.

Let's see, so after having talked to (b) (6) and referenced her qualification and her tell me she was qualified, I asked her then how did she do that; how could she check that block with a hash mark? And she said that's what I was directed to do -- or that's what I was told to do; that's how we do it here. And I said well that's -- that's incorrect.

And I looked at Sergeant (b) (6) and I said Sergeant (b) (6) I want this HAZDEC fixed, I want the JI redone, and I will be at the pallet at twelve o'clock to reinspect it to see that you've done your job. And at that time I left.

LTCOL (b) (6) What time was that? Guess.

MR. (b) (6) I would estimate probably around 10:30 to 10:45 because it's probably an hour and a half before noon.

Then I went back to the office and got engaged in the rest of my 27 tasks. Noon -- at twelve o'clock, I went back to the CALA. So I went back to the CALA and drove down to the OSA and noted that the ammunition was still sitting at the OSA.

There was one -- one Marine present and that was the Corporal (b) (6) and he was an ammo tech -- 2311 ammo tech.

I know Corporal (b) (6) personally, because he worked for me at Lejeune when I was stationed there -- or worked down there as a DoD employee. And then I guess he moved to MRB. So I greeted (b) (6) and he asked me of course what was wrong with the pallet.

So we started going over the entire pallet as I just did with you gentlemen. And at that time I noticed that they had corrected some of the deficiencies. They had put proper shipping names and UN numbers on all the containers, and they -- they appeared to put more labels or paint or something on containers. It's difficult to see a box and everything on it when they're all strapped down, so I couldn't tell you all the markings that they put on it. But I did note that the seals were not done -- or they were not crimped a second time yet.

Okay. And when I was discussing all these deficiencies with (b) (6) -- Corporal (b) (6), Gunnery Sergeant (b) (6) showed up carrying a pair of crimpers. He handed them to Corporal (b) (6) and told him to get crimping. And (b) (6) started crimping pallets -- or seals on pallets straps.

The Gunny had asked me what was wrong with the pallet, so I went through it another time with the Gunnery Sergeant; explained to him what all was wrong with his pallet. And I pointed over across the -- the OSA to a pallet -- or a pile of

cargo straps -- or cargo nets, and I said there's your cargo nets, you really need to put a cargo top net on this pallet. Well, they immediately, after they got done crimping, grabbed the top net, laid it out and threw it over the pallet and started to band it down and strap it down.

And I told them that if they had any problems or anything that they -- they could contact me at any time. And if they need PMEs or training in this area to just let me know and I could teach them. If they wanted to get a PME at Cherry Point, they could bring their ammo techs up here and I would teach them and instruct them.

And at that time I went back to station ordnance and got involved again with other problems on base.

Questions by Major (b) (6)

Q. Roughly what time would that be?

A. Let's see --

Q. It sounds like a lot of stuff transpired since noon.

A. I would think 12:30, maybe a half an hour later.

Q. Okay.

A. Yeah.

Q. Did you ever see Lance Corporal (b) (6) again?

A. No.

Q. Or anybody from APOE come back out?

A. No, I didn't see -- on that day, no.

Q. Did they ever try to get back in touch with you to verify that what they had done met your request for everything?

A. No. No.

Q. Okay.

A. And the -- this is the odd thing, gentlemen, my venue as the base explosive safety officer is just that, to ensure that people are doing things safely in an explosive arena, whether they're shipping it, whether they're storing it, whether they're moving it or handling it and how they handle it.

In this case, I was disturbed because I know what it should look like and I know what it didn't look like, and it made me wonder whether or not an inspection had been done or it was going to be done, so I had to investigate. Because I did not want it going on the plane that way.

Q. Right.

A. Now, the consequence of this particular munition though, one of the things that's important to know about this -- these munitions, these are what they refer to as cartridged munitions. So none of these munitions contain an EED or an EID, okay, which would make them a sensitive munition.

In other words, if I was to give any of these items to a Marine and put him in full tactical outfit in gear with his vest and all his bandoleers, he could wear this stuff aboard the aircraft.

Q. Hm.

A. So now having it in DOT POP performance containers and being properly tied to a pallet, it's safer then them wearing them on their body.

Q. Okay. So there's nothing in here that doesn't jive with all that stuff? All that stuff is compatible, syncs up and all that --

A. This stuff here is all good. Now, I know there -- you know, you have -- you have a C-item here, you got S-items, you got an E-item, you got a G-item, but the G-item isn't a fireworks.

Q. What makes it a firework? I don't really --

A. UN300 and above. 300 to 335, those are fireworks.

Q. Okay.

A. It's weird. You just remember that stuff after you've been doing it a long time. Yeah. But C, D and E are compatible. And they're compatible with G as long as G isn't fireworks.

Q. Okay.

A. Yeah.

Q. And like an illume round isn't a firework?

A. No.

Q. Or a --

A. None of these are fireworks. And that's why the proper shipping name and the UN number is so critical when you do an air flight. You look at the top of that container -- especially

pilots. Pilots are notorious. They want to know. They want to see those proper shipping names, because they know if they see a detonator or a firework or an incendiary or a tear gas or an incapacitating agent, then that alerts them to look for other things. And there's just -- I don't know. Just been doing this too long.

Q. So when you walked away and you went back to your office, everything that you saw left you feeling -- give you warm and fuzzy this thing's gonna get on that plane well?

A. Well, I'm not gonna say that.

Q. Okay.

A. I'm gonna say that I was more comfortable that there was now a Gunnery Sergeant that was an embarker present.

Q. Okay.

A. And that he was correcting the deficiencies with the Corporal.

Q. Okay.

A. Now, I would have been a lot happier had the embarkers been present because, in reality, as soon as Gunnery (b) (6) was done with that pallet, he should have requested a new JI because he has changed the inspection standard.

Q. So when the ordnance leaves the CALA, you know, gets on the plane, who's the final authority on that?

A. The crew master or loadmaster on that aircraft.

Q. And then before --

A. But the pilot -- the pilot can say nope.

Q. Right. And before that, like, is it the -- is it APOE's the final authority? Is it the MRB's the final authority?

A. No, it's the APOE is the one that does the HAZDEC. They have the authority.

Q. Okay. So they stop it if they see something wrong.

A. Anything. Yeah.

Q. And they've got to re -- if there's any tweak to anything, they've got to redo whatever paperwork.

A. They -- they should redo it.

Q. They should.

A. Yep.

Q. Okay.

A. They should redo it. Because if you look at the HAZDEC and -- and if you go through it and then you develop your load plan, they have to give every pilot a brief, okay.

Q. When you say "they," you mean the?

A. The APOE.

Q. Okay.

A. Okay. If I build a -- if I build a hazardous material shipment for you as the pilot and I hand you that, it's telling you that I've looked at everything.

Q. Um-hmm.

A. And I've inspected it all and then that it meets the requirement from the Code of Federal Regulation.

Q. So when --

A. That's what this is telling you.

Q. Right. So when --

A. And this is your loadmaster.

Q. So my loadmaster signs this.

A. Um-hmm.

Q. Is there anything that says that he has to sign this and that APOE should keep it with a signed copy?

A. I don't know.

Q. Okay.

A. Because I've worked with so many services. They all do it differently.

Q. Right.

A. And so much of this is automated through different systems now.

MAJ (b) (6) Okay.

LTCOL (b) (6) So purposes of here at Cherry Point, is there a chance there's one of those floating around with an aircrew signature on it?

MR. (b) (6) I have really no knowledge. No idea. Because I don't -- I don't interfere with the -- that's -- that's procedural for the APOE.

LTCOL (b) (6) Um-hmm.

MR. (b) (6) That has nothing to do with my venue.

LTCOL (b) (6) Um-hmm.

MR. (b) (6) You know? So I don't get involved in my -- other lanes. I try to stay out of them.

LTCOL (b) (6) Got it.

Questions by Lieutenant Colonel (b) (6)

Q. Did you have any interaction with any of the crews?

A. Which crews?

Q. The -- the Yankee crews.

A. I didn't even meet them or say hello to them when they got here. Just the guard.

Q. Well, you said the Gunnery Sergeant. That's not the Gunnery Sergeant from the crew.

A. No, he's the ammo --

Q. Gotcha.

A. -- or embarker.

Q. Okay. I want to double-check on that.

A. Yeah. That's (b) (6) Gunnery Sergeant (b) (6)

Q. Yep. Do you have -- your job, I think you're the only one that does your job on base, right?

A. Yeah.

Q. There's nobody else.

A. I'm the only one, yeah.

Q. It's amazing. Are you aware of any other -- like, you showed -- those photos are awesome. Thank you very much.

Are you aware of any other photos or texts or information out there describing the flight?

A. No. But I was thinking about something this morning that might be of relevance, may not be. A lot of the airfield is covered by camera. Now whether or not there's -- those cameras cover the CALA and the OSA and if the -- and I don't know if that footage is saved or if it goes into a loop and recycled over --

Q. Um-hmm.

A. I don't know those things.

Q. Right.

A. All right. Because if you've ever been into our EOC, my God, I mean, for dispatch, there must be 20 monitors in there with camera that are split four ways with pictures everywhere that's going around this base.

Q. Gotcha.

A. And I would encourage you to look at camera footage maybe through PMO or air operations. And then I would encourage you again to find out if there were vehicles -- government GSA vehicles involved in any part of this, because all the ones on Cherry Point are equipped with dash cams.

Q. Okay.

A. But they only click on if there's an incident, you know; if you jerk the wheel too hard or whatever. But I don't know. It's a possibility.

Q. Gotcha.

A. It might help you.

Questions by Major (b) (6)

Q. Have you ever had a load like this that was -- have you ever had to correct loads before besides this one or is this kind of like a one-off?

A. Well, I've been in the industry a long time, okay. So it's hard to quantify.

Q. Well, I understand. Like in -- let's say in the last year at Cherry Point.

A. Okay. I'll -- I will give you a little historical data. I used to work at Cherry -- at Camp Lejeune, all right. In January 11, 2016 I came to Cherry Point, okay. Prior to coming here I worked as a material handler at the Ammunition Storage Point for Lejeune. One of my jobs over there was to supervise Marines in building these packages. And to help them build them and to teach them how to build a package. Then I came up here. I have not had a good shipment since I left Lejeune.

Q. What does that mean?

A. I have never had a Marine unit bring a pallet here that met all my widgets.

Q. And not your requirements, but the manual's requirements.

A. The manual.

Q. Got it.

A. Because the vast majority of Marines don't understand HAZDECs because they're not qualified for HAZDECs.

Q. So when you find an error, is that -- is there a report that you send out that you're documenting --

A. I write a letter.

Q. Okay.

A. I write a letter back to that command or I'll call that command and say, hey, your shipment is wrong. You need to send people up here to correct it. When they get here, come by and see me and I'll tell you what's wrong with it.

LTCOL (b) (6) Did you write a letter for this one?

MR. (b) (6) For this one? No. I actually went back to my desk and sent all that information to the G-4. I think it was Captain (b) (6) (b) (6).

Questions by Major (b) (6) continued:

Q. So from your perspective there's a problem with people knowing how to create these things.

A. Well, part of the reason I went out there that morning at seven o'clock was because I knew that there were two shipments moving through over the weekend. One that was supposed to have came in, material delivered on Saturday for a Sunday shipment; and then material to be delivered Sunday for a Monday shipment. Gulf Company delivering Saturday; Hotel Company delivering Sunday, and consequently.

Q. So if people at the APOE have a problem with all this stuff, are they -- do they know they can contact you? Are you kind of the final authority on base?

A. I'm not a final authority. I'm just an oversight for safety.

Q. Oversight. Okay.

A. And there's a big difference.

Q. Okay.

A. There's a huge difference.

Q. So you can advise them on what to do, but they don't --

A. I can advise them that their stuff is a mistake.

Q. -- necessarily have to listen to you.

A. Yeah. They don't have to listen to me, and they can ship it wrong; but they can pay the consequence too.

Q. Gotcha.

A. Yeah. A lot of people disregard what I tell them. Like, for instance, this ammunition was sited and placed on the OSA. And I gave them a map telling them to put it in the red label area on the CALA. Those are two different pieces of real estate.

Q. Gotcha.

A. The OSA is not sited for explosives. The CALA is. The OSA is for green gear. Now you can use the OSA pad to download your ordnance off your truck and drive it over to the CALA with a forklift. That's allowed.

Q. Okay.

A. So the -- there's a lot of different venues here.

Q. Okay.

A. Yeah.

Questions by Lieutenant Colonel (b) (6)

Q. How many hours do you work a day? What time'd you come in and what time do you leave?

A. Well, I hate to say it, but I only work eight, sir. I could work all 24 of them.

Q. Keeps you busy.

A. I have 27 programs that I run.

LTCOL (b) (6) So you had that -- just talking this -- the reason I ask is because you just talked about those two flights. Somebody came in for Saturday to load for Sunday?

MR. (b) (6) Gulf Company, 2d MRB, the sister squadron to Hotel, came in Saturday and flew Sunday.

Questions by Lieutenant Colonel (b) (6) continued:

Q. Did you have a chance to look at that?

A. No, because they delivered -- and I don't work weekends.

Q. Gotcha.

A. And they won't pay me to work weekends or give me the comp time to work weekends, so...

Q. Yeah. Wow. So those don't get reviewed by an explosives safety officer?

A. No. And it's not really my job to review them.

Q. No, no. I'm not pointing at you. But I want you to understand --

A. That -- what I -- oh, I understand sir.

Q. We have a common theme running through these things about manpower.

A. Um-hmm.

Q. I just wanted to --

A. It's a consistent problem.

Q. And I just wanted to -- wanted to see --

A. Yep.

Q. -- you know, more to it -- this is more about the effects of the reduced manpower with the Marine Corps right now.

A. And I'll be honest with you, sir. Now this is opinion. Please remember this, opinion. I find it a systemic problem throughout the entire Marine Corps. But I also find that same problem in the other services. And I've dealt with all services, because they all come here to train because of the size of our CALA and its capability, meaning we can actually bring a C-5 here and turn it around on the CALA and load.

Q. Gotcha.

A. And we can bring C-17s, C-9s. We can bring all these different aircraft aboard station because our strip's long enough and our CALA's huge.

Q. Yeah.

A. So I encounter all services and they all have a systemic problem when it comes to ammunition and transportation.

Q. Gotcha.

A. And it's just not the air. It's ground too.

LTCOL (b) (6) Right.

MR. (b) (6) Ground crews.

Questions by Lieutenant Colonel (b) (6)

Q. Do certain units have certain history with you, certain reputation with you?

A. Yes, they do.

Q. And what's the reputation from 2d Raider Battalion?

A. I know the 2d and the 3d MRBs pretty well and the personnel that have worked for those units. And historically, that they -- they've had problems in the past.

Q. Like what?

A. Sir, don't want to ask that one.

Q. No, actually I do, because I want to make sure we solve this problem.

A. I believe in the past, 3d MRB, the problem before this was a different battalion. I believe it was 3d. And I can't remember if it was Lima or Mike or November. I can't remember which company. But they brought ammunition up here, staged it, and then put a Motor-T operators up here to stand guard that were not pistol qualed and gave them a pistol to guard the ammunition.

And then at six o'clock in the morning, the guard called his Gunny and said, hey, my shift's over, what do you want me to do. He told him to come back. So the junior Marine took his 9-millimeter and all the rounds and put it inside the guard shack and left it and got in his POV and drove home.

I went out there with my Marine that works for me, and I find an unsecured ammunition on the CALA in the OSA with an SRC rating of 1, which means I got a shoulder fired rocket out there. That's a level -- I mean, you can't leave that thing anywhere. It requires a hand-to-hand signature if I give it to you.

Q. So you're saying that one time before out -- was it the OSA or the CALA?

A. Well that particular time, it was at the OSA again.

Q. At the OSA, a 3d MRB Marine just left a weapon out there?

A. Yep. We looked for him for a while, because we thought he might have killed himself or something. We didn't know where he went.

MAJ (b) (6) And how can you get to the CALA? Is there more than one way to get there?

MR. (b) (6) You can either go in the flight line and go across the flight line to the CALA like you were an aircraft, or you can go down the access road and then into the CALA road.

MAJ (b) (6) And only -- besides a key, is there like, you know, barb wire on the top, all sorts of stuff?

MR. (b) (6) No. No. No. We do -- that's a MILCON that's happening next year. They're putting fence around everything in preparation for the strike fighter.

Yeah. I -- I've encountered problems with MRB, but I've encountered problems with 2d MAR. I've encountered problems with 135th SOAR, Army unit out of Fort Bragg.

LTCOL (b) (6) Right.

MR. (b) (6) I've -- 17th CAB, Fort Bragg. 165th. 96th.

LTCOL (b) (6) 17th CAB? Really?

MR. (b) (6) Yeah.

LTCOL (b) (6) How about VMGR?

MR. (b) (6) VMGR, the only problems I've had with them is over in Hanger 250 doing their job.

LTCOL (b) (6) Is that 252?

MR. (b) (6) Yeah.

LTCOL (b) (6) How about 452 up in New York?

MR. (b) (6) No.

LTCOL (b) (6) No -- no relationship?

MR. (b) (6) Is that the Yankees?

LTCOL (b) (6) Yeah.

MR. (b) (6) Yeah. No. I've had them come in here a few months ago.

LTCOL (b) (6) Yeah.

MR. (b) (6) It might have been six months ago. They even brought me a patch. Pretty good group of guys. They were pretty much spot on. I had a lot of -- they were -- I was really happy with them, and I guess they were tickled with everything too because they left me a patch.

LTCOL (b) (6) Gotcha. You say they were very professional? Is that what you're saying?

MR. (b) (6) I think the 452 did real well.

LTCOL (b) (6) Gotcha.

MR. (b) (6) Yeah.

MAJ (b) (6) I have a PUB question, sir. So if we were going through this and this is the --

LTCOL (b) (6) Do -- do you want to record this?

MAJ (b) (6) -- CFR-49, and it seemed like a discrepancy in the PUB. But for the 1.1E.

MR. (b) (6) Um-hmm.

Questions by Major (b) (6)

Q. When I tracked it across to where it's forbidden, it says forbidden for quantity limitations on passengers and cargo aircraft for both respectively.

A. Yeah.

Q. And I don't really know this stuff very well so that's what seemed like to be an error with the section further in the back.

A. It would -- you'll -- you'll have to go a little bit deeper in this though, 'cause -- I don't know how to explain this. It -- it -- it's -- when -- when you apply this to commercial air, it's totally different.

Q. Okay.

A. Now, if I -- if you look at Table 4-2 in the AFMAN, okay -- look at Table 4-2 in the AFMAN, and then look at Table 6 -- or Column 6 and Column 7, which are essentially the same ones you have here.

Q. Um-hmm.

A. Okay. And they're gonna tell you what the restrictions are. And that will be under special provisions. So you -- under special provisions, you would be looking at Column 7.

Q. Okay.

A. Did you see that, Major?

MAJ (b) (6) I'm pulling it up, sir.

MR. (b) (6) That's a big damn table, so you'll see it. There it is.

MAJ (b) (6) Okay.

MR. (b) (6) That's it.

MAJ (b) (6) Okay.

MR. (b) (6) Okay. So here -- here you go.

MAJ (b) (6) Oh, that's for --

MR. (b) (6) Special provisions and six.

MAJ (b) (6) There it goes. That's 4-1. Should I

go further?

MR. (b) (6) No, that's it.

MAJ (b) (6) This is it then?

MR. (b) (6) That's it.

MAJ (b) (6) Special Provisions, six and seven. So now --

MR. (b) (6) So if you look at special provisions and then -- then you want to go down to --

MAJ (b) (6) I need to look up the UN0006; is that right?

MR. (b) (6) No, you don't want to do that.

MAJ (b) (6) Okay.

MR. (b) (6) You want to -- you want to go down to cartridges for weapons.

IMC: Okay.

MR. (b) (6) Yeah. And then you would go to whatever this one was if you're -- if you're concerned with it. Yep. Cartridges for weapons.

Questions by Major (b) (6)

Q. You -- you caught my attention when you said you knew you had a -- a one -- a 1.1 --

A. Um-hmm.

Q. -- on the pallet.

A. It doesn't bother me.

Q. Okay. But that --

A. [unintelligible].

Q. That's -- that's something that we're trying to get to the bottom of, that 1.1E.

A. Okay.

Q. So here's cartridges coming up here.

A. Yeah. This is a two-week class to teach you all this stuff.

Q. I'm sure it is.

A. And even then you don't have it till you've been doing it awhile.

Q. So that's the item that -- right there.

A. Cartridges with weapon, bursting charge. That's the certain -- what's the date on this one, do you know?

Q. This is the 2012.

A. 2012.

Q. Yeah. Which was in effect --

A. Right.

Q. -- at the time.

A. Okay. So it's authorized for a P4 movement and packaging will be A512. But the important part is it tells you P4, but did you notice there's no other special provisions? Like, these numbers?

Q. Yes.

A. That's -- that's very good.

Q. That's good?

A. That means there's no restrictions.

Q. No restrictions.

A. Yeah. Just -- you're only restriction is P4.

So then if you go to the bottom -- or the -- the bottom of this table, at the very end of this table you're gonna get all our P-codes.

Q. Okay.

A. Yeah. And then drop down to that P-code.

Q. It is a big table.

A. It's huge. I can't remember. It's kind of like the SLO[ph], AC-SAF. That thing's 5700 pages. That's just the ammo PUB.

MAJ (b) (6) They don't make it easy.

MR. (b) (6) Okay.

MAJ (b) (6) Okay. Got it all the way down.

MR. (b) (6) Yeah. You almost have to be a CPA to do half this stuff. The only reason I remember half of it is just doing it so long.

Okay. So now you're already past. Those are the numbers that comply to the Column 7.

MAJ (b) (6) Okay.

MR. (b) (6) So go -- keep going. There you go.

MAJ (b) (6) P-codes.

MR. (b) (6) There you go. P4. So transport this material on cargo aircraft only.

MAJ (b) (6) Okay.

MR. (b) (6) Okay. And then it tells you deviations are authorized according to Paragraph 2-2.

MAJ (b) (6) Okay.

MR. (b) (6) And Attachment 22. Duty passengers do not require deviation.

Now if you go to Attachment 22 and you read it on 2-2, it's basically gonna tell you that a green shirter is not a green shirter. He's now cargo.

MAJ (b) (6) Okay.

LTCOL (b) (6) He's now what?

MR. (b) (6) Cargo.

LTCOL (b) (6) Okay.

MR. (b) (6) Yeah.

MAJ (b) (6) Yeah. We're --

MR. (b) (6) And that'll -- it just means that being he is a Department of Defense on a training op --

LTCOL (b) (6) He's not a passenger.

MR. (b) (6) He's not a passenger.

MAJ (b) (6) So the caveat's if you had someone who was Space-A.

MR. (b) (6) Couldn't put him on that flight.

MAJ (b) (6) Couldn't put him on that flight.

MR. (b) (6) Nope.

MAJ (b) (6) So that's right here.

MR. (b) (6) Yep.

MAJ (b) (6) Compatibility waivers. And then the movement deviations.

MR. (b) (6) Yeah. See there's move -- do not transport passengers with hazardous materials cargo aircraft in 41 and 42. Eligibility P-codes sometimes. So see Attachment 22 for deviation authority. And then go to 22 and there you go. It says that you're cargo.

MAJ (b) (6) Participants involved in a tactical --

MR. (b) (6) Contingency [inaudible] or deployment ops.

MAJ (b) (6) They are not considered passengers.

MR. (b) (6) They are not passengers anymore. Yeah. Right.

LTCOL (b) (6) So they're not considered passengers. But what about the differentiation between a passenger plane and a cargo airplane? Is that to determine which one --

MR. (b) (6) There's no -- there's -- it --

LTCOL (b) (6) Is that used to make that determination or is that determines --

MR. (b) (6) To determine whether to use a passenger vehicle -- or a passenger plane or a cargo plane?

LTCOL (b) (6) So on one of the requirements -- remember, we looked that up -- it said that -- she showed us in the CFR how she checks it. 1.1E, make sure the UN code went

across. And then she went across that table. And on the right it said, hey, if it's a passenger airplane, you can take this much of it or you can't take it at all. And if it's a cargo airplane, it could be this or this.

My question is this: Does that designation, whether a person's a passenger or not -- you said green shirts or not, which that's how I read it -- does that have anything to do with the delineation between whether this is a passenger airplane or a cargo airplane?

MR. (b) (6) The P4 just tells you that it's cargo.

LTCOL (b) (6) Gotcha.

MR. (b) (6) So, I mean, as soon as -- as soon as -- as soon as you pick up one item on that manifest that's P4, you're into cargo mode.

LTCOL (b) (6) Okay. All right.

MR. (b) (6) So there is no reason to even look at passenger anymore.

Now the only thing that would highlight you then at that time is if you went to the APOE and they were putting people in civilian clothes on that plane. You'd be like, oh, no, hell no, not going. That would be a big red flag.

LTCOL (b) (6) Gotcha.

MR. (b) (6) And the pilot would have done that automatically. He would have said, no, go back.

But, yeah. Once you see your P-codes, those -- those list all your restrictions as far as passenger or cargo.

MAJ (b) (6) Okay.

MR. (b) (6) And that's -- the AFMAN's actually so much easier to read than that.

LTCOL (b) (6) That's what we're gonna do.

MAJ (b) (6) [Inaudible].

MR. (b) (6) Now one of the things I was gonna tell you, gentlemen, and unfortunately during the time and the course of the day after leaving the OSA that day with Gunnery Sergeant and Corporal (b) (6), I wanted to get back out there to see it off. But with my other 20-some programs on base, I was unable to do so.

LTCOL (b) (6) Gotcha.

MR. (b) (6) And I was -- I'm pretty confident, usually the loadmasters know what they're doing. You know, because ammunition is historically the last pallet on the plane. You always put your hazard to the closest exit.

MAJ (b) (6) Um-hmm.

MR. (b) (6) Now, with all the rules and things that have changed in the world with the CFR and the AFMAN pertaining to the use of lithium batteries and that stuff, that really worries me.

I also would encourage you gentlemen to also look at the -- what do they call it? -- the MCRP. That is the unit

embarkation handbook. And the AFMAN. If you're reading the AFMAN, they talk about hidden problems. And it lists common, missed, hidden problems.

And -- and it's historically the same things that have plagued the FAA over the last 20 years. And one of the biggest items on that list is lithium. There's other things though. Batteries particularly have been a problem with FAA flights causing incredible damage, but there's been other things such as concealed discrepancies in equipment that had cylinders.

So, I mean, when you look at green gear and that green gear isn't defined, you've opened up container of container in container of hidden problems unless they're manifested or itemized. But there is a listing inside the AFMAN that says --

MAJ (b) (6) Hidden cargo --

MR. (b) (6) Hidden hazardous shipment.

MAJ (b) (6) Hidden hazardous shipment.

MR. (b) (6) Yeah.

MAJ (b) (6) Yeah.

MR. (b) (6) And -- and that's something very important that often gets overlooked.

MAJ (b) (6) Do you deal with the lithium battery side of it or no?

MR. (b) (6) No.

LTCOL (b) (6) What page is that on?

MR. (b) (6) It's not explosive.

MAJ (b) (6) Yeah.

MAJ (b) (6) 50. Five-zero.

MR. (b) (6) Now the Navy has published a lot of new stuff on that.

MAJ (b) (6) Yeah.

LTCOL (b) (6) Thanks.

MR. (b) (6) It's on the NOSA website for lithium. It's very, very eye opening.

LTCOL (b) (6) Thank you.

(b) (6) you got anything else?

LTCOL (b) (6) No. That's been very eye opening.

MAJ (b) (6) Yeah.

LTCOL (b) (6) Thank you so much. I think that concludes our interview.

MR. (b) (6) All right, sir.

[END OF PAGE]

06/26/2012

SURFACE HOURLY ABBREVIATED FORMAT

ONE HEADER RECORD FOLLOWED BY DATA RECORDS:

COLUMN DATA DESCRIPTION

01-06 USAF = AIR FORCE CATALOG STATION NUMBER
08-12 WBAN = NCDC WBAN NUMBER
14-25 YR--MODAHRMN = YEAR-MONTH-DAY-HOUR-MINUTE IN GREENWICH MEAN TIME (GMT)
27-29 DIR = WIND DIRECTION IN COMPASS DEGREES, 990 = VARIABLE, REPORTED AS
'***' WHEN AIR IS CALM (SPD WILL THEN BE 000)
31-37 SPD & GUS = WIND SPEED & GUST IN MILES PER HOUR
39-41 CLG = CLOUD CEILING--LOWEST OPAQUE LAYER
WITH 5/8 OR GREATER COVERAGE, IN HUNDREDS OF FEET,
722 = UNLIMITED
43-45 SKC = SKY COVER -- CLR-CLEAR, SCT-SCATTERED-1/8 TO 4/8,
BKN-BROKEN-5/8 TO 7/8, OVC-OVERCAST,
OBS-OBSCURED, POB-PARTIAL OBSCURATION
47-47 L = LOW CLOUD TYPE, SEE BELOW
49-49 M = MIDDLE CLOUD TYPE, SEE BELOW
51-51 H = HIGH CLOUD TYPE, SEE BELOW
53-56 VSB = VISIBILITY IN STATUTE MILES TO NEAREST TENTH
NOTE: FOR SOME STATIONS, VISIBILITY IS REPORTED ONLY UP TO A
MAXIMUM OF 7 OR 10 MILES IN METAR OBSERVATIONS, BUT TO HIGHER
VALUES IN SYNOPTIC OBSERVATIONS, WHICH CAUSES THE VALUES TO
FLUCTUATE FROM ONE DATA RECORD TO THE NEXT. ALSO, VALUES
ORIGINALLY REPORTED AS '10' MAY APPEAR AS '10.1' DUE TO DATA
BEING ARCHIVED IN METRIC UNITS AND CONVERTED BACK TO ENGLISH.
58-68 MW MW MW MW = MANUALLY OBSERVED PRESENT WEATHER--LISTED BELOW IN PRESENT WEATHER
TABLE
70-80 AW AW AW AW = AUTO-OBSERVED PRESENT WEATHER--LISTED BELOW IN PRESENT WEATHER TABLE
82-82 W = PAST WEATHER INDICATOR, SEE BELOW
84-92 TEMP & DEWP = TEMPERATURE & DEW POINT IN FAHRENHEIT
94-99 SLP = SEA LEVEL PRESSURE IN MILLIBARS TO NEAREST TENTH
101-105 ALT = ALTIMETER SETTING IN INCHES TO NEAREST HUNDREDTH
107-112 STP = STATION PRESSURE IN MILLIBARS TO NEAREST TENTH
114-116 MAX = MAXIMUM TEMPERATURE IN FAHRENHEIT (TIME PERIOD VARIES)
118-120 MIN = MINIMUM TEMPERATURE IN FAHRENHEIT (TIME PERIOD VARIES)
122-126 PCP01 = 1-HOUR LIQUID PRECIP REPORT IN INCHES AND HUNDREDTHS --
THAT IS, THE PRECIP FOR THE PRECEDING 1 HOUR PERIOD
128-132 PCP06 = 6-HOUR LIQUID PRECIP REPORT IN INCHES AND HUNDREDTHS --
THAT IS, THE PRECIP FOR THE PRECEDING 6 HOUR PERIOD
134-138 PCP24 = 24-HOUR LIQUID PRECIP REPORT IN INCHES AND HUNDREDTHS
THAT IS, THE PRECIP FOR THE PRECEDING 24 HOUR PERIOD
140-144 PCPXX = LIQUID PRECIP REPORT IN INCHES AND HUNDREDTHS, FOR
A PERIOD OTHER THAN 1, 6, OR 24 HOURS (USUALLY FOR 12 HOUR PERIOD
FOR STATIONS OUTSIDE THE U.S., AND FOR 3 HOUR PERIOD FOR THE U.S.)
T = TRACE FOR ANY PRECIP FIELD
146-147 SD = SNOW DEPTH IN INCHES

NOTES:

- *'s IN FIELD INDICATES ELEMENT NOT REPORTED.

- SOME VALUES WERE CONVERTED FROM METRIC TO ENGLISH UNITS. THIS WILL
OCCASIONALLY RESULT IN MINOR DIFFERENCES VS ORIGINAL DATA DUE TO ROUNDING.

- COLUMN POSITION REFERS TO ASCII TEXT DATA.

- THIS FORMAT CAN BE EASILY IMPORTED INTO A SPREADSHEET OR A DATABASE
MANAGEMENT SYSTEM SINCE FIELDS ARE SPACE-DELIMITED.

- THIS FORMAT DOES NOT INCLUDE QUALITY CONTROL FLAGS, WHICH ARE AVAILABLE IN THE ADVANCED FORMAT THROUGH THE CLIMATE DATA ONLINE SYSTEM.

PRESENT WEATHER CODE TABLE

The code that denotes a specific type of weather observed.

00-49 No precipitation at the station at the time of observation

---

00-19 No precipitation, fog, ice fog (except for 11 and 12), duststorm, sandstorm, drifting or blowing snow at the station at the time of observation or, except for 09 and 17, during the preceding hour

---

00: Cloud development not observed or not observable
01: Clouds generally dissolving or becoming less developed
02: State of sky on the whole unchanged
03: Clouds generally forming or developing
04: Visibility reduced by smoke, e.g. veldt or forest fires, industrial smoke or volcanic ashes
05: Haze
06: Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation
07: Dust or sand raised by wind at or near the station at the time of observation, but no well-developed dust whirl(s) or sand whirl(s), and no duststorm or sandstorm seen or, in the case of ships, blowing spray at the station
08: Well developed dust whirl(s) or sand whirl(s) seen at or near the station during the preceding hour or at the time of observation, but no duststorm or sandstorm
09: Duststorm or sandstorm within sight at the time of observation, or at the station during the preceding hour
10: Mist
11: Patches of shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2 meters on land or 10 meters at sea
12: More or less continuous shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2 meters on land or 10 meters at sea
13: Lightning visible, no thunder heard
14: Precipitation within sight, not reaching the ground or the surface of the sea
15: Precipitation within sight, reaching the ground or the surface of the sea, but distant, i.e., estimated to be more than 5 km from the station
16: Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station
17: Thunderstorm, but no precipitation at the time of observation
18: Squalls at or within sight of the station during the preceding hour or at the time of observation
19: Funnel cloud(s) (Tornado cloud or waterspout) at or within sight of the station during the preceding hour or at the time of observation

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20-29 Precipitation, fog, ice fog or thunderstorm at the station during the preceding hour, but not at the time of observation

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20: Drizzle (not freezing) or snow grains not falling as shower(s)
21: Rain (not freezing) not falling as shower(s)
22: Snow not falling as shower(s)
23: Rain and snow or ice pellets not falling as shower(s)
24: Freezing drizzle or freezing rain not falling as shower(s)
25: Shower(s) of rain
26: Shower(s) of snow or of rain and snow

27: Shower(s) of hail (Hail, small hail, snow pellets), or rain and hail
28: Fog or ice fog
29: Thunderstorm (with or without precipitation)

30-39 Duststorm, sandstorm, or blowing snow

30: Slight or moderate duststorm or sandstorm has decreased during the preceding hour
31: Slight or moderate duststorm or sandstorm no appreciable change during the preceding hour
32: Slight or moderate duststorm or sandstorm has begun or has increased during the preceding hour
33: Severe duststorm or sandstorm has decreased during the preceding hour
34: Severe duststorm or sandstorm no appreciable change during the preceding hour
35: Severe duststorm or sandstorm has begun or has increased during the preceding hour
36: Slight or moderate drifting snow generally low (below eye level)
37: Heavy drifting snow generally low (below eye level)
38: Slight or moderate blowing snow generally high (above eye level)
39: Heavy blowing snow generally high (above eye level)

40-49 Fog or ice fog at the time of observation

40: Fog or ice fog at a distance at the time of observation, but not at the station during the preceding hour, the fog or ice fog extending to a level above that of the observer
41: Fog or ice fog in patches
42: Fog or ice fog, sky visible, has become thinner during the preceding hour
43: Fog or ice fog, sky invisible, has become thinner during the preceding hour
44: Fog or ice fog, sky visible, no appreciable change during the preceding hour
45: Fog or ice fog, sky invisible, no appreciable change during the preceding hour
46: Fog or ice fog, sky invisible, has begun or has become thicker during the preceding hour
47: Fog or ice fog, sky invisible, has begun or has become thicker during the preceding hour
48: Fog, depositing rime, sky visible
49: Fog, depositing rime, sky invisible

50-99 Precipitation at the station at the time of observation

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50-59 Drizzle

50: Drizzle, not freezing, intermittent, slight at time of observation
51: Drizzle, not freezing, continuous, slight at time of observation
52: Drizzle, not freezing, intermittent, moderate at time of observation
53: Drizzle, not freezing, continuous, moderate at time of observation
54: Drizzle, not freezing, intermittent, heavy (dense) at time of observation
55: Drizzle, not freezing, continuous, heavy (dense) at time of observation
56: Drizzle, freezing, slight
57: Drizzle, freezing, moderate or heavy (dense)
58: Drizzle and rain, slight
59: Drizzle and rain, moderate or heavy

60-69 Rain

60: Rain, not freezing, intermittent, slight at time of observation
61: Rain, not freezing, continuous, slight at time of observation
62: Rain, not freezing, intermittent, moderate at time of observation
63: Rain, not freezing, continuous, moderate at time of observation
64: Rain, not freezing, intermittent, heavy at time of observation
65: Rain, not freezing, continuous, heavy at time of observation
66: Rain, freezing, slight
67: Rain, freezing, moderate or heavy
68: Rain or drizzle and snow, slight
69: Rain or drizzle and snow, moderate or heavy

70-79 Solid precipitation not in showers

70: Intermittent fall of snowflakes, slight at time of observation
71: Continuous fall of snowflakes, slight at time of observation
72: Intermittent fall of snowflakes, moderate at time of observation
73: Continuous fall of snowflakes, moderate at time of observation
74: Intermittent fall of snowflakes, heavy at time of observation
75: Continuous fall of snowflakes, heavy at time of observation
76: Diamond dust (with or without fog)
77: Snow grains (with or without fog)
78: Isolated star-like snow crystals (with or without fog)
79: Ice pellets

80-99 Showery precipitation, or precipitation with current or recent thunderstorm

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80: Rain shower(s), slight
81: Rain shower(s), moderate or heavy
82: Rain shower(s), violent
83: Shower(s) of rain and snow mixed, slight
84: Shower(s) of rain and snow mixed, moderate or heavy
85: Show shower(s), slight
86: Snow shower(s), moderate or heavy
87: Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed, slight
88: Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed, moderate or heavy
89: Shower(s) of hail (hail, small hail, snow pellets) , with or without rain or rain and snow mixed, not associated with thunder, slight
90: Shower(s) of hail (hail, small hail, snow pellets), with or without rain or rain and snow mixed, not associated with thunder, moderate or heavy
91: Slight rain at time of observation, thunderstorm during the preceding hour but not at time of observation
92: Moderate or heavy rain at time of observation, thunderstorm during the preceding hour but not at time of observation
93: Slight snow, or rain and snow mixed or hail (Hail, small hail, snow pellets), at time of observation, thunderstorm during the preceding hour but not at time of observation
94: Moderate or heavy snow, or rain and snow mixed or hail(Hail, small hail, snow pellets) at time of observation, thunderstorm during the preceding hour but not at time of observation
95: Thunderstorm, slight or moderate, without hail (Hail, small hail, snow pellets), but with rain and/or snow at time of observation, thunderstorm at time of observation
96: Thunderstorm, slight or moderate, with hail (hail, small hail, snow pellets) at time of observation, thunderstorm at time of observation
97: Thunderstorm, heavy, without hail (Hail, small hail, snow pellets), but with rain and/or snow at time of observation, thunderstorm at time of observation

98: Thunderstorm combined with duststorm or sandstorm at time of observation, thunderstorm at time of observation
99: Thunderstorm, heavy, with hail (Hail, small hail, snow pellets) at time of observation, thunderstorm at time of observation

PAST WEATHER CODE TABLE

The code that denotes a specific type of past weather observed.
0: Cloud covering 1/2 or less of the sky throughout the appropriate period
1: Cloud covering more than 1/2 of the sky during part of the appropriate period and covering 1/2 or less during part of the period
2: Cloud covering more than 1/2 of the sky throughout the appropriate period
3: Sandstorm, duststorm or blowing snow
4: Fog or ice fog or thick haze
5: Drizzle
6: Rain
7: Snow, or rain and snow mixed
8: Shower(s)
9: Thunderstorm(s) with or without precipitation

LOW CLOUD TYPE

0: No low clouds
1: Cumulus humulis or Cumulus fractus other than of bad weather or both
2: Cumulus mediocris or congestus, with or without Cumulus of species fractus or humulis or Stratocumulus all having bases at the same level
3: Cumulonimbus calvus, with or without Cumulus, Stratocumulus or Stratus
4: Stratocumulus cumulogenitus
5: Stratocumulus other than Stratocumulus cumulogenitus
6: Stratus nebulosus or Stratus fractus other than of bad weather, or both
7: Stratus fractus or Cumulus fractus of bad weather, or both (pannus) usually below Altostratus or Nimbostratus
8: Cumulus and Stratocumulus other than Stratocumulus cumulogenitus, with bases at different levels
9: Cumulonimbus capillatus (often with an anvil), with or without Cumulonimbus calvus, Cumulus, Stratocumulus, Stratus or pannus

MIDDLE CLOUD TYPE

0: No middle clouds
1: Altostratus translucidus
2: Altostratus opacus or Nimbostratus
3: Altocumulus translucidus at a single level
4: Patches (often lenticular) of Altocumulus translucidus, continually changing and occurring at one or more levels
5: Altocumulus translucidus in bands, or one or more layers of Altocumulus translucidus or opacus, progressively invading the sky; these Altocumulus clouds generally thicken as a whole
6: Altocumulus cumulogentis (or cumulonimbogentus)
7: Altocumulus translucidus or opacus in two or more layers, or Altocumulus opacus in a single layer, not progressively invading the sky, or Altocumulus with Altostratus or Nimbostratus
8: Altocumulus castellanus or floccus
9: Altocumulus of a chaotic sky; generally at several levels

HIGH CLOUD TYPE

0: No High Clouds
1: Cirrus fibratus, sometimes uncinus, not progressively invading the sky
2: Cirrus spissatus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus castellanus or floccus
3: Cirrus spissatus cumulonimbogenitus
4: Cirrus unicinus or fibratus, or both, progressively invading the sky; they generally thicken as a whole
5: Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole, but the continuous veil does not reach 45 degrees above the horizon
6: Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole; the continuous veil extends more than 45 degrees above the horizon, without the sky being totally covered
7: Cirrostratus covering the whole sky
8: Cirrostratus not progressively invading the sky and not entirely covering it
9: Cirrocumulus alone, or Cirrocumulus predominant among the High clouds

Navigation Log FltPlan.com

Monday 07-10-17
Dept: 1345L - Arr: 1734L

IFR	YANKY72	Type C130/I	300Kts	Dep: KNKT
Dept: 1745Z	16,000	ROUTE (see below)		
Dest: KNJK	ETE: 6:49			
FOB: 0900	Altn:	ON FILE 452	SOB: 17	Color: GY

ATIS:127.47
Clnc:125.95
FSS: 800-992-7433 (1-62-2)
ATC Clnc issues? FltPlan.1-203-262-8383
Elev:29 Gnd:128.62 Twr:121.3

EWN ILM J4 IRQ J52 TXK J42 ABI J66 EWM J4 SSO J50 GBN J2 IPL

NOTE==> Your Departure Date/Time needs to be updated. No Forecast winds for that far in the past: using winds valid for 07/14/2017 14:00:00Z

KNKT to KNJK : TC=267° : (FMS winds: 87°/ 3) : MC= 276° : ST. LINE=**1924nm** : AIRWAY=**1999nm** : Extra=**4%**

Winds Aloft	FL180 ISA(-21) Comp	FL160 ISA(-17) Comp	FL140 ISA(-13) Comp	FL120 ISA(-09) Comp
EWN	285/015 +15 -012	289/016 +15 -013	293/016 +15 -014	283/016 +15 -013
ILM	290/010 +15 -004	295/011 +15 -004	300/013 +16 -003	290/011 +15 -005
FLO	263/012 +15 -012	268/012 +15 -012	274/011 +15 -011	284/009 +15 -009
CAE	245/012 +15 -012	245/010 +15 -010	245/009 +15 -009	278/008 +15 -007
IRQ	227/012 +14 -010	228/010 +15 -009	228/009 +15 -007	271/006 +15 -006
AJFEB	213/012 +14 -006	215/011 +14 -007	217/012 +14 -007	214/010 +14 -005
ATL	213/011 +14 -007	215/011 +14 -007	216/012 +14 -008	212/010 +14 -006
VUZ	226/004 +14 -003	218/006 +14 -004	211/008 +14 -004	200/008 +14 -003
IGB	232/004 +14 -004	208/004 +14 -003	184/004 +14 -001	176/006 +14 +000
SQS	264/002 +14 -002	100/002 +15 +002	075/002 +15 +002	082/003 +15 +003
TXK	041/008 +15 +005	029/008 +15 +004	016/007 +14 +002	005/006 +14 +001
FUZ	030/009 +16 +007	359/008 +15 +002	328/006 +15 -002	246/004 +15 -003
ABI	115/006 +15 +005	141/006 +15 +003	165/005 +16 +000	150/008 +15 +002
BGS	132/014 +15 +009	139/014 +15 +009	145/016 +15 +008	139/017 +15 +010
EWM	068/015 +16 +015	074/015 +16 +015	081/016 +16 +015	085/013 +15 +013
SSO	051/018 +15 +013	052/019 +15 +013	054/019 +16 +014	057/014 +15 +011
TFD	043/014 +15 +006	052/013 +16 +008	060/012 +17 +009	053/012 +17 +007
GBN	051/013 +15 +009	063/012 +15 +010	075/010 +16 +009	062/010 +17 +008
MOHAK	070/013 +15 +012	092/012 +15 +011	114/011 +16 +009	105/010 +17 +009
BZA	074/012 +15 +012	098/012 +15 +011	123/011 +16 +009	114/010 +17 +009
Avg. Trip Winds=>	+ 3 Tailwind	+ 3 Tailwind	+ 2 Tailwind	+ 2 Tailwind
FLT TIME==>	**6:49(+00) 300TAS**	**6:49(+00) 300TAS**	**7:01(+12) 290TAS**	**7:14(+25) 280TAS**
Fuel Burn==>	**38,378 Lbs**	**40,348 Lbs**	**43,871 Lbs**	**42,255 Lbs**

FIX	ST	LAT/LON	InB/Out	Leg	Rem	Fuel Burn Leg	Fuel Burn Tot.	Leg	Rem	ETE	WX
KNKT CHERRY POINT	NC	N3454.2W07652.8	---/330	0	1999	500	500.0 |	0:00	6:49	0:00 |	
EWN 113.6 NEW BERN	NC	N3504.4W07702.7	329/232	13	1986	669	1169 |	0:06	6:43	0:06 |	122.65
ILM 117.0 WILMINGTON	NC	N3421.1W07752.5	231/273	60	1926	1471	2640 |	0:16	6:27	0:22 |	122.65
FLO 115.2 FLORENCE	SC	N3414.0W07939.4	268/255	89	1837	1929	4569 |	0:18	6:09	0:40 |	122.65
CAE 114.7 COLUMBIA	SC	N3351.4W08103.2	254/263	73	1764	1587	6156 |	0:16	5:53	0:56 |	122.65
IRQ 113.9 COLLIERS	SC	N3342.4W08209.7	264/272	56	1708	1203	7359 |	0:11	5:42	1:07 |	122.65
AJFEB 113.9/272/101	GA	N3338.4W08410.2	272/272	101	1607	2149	9509 |	0:21	5:21	1:28 |	122.65
ATL 116.9 ATLANTA	GA	N3337.7W08426.1	272/277	13	1594	273	9782 |	0:03	5:18	1:31 |	122.65
VUZ 114.4 VULCAN	AL	N3340.2W08654.0	268/261	123	1471	2570	12.4 |	0:25	4:53	1:56 |	122.65
IGB 116.2 BIGBEE	MS	N3329.1W08830.8	258/266	82	1389	1685	14.0 |	0:16	4:37	2:12 |	122.65
SQS 114.7 SIDON	MS	N3327.8W09016.6	266/269	88	1301	1779	15.8 |	0:18	4:19	2:30 |	122.65
TXK 116.3 TEXARKANA	AR	N3330.8W09404.4	263/250	191	1110	3790	19.6 |	0:38	3:41	3:08 |	122.65
FUZ 115.7 RANGER	TX	N3253.4W09710.8	250/255	161	949	3147	22.8 |	0:32	3:09	3:40 |	122.65
ABI 113.7 ABILENE	TX	N3228.9W09951.8	249/256	138	811	2669	25.4 |	0:27	2:42	4:07 |	122.65
BGS 114.3 BIG SPRING	TX	N3223.1W10129.0	255/254	82	729	1552	27.0 |	0:16	2:26	4:23 |	122.65

NWS SRRS PRODUCTS FOR:
2017071000 to 2017071023

FDUS14 KWBC 100203
DATA BASED ON 100000Z
VALID 101200Z FOR USE 0900-1800Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ACK	2516	2309+09	2418+08	2527+04	2535-10	2538-23	264238	264648	257656
ACY	2211	2612+11	2717+05	2520+05	2524-09	2628-21	263637	254448	256557
AST	3317	3212+10	2915+07	2716+02	2724-11	2733-23	284440	295548	295555
AVP	2319	2520+10	2527+04	2628+03	2639-10	2643-22	264839	264749	265059
AXN	0518	0407+14	0116+08	3420+04	3137-08	3042-20	305237	316147	315857
BDL	2516	2413+09	2415+04	2532+02	2643-11	2543-22	265039	254849	255659
BGR	2521	2632+09	2632+03	2634-02	2548-12	2554-23	256140	256551	256158
BML	2526	2628+09	2532+03	2535-02	2550-13	2555-24	256641	257150	256859
BRL	2543	2530+21	2529+12	2633+07	2745-10	3051-19	314434	323944	333156
CGI	2421	2619+18	2714+11	2912+03	2708-07	3116-19	331635	341446	331657
CHS	2115	2115+15	2214+10	2214+05	2420-07	2523-17	232633	222744	252356
CLL	2421	2312+16	3311+11	3308+05	0305-07	0909-17	081132	040743	011053
CMH	2418	2922+13	3017+08	2914+03	2728-10	2829-21	302738	333648	346657
COU	2436	2519+20	2516+13	2610+07	3013-08	3020-20	312035	322346	321757
CSG	9900	9900+15	2106+10	2207+05	2406-06	2606-18	262033	262643	273356
CVG	2622	2819+14	2916+08	2914+04	2819-10	2927-21	323436	334446	334657
DLH	0306	3406+12	3109+06	3217+02	3134-10	3144-22	315938	316647	316657
EKN		2516+10	2815+09	2619+05	2727-09	2632-21	263838	263748	273859
EVV	2519	2413+16	2815+11	2913+04	2715-08	3022-19	322635	323046	333457
EYW	1213	1211+15	1113+12	1110+07	1706-08	1208-19	130734	140644	990056
FLO	1910	1911+15	2315+09	2414+04	2710-08	2721-18	233433	224244	244456
FOT	3524	3514+17	3007+12	2410+06	2721-06	2825-19	302536	332846	282756
FSD	0221	3618+19	3131+15	3037+09	3031-08	3036-19	304635	315247	314857
FSM	2117	2118+17	2116+11	2214+05	9900-05	0307-18	021336	351945	332653
FWA	2620	2616+15	2519+10	2623+03	2824-11	2926-20	312437	305147	328258
GAG		2416+23	2708+15	3111+07	9900-05	9900-19	021634	341444	331852
GRI		2932+25	2922+18	2716+10	2812-09	3114-19	332134	332545	313054
GSP	2905	9900+14	2309+10	2512+06	2510-07	2714-19	262735	262845	263356
HAT	2217	2417+14	2518+09	2622+04	2525-08	2429-18	243334	234144	244456
HSV	9900	0511+16	0213+09	9900+06	9900-06	9900-18	331335	341745	311555
H51	1609	0709+17	0905+12	9900+06	9900-07	9900-17	180933	110743	110953
H52	9900	1008+17	9900+12	9900+05	0607-08	0407-18	081132	071443	071555
H61	1313	1511+16	1607+10	1808+05	2015-07	1612-18	081033	071543	062055
LBB		2320+21	9900+15	0408+07	1109-05	0908-17	010833	361243	341053
LCH	2405	9900+15	3107+10	2909+05	2911-07	9900-16	030632	020543	990054
LND			2310+17	2609+10	2712-07	2620-19	253634	254545	274353
LSE	9900	3117+16	3027+10	2834+05	3133-08	3244-20	314536	303945	275057
LWS	2809	2606+16	2413+11	2327+06	2338-12	2344-23	235438	236048	236454
MBW			2614	2617+11	2713-07	2916-18	292934	293245	283555
MCW	1920	2823+22	2842+16	2847+08	3042-08	3143-20	325036	325246	262256
MGM	9900	2505+15	2206+10	2206+05	3006-05	2606-18	261933	272442	293056
MKG	2210	2518+14	2516+08	2427+01	2716-11	2730-22	295936	297447	299659
MLB	1614	1611+16	1609+11	1805+06	9900-08	1406-18	140934	100844	061555
MLS		2010+21	2609+16	2911+08	2718-10	2818-21	285236	277846	286554
MOT		9900+14	3219+11	3229+04	3130-10	2932-22	294537	305847	294956
MQT	9900	2907+10	2817+05	2824+00	2923-12	3029-25	304340	295748	296255
MRF			0509+15	0414+07	0805-07	0609-16	051732	041943	030854
OMA	2644	2939+24	2831+17	2725+09	2724-09	3127-19	343335	343845	341955
ONT	9900	2605+22	1206+16	1109+09	1006-08	1614-18	152132	162542	202152
ORF	9900	9900+13	2419+07	2528+04	2529-08	2532-19	245134	245645	246157
PFN	2211	2108+16	2208+11	2107+05	2408-07	9900-18	990032	290642	331555
PHX	1108	3208+23	3209+17	9900+10	2106-06	2105-17	130832	111843	241154
PIR		0116+18	3330+14	3236+07	2938-08	2830-19	293535	305046	315456
PSX	1913	9900+16	9900+11	2608+06	2806-07	3506-17	111232	081843	121454
PUB			3005+19	0607+12	0406-06	0108-17	361934	352144	331953

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 PWM 2520 2619+10 2524+03 2532-01 2549-11 2551-23 255839 255750 255959
 RDM      3107+14 2610+10 2419+04 2431-10 2537-22 254638 254848 255154
 ROA 9900 2311+13 2520+09 2522+03 2722-08 2622-21 262937 263547 263657
 ROW      1914    2208+16 2405+09 1707-07 0908-17 350933 011443 010953
 SAC 1914 2115+23 2114+14 2017+09 2513-06 2420-19 242436 223444 244250
 SAV 2011 2215+15 2313+10 2315+06 2518-07 2318-18 211633 211543 271855
 SIY      9900+16 2310+12 2320+06 2526-07 2631-20 273437 273547 264155
 SLN 2431 2514+24 2908+16 3405+09 3205-08 3014-20 351534 361644 341854
 SPI 2531 2422+19 2521+12 2418+06 2828-10 3035-19 313335 323044 334457
 SPS 2320 2309+20 9900+12 3411+06 0710-05 0511-17 350734 321042 311753
 SYR 2620 2522+09 2523+03 2732+00 2641-12 2653-24 266039 266550 266359
 TCC      2320    2419+15 2408+09 1506-05 0806-18 031033 341543 330953
 TUL 2217 2215+18 2209+13 2311+06 9900-05 0209-18 011235 362144 342354
 TVC 2611 2614+12 2724+06 2822+00 2926-12 2951-23 287838 287949 299757
 TYS 9900 0109+14 3406+09 2512+06 2714-07 2816-20 312336 312846 313256
 T01 2006 9900+16 9900+11 2906+06 2907-07 9900-17 071232 071443 100955
 T06 9900 9900+16 9900+11 2607+05 2909-07 9900-17 040932 040842 080754
 T07 2305 9900+16 9900+11 9900+06 9900-07 9900-18 070632 030743 051254
 WJF      2909+23 9900+17 9900+10 9900-08 1508-18 162033 172542 211952
 YKM 3121 2407+13 2515+09 2522+03 2429-12 2434-24 234441 235049 245052
 ZUN              2914+16 0107+11 1208-06 9900-17 041133 351443 341454
 4J3 1605 1808+15 1911+11 1810+05 1806-07 9900-18 070933 071143 031354

FDUS12 KWBC 100203
 DATA BASED ON 100000Z
VALID 100600Z   FOR USE 0500-0900Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ACK 2613 3006+10 2718+08 2627+04 2637-10 2537-23 254340 256047 257954
 ACY 2615 2824+11 2518+10 2521+05 2525-10 2623-23 264138 255747 258154
 AST 3315 3009+12 2613+08 2615+03 2527-12 2530-23 243740 244349 244352
 AVP 2417 2614+10 2520+06 2626+03 2633-10 2631-23 272939 283449 273760
 AXN 0625 0315+14 3219+10 3024+05 3031-07 3146-19 304936 304747 304956
 BDL 2616 2611+10 2514+05 2525+02 2540-11 2539-24 263239 263349 254958
 BGR 2818 2618+09 2625+03 2531-02 2542-12 2649-24 265340 275151 265857
 BML 2728 2837+09 2734+04 2631-02 2640-12 2643-24 265240 265251 265860
 BRL 2329 2422+19 2617+12 2808+07 3126-11 3141-21 314935 324846 325157
 CGI 2419 2710+18 2610+11 2608+03 3517-07 3320-19 322335 312646 313057
 CHS 2012 2015+16 2117+11 2218+06 2322-07 2423-17 242033 252343 252755
 CLL 1812 2808+17 3412+11 3410+06 3513-06 3510-17 010832 990043 131354
 CMH 2314 3119+13 2921+08 2918+04 2725-09 2832-21 283538 283649 284359
 COU 2327 2422+18 2413+13 2905+06 3417-08 3226-19 323036 322846 312957
 CSG 9900 9900+15 9900+10 2505+06 2213-06 2909-17 271933 272642 283354
 CVG 2313 2716+14 3120+08 3118+04 2824-09 2830-21 293337 293848 294459
 DLH 0309 0406+13 3005+06 3020+01 3030-11 3043-23 305639 316648 317556
 EKN      2323+12 2419+09 2518+04 2616-09 2922-21 282837 283148 264059
 EVV 2421 2613+16 3011+09 3410+05 3119-08 3126-20 313536 314447 314657
 EYW 1117 1111+17 1108+12 1409+07 1510-07 1316-18 111033 111043 110555
 FLO 2109 2215+16 2317+10 2214+05 2110-08 2317-18 243133 253444 254155
 FOT 3627 3516+18 2805+14 2508+07 2524-07 2530-19 252736 262446 243754
 FSD 2830 3021+24 2831+17 2840+09 3235-07 3235-19 313836 324746 335957
 FSM 2020 2114+17 2012+12 1709+06 0510-05 0312-18 321335 312844 303453
 FWA 2325 2726+14 3120+08 3320+02 2934-10 2933-22 283738 284249 294660
 GAG      2206+22 9900+15 9900+08 0510-05 0106-19 341933 331843 322553
 GRI      2529+25 2713+18 3112+10 3514-07 3314-20 322135 322945 334355
 GSP 2009 9900+15 2407+10 2414+06 2509-07 2813-20 253535 254544 264855
 HAT 2117 2317+14 2420+10 2523+05 2519-07 2429-18 243733 244144 244055
 HSV 0706 0509+17 0313+10 9900+06 2505-07 3308-19 311435 293044 294454
 H51 1407 0309+18 0205+13 9900+07 9900-07 9900-16 221133 241743 271554
 H52 9900 0711+17 0608+12 0606+06 9900-06 9900-17 070932 071142 051254
 H61 1308 1508+16 1509+11 1610+05 1616-07 1411-17 090733 091143 101755
 LBB      2117+23 2707+15 3608+08 0912-06 0612-18 311632 321343 241353
 LCH 2905 9900+15 2807+11 2506+06 9900-06 0509-16 341131 331043 990054
 LND              0905+16 9900+11 2816-07 2825-19 273234 283445 263055
 LSE 2136 2338+16 2426+10 2225+04 2731-11 3136-19 335234 326546 318157
 LWS 2814 2713+18 2318+13 2430+07 2436-10 2440-22 244538 244747 235755
```

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 MBW              1312    1607+12 2817-07 3227-18 293434 293045 293653
 MCW 1728 2129+17 2333+12 2637+05 2946-08 3147-18 324734 324645 325057
 MGM 0805 1705+16 9900+11 9900+06 2410-05 2808-17 271833 282442 293354
 MKG 2519 2821+13 3123+06 3031+01 3034-12 2939-23 294939 295249 305858
 MLB 1609 1608+16 1409+11 1607+06 1808-07 1510-18 141234 101044 062254
 MLS      1816+22 2216+15 2514+07 3116-08 2821-21 264835 265146 275756
 MOT      3209+14 3312+08 3220+04 3233-09 3138-21 304637 296647 306257
 MQT 3210 3014+11 2919+05 2926-01 3033-12 3038-25 304342 305051 305857
 MRF              1305+15 0111+08 0215-06 0512-17 041733 051543 081653
 OMA 2248 2534+23 2717+18 3019+09 3324-08 3223-20 313135 313746 325156
 ONT 9900 2807+22 3605+17 0208+09 1112-07 1318-17 142032 152542 162752
 ORF 1806 2609+14 2523+09 2528+04 2528-08 2534-20 255834 256444 256856
 PFN 2005 9900+16 2007+11 2107+06 2109-06 9900-17 330532 990042 311154
 PHX 3019 3021+24 3213+16 9900+09 1510-06 1211-16 101932 081743 110555
 PIR      3522+22 3033+16 2937+08 3124-07 3131-19 313935 315346 315857
 PSX 2211 3205+18 9900+12 9900+07 9900-07 2508-16 130532 100542 091955
 PUB              2005+19 0808+11 0113-06 3614-18 351634 331444 312753
 PWM 2919 2922+10 2724+04 2632-01 2644-11 2644-24 264140 263950 265358
 RDM      3008+15 2513+12 2223+06 2333-10 2439-21 244637 234647 235555
 ROA 2213 2312+13 2516+07 2514+05 2716-08 2819-21 272637 263946 256055
 ROW      1914    2012+16 2307+08 0706-07 3613-17 351132 341243 030753
 SAC 2110 1914+24 2113+16 2119+09 2612-05 2516-19 232236 222844 223850
 SAV 2209 1913+16 2117+11 2215+06 2318-07 2219-17 241432 251843 262055
 SIY      9900+17 2309+13 2115+07 2423-07 2435-20 243537 243547 234954
 SLN 2137 2419+23 2913+15 3605+09 3612-07 3121-19 322335 332644 322954
 SPI 2423 2619+18 2718+11 3108+06 3225-10 3133-20 314435 324746 325058
 SPS 2015 2310+20 3307+14 3606+07 0513-05 0313-17 321533 302442 272354
 SYR 2621 2524+09 2423+03 2524-01 2637-11 2642-23 264739 265250 275660
 TCC      2317    2118+17 2114+08 1111-06 0505-17 341833 322043 320952
 TUL 2028 2017+18 1806+13 1306+06 0513-05 0111-18 331635 322644 313054
 TVC 2815 2928+11 3025+05 3029+00 3032-12 3034-24 304741 296050 296157
 TYS 9900 9900+14 2505+10 2408+06 2811-07 2917-20 291936 273146 284555
 T01 9900 9900+17 3106+12 2907+06 9900-07 9900-16 360932 340842 990054
 T06 9900 9900+16 9900+11 9900+05 2306-07 9900-17 340832 350742 050754
 T07 9900 9900+17 9900+11 9900+06 9900-06 9900-17 070532 080542 051154
 WJF      2913+24 3311+18 3609+10 1305-07 1414-17 152133 162643 182352
 YKM 3231 2511+16 2318+10 2420+04 2429-11 2439-23 245038 235348 235755
 ZUN              2311+16 3409+11 0616-07 0411-16 011032 321043 290855
 4J3 9900 1607+16 1607+11 1707+06 1607-07 1406-17 050732 060942 060854

FDUS16 KWBC 100203
 DATA BASED ON 100000Z
VALID 110000Z   FOR USE 1800-0500Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ACK 2517 2722+12 2617+07 2525+05 2630-09 2744-21 273937 295547 304558
 ACY 2121 2418+13 2717+08 2518+06 2629-08 2633-19 291534 313545 314857
 AST 3321 3013+08 2714+04 2621+00 2829-10 2846-21 276135 276645 276655
 AVP 2217 2220+12 2616+08 2515+03 2627-09 2644-19 254935 285645 286558
 AXN 3505 3505+14 3114+11 3223+06 3233-09 3036-21 305337 305747 306456
 BDL 2226 2627+12 2624+08 2521+03 2629-09 2646-20 285336 295647 297658
 BGR 2520 2624+11 2723+06 2624+01 2632-12 2643-24 265141 286550 286457
 BML 2514 2420+11 2619+05 2521+00 2733-11 2642-24 275640 289048 289259
 BRL 2627 2731+20 2830+14 2937+09 3129-06 3039-18 294235 294046 304556
 CGI 2226 2425+20 2617+13 3607+09 3512-06 3210-18 281635 231945 241556
 CHS 2013 2515+15 2616+11 2614+07 2612-07 2520-17 231933 231743 251856
 CLL 2015 2808+18 3208+11 3407+06 0209-06 3606-17 190732 151042 990054
 CMH 2225 2532+16 2738+11 3039+03 3135-07 3136-19 283833 284243 274857
 COU 2326 2523+22 2913+15 3314+09 3220-06 3113-18 311935 322445 323156
 CSG 2109 2205+16 2306+12 2207+06 9900-04 9900-18 251233 262243 272355
 CVG 2226 2632+18 2730+12 3128+05 3133-07 3033-18 283834 274444 264057
 DLH 3110 3110+12 3117+08 3123+04 3136-09 3143-21 313838 313349 306058
 EKN      2317+16 2515+09 2721+04 2737-09 2644-17 264033 273344 293457
 EVV 2227 2530+20 2621+13 3417+09 3319-07 3119-18 283135 243544 222757
 EYW 1012 1309+17 1106+12 9900+07 0105-07 0608-18 130632 150743 161156
 FLO 2315 2611+16 2810+11 2910+07 2905-06 2815-18 233333 243343 253057
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 FOT 3522 3510+18 3307+13 2908+08 2916-05 2821-18 282134 281845 281657
 FSD 0805 0205+16 3216+15 3121+08 3133-08 3043-20 295334 295345 305755
 FSM 1813 2014+19 2210+12 9900+06 0210-05 3607-18 340835 331244 341852
 FWA 2235 2443+16 2641+11 2738+06 2929-05 2932-18 305034 296143 296956
 GAG      1913+26 2112+17 2310+08 3609-05 3609-17 011234 021444 320651
 GRI      1910+23 2418+17 2716+10 3221-07 3124-18 302934 303445 303755
 GSP 2112 2410+15 3008+11 2710+09 3112-05 3114-19 241534 990043 081057
 HAT 2320 2319+16 2215+11 2217+05 2325-08 2423-18 242632 242843 263556
 HSV 9900 9900+17 0505+10 3608+07 0212-05 3506-18 191234 190945 190656
 H51 1009 9900+18 9900+13 9900+07 9900-07 9900-16 261032 251743 170754
 H52 1107 9900+17 0806+12 0608+06 1005-07 9900-18 061132 061342 081654
 H61 9900 1007+17 1205+12 1605+07 1812-07 1412-18 070633 071143 062854
 LBB      1815+25 1814+16 1908+07 0610-04 0405-17 340633 280543 290652
 LCH 2405 2108+16 2209+11 2308+06 9900-06 9900-16 290632 250642 250854
 LND              2209+18 2509+10 2817-07 2632-18 245333 246644 256455
 LSE 3608 3409+15 3213+11 3020+06 3031-08 3037-20 305037 305147 305456
 LWS 2909 2810+15 2418+09 2426+03 2433-11 2542-22 265137 275646 275754
 MBW              9900    2513+11 2627-06 2530-17 262733 253543 275157
 MCW 0108 0309+17 3215+13 2926+08 3026-07 3038-19 305335 316946 316455
 MGM 9900 9900+16 9900+11 9900+06 2707-04 9900-18 251532 262543 263255
 MKG 3508 2917+15 2825+11 2925+05 2935-07 3039-20 295336 295947 274556
 MLB 1312 0906+17 1305+11 9900+06 9900-07 1407-17 120733 990043 990055
 MLS      2310+26 2310+17 2311+08 2725-08 2630-21 263837 264647 266555
 MOT      1718+18 2522+14 2619+07 3117-10 3028-22 284737 294748 285756
 MQT 9900 3012+11 2816+05 2921+02 3028-10 3043-23 305839 296048 296757
 MRF              1316+15 0307+09 0309-05 3613-16 350732 990043 080953
 OMA 0211 2715+24 2719+16 2927+09 3129-07 2932-18 303634 313245 314555
 ONT 2411 2513+21 2505+16 9900+09 1511-07 1715-18 201333 211840 201151
 ORF 2318 2407+16 2413+11 2516+05 2717-07 2622-19 263033 263343 281356
 PFN 2207 9900+16 9900+11 2207+06 9900-06 9900-17 990032 990042 250855
 PHX 2814 2815+25 3013+16 0407+10 2006-05 9900-16 161631 181542 080754
 PIR      1406+22 3205+15 2913+08 3024-08 2837-20 285834 285846 296354
 PSX 1410 9900+18 2905+13 3106+07 3507-06 9900-17 140833 121942 142154
 PUB              1509+21 1509+13 9900-05 2611-16 990033 332343 343155
 PWM 2418 2519+11 2615+06 2620+02 2630-11 2745-23 285739 288248 298659
 RDM      3112+14 2516+10 2520+04 2638-09 2745-18 275235 275245 285356
 ROA 2111 2311+15 2713+10 2913+07 2927-08 2929-18 241233 261044 311857
 ROW      1715    1715+18 1812+09 0809-05 0608-17 350933 301542 330853
 SAC 2206 2110+22 2212+15 2512+09 2416-06 2411-19 990035 251044 244150
 SAV 1809 2611+16 2510+11 2710+06 2415-06 2315-17 211633 231343 261456
 SIY      3210+18 2313+12 2415+07 2722-05 2729-18 282734 272645 272656
 SLN 2017 2016+24 9900+16 9900+10 3609-06 3311-17 320934 311544 322254
 SPI 2433 2637+21 2732+14 3030+09 3024-06 3027-18 303235 293446 283356
 SPS 1815 1915+21 2306+13 0114+07 0414-05 0606-17 320633 301143 301552
 SYR 2218 2421+12 2520+06 2620+01 2629-11 2636-22 276635 277646 279158
 TCC      2015    2015+19 2015+10 0405-04 3505-17 021134 021044 311152
 TUL 1821 2311+20 2405+14 9900+08 3610-04 3209-18 360534 341044 351453
 TVC 9900 9900+12 3012+09 3019+04 2929-09 3040-21 294538 294548 295556
 TYS 9900 2105+17 9900+12 3307+08 3315-07 3218-18 231234 171043 990056
 T01 9900 9900+17 2605+12 2806+06 2305-07 9900-16 110732 101142 140954
 T06 9900 9900+16 3005+12 3005+06 2206-07 9900-17 990032 990042 990054
 T07 9900 9900+17 9900+12 9900+06 9900-06 9900-17 990032 990042 100954
 WJF      2718+24 3014+17 3105+09 1406-07 1613-18 181133 201040 990050
 YKM 3112 2910+13 2712+08 2616+02 2629-12 2739-22 276036 287245 286555
 ZUN              2911+22 2911+13 0505-05 0911-15 990032 360742 331354
 4J3 9900 9900+16 2005+11 2005+06 1809-06 1608-17 100533 081442 041455

FDUS11 KWBC 100203
 DATA BASED ON 100000Z
VALID 100600Z   FOR USE 0500-0900Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      2008+21 9900+14 0208+07 0613-06 0617-17 021232 351142 990054
 ABQ              1913+17 9900+10 0424-07 0318-16 351332 291543 321654
 ABR 0427 3619+17 3219+13 3026+08 3134-07 3139-19 315136 316446 316857
 AGC 2416 2318+10 2520+08 2522+04 2623-10 2733-21 273938 283949 273959
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ALB 2517 2620+10 2521+04 2525+00 2639-11 2635-23 263339 273650 274260
ALS                      9900+12 0311-06 0215-17 361833 352244 322153
AMA      2116    2512+16 2909+08 0911-05 0305-18 331633 332042 331552
ATL 9900 9900+15 2110+11 2209+06 9900-07 2712-18 262434 263543 274354
BAM              2910+20 2908+11 2513-08 2422-19 213734 214145 234051
BCE                      3310+11 0908-06 2207-17 221532 241843 221856
BFF      3008    9900+19 9900+11 2806-08 2914-18 302434 303145 312954
BHM 0707 9900+15 0305+11 9900+06 9900-06 3109-18 272034 283642 284754
BIH      9900    3513+18 3609+10 1105-07 2409-18 212933 203544 202152
BIL      2011    1809+17 2405+09 2916-08 2821-21 264535 266046 266155
BLH 2315 1811+24 1209+17 0911+09 1414-06 1523-17 132432 132242 141954
BNA 9900 9900+15 3207+10 3512+03 3008-06 3116-20 312436 313046 304056
BOI      9900+26 9900+18 2207+10 2526-09 2631-21 235135 235845 236253
BOS 2716 3013+10 2715+05 2629+01 2642-10 2541-23 263640 263749 255757
BRO 1417 1414+17 1416+12 1518+07 1314-07 9900-17 301732 292643 292454
BUF 2528 2628+10 2519+05 2522-01 2639-12 2647-23 265339 265450 275660
CAE 1910 1909+16 2111+10 2213+05 2307-08 2522-18 242733 253144 253855
CAR 2820 2725+07 2530+02 2539-03 2544-14 2554-25 266741 266651 266556
CLE 2516 2617+10 2822+07 2822+03 2731-10 2837-22 284138 283949 274560
CRP 2012 9900+19 1705+12 1607+07 1806-07 9900-16 990034 990043 120953
CRW 2512 2415+11 2615+10 2614+05 2815-08 2922-21 282737 283148 273959
CZI              0911+17 1310+09 2723-08 2833-19 284035 284245 284556
DAL 2016 9900+18 9900+12 9900+05 0409-06 0311-17 331132 261542 281554
DBQ 2330 2525+19 2519+12 2518+04 2928-11 3140-22 316936 327646 317258
DEN              1908+20 2206+12 3417-07 3413-17 332334 341745 312153
DIK      9900+17 3220+13 3121+06 3125-08 2929-20 295036 286546 295958
DLN              3007+14 2508+08 2622-08 2631-20 244936 236846 246855
DRT 1728 1518+19 1311+13 1311+08 0805-06 0311-18 051333 061543 081153
DSM 2246 2631+21 2523+16 2920+09 3131-09 3140-20 314435 314546 324457
ECK 2519 2521+10 2729+05 2833+00 2841-12 2746-24 285139 285849 286059
ELP      1210    1407+18 9900+10 0612-07 0215-16 360832 361143 031453
ELY              9900+17 3207+10 2414-07 2328-18 202933 203144 213653
EMI 1814 2519+12 2721+06 2520+05 2519-10 2721-23 283038 283348 265757
FAT 9900 9900+23 9900+18 2408+09 1807-07 2108-18 202834 203043 211951
GPI      2811+21 2317+14 2224+06 2428-10 2433-22 243838 234447 245456
FMN              3511+19 3110+12 9900-07 0210-17 011532 361343 311655
GCK      2014+24 2609+17 9900+09 3507-05 3409-19 332134 332044 312753
GEG      2411+18 2315+11 2420+05 2337-11 2342-23 244839 235248 245955
GFK 0113 3511+13 3313+08 3316+02 3230-09 3247-22 316237 316147 316757
GGW      1618+21 2318+15 2722+07 3016-09 2921-21 274636 275647 285556
GJT              9900+21 9900+13 9900-06 2607-18 301433 321744 282555
GLD      2125    2414+18 0707+11 0211-07 3217-19 332534 332245 322353
GRB 2513 2820+14 2922+07 2927+00 2935-12 3045-23 306039 306749 307257
GTF      2424    2212+17 2208+09 2720-10 2627-22 244937 245146 255355
HOU 1709 2105+16 2613+12 2712+07 2510-06 1906-17 021231 361542 341655
ICT 2033 2412+21 9900+15 9900+07 0214-05 3210-19 322135 332444 312553
ILM 2316 2316+16 2420+11 2420+05 2418-08 2428-18 242834 243744 253755
IMB              2610+13 2221+07 2332-10 2340-22 244437 244547 235755
IND 2227 2723+15 2917+09 3513+04 3026-10 3027-21 293837 304748 305358
INK      1622+22 9900+15 0208+08 0715-07 0411-16 360732 351043 130854
INL 3311 3113+11 3017+05 3024+00 3125-12 3132-25 315640 317049 317256
JAN 1006 1405+17 0713+12 0710+05 9900-06 9900-17 302332 283142 293755
JAX 2308 2013+15 2114+10 2112+06 2114-07 2017-17 200832 990043 340555
JFK 2412 2605+10 2621+09 2625+04 2533-10 2531-24 263339 264248 256555
JOT 2424 2721+16 2811+11 3114+04 3128-11 3040-22 314937 326647 327657
LAS      9900+26 9900+18 9900+09 2011-06 1915-17 161232 181743 173654
LIT 1913 1708+18 1805+12 1306+04 0510-06 0312-19 330935 303344 303854
LKV              9900+15 2014+08 2329-07 2434-20 243637 243846 235353
LOU 2213 2715+15 3116+08 3314+05 2816-08 2927-21 303237 303847 304358
LRD 1731 1521+19 1623+13 1418+07 1110-07 9900-17 291334 292143 320953
MEM 1705 1505+18 3605+12 3608+03 0606-06 0112-19 321535 302945 303954
MIA 1111 1210+16 1309+11 1408+07 1505-08 1313-18 121134 130844 990055
MKC 2236 2418+22 2614+13 2806+08 3516-07 3223-19 312735 322746 312756
MOB 0705 1106+16 9900+11 9900+05 2605-06 2905-17 260932 280942 311454
MSP 1710 9900+15 3310+09 3220+04 3039-09 3151-20 306336 296645 277855
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 MSY 9900 9900+16 9900+11 9900+05 1908-06 9900-16 340632 320842 330754
 OKC 2020 2306+19 9900+14 9900+07 0512-05 0311-18 332334 322143 302453
 ONL      2817+26 2912+18 2817+10 3223-07 3225-19 313035 323745 335056
 OTH 0114 3408+13 2809+10 2611+04 2528-09 2536-21 254037 244347 244554
 PDX 3411 2912+12 2616+09 2517+03 2429-11 2436-23 244639 235348 235453
 PIE 9900 1707+16 1708+11 1709+06 1717-07 1612-17 110933 071243 071754
 PIH      3410    2406+20 2108+11 2816-07 2531-19 232834 234345 255055
 PLB 2630 2635+09 2632+03 2633-03 2639-13 2647-24 265740 266251 266260
 PRC              2908+16 3606+08 1008-06 1210-16 141231 141343 140756
 PSB      2523+10 2528+06 2526+03 2627-10 2731-22 273539 284050 284260
 RAP      0609+22 3106+17 2911+10 3026-08 2926-19 293835 293946 304555
 RBL 1609 1807+22 2005+15 2108+07 2425-06 2423-20 242436 233245 235051
 RDU 2006 2306+14 2418+10 2422+05 2522-08 2624-20 255034 245444 256056
 RIC 2111 2614+13 2513+07 2417+05 2525-09 2629-21 264836 257045 257355
 RKS              0610    3210+12 2615-07 2715-18 282634 283145 272555
 RNO      2713    2516+17 2215+11 2216-07 2422-20 223235 223844 234050
 SAN 1807 9900+21 0708+16 0814+09 1313-07 1321-17 132232 142442 152652
 SAT 2020 1906+18 1507+13 1409+07 9900-06 2905-17 990034 050743 111753
 SBA 9900 0407+23 0308+17 0206+10 1508-07 1613-18 161833 162342 181251
 SEA 0106 2905+09 2709+07 2514+03 2420-13 2426-24 233840 234649 234953
 SFO 2711 2308+24 2309+15 2208+09 2707-05 2309-19 231736 222544 223450
 SGF 2225 2323+18 2214+13 2107+05 0315-07 3415-18 332236 322146 302455
 SHV 1709 1516+18 1313+12 0808+06 0206-05 0307-18 312432 292642 303254
 SLC      9900    2905+18 2708+10 1906-07 2318-18 242333 243344 243355
 SSM 2612 2819+09 2923+03 2929-02 3040-13 3046-26 305042 305152 305857
 STL 2525 2517+18 2515+12 2907+06 3318-09 3227-20 323635 324046 323957
 TLH 2205 2107+15 2209+11 2310+06 2113-06 2306-17 990032 280742 301354
 TRI      2408+14 2315+09 2317+05 2915-07 2918-20 282136 273246 265055
 TUS      3114+24 3408+17 0605+09 1011-06 1011-17 091132 071642 990053
 2XG 1917 2011+16 1907+10 1909+06 2008-07 1813-17 181633 171343 060955

FDUS10 KWBC 100203
 DATA BASED ON 100000Z
VALID 110000Z   FOR USE 1800-0500Z. TEMPS NEG ABV 24000
FT   45000  53000
 ABI 070763 080970
 ABQ 351763 990071
 ABR 297460 293064
 AGC 254967 281961
 ALB 277762 263459
 ALS 321463 250571
 AMA 990062 990070
 ATL 272866 280767
 BAM 255361 261866
 BCE 262363 231571
 BFF 273764 272066
 BHM 282665 320666
 BIH 241463 231368
 BIL 257359 271962
 BLH 172063 120772
 BNA 302565 321665
 BOI 255159 262664
 BOS 286562 253559
 BRO 990065 081370
 BUF 284661 273360
 CAE 263166 250968
 CAR 265353 253955
 CLE 284365 282660
 CRP 111364 081371
 CRW 283969 281663
 CZI 255663 262965
 DAL 010763 080970
 DBQ 316460 292762
 DEN 282063 261468
 DIK 277659 282362
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DLN 255659 251862
DRT 081564 071670
DSM 325761 302566
ECK 294861 303159
ELP 031063 050972
ELY 253063 232168
EMI 274967 262162
FAT 251763 221168
GPI 243953 252558
FMN 291464 241071
GCK 281362 280970
GEG 264255 262656
GFK 296558 303359
GGW 255157 272259
GJT 272864 261569
GLD 281963 261269
GRB 305359 293260
GTF 255357 252558
HOU 110865 080871
ICT 321961 291070
ILM 252465 251667
IMB 274560 252760
IND 313062 302263
INK 080764 051571
INL 306457 303357
JAN 312264 010969
JAX 990065 251070
JFK 284764 262761
JOT 252965 303664
LAS 221562 221171
LIT 322062 362269
LKV 253861 252262
LOU 312067 321863
LRD 130864 071771
MEM 311663 352267
MIA 990065 110871
MKC 333661 291869
MOB 311565 060669
MSP 306959 303761
MSY 350765 071070
OKC 361262 020670
ONL 295062 282566
OTH 263563 262361
PDX 274659 262158
PIE 111867 990070
PIH 246461 273065
PLB 276358 263856
PRC 211362 190773
PSB 245667 272361
RAP 265562 282164
RBL 254161 252666
RDU 273166 261365
RIC 273868 261564
RKS 254163 252668
RNO 254661 252066
SAN 161164 120871
SAT 101664 071371
SBA 990064 140970
SEA 274555 252356
SFO 253162 231567
SGF 342860 322069
SHV 341363 061270
SLC 254063 242468
SSM 295157 293657
STL 334361 322766
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 TLH 320965 990070
 TRI 283267 271164
 TUS 140563 020573
 2XG 130866 251069

FDUS15 KWBC 100203
 DATA BASED ON 100000Z
VALID 110000Z   FOR USE 1800-0500Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      2012+22 2011+13 0708+07 0715-05 0510-16 281033 251443 990053
 ABQ              9900+21 9900+12 0410-05 0309-16 021532 022042 042655
 ABR 9900 1405+16 3414+14 3323+07 3024-08 2935-21 295336 287145 296855
 AGC 2218 2529+14 2530+08 2529+02 2637-09 2740-19 264233 264543 294257
 ALB 2219 2417+11 2618+07 2621+02 2632-10 2646-21 266136 286947 288660
 ALS                      2206+14 9900-05 1705-16 020832 342542 342155
 AMA      1914    2013+18 2013+09 0307-04 3605-18 040734 020544 301051
 ATL 1905 9900+15 2305+12 9900+07 9900-05 9900-18 221234 252544 252556
 BAM              2614+20 2615+11 2425-06 2527-19 252335 252645 244953
 BCE                      2811+11 2212-05 2315-16 212832 222543 251755
 BFF      1312    1710+17 2407+10 2718-07 2731-16 274432 285143 285356
 BHM 9900 9900+15 9900+11 9900+08 0309-05 9900-18 201034 251644 262755
 BIH      9900    2812+19 3010+11 9900-06 1506-19 190934 202343 252049
 BIL      3109    2309+17 2213+09 2330-09 2440-21 254036 264245 265756
 BLH 2215 2215+24 2409+17 9900+10 1712-06 1813-16 172033 171741 181052
 BNA 2113 2408+18 3306+11 3406+07 3613-06 3313-18 231634 192144 172056
 BOI      3207+22 2814+14 2621+06 2537-07 2637-19 264536 284745 274856
 BOS 2323 2620+12 2623+07 2523+04 2631-10 2746-21 285637 287147 297259
 BRO 1414 1511+18 1413+12 1417+07 1111-06 2006-17 200732 271543 261555
 BUF 2222 2325+11 2317+06 2218+00 2332-10 2648-19 265635 265945 266558
 CAE 2311 3306+17 2607+11 2708+07 2607-06 2812-18 242333 242943 253257
 CAR 2315 2621+09 2529+04 2631-01 2642-14 2648-26 265442 265752 265757
 CLE 2423 2546+15 2846+08 2835+03 3034-08 3035-19 274534 275044 277157
 CRP 1414 1306+19 1408+13 1507+07 9900-07 9900-17 200633 180943 141454
 CRW 2216 2519+16 2818+11 3028+06 3139-09 2742-17 273633 272943 292657
 CZI              2510+19 2408+10 2916-07 2729-18 254934 256144 266854
 DAL 1712 2608+19 2907+12 9900+05 0512-05 0508-17 271733 272243 291253
 DBQ 0212 2911+16 2917+13 2930+09 3031-07 3035-19 294436 294546 305155
 DEN              2810+20 9900+13 1707-06 2711-17 282232 272742 273055
 DIK      1821+22 2215+15 2313+07 2313-10 2727-21 284236 285147 276955
 DLN              3214+15 2524+09 2339-09 2442-21 264037 253846 254354
 DRT 1520 1521+19 1523+13 1314+08 9900-05 9900-18 101233 112242 082353
 DSM 3413 2818+22 2829+17 2933+09 3034-08 3040-19 304534 325146 314955
 ECK 2408 3018+12 2823+07 2830+03 2939-08 2939-20 283937 274347 275556
 ELP      9900    9900+19 9900+10 0209-06 3205-16 330832 360743 360953
 ELY              3106+22 3107+13 2708-07 2516-18 233633 224744 233552
 EMI 2114 2220+14 2621+08 2715+04 2729-08 2636-18 243035 294044 305257
 FAT 3109 3107+24 2710+16 2615+09 9900-07 9900-19 201534 211642 252249
 GPI      2510+18 2512+09 2522+03 2534-11 2435-23 244338 245050 245354
 FMN              3305+23 9900+14 9900-05 2309-16 271332 331542 011754
 GCK      1615+27 1814+18 2015+09 3206-05 3311-16 351134 341844 331253
 GEG      2414+15 2413+07 2419+02 2427-13 2532-23 253739 264547 275253
 GFK 9900 2807+13 3114+11 3228+05 3333-10 3033-22 293238 294647 295757
 GGW      2915+24 2914+15 2917+06 2516-12 2432-21 253137 264347 256558
 GJT              3012+20 2811+12 2213-05 2223-16 232532 252942 273356
 GLD      1618    1718+19 1710+12 3409-06 3014-16 320733 332744 311955
 GRB 3405 3510+13 3115+09 3020+05 2931-08 3039-21 304737 295747 295056
 GTF      2607    2912+13 2819+06 2539-11 2448-22 255138 236347 236056
 HOU 9900 3010+17 3011+11 3113+05 0220-06 0112-16 990032 120643 141054
 ICT 1817 2014+22 1410+15 1110+10 3211-06 3310-18 010634 360644 341653
 ILM 2318 2415+15 2610+10 2706+05 9900-06 3010-17 232132 242943 253257
 IMB              2515+09 2523+04 2537-09 2647-19 285334 275645 285556
 IND 2334 2638+19 2733+13 2932+06 3130-06 2932-18 303435 274144 264956
 INK      1519+24 1516+15 0710+10 0710-05 0307-16 320533 990043 990053
 INL 3111 3211+10 3217+07 3222+02 3140-10 3151-22 325838 305749 306559
 JAN 9900 9900+16 9900+11 9900+06 9900-06 9900-17 282433 273143 273154
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 JAX 9900 9900+16 9900+11 2405+06 2212-06 2011-17 151133 100943 990055
 JFK 2126 2420+13 2719+08 2620+05 2629-08 2639-20 283735 294646 306359
 JOT 3411 2918+18 2824+14 2829+08 3031-06 2932-16 273732 253842 233653
 LAS      2007+28 2210+19 2312+11 2207-06 1915-17 192133 192343 201152
 LIT 1909 1916+19 1908+12 0306+06 0509-04 0407-18 300835 301345 311953
 LKV              2613+15 2613+06 2629-06 2735-18 283234 273445 283556
 LOU 2223 2625+19 2721+12 3320+08 3223-07 3123-18 283734 253844 252256
 LRD 1419 1421+17 1523+13 1420+07 1106-06 9900-17 241533 232443 170853
 MEM 2010 2211+19 9900+11 0106+06 0210-05 3608-18 260935 250845 291155
 MIA 1307 1105+16 1309+11 1211+06 0511-07 0814-18 990032 990043 240655
 MKC 2322 2619+24 2913+16 3210+10 3313-06 3014-18 322034 351945 323255
 MOB 9900 9900+16 2705+11 2705+06 1607-06 9900-17 281132 291142 281555
 MSP 9900 3408+13 3214+10 3121+05 3130-08 3037-21 305337 305746 306156
 MSY 9900 9900+16 9900+11 9900+06 1708-06 9900-16 270532 260542 261154
 OKC 1822 2317+21 3007+14 3411+08 0212-05 0206-18 360534 990044 321151
 ONL      9900+22 3407+16 2720+09 2931-08 2937-18 284534 294145 304654
 OTH 0117 3511+12 3010+09 2719+04 2738-06 2740-18 274234 274145 274457
 PDX 3012 3114+09 2813+06 2620+01 2627-11 2744-20 275935 276345 276355
 PIE 3606 1105+16 9900+12 1805+07 1809-08 1305-18 090933 111542 112354
 PIH      2614    2616+18 2522+10 2534-08 2536-19 254435 245445 246553
 PLB 2316 2320+10 2521+05 2620+01 2630-11 2642-24 276639 278649 780159
 PRC              2710+18 2808+10 2106-05 2011-16 171732 171742 140554
 PSB      2423+13 2622+08 2617+02 2537-10 2647-19 254034 264544 285757
 RAP      1618+23 2019+15 2309+09 3018-08 2831-18 265033 276645 286255
 RBL 1707 9900+21 2406+13 2514+08 2617-05 2812-18 301035 310845 281256
 RDU 2118 9900+16 2508+11 2613+06 2916-06 2818-19 262434 243243 243356
 RIC 2019 2415+15 2616+09 2519+06 2724-07 2726-19 990032 321544 310956
 RKS              2510    9900+09 3108-06 2730-17 244132 234743 245656
 RNO      2615    2515+17 2317+10 2319-06 2515-19 260735 261045 244152
 SAN 2206 2006+22 1907+15 1808+09 1516-07 1914-17 211232 211640 201052
 SAT 1415 1514+18 1610+12 1508+07 9900-06 9900-17 141133 131943 121654
 SBA 9900 3206+23 0105+16 0505+09 0808-07 1209-18 220533 240741 990050
 SEA 2306 3007+07 2808+05 2612+00 2626-13 2735-23 275638 277245 276954
 SFO 2911 2609+21 2611+15 2612+10 2412-06 2408-19 220936 241743 253950
 SGF 2119 2419+19 2205+14 0713+10 3510-06 3211-18 331134 361645 352855
 SHV 1808 1505+16 1405+11 0506+07 0412-04 0407-18 282433 282543 272153
 SLC      9900    2807+18 3110+10 3014-07 2626-17 244533 235543 244553
 SSM 9900 3010+10 2818+05 2923+02 2930-11 2939-24 295339 296148 296557
 STL 2328 2629+20 2816+14 3219+09 3222-06 3116-18 311935 291946 302756
 TLH 2006 9900+16 2205+11 2208+06 2006-07 2310-17 220832 240743 271055
 TRI      2209+17 9900+11 3211+08 3220-07 3024-18 251333 230944 351057
 TUS      3116+26 3216+17 3410+10 9900-05 9900-15 140931 170942 990054
 2XG 1506 1805+17 2105+11 9900+06 9900-06 2108-17 151233 111544 091955

FDUS13 KWBC 100203
 DATA BASED ON 100000Z
VALID 101200Z   FOR USE 0900-1800Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      2409+20 0507+14 0316+06 1012-05 0709-17 361232 341042 280553
 ABQ              3406+16 3207+10 0611-06 0513-16 032133 362043 362353
 ABR 0617 0317+13 3421+10 3232+07 3033-08 2937-20 304836 305446 305657
 AGC 2515 2915+11 2917+07 2722+04 2627-10 2630-22 273838 283949 283759
 ALB 2517 2419+09 2321+02 2633+01 2650-12 2649-23 255839 265849 265659
 ALS                      3306+11 0608-06 0410-17 012034 352444 333053
 AMA      2528    2711+16 9900+07 1006-05 0305-18 041433 331143 321352
 ATL 9900 1805+15 2208+09 2408+06 9900-07 2606-18 272035 272244 273055
 BAM              2715+17 2414+10 2421-07 2526-20 234035 235344 234851
 BCE                      9900+10 1916-06 2313-17 241533 232244 252755
 BFF      1006    2307+18 2412+11 3118-07 3115-18 302835 323045 303654
 BHM 0905 9900+15 9900+11 2105+06 0407-05 9900-18 311234 301345 282755
 BIH      9900    9900+17 9900+09 2308-07 2512-18 202934 203843 232552
 BIL      2711    2613+16 2614+08 2417-09 2626-21 265436 257446 267254
 BLH 2008 1811+24 1612+16 1711+09 2008-07 1717-17 152532 152342 201953
 BNA 9900 2805+15 3510+09 3411+04 2910-06 2912-19 332135 362546 352257
 BOI      2009+21 2013+17 2216+10 2328-09 2429-21 244337 235746 247053
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BOS 2416 2415+10 2415+03 2531+02 2545-11 2543-23 264839 264850 255759
BRO 1522 1419+19 1416+12 1515+06 1610-07 9900-17 280932 291743 291755
BUF 2525 2618+09 2721+05 2825+01 2737-13 2743-24 275539 265850 275858
CAE 1906 2211+15 2311+10 2410+05 2615-07 2520-18 233133 233344 243656
CAR 2313 2518+07 2527+02 2536-03 2552-14 2557-25 247942 258451 246857
CLE 2621 2919+12 2918+07 2720+02 2924-11 2838-22 284138 315248 327058
CRP 1719 1408+18 1606+12 1908+06 9900-07 0106-17 161133 122243 131554
CRW 2609 3517+13 3114+08 2915+05 2725-09 2629-21 283337 283248 293258
CZI              2214+16 2616+09 2910-08 2728-20 274035 275345 275354
DAL 2018 9900+18 9900+11 9900+05 0906-06 0708-17 301233 291742 302054
DBQ 0414 3612+14 3117+10 2928+04 2844-07 2848-18 284933 284744 273957
DEN              2708+20 2507+12 9900-07 3209-18 331834 332145 322153
DIK      9900+18 3317+14 3124+06 2823-09 2828-21 293937 296046 296056
DLN              2309+16 2720+09 2622-09 2527-22 254537 246346 246954
DRT 1826 1624+18 1618+12 1512+08 9900-07 0807-18 062333 062343 081353
DSM 2656 2843+24 2836+17 2833+08 2932-09 3033-20 334335 354045 351157
ECK 2713 2915+12 2824+07 2928+01 2834-12 2737-23 306239 308249 319457
ELP      1913    9900+17 9900+09 0206-07 0509-17 350832 021743 011054
ELY              2114+16 2606+09 9900-07 2418-18 223433 224344 234654
EMI 2417 2518+12 2519+07 2622+04 2630-09 2631-21 263938 254648 264958
FAT 9900 3005+22 2505+17 2307+09 2208-07 2508-19 202534 203143 232351
GPI      2614+18 2522+11 2430+05 2443-11 2442-23 244538 245048 245256
FMN              9900+17 3308+11 0808-06 0709-17 331033 331644 332654
GCK      2114+24 2406+16 2205+09 9900-05 3507-19 361734 361245 342052
GEG      2421+16 2521+09 2422+04 2339-12 2345-24 235039 236549 236354
GFK 0312 3617+12 3414+06 3222+02 3136-10 3142-21 304938 315648 306156
GGW      2216+23 2514+16 2613+07 2619-10 2721-23 274738 275047 275556
GJT              9900+19 9900+12 2209-07 2713-17 261433 271544 272955
GLD      2416    9900+19 1005+11 9900-07 3513-17 361834 011545 332553
GRB 2412 2417+12 2422+06 2618+01 2924-09 2833-21 295136 286545 277258
GTF      2914    2717+15 2618+07 2419-10 2425-22 254138 254947 256256
HOU 2213 2607+16 3113+10 2817+05 2614-06 2706-17 081032 060843 131353
ICT 2325 2110+23 9900+14 0109+08 3306-06 3010-20 351435 361644 351853
ILM 2216 2412+15 2416+10 2319+05 2425-08 2427-18 233533 244044 243855
IMB              2514+11 2326+05 2333-11 2340-22 245038 236148 246153
IND 2722 2622+16 2820+10 2520+04 2922-08 3025-20 314536 324946 326458
INK      1613+22 0810+15 0910+07 0809-07 0909-16 360832 351043 300854
INL 3512 3313+09 3120+04 3126+01 3132-12 3137-24 325739 316948 317657
JAN 9900 9900+17 0711+11 9900+04 9900-07 9900-18 301333 302743 303455
JAX 1910 2211+15 2213+11 2312+06 2217-07 2013-18 170733 990043 330955
JFK 2708 3016+10 2821+06 2526+04 2533-10 2634-22 264238 254649 255858
JOT 2831 2825+16 2526+09 2433+02 2638-10 2939-20 315534 306345 308457
LAS      9900+24 2006+17 1810+09 2212-06 2115-17 182233 182642 212954
LIT 1811 2007+18 1906+12 2107+04 0707-05 9900-18 361035 341245 313253
LKV              2512+13 2517+06 2427-08 2437-20 254337 244647 245354
LOU 2617 2814+15 3114+08 3010+05 2717-09 2925-20 333735 334446 334857
LRD 1731 1526+18 1525+12 1420+06 1306-07 1105-18 990034 990043 990053
MEM 1908 2409+18 9900+11 0206+03 0305-06 9900-18 331035 341246 331456
MIA 1415 1313+16 1312+11 1308+06 1106-08 1211-19 130834 190544 990056
MKC 2433 2618+22 2716+14 3306+10 3209-08 3115-20 322135 343146 362856
MOB 9900 9900+15 2706+10 2505+05 2806-07 2105-18 280932 311342 321554
MSP 0314 0505+14 3405+09 3212+05 3136-08 3046-20 305637 316147 305056
MSY 9900 1906+15 1705+11 9900+05 2506-07 9900-17 360732 011142 990054
OKC 2320 2510+19 2705+13 2807+07 0605-05 0510-18 031334 331543 332152
ONL      3522+23 3016+17 2924+09 3026-08 2823-19 313335 313546 324756
OTH 0209 3409+12 2812+09 2713+05 2724-09 2830-20 304436 315646 314757
PDX 3206 3013+11 2817+08 2619+03 2626-11 2732-23 284040 294848 284954
PIE 1410 1608+16 1808+11 1909+06 2014-07 1712-18 080934 052043 061955
PIH      1612    2108+17 2610+10 2412-08 2524-20 244235 234945 245652
PLB 2518 2428+09 2540+03 2643-02 2641-13 2654-25 256641 257350 267358
PRC              9900+17 1806+10 2208-06 2009-17 140832 161243 221353
PSB      2415+09 2617+08 2624+03 2634-10 2638-22 264439 264749 274659
RAP      0707+19 9900+16 2608+08 2521-08 2827-19 304235 294845 295255
RBL 1507 1705+21 2011+15 2114+07 2531-06 2529-20 252736 252946 244653
RDU 9900 2005+14 2415+08 2517+05 2520-08 2622-20 254435 245045 245657
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 RIC 9900 2607+13 2517+06 2622+04 2626-08 2625-20 253336 244946 246057
 RKS              2609    3108+11 2417-07 2521-18 242534 253545 284752
 RNO      2610    2416+16 2123+09 2518-06 2627-20 233136 224244 234651
 SAN 2006 9900+21 9900+16 1607+08 1513-08 1616-18 152732 152741 191652
 SAT 1820 1609+18 1708+12 1911+06 9900-07 9900-17 130734 122742 131654
 SBA 9900 9900+22 9900+17 0707+10 1108-08 1105-19 171533 191542 231051
 SEA 3308 3208+08 2912+07 2716+02 2621-13 2629-25 273141 273650 274052
 SFO 3011 2609+22 2408+15 2207+09 2609-06 2515-19 241936 223044 243850
 SGF 2328 2319+18 2316+13 2413+06 2306-07 3114-19 321536 341446 342156
 SHV 1612 1609+16 1310+11 9900+05 0205-05 9900-18 321333 292642 312854
 SLC      9900    3506+17 2410+09 2418-08 2523-18 243933 254644 255353
 SSM 2711 2817+09 2828+04 2835-01 2935-13 2941-25 294342 295051 295956
 STL 2529 2524+19 2521+12 2517+06 2918-08 3025-19 312535 312246 321857
 TLH 2212 2211+16 2310+11 2210+05 2210-08 2005-18 990032 260743 321554
 TRI      3307+14 2607+09 2513+05 2717-07 2719-20 282736 292846 293357
 TUS      3510+23 3608+16 2005+09 9900-07 9900-17 110932 101342 240553
 2XG 2014 1911+16 1809+10 1809+06 1707-07 1910-17 191033 170744 060956

FDUS16 KWBC 101402
 DATA BASED ON 101200Z
VALID 111200Z   FOR USE 0600-1700Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ACK 2319 2422+12 2623+07 2629+03 2539-10 2540-20 265234 275344 274756
 ACY 2718 2725+15 2526+08 2632+03 2434-08 2632-18 253634 263544 263255
 AST 3417 3214+08 3115+06 3118+03 3030-10 3038-22 284737 265047 274556
 AVP 2729 2833+14 2832+09 2730+04 2532-09 2439-19 243835 254445 285657
 AXN 1820 2111+17 2408+12 2613+05 2728-11 2823-22 293835 285345 268756
 BDL 2523 2432+14 2536+08 2533+02 2631-08 2636-20 275935 265845 265258
 BGR 2218 2323+11 2426+05 2629+00 2739-12 2655-22 256838 266747 266857
 BML 2111 2317+10 2528+06 2634+01 2645-11 2650-22 266038 276247 277958
 BRL 2409 2823+19 2929+14 2930+08 2929-09 2825-18 323834 335344 324755
 CGI 2521 2517+19 2407+12 1706+08 2509-08 3110-17 352234 351744 150555
 CHS 2413 2508+15 2411+10 2511+05 9900-07 1909-17 211433 221744 241457
 CLL 2117 2106+18 9900+11 9900+05 9900-07 1109-17 140933 141443 091353
 CMH 2531 2742+17 2737+12 2736+06 2927-09 3029-19 303935 304145 275556
 COU 2628 2510+20 2506+14 2710+08 2613-09 2711-17 331534 362945 331753
 CSG 9900 9900+15 2105+10 2207+05 9900-07 9900-19 260835 261944 272255
 CVG 2738 2526+18 2731+13 2835+07 3127-08 3135-19 334434 312944 283956
 DLH 9900 3106+12 3219+10 3127+03 2935-10 3042-22 305337 304947 296458
 EKN      2729+15 2731+11 2836+05 2730-09 2735-19 283035 252545 253755
 EVV 2824 2516+18 2612+13 2517+08 2922-08 3021-18 352934 351644 311155
 EYW 1313 1009+16 1406+12 9900+07 3409-08 9900-18 030833 010843 050856
 FLO 2508 2510+15 2707+11 2810+05 9900-07 2311-18 232133 242144 251356
 FOT 3622 0111+17 9900+12 2809+07 2820-05 2727-18 272635 272646 262357
 FSD 1908 2522+19 2534+13 2539+06 2443-07 2444-18 264133 264244 264258
 FSM 2119 2406+17 1906+11 9900+05 1505-05 9900-19 091334 091043 070553
 FWA 2925 2820+16 2825+13 2831+08 2928-08 3039-20 315535 315446 295254
 GAG      2526+24 2606+16 9900+08 9900-05 0505-18 062334 042944 060752
 GRI      2119+24 2118+17 2219+10 2324-07 2631-18 282833 293044 301256
 GSP 2410 9900+16 2605+10 2808+07 2706-07 2509-19 200834 241844 990056
 HAT 2413 2512+15 2516+10 2518+05 2422-07 2424-18 242733 242944 242856
 HSV 2006 1706+16 0810+12 2405+07 9900-06 9900-19 020635 031045 011054
 H51 1409 1707+18 1305+13 1507+06 1405-07 0905-17 180533 251043 230655
 H52 1411 1308+16 1608+11 1405+06 0605-08 0507-17 051132 070943 071055
 H61 1511 1609+16 1510+11 1407+06 9900-08 0807-18 080933 081243 042155
 LBB      2020+22 1507+16 0408+08 1010-05 0711-18 051634 052543 990051
 LCH 2311 2609+15 9900+10 9900+05 2206-07 9900-17 080633 170943 990054
 LND              2711+18 2620+09 2723-07 2626-19 263735 264845 266055
 LSE 9900 3109+16 3215+12 3221+06 3028-09 2931-21 314536 318044 299957
 LWS 9900 2405+11 2609+06 2618+01 2634-11 2743-22 266238 267446 267054
 MBW              2920    2917+10 2713-06 2624-18 264033 275045 265154
 MCW 1406 3008+18 3112+14 3018+07 2824-09 2933-19 305134 306445 297756
 MGM 2206 2007+15 2207+10 2405+06 9900-07 9900-19 260935 272144 272355
 MKG 3207 3108+15 2912+10 2917+05 3029-09 2939-21 295136 305546 306556
 MLB 1509 1207+17 9900+12 9900+06 1207-07 1012-19 031734 022244 032856
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 MLS      2822+19 2623+12 2624+05 2537-10 2643-19 265336 265546 266256
 MOT      2622+18 2526+12 2634+05 2737-09 2633-20 263737 254048 275156
 MQT 2707 2610+10 3018+07 3128+03 3045-10 3046-23 305138 316248 326858
 MRF              0105+16 0110+08 0607-07 0914-17 031333 011143 351353
 OMA 2406 2819+22 2617+15 2519+08 2422-09 2528-18 273433 293944 303656
 ONT 9900 2609+22 9900+16 1810+09 2111-07 2216-19 222432 222441 231551
 ORF 2517 2611+15 2813+09 2617+06 2520-07 2525-18 252434 271244 301756
 PFN 2107 2011+16 2008+11 1805+06 9900-07 9900-18 280733 310743 281856
 PHX 2314 2810+23 2907+16 9900+08 2908-06 2110-16 201531 211742 221653
 PIR      2413+19 2106+14 2910+06 2824-07 2927-20 275135 275545 266053
 PSX 2110 1006+18 9900+12 9900+06 9900-07 1108-17 130734 190744 111653
 PUB              2510+19 2810+12 2606-05 2408-17 301433 291743 282655
 PWM 2220 2322+11 2426+06 2532+02 2641-11 2650-21 266037 265647 266758
 RDM      3006+10 2913+08 2817+04 2830-08 2837-20 274136 273846 264456
 ROA 2816 2920+18 2912+11 2711+05 2818-07 2923-18 262335 252244 262556
 ROW      2019    2012+16 9900+09 1011-05 0911-17 052033 054143 031752
 SAC 1809 2011+20 2114+14 2212+09 2514-06 2807-19 020836 990045 254050
 SAV 2309 2407+15 2411+10 2510+05 2410-07 2310-18 210933 230644 260857
 SIY      9900+15 2306+11 2512+05 2722-05 2729-18 272935 273446 263556
 SLN 2234 2214+23 1714+18 1613+10 9900-05 2511-18 990033 351344 351554
 SPI 2833 2823+19 2824+13 2826+08 2831-09 2924-17 313634 344745 312853
 SPS 2432 2415+21 1306+13 0513+06 1210-05 1008-18 070834 990044 030551
 SYR 9900 2613+12 2817+07 2721+03 2634-09 2734-21 273237 254747 266258
 TCC      2235    2615+17 2206+09 1307-04 0709-16 061933 053043 041855
 TUL 2125 2509+19 2606+12 9900+06 9900-05 9900-19 101334 081144 990053
 TVC 3207 2808+12 2816+07 3024+04 3030-09 2934-22 294438 304547 305556
 TYS 2411 9900+17 0307+11 9900+06 2811-07 3012-19 280934 310544 320956
 T01 1810 9900+17 2107+11 2310+06 2206-07 9900-17 090733 151243 141054
 T06 1505 1505+16 1806+11 1906+05 9900-07 3505-17 090632 130543 990054
 T07 1708 1806+15 1906+11 1905+06 9900-07 9900-18 030533 990043 300755
 WJF      2914+23 3009+16 2506+09 1807-08 2311-19 222332 222140 251050
 YKM 3222 2806+10 2910+06 2914+02 2926-11 2938-22 295737 297745 286856
 ZUN              3106+16 0607+10 3008-06 9900-16 180631 210842 261655
 4J3 1706 1806+15 1708+10 1705+06 9900-07 1206-18 060733 020843 361656

FDUS14 KWBC 101402
 DATA BASED ON 101200Z
VALID 110000Z   FOR USE 2100-0600Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ACK 2417 2824+12 2625+07 2422+06 2529-08 2638-20 265135 274846 264956
 ACY 2119 2418+13 2716+08 2517+06 2729-08 2634-19 242834 252345 253356
 AST 3318 3013+08 2814+05 2719+00 2833-10 2847-21 276636 277246 277055
 AVP 2217 2321+12 2720+08 2522+02 2630-09 2638-19 245434 256345 276758
 AXN 3605 3606+14 3115+11 3326+06 3131-09 3036-21 305037 306846 306656
 BDL 2221 2422+12 2623+07 2421+04 2531-10 2641-20 256335 266446 276357
 BGR 2418 2520+11 2720+06 2522+01 2631-11 2641-24 277638 279147 289759
 BML 2518 2424+11 2520+05 2519+00 2527-11 2637-24 267337 269047 279860
 BRL 2624 2727+20 2826+13 2934+09 3128-06 3032-18 293736 304946 315456
 CGI 2226 2626+20 2615+13 0611+09 3510-07 3111-19 292135 292544 302856
 CHS 1811 2308+16 2510+11 2614+06 2520-06 2520-17 241733 221643 202356
 CLL 1914 2311+18 3107+12 3406+06 9900-06 2806-17 180932 151642 151253
 CMH 2429 2633+17 2835+11 2938+05 3133-07 3031-19 283834 264544 265455
 COU 2325 2621+21 2814+15 3113+09 3112-07 2908-19 312034 332645 323256
 CSG 2208 2105+16 9900+11 9900+06 3505-06 2507-18 252133 262643 272555
 CVG 2328 2735+19 2825+13 3025+06 3224-08 3226-19 293135 274044 254255
 DLH 3007 3009+12 3219+09 3122+04 3130-09 3136-21 304238 295048 305757
 EKN      2423+16 2722+10 2824+04 2735-08 2931-18 293533 262944 303556
 EVV 2326 2727+20 2720+13 3412+08 3320-07 3319-19 292535 273144 273356
 EYW 1109 1308+17 1310+12 1409+07 3009-08 9900-18 090833 090643 990055
 FLO 2216 9900+16 2505+11 2707+06 3106-07 3017-17 242933 223143 223856
 FOT 3523 3512+18 3209+13 2911+08 2920-05 2822-18 282135 271746 271457
 FSD 0805 0305+16 3317+15 3219+09 3029-07 3040-19 294734 305646 305255
 FSM 1711 2015+19 2209+12 9900+06 0407-05 9900-18 340835 311143 331853
 FWA 2338 2544+17 2747+11 2842+08 3035-06 3037-18 304435 304446 304356
 GAG      1811+25 1911+16 2210+08 3409-05 3507-18 351034 361144 320851
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 GRI      1909+23 2515+18 2820+10 3220-07 2824-18 301733 311745 312654
 GSP 2112 2110+15 2505+11 2907+07 3211-06 2911-18 251734 252444 252655
 HAT 2320 2419+15 2516+11 2511+05 2710-08 2527-17 243433 234043 234156
 HSV 9900 1106+17 0713+11 9900+07 0307-06 9900-18 250835 261245 261455
 H51 1308 0806+18 0405+13 9900+07 9900-07 9900-16 261133 261743 220954
 H52 1207 1005+16 0806+11 9900+06 9900-07 0707-18 061232 061642 071554
 H61 9900 1407+17 9900+12 1605+06 1711-08 1209-18 051033 041943 042554
 LBB      1915+25 1914+16 2011+07 0811-05 0506-17 330833 281043 310952
 LCH 1807 2107+16 2207+11 2106+05 2106-06 2805-16 990032 200542 230654
 LND              9900+19 2608+10 2718-08 2637-18 245433 246244 255753
 LSE 3507 9900+15 3111+11 3020+06 3033-08 3036-20 294836 304947 315755
 LWS 2908 2810+14 2421+08 2426+02 2533-13 2541-23 265538 276246 276153
 MBW              3011    2810+10 2525-06 2428-17 253333 254044 274354
 MCW 3608 3408+17 3114+13 3027+09 3029-07 3136-19 305435 316046 305955
 MGM 2105 2206+16 2408+10 9900+06 3205-05 2605-18 262033 272543 282955
 MKG 9900 3008+15 2919+10 2826+05 2938-08 2940-20 294637 295046 294357
 MLB 1412 9900+16 9900+11 1205+06 1405-06 1407-18 090634 060544 031155
 MLS      2410+26 2410+17 2511+09 2715-09 2729-21 264237 265047 266954
 MOT      1820+18 2620+15 2719+07 2825-10 2828-23 274338 275146 276355
 MQT 9900 3013+11 2924+05 3024+03 3029-11 3042-22 315538 315648 305959
 MRF              1213+16 0406+08 0312-06 3613-16 341132 330743 070853
 OMA 0206 2613+23 2815+17 2922+09 3127-08 3027-18 302834 303345 293755
 ONT 2412 2408+22 2305+16 9900+09 1509-08 1809-18 211032 191640 200651
 ORF 2316 2506+15 2410+10 2515+07 2821-07 2626-18 244433 245043 255256
 PFN 2210 9900+16 2305+11 2307+06 9900-06 9900-17 990032 990042 321155
 PHX 2813 2814+26 2812+17 3306+10 2205-05 1805-16 151331 161242 070653
 PIR      1407+22 9900+16 2711+08 2818-09 2735-19 274734 275345 286155
 PSX 1413 9900+18 3105+13 3306+06 3305-06 2206-17 141333 122243 132454
 PUB              1511+21 1509+13 9900-06 2509-17 300833 332143 353055
 PWM 2519 2622+11 2611+06 2518+02 2527-11 2640-23 267636 268647 288760
 RDM      3112+14 2516+09 2620+03 2732-08 2742-18 275135 275646 275656
 ROA 2111 2313+16 2711+09 3012+06 2725-07 2726-18 292635 282144 250554
 ROW      2212    1815+18 1814+09 0807-05 9900-16 321132 291743 341253
 SAC 2206 2210+22 2314+15 2415+10 2517-06 2609-18 020536 990045 243551
 SAV 1812 2410+16 2408+11 2609+06 2516-07 2615-17 231032 221443 211956
 SIY      3211+17 2413+12 2515+07 2828-06 2729-18 273135 272945 272857
 SLN 1919 2113+24 9900+17 9900+10 3511-07 3314-17 290534 260544 301953
 SPI 2430 2734+20 2831+14 2927+09 3025-06 3026-18 303236 293846 314756
 SPS 1715 1816+21 2808+14 3413+07 0612-05 0406-18 300834 290943 301152
 SYR 2415 2320+11 2519+06 2419+00 2427-11 2645-21 266535 267446 267758
 TCC      1914    2015+19 2015+10 0805-05 9900-17 010933 350744 321252
 TUL 1818 2209+20 2306+14 1706+08 3608-05 3107-19 350634 331043 341553
 TVC 9900 3305+12 2811+07 2817+02 2931-10 3043-21 305137 305147 305057
 TYS 9900 9900+17 0207+11 3508+07 2913-06 3015-18 281834 271444 990056
 T01 1406 2006+17 2508+12 2811+06 2207-07 9900-17 090832 080642 151154
 T06 9900 9900+15 9900+11 3005+06 2306-07 9900-17 990031 990042 990054
 T07 9900 9900+16 9900+11 9900+06 9900-07 9900-17 990032 990042 061154
 WJF      2716+24 2911+17 3005+09 1505-08 1408-18 201032 201741 990050
 YKM 3015 2911+12 2713+08 2617+02 2628-12 2742-22 276337 277546 286754
 ZUN              2911+22 2811+13 9900-06 0806-16 990031 990042 352154
 4J3 9900 2005+17 1806+12 1907+06 1709-06 1506-17 070732 051242 021555

FDUS10 KWBC 101402
 DATA BASED ON 101200Z
VALID 111200Z   FOR USE 0600-1700Z. TEMPS NEG ABV 24000
FT   45000  53000
 ABI 081663 081071
 ABQ 341363 100972
 ABR 276962 282963
 AGC 293763 292664
 ALB 263759 283961
 ALS 260762 990072
 AMA 990063 990072
 ATL 352766 341766
 BAM 255962 262066
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BCE 271563 281170
BFF 274363 272268
BHM 342365 361868
BIH 252764 261368
BIL 265261 261862
BLH 251164 990071
BNA 332362 021766
BOI 264861 252162
BOS 256166 273160
BRO 040665 091471
BUF 285062 272861
CAE 271766 301166
CAR 265455 273856
CLE 295062 292064
CRP 091564 071871
CRW 283866 321865
CZI 265661 282665
DAL 061463 051071
DBQ 315262 303665
DEN 281963 251169
DIK 273958 292662
DLN 264760 262961
DRT 071664 081570
DSM 293662 303067
ECK 295061 312959
ELP 362263 081372
ELY 254063 261269
EMI 282667 281862
FAT 252764 271168
GPI 264254 251957
FMN 301163 120571
GCK 260963 281372
GEG 274454 262057
GFK 286258 303659
GGW 274557 282760
GJT 282163 280870
GLD 271563 261671
GRB 306160 313861
GTF 264557 251658
HOU 081664 061771
ICT 261163 291570
ILM 261766 260767
IMB 265060 272560
IND 325564 342464
INK 051663 080971
INL 285058 313758
JAN 362163 011570
JAX 030765 310869
JFK 243169 272662
JOT 315862 313365
LAS 250863 290671
LIT 022463 051569
LKV 264062 272262
LOU 333765 012464
LRD 061464 071871
MEM 012963 051767
MIA 361465 091271
MKC 281763 312569
MOB 311665 021269
MSP 297561 303162
MSY 331266 051170
OKC 990063 290671
ONL 284662 282767
OTH 264162 272361
PDX 274760 262158
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 PIE 061767 990069
 PIH 265762 261865
 PLB 285558 273959
 PRC 251463 990071
 PSB 283562 293162
 RAP 266461 262664
 RBL 254561 272165
 RDU 281068 291865
 RIC 272267 272266
 RKS 265062 261867
 RNO 255062 271767
 SAN 240964 090570
 SAT 082163 081770
 SBA 990064 990070
 SEA 274256 262057
 SFO 253463 281168
 SGF 341563 332068
 SHV 041563 031570
 SLC 265063 281769
 SSM 295758 303658
 STL 332864 332765
 TLH 311665 990069
 TRI 261468 341566
 TUS 271565 111173
 2XG 061365 290568

FDUS15 KWBC 101402
 DATA BASED ON 101200Z
VALID 111200Z   FOR USE 0600-1700Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      2211+19 1610+13 1913+07 0910-06 1011-17 050633 990043 360552
 ABQ              9900+16 2507+10 9900-05 0506-16 031032 351143 330955
 ABR 2130 2120+20 1917+13 1913+05 2524-08 2824-20 284136 275245 266154
 AGC 2629 2835+15 2737+10 2738+04 2828-08 2828-19 273634 264845 266056
 ALB 2619 2519+12 2524+08 2528+02 2736-09 2639-20 265135 266746 276759
 ALS                      2709+11 2507-05 2605-17 310533 311243 282355
 AMA      2328    2613+17 9900+08 9900-04 0710-17 062433 053744 060952
 ATL 9900 9900+15 2307+10 2405+05 9900-07 9900-19 150735 200745 251055
 BAM              2511+15 2325+10 2623-06 2617-18 251136 252146 244453
 BCE                      2812+09 2411-06 2514-18 222933 223842 233453
 BFF      2211    3212+17 3213+10 2718-07 2727-18 274633 275044 264654
 BHM 9900 1906+15 2311+11 2205+06 0809-06 9900-19 990035 990045 340754
 BIH      9900    9900+16 1608+09 9900-07 9900-19 261136 242741 252950
 BIL      3217    2915+12 2722+05 2637-11 2646-19 265835 266146 256255
 BLH 9900 2208+23 2007+16 1908+09 2507-07 2313-18 232231 232241 221952
 BNA 2312 2505+18 9900+11 1007+07 2906-08 2809-19 362134 032544 062356
 BOI      3411+19 2708+12 2522+04 2640-07 2639-20 264735 264846 255055
 BOS 2326 2329+12 2432+07 2535+02 2637-10 2639-20 265036 276545 275957
 BRO 1615 1715+18 1516+12 1414+06 1214-07 1312-17 200733 211443 231655
 BUF 3305 2713+13 2818+08 2622+03 2728-08 2829-21 272837 263447 265557
 CAE 2510 2609+15 2508+10 2607+05 9900-07 2208-18 221633 231744 251357
 CAR 2422 2426+10 2430+04 2529-02 2636-13 2646-26 256342 257050 268355
 CLE 2927 2829+15 2628+10 2636+05 2827-08 2934-20 283537 283945 275255
 CRP 1812 1410+18 1509+12 1608+06 1606-08 1010-18 151033 190845 150953
 CRW 2628 2719+17 2724+12 2831+06 2836-09 2736-19 293234 292645 242655
 CZI              2721+18 2725+09 2726-07 2633-19 273935 274746 265156
 DAL 2427 2509+19 9900+11 1906+06 0812-05 1111-18 990033 270743 310653
 DBQ 9900 3011+18 3119+13 3024+08 3029-07 2834-20 313935 327844 307956
 DEN              3114+19 3114+11 2718-05 2419-17 262032 263143 263456
 DIK      3220+19 2727+13 2637+06 2633-09 2632-20 264237 275147 275956
 DLN              2405+11 2522+04 2640-10 2650-19 265835 256146 256355
 DRT 1719 1621+17 1623+13 1716+07 1509-07 1212-18 071933 041843 031452
 DSM 1511 2919+20 3026+14 2923+08 2726-09 2823-18 282334 303345 293854
 ECK 0307 3309+13 2913+08 2819+05 2824-08 2929-21 283938 294147 294556
 ELP      2915    2307+16 9900+09 9900-06 1012-16 022532 023842 362753
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ELY              3009+17 9900+10 2312-07 2413-19 242035 243543 244151
EMI 2620 2825+15 2628+10 2735+03 2537-09 2540-19 273335 273244 273254
FAT 3205 9900+22 2308+15 2410+08 1608-07 3305-19 240935 242441 252950
GPI      2810+13 2712+05 2721+00 2623-14 2633-24 264740 255548 255952
FMN              3122+17 3110+10 2210-06 2106-16 240532 270843 282355
GCK      2417+26 2310+18 2309+09 2508-05 3208-17 030933 361644 011154
GEG      2615+12 2708+06 2613+00 2725-13 2833-23 274140 274748 265352
GFK 1935 2025+16 2322+11 2627+03 2523-10 2737-20 284736 293847 284759
GGW      3209+16 2917+10 2725+04 2532-12 2539-22 266237 267446 266454
GJT              9900+18 2709+10 2514-06 2520-18 252832 253643 254055
GLD      2217    2211+19 2508+12 2514-06 2316-17 271633 301944 302255
GRB 2508 2713+13 2918+08 3123+04 3033-08 3040-21 304737 315047 306956
GTF      3606    2718+06 2628+02 2632-13 2645-22 266937 257646 256754
HOU 2213 0505+17 0208+11 3505+05 9900-07 0807-17 111233 131944 111453
ICT 2234 2422+22 2409+14 1411+10 2707-06 9900-18 071233 051644 350953
ILM 2515 2510+15 2614+10 2713+05 2212-07 2315-17 242433 242244 241857
IMB              2715+08 2622+03 2732-09 2744-20 275136 274746 274756
IND 2736 2830+20 2833+13 2837+07 2938-09 3036-18 324034 323945 284155
INK      1816+20 9900+16 0206+08 0911-06 0818-17 020734 030543 010652
INL 1405 3507+10 3119+08 2932+03 2840-11 2942-22 304838 295849 307559
JAN 2008 1812+15 2009+10 1907+06 9900-07 0707-18 990034 291943 291654
JAX 1911 9900+15 2106+10 2108+05 2008-08 1706-18 990034 021044 351757
JFK 2730 2531+15 2434+08 2535+03 2633-08 2536-19 263834 254044 273455
JOT 2812 2813+17 3020+13 2926+08 3029-08 2937-19 304135 326845 315955
LAS      2111+26 2112+17 2010+09 2107-08 2414-19 232533 232541 231952
LIT 2111 1409+18 1013+11 9900+06 1208-05 9900-18 081134 071344 041053
LKV              2409+11 2516+05 2627-06 2728-20 273635 263946 264256
LOU 2731 2518+17 2617+13 2721+07 3127-07 2928-19 353735 342444 311655
LRD 1627 1624+18 1623+13 1619+06 1313-08 1013-18 160935 990044 040952
MEM 2010 1210+17 1017+11 1506+07 1206-06 3406-18 041334 051944 051654
MIA 1413 1008+18 9900+13 9900+07 1111-09 0908-19 361034 342144 011756
MKC 2526 2308+22 2005+16 2306+09 2510-08 2611-18 260933 361644 321753
MOB 9900 2105+15 2005+10 1907+05 9900-07 9900-18 280933 261443 261755
MSP 1506 2907+16 3309+13 3217+06 2830-11 2823-21 304435 297444 279857
MSY 2306 2206+15 2106+11 2105+06 9900-07 9900-17 990033 240743 281155
OKC 2328 2515+21 9900+13 3611+06 1506-05 0905-18 081234 071144 050852
ONL      2227+23 2433+16 2543+09 2550-08 2936-18 274733 274544 262856
OTH 0315 3613+11 3511+09 3213+05 2923-07 2824-20 273436 263846 264156
PDX 3415 3115+08 3116+07 3017+03 3030-10 3040-21 285136 275046 274757
PIE 1807 1605+16 1306+11 1405+06 9900-08 1208-18 090533 021243 022156
PIH      2510    2411+16 2521+08 2531-08 2638-19 263835 253745 253856
PLB 2709 2710+11 2719+06 2726+02 2734-11 2745-22 275438 276348 267659
PRC              9900+17 2107+09 2613-07 2217-17 203032 202842 212653
PSB      2833+13 2825+08 2725+02 2734-08 2632-19 263834 275045 276157
RAP      3307+23 3010+16 3018+09 2723-08 2831-20 274336 274945 275954
RBL 9900 9900+18 1906+12 2408+08 2620-06 2720-18 271935 281646 251357
RDU 2613 2608+16 2915+10 3112+07 2514-07 2520-18 251634 251244 340656
RIC 2521 2614+16 2709+09 2914+05 2528-08 2731-18 253034 272644 272856
RKS              2716    2816+10 2720-07 2521-18 264233 254745 265854
RNO      2706    2308+14 2217+09 2520-06 2712-18 310636 290646 243852
SAN 9900 2305+21 1910+15 1714+08 2111-07 2322-17 242532 222241 211652
SAT 1817 1616+18 1713+13 1712+06 1706-08 1111-17 120935 120944 081752
SBA 9900 3406+22 3605+16 0406+08 1008-08 2206-19 221433 231340 290850
SEA 0406 3308+05 3110+05 3015+01 2928-12 2939-23 305738 296746 286457
SFO 2710 2511+20 2313+15 2411+10 2513-06 2608-19 990036 261244 253650
SGF 2425 2311+19 2110+13 1214+09 2307-07 9900-17 010834 351045 321053
SHV 2408 3109+15 9900+12 3605+05 1014-05 0909-18 320533 291643 311253
SLC      1907    2409+17 2410+10 2715-08 2514-19 253234 244645 255153
SSM 2910 2917+09 2924+04 2929+01 2938-10 2845-22 284639 295149 295657
STL 2730 2608+20 2613+14 2717+08 2720-09 2918-17 332534 343345 331353
TLH 2307 2011+15 2010+11 1909+05 2105-07 9900-18 990033 300543 291556
TRI      2810+17 3208+11 9900+06 2815-07 3017-19 271734 271244 271556
TUS      2716+21 3315+15 3615+07 0306-05 9900-16 170631 200642 251453
2XG 1809 1705+16 9900+11 9900+07 1406-07 1407-18 080934 061044 031356
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FDUS13 KWBC 101402
 DATA BASED ON 101200Z
VALID 110000Z   FOR USE 2100-0600Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      1814+22 1810+13 0512+06 0812-05 0509-17 270733 270843 990053
 ABQ              9900+21 9900+12 0508-05 0408-16 030932 011342 032455
 ABR 1206 9900+18 3514+14 3317+07 3126-09 3038-21 286535 286346 296455
 AGC 2323 2533+14 2729+09 2935+04 3142-08 3134-19 272933 264244 275557
 ALB 2317 2419+12 2422+06 2523+02 2526-11 2646-20 256935 258146 267859
 ALS                      9900+14 9900-06 9900-17 011232 342442 352155
 AMA      1913    2012+18 2012+09 0408-04 3407-18 360934 350744 311351
 ATL 1606 9900+16 9900+11 9900+06 9900-06 2806-18 241834 242444 242955
 BAM              2617+20 2518+11 2528-06 2521-19 271835 252445 244653
 BCE                      2913+11 2011-06 2017-17 212732 232543 272154
 BFF      1409    1610+18 2110+10 2718-06 2734-17 274132 274044 283754
 BHM 9900 2105+15 9900+10 9900+07 0408-05 9900-18 250834 271844 272954
 BIH      9900    2607+19 3010+11 0105-06 9900-19 150934 191744 252650
 BIL      2314    2312+17 2414+09 2536-10 2542-20 273536 283746 265755
 BLH 2214 2214+25 2211+17 9900+10 2007-07 1913-17 172332 162842 171152
 BNA 2311 2508+18 3207+12 0211+06 3211-06 3214-19 281534 251944 212256
 BOI      3206+22 2712+15 2521+07 2540-08 2642-19 274636 285046 274856
 BOS 2421 2717+11 2621+08 2424+04 2530-10 2646-20 267335 276646 276257
 BRO 1519 1517+17 1517+13 1414+06 1206-07 2208-17 231332 262043 272455
 BUF 2220 2418+12 2625+06 2727+01 2833-10 2842-21 275536 267445 257258
 CAE 2015 9900+16 9900+11 2808+06 3107-06 2914-18 233033 233343 233556
 CAR 2315 2623+09 2630+04 2632-01 2641-14 2650-25 265742 267051 277557
 CLE 2626 2835+15 2827+10 2935+04 2934-07 2940-19 274536 265845 266356
 CRP 1519 1611+18 1508+13 1406+07 9900-07 2006-17 210934 180844 150853
 CRW 2221 2424+16 2823+11 2922+05 2927-08 3028-19 293132 262644 302455
 CZI              2705+17 2906+09 2925-07 2636-19 255534 256644 266553
 DAL 1812 2111+18 2809+12 9900+06 0609-05 0307-17 261733 251843 271053
 DBQ 3207 2811+16 2815+13 2930+09 3034-07 3039-19 293936 294246 315455
 DEN              1914+19 1611+11 3010-06 2816-16 262531 252742 252655
 DIK      1822+23 2124+14 2321+07 2725-09 2832-20 275136 266146 276955
 DLN              2815+17 2618+08 2437-09 2446-21 254637 254947 254954
 DRT 1520 1521+20 1622+13 1312+07 9900-06 9900-17 071033 071942 071752
 DSM 3409 2717+21 2823+16 2934+09 3032-08 2936-18 314035 314445 305056
 ECK 2307 2907+13 2708+08 2918+03 2938-09 2946-20 294536 274347 284857
 ELP      1005    9900+19 9900+10 0108-06 3108-16 990032 270943 360653
 ELY              9900+21 2806+12 2814-07 2518-18 223333 224543 233553
 EMI 2217 2220+14 2721+09 2822+04 2730-08 2632-19 253533 262944 253956
 FAT 3110 3207+23 2907+17 2608+09 9900-07 9900-19 181435 211442 252449
 GPI      2408+18 2411+10 2519+02 2333-12 2334-24 243939 245049 245053
 FMN              3609+23 3307+14 9900-06 2506-16 261432 321242 041855
 GCK      1516+26 1615+17 2008+10 3107-05 3112-17 341534 341744 301152
 GEG      2415+14 2413+06 2518+02 2521-13 2531-24 253640 264747 275452
 GFK 1805 9900+14 3217+12 3131+05 3134-10 3035-23 294538 295047 295956
 GGW      2708+25 2709+16 2715+08 2723-11 2533-22 263638 265148 265356
 GJT              3011+21 2810+12 2116-06 2419-16 242532 262543 283055
 GLD      1718    1718+19 1713+11 3207-06 3115-17 321933 332944 321853
 GRB 0705 3209+14 3113+08 3017+04 3032-08 3040-21 303838 304147 304957
 GTF      9900    3308+13 2911+05 2441-11 2347-22 234638 234948 244855
 HOU 1505 3606+17 3411+12 3510+07 3415-06 2306-17 180932 131243 141754
 ICT 1817 1915+21 1115+16 1112+10 3410-06 3113-18 320534 330544 311252
 ILM 2213 2512+16 2510+11 2607+05 2723-06 2527-17 232433 222643 213556
 IMB              2518+09 2623+03 2635-10 2746-19 275535 276046 286056
 IND 2334 2737+20 2733+13 2935+07 3128-07 3032-19 303636 283646 274156
 INK      1516+25 1515+16 0707+09 0610-05 0306-16 320732 320943 040653
 INL 3010 3111+11 3217+07 3123+03 3136-10 3144-22 304338 294449 295758
 JAN 9900 1905+16 9900+11 9900+06 9900-06 0406-17 282633 283343 283354
 JAX 9900 2205+16 2406+11 2310+06 2118-07 2011-17 990032 010742 010955
 JFK 2224 2422+12 2621+06 2420+05 2628-09 2637-19 243934 264145 254357
 JOT 3012 2722+18 2730+13 2835+08 2935-07 3037-19 284336 284547 294157
 LAS      2007+28 2209+19 2312+10 2606-07 1813-17 202132 192642 221253
 LIT 1908 1816+19 1806+11 0606+05 0708-04 0407-18 310935 301544 302353
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 LKV              2613+14 2613+06 2631-06 2735-18 273535 283646 283657
 LOU 2324 2730+19 2823+13 3211+07 3322-08 3322-19 282734 263644 264356
 LRD 1424 1422+18 1517+11 1315+08 1405-06 2305-17 231334 241643 990053
 MEM 2109 2207+18 9900+11 0508+05 9900-05 3608-18 300835 301145 312054
 MIA 1409 9900+16 1209+12 1307+07 1110-08 0912-18 050934 340944 320955
 MKC 2321 2620+23 2914+16 3013+10 3311-07 3012-18 321734 301645 322755
 MOB 2309 9900+16 2505+11 2606+06 9900-07 9900-17 281132 281442 281754
 MSP 0107 3408+15 3213+11 3121+06 3132-08 3036-21 304837 305647 306355
 MSY 2305 2406+15 2606+11 2706+06 1809-07 9900-17 290732 290942 260854
 OKC 1719 2115+21 3007+14 3008+08 0308-05 0206-18 310734 290944 341051
 ONL      9900+22 2809+17 2815+09 3027-08 2931-18 283534 293745 303854
 OTH 0115 3408+12 3010+08 2818+04 2836-06 2740-18 274435 274446 274756
 PDX 3013 3014+09 2815+06 2720+01 2832-09 2845-20 276236 276546 276755
 PIE 9900 9900+16 1906+11 2009+06 9900-08 1111-17 091732 081842 071855
 PIH      2714    2615+18 2422+10 2534-07 2537-20 264336 254945 246453
 PLB 2418 2423+11 2621+05 2520+00 2527-11 2634-25 266938 268647 269659
 PRC              2812+18 2813+09 2112-05 2013-16 171531 181442 220653
 PSB      2225+13 2524+08 2723+02 2728-09 2741-19 264934 255444 265857
 RAP      1612+24 1713+15 2010+07 2635-07 2746-17 265034 275645 275654
 RBL 1707 9900+20 2508+13 2515+08 2716-05 2914-18 301135 310846 281057
 RDU 2118 2410+15 2908+10 2810+07 2816-06 2719-18 243934 234643 244856
 RIC 2116 2315+14 2914+09 2908+07 2824-07 2627-19 254234 245943 245756
 RKS              2411    3011+10 2915-07 2539-17 244333 244343 254755
 RNO      2616    2517+17 2422+10 2523-06 2712-18 320736 290546 243553
 SAN 2307 2206+21 1806+15 1711+08 1714-07 2112-17 191032 191540 191251
 SAT 1518 1516+18 1707+12 1407+07 9900-06 2107-17 161034 121543 101552
 SBA 9900 3207+23 0209+16 0408+08 0908-08 0909-19 210533 211040 990050
 SEA 2205 2906+07 2912+05 2716+00 2725-13 2736-23 275438 276846 276853
 SFO 2911 2610+21 2514+15 2416+10 2512-06 2510-19 990036 250944 253850
 SGF 2219 2419+18 2205+14 0912+10 3605-07 3014-18 341034 351545 342254
 SHV 1606 1407+16 1305+13 9900+07 0614-04 0507-18 282333 272543 272353
 SLC      9900    3005+19 2908+11 2722-06 2626-18 244633 235743 254754
 SSM 2808 3018+11 2927+05 2927+01 2934-11 2945-24 305840 306548 307357
 STL 2427 2626+20 2816+14 3118+08 3118-07 2912-19 312235 312946 323856
 TLH 2211 2006+16 2109+11 2211+06 1907-06 9900-17 990032 320842 311754
 TRI      2210+17 9900+11 3111+07 2820-07 2820-18 292234 292044 280955
 TUS      3015+26 3114+18 3309+10 0405-06 0606-16 140731 140942 030853
 2XG 1607 1705+17 9900+12 9900+07 2205-06 1807-17 131134 121244 121456

FDUS11 KWBC 101402
 DATA BASED ON 101200Z
VALID 101800Z   FOR USE 1700-2100Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ABI      1908+21 1505+14 0607+06 0711-06 0908-17 990033 270543 300853
 ABQ              3206+17 3411+11 0313-06 0408-17 051533 031943 031454
 ABR 9900 0306+15 3519+13 3424+07 3128-08 2934-20 294336 305946 306256
 AGC 2013 2320+13 2625+08 2832+03 2639-09 2640-20 234334 253746 294758
 ALB 2213 2318+10 2524+04 2727+02 2741-11 2750-22 276438 287547 308558
 ALS                      0206+13 0609-06 9900-18 050934 361744 013254
 AMA      2310    2309+17 2312+08 0806-05 0705-18 990033 330944 310952
 ATL 9900 2905+15 2307+09 2610+06 2005-07 2410-18 990034 241244 271056
 BAM              2510+16 2426+08 2523-07 2521-20 243836 235045 235352
 BCE                      2807+11 2407-07 2113-17 212033 222544 273454
 BFF      1310    2107+17 2411+11 2619-07 2620-19 271734 292445 303454
 BHM 9900 9900+15 9900+11 2805+06 9900-06 9900-18 990034 231044 261155
 BIH      9900    2305+17 2605+10 2706-07 9900-19 212334 203443 242451
 BIL      2510    2916+16 2920+08 2623-09 2528-21 254436 255546 256554
 BLH 2010 1707+23 1610+16 2009+09 2005-08 1717-17 172332 172442 201653
 BNA 2108 2607+17 3310+10 3508+04 3012-06 3117-19 291435 230644 990056
 BOI      2605+19 2912+14 2415+07 2435-09 2441-21 254738 245247 246253
 BOS 2316 2418+10 2522+07 2629+03 2638-11 2554-23 266638 266649 275557
 BRO 1414 1517+16 1515+12 1615+06 1508-08 1510-17 230933 261744 261554
 BUF 2422 2417+11 2617+06 2722+01 2731-11 2649-21 266336 267247 277960
 CAE 2007 9900+15 2509+10 2513+05 2808-07 2510-18 212433 202843 213457
 CAR 2310 2717+08 2625+02 2628-03 2553-15 2660-26 276442 266652 256756
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CLE 2411 2409+13 2521+08 2634+02 2642-09 2540-19 254235 254645 285358
CRP 1611 1812+18 1810+12 1706+06 9900-08 1308-17 151133 131644 121253
CRW 2212 2720+15 2820+09 2919+03 2732-08 2732-20 232133 221644 261456
CZI              2608+16 9900+09 2508-08 2322-18 243834 244845 265554
DAL 2006 2608+19 2605+11 2405+05 0505-06 9900-17 261133 251642 281353
DBQ 2610 2412+15 2926+15 2835+09 2941-07 3043-20 304737 314347 304056
DEN              2205+20 2307+13 2911-07 2514-18 281033 301844 333054
DIK      2021+20 2216+15 2514+07 2825-10 2733-21 274736 286246 285956
DLN              2013+16 2320+10 2329-11 2434-22 244539 245748 247153
DRT 1618 1629+19 1617+13 1207+07 9900-07 9900-17 081633 072042 061453
DSM 2815 3017+22 2929+17 2832+09 2937-08 2932-19 303235 314046 314056
ECK 2013 2414+13 2619+07 2628+01 2737-10 2742-21 274436 255346 266859
ELP      9900    9900+17 0407+09 3210-07 9900-17 990032 130543 020953
ELY              2606+18 2607+10 2207-08 2311-18 223134 224244 243752
EMI 2211 2213+12 2523+08 2724+04 2635-08 2535-19 221934 292046 301756
FAT 9900 9900+22 2805+16 2507+09 9900-07 3505-19 201935 212343 242350
GPI      2605+17 2612+09 2422+04 2346-13 2340-24 224640 225451 235753
FMN              2906+18 3511+12 9900-06 9900-17 080533 340544 323055
GCK      2009+25 1909+17 1705+09 2908-05 3406-18 351034 341345 350952
GEG      2415+12 2215+08 2220+03 2326-13 2432-25 254140 254249 254653
GFK 9900 3409+12 3215+08 3223+04 3137-10 3041-22 303838 304547 295357
GGW      2411+22 2511+16 2710+08 2620-11 2528-23 263238 273747 265156
GJT              2606+19 2508+12 2414-06 2314-18 231833 252144 293755
GLD      1706    1708+18 1412+11 3510-07 2709-18 321534 321545 301353
GRB 0905 2805+12 2910+08 2915+02 3030-09 3044-21 305337 304947 294657
GTF      9900    2511+14 2520+07 2533-11 2335-23 234339 245249 246454
HOU 9900 3010+16 3212+11 3113+05 2807-07 9900-17 131232 131643 131754
ICT 2016 2115+22 1010+15 0816+09 3010-05 2914-19 360534 990044 321853
ILM 2215 2516+15 2618+10 2622+05 2518-07 2420-18 232533 222843 223157
IMB              2516+09 2423+03 2435-10 2642-21 264737 275147 275155
IND 2223 2529+17 2932+11 3126+05 3239-10 3232-19 283533 273544 284356
INK      1611+23 1212+15 1008+07 0407-07 0906-16 990032 990043 360754
INL 3112 3113+08 3218+06 3224+02 3132-11 3143-23 315638 315848 316058
JAN 9900 0706+17 0709+11 9900+05 9900-06 9900-17 261434 272743 282854
JAX 2007 2511+16 2309+10 2210+06 2116-07 2012-18 990033 040543 050855
JFK 2115 2424+12 2426+05 2723+04 2633-09 2645-20 264536 305547 315158
JOT 2318 2622+16 2638+13 2842+07 3044-08 3136-19 304037 303946 284957
LAS      2008+25 2415+17 2417+09 2007-07 1913-18 182633 202742 242553
LIT 1808 1714+18 1708+12 9900+04 0409-05 0105-18 230535 240944 281553
LKV              2413+11 2425+05 2532-07 2735-19 293936 294046 283757
LOU 2317 2524+17 2822+11 2922+05 2931-08 2936-20 273034 262444 292155
LRD 1416 1526+17 1624+12 1516+07 1407-07 1610-18 210734 990043 020553
MEM 1908 9900+18 9900+11 9900+04 0505-06 3409-19 990035 180844 210855
MIA 1309 1410+16 1406+12 9900+07 1312-08 1113-19 100634 990044 990056
MKC 2320 2624+22 3016+15 3112+09 2911-08 3207-19 331534 332245 302656
MOB 9900 2705+15 2706+10 2609+05 9900-07 2305-17 250932 271242 291755
MSP 0111 0108+14 3312+10 3118+05 3035-08 3042-20 304938 305447 305657
MSY 9900 2409+15 2307+10 2206+05 9900-07 2605-17 990032 990042 250654
OKC 1915 2313+19 2309+13 3105+06 3605-05 9900-18 990034 330644 311252
ONL      0116+22 3219+16 2820+09 2832-08 2832-19 303134 303245 303655
OTH 0211 3512+12 3112+09 2717+03 2837-07 2847-19 295135 295046 295157
PDX 3109 3114+09 2914+07 2716+01 2628-12 2641-22 285837 286746 286154
PIE 9900 1512+16 1509+11 1709+06 1908-07 9900-18 080834 061743 052155
PIH      2214    2519+17 2621+10 2416-09 2525-21 254636 246345 246451
PLB 2313 2522+10 2629+04 2629-01 2738-12 2745-25 274941 275450 286656
PRC              9900+16 2911+09 2009-07 1810-17 161732 181443 262053
PSB      2312+11 2721+07 2721+02 2641-09 2646-19 254436 273947 305758
RAP      1911+21 2310+15 2605+08 2625-07 2626-18 273235 284546 294854
RBL 1706 2008+19 2211+14 2317+07 2621-06 2821-18 321735 341746 272056
RDU 1705 2806+14 2716+09 2621+06 2718-08 2521-19 243334 224944 234856
RIC 1908 2208+13 2722+07 2721+05 2724-07 2525-19 242834 243445 232055
RKS              2711    2713+09 2427-07 2432-18 253334 264145 274454
RNO      2311    2314+16 2325+09 2523-06 2621-20 262136 243245 234651
SAN 9900 9900+21 9900+15 1512+08 1514-08 1713-18 182032 191341 211052
SAT 1711 1816+18 1814+12 1707+06 9900-08 1507-17 141633 122243 091752
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 SBA 9900 0206+22 0407+16 0608+08 0912-08 0509-19 160934 201140 230750
 SEA 9900 9900+07 3009+06 2712+01 2518-14 2526-24 263241 273848 274552
 SFO 3113 2609+22 2312+15 2220+09 2612-06 2714-19 251336 242044 243750
 SGF 2220 2326+17 2412+13 0507+08 3010-06 3017-18 330835 290645 261855
 SHV 1705 1305+16 1315+12 0705+06 0405-05 9900-18 261733 272442 282253
 SLC      9900    2608+16 2606+09 2612-08 2419-19 243634 244844 254452
 SSM 2906 3018+11 2826+05 2829+00 2831-12 2833-25 294141 295150 295755
 STL 2322 2529+20 2715+13 3119+08 3120-07 3317-19 321836 282045 243255
 TLH 2205 2414+15 2310+10 2212+06 2308-07 2106-18 990032 270543 291055
 TRI      2905+16 2809+09 2813+06 2617-07 2824-19 261936 270845 031355
 TUS      3207+23 3407+16 9900+09 9900-07 9900-18 091031 101042 290653
 2XG 2013 2009+16 2007+11 2005+07 9900-07 1907-17 161134 121444 091955

FDUS12 KWBC 101402
 DATA BASED ON 101200Z
VALID 101800Z   FOR USE 1700-2100Z. TEMPS NEG ABV 24000
FT  3000    6000   9000    12000   18000   24000  30000  34000  39000
 ACK 2320 2419+12 2424+10 2424+05 2531-10 2544-22 266238 256447 255358
 ACY 2116 2316+12 2719+06 2719+05 2630-08 2636-19 282634 312946 261557
 AST 3216 3213+08 2914+06 2717+01 2728-13 2740-23 296437 297346 296754
 AVP 2114 2220+11 2423+06 2624+03 2738-09 2647-20 264836 285547 307158
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```

Federal Aviation Administration

Memorandum

Date: August 21, 2017

To: (b) (6) Acting Group Manager, Safety and Technical Training, Litigation Support Group, AJI-17 (b) (6)

From: (b) (6) Manager, Quality Control Group, AJV-E1

Subject: **INFORMATION:** Certification Statement
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

I certify that air traffic aircraft accident package, ZME-ARTCC-0277, has been reviewed and is complete.

Federal Aviation Administration

Memorandum

Date: August 22, 2017

To: (b) (6) Director, Eastern Service Center

From: (b) (6) Memphis Air Route Traffic Control Center

Subject: **INFORMATION:** Certification Statement
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

I certify that air traffic aircraft accident package, ZME-ARTCC-0277, has been reviewed and is complete.

AIRCRAFT ACCIDENT PACKAGE
ZME-ARTCC-0277
YANKY72, C130
July 10, 2017, 2100 UTC
Destroy: January 10, 2020 UTC

SECTION 1.
Table of Contents

TABLE OF CONTENTS

SECTION 2.

FAA Form 8020-6, Report of Aircraft Accident, and

FAA Form(s) 8020-6-1, Report of Aircraft Accident (Continuation Sheet)

FAA Form 8020-6, Report of Aircraft Accident

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

REPORT OF AIRCRAFT ACCIDENT

REPORT DATE	REPORT NO.
August 22, 2017	ZME-ARTCC-0277

NAME OF REPORTING FACILITY: Memphis ARTCC (ZME)

1. AIRCRAFT IDENTIFICATION AND TYPE	2. DATE/TIME OF ACCIDENT (UTC)	3. LOCATION OF ACCIDENT (MANDATORY)
YANKY72, C130	July 10, 2017; 2100 UTC	Itta Bena, MS
		LATITUDE/LONGITUDE (OPTIONAL): Unknown

4. NATURE OF ACCIDENT: Aircraft crashed enroute.

5. TYPE OF FLIGHT: IFR Flight Plan

6. FLIGHT CREW

NAME	POSITION	ADDRESS (CITY AND STATE)	UNINJURED	INJURED	FATALITY	UNKNOWN
Unknown Unknown	Pilot	Unknown, Unknown			X	
Unknown Unknown	Co-Pilot	Unknown, Unknown			X	

7. PASSENGER DATA	NUMBER ABOARD AIRCRAFT	NUMBER UNINJURED	NUMBER INJURED	NUMBER FATALITIES
	14	0	0	14

8. AIRCRAFT DAMAGE: Destroyed

9. PROPERTY DAMAGE: Unknown

10. OPERATING STATUS OF NAVIGATIONAL AIDS/LIGHTS/COMMUNICATIONS: Normal

11. WEATHER DATA (USE UTC DATE/TIME)

REPORT JUST PRIOR TO ACCIDENT
GREENWOOD SPECI - 2053 UTC: automated, wind variable at three knots, visibility one zero statute miles, clear, temperature three three, dew point one nine, altimeter three zero zero zero

FIRST REPORT SUBSEQUENT TO ACCIDENT
GREENWOOD METAR - 2153 UTC: automated, wind two nine zero at four knots, visibility one zero statute miles, clear, temperature three three, dew point two one, altimeter three zero zero zero

12. ATO PERSONNEL INVOLVED

NAME	FACILITY	OPERATING POSITION	CHECK IF EYEWITNESS
(b) (6)	ZME ARTCC	R12 R	
	ZME ARTCC	R65-66 R	
	ZME ARTCC	R15-67 R	
	ZME ARTCC	R15-67 R	
	ZME ARTCC	D15-67 RA	
	ZME ARTCC	D15-67 RA	

*OPERATING INITIALS

(b) (6)

FAA Form 8020-6 (12-14) Supersedes Previous Edition — Electronic Version

ZME-ARTCC-0277
YANKY72

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE August 17, 2017	REPORT NO. ZME-ARTCC-0277
	NAME OF REPORTING FAC LITY Washington ARTCC (ZDC)	

14. CHRONOLOGICAL SUMMARY OF FLIGHT

July 10, 2017

ALL TIMES BELOW ARE COORDINATED UNIVERSAL TIME
UNLESS OTHERWISE SPECIFIED

1813 YANKY72 was handed off from Cherry Point Approach Control (NKT) to Washington ARTCC (ZDC), New Bern Sector (EWN).

1814 NKT called EWN and advised that YANKY72 was requesting direct to FLO VORTAC. EWN approved the request.

1815 YANKY72 made initial contact with EWN climbing to FL200.

1816 YANKY72 requested deviation for weather. EWN approved the request.

1817 ZDC Sampson Sector (SAM) accepted handoff on YANKY72. YANKY72 was instructed to contact SAM on 135.3.

1818 YANKY72 made initial contact with SAM.

1823 YANKY72 requested to level off at 14,000 feet for weather. SAM approved the request.

1825 YANKY72 requested climb to FL200. SAM approved the request.

1831 YANKY72 requested FL180 as the final. SAM approved the request.

1836 Jacksonville ARTCC (ZJX) accepted the handoff on YANKY72. YANKY72 was instructed to contact ZJX on 133.45.

No More Follows

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE July 13, 2017	REPORT NO. ZME-ARTCC-0277
	NAME OF REPORTING FACILITY Jacksonville ARTCC (ZJX)	

14. CHRONOLOGICAL SUMMARY OF FLIGHT

July 10, 2017

ALL TIMES BELOW ARE COORDINATED UNIVERSAL TIME
UNLESS OTHERWISE SPECIFIED

1836 YANKY72 made initial contact with Jacksonville Center (ZJX) Florence (R71) sector and reported level at FL180. R71 instructed YANKY72 to squawk 3025. YANKY72 acknowledged and complied.

1837 R71 asked YANKY72 if he wanted routing to keep him clear of the precipitation ahead of him. YANKY72 said that he did.

1838 R71 cleared YANKY72 direct Vance direct Colliers with the rest of his route unchanged.

1844 R71 provided YANKY72 with traffic information.

1845 Washington Center requested control for climb for NKS412 reference YANKY72. The Florence radar-associate (D71) controller approved it.

1901 R71 instructed YANKY72 to contact ZJX on 124.7 MHz. YANKY72 acknowledged.

1902 YANKY72 made initial contact with ZJX Columbia (R72) sector and reported level FL180. R72 acknowledged.

1905 R72 provided YANKY72 with traffic information.

1907 YANKY72 advised that he had traffic in sight.

1909 R72 provided YANKY72 with precipitation information. YANKY72 acknowledged.

1915 R72 instructed YANKY72 to contact Atlanta Center on 128.1 MHz. YANKY72 acknowledged.

No More Follows

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE July 14, 2017	REPORT NO. ZME-ARTCC-0277
	NAME OF REPORTING FACILITY Atlanta ARTCC (ZTL)	

14. CHRONOLOGICAL SUMMARY OF FLIGHT

July 10, 2017

ALL TIMES BELOW ARE COORDINATED UNIVERSAL TIME
UNLESS OTHERWISE SPECIFIED

1915 YANKY72 checked on the ZTL Sinca Sector (R19) at FL180. R19 acknowledged.

1918 R19 instructed YANKY72 to change his transponder code. YANKY72 acknowledged.

1921 R19 switched YANKY72 to the ZTL East Departure Sector (R16). YANKY72 acknowledged. YANKY72 checked on the R16 frequency at FL180. R16 acknowledged.

1933 R16 issued traffic to YANKY72. YANKY72 acknowledged.

1934 YANKY72 reported the traffic in sight to R16. R16 acknowledged and issued additional traffic. YANKY72 acknowledged.

1935 YANKY72 reported the traffic in sight to R16. R16 acknowledged and issued additional traffic. YANKY72 acknowledged.

1936 YANKY72 reported the traffic in sight to R16. R16 acknowledged.

1941 R16 switched YANKY72 to the ZTL West Departure Sector (R04). YANKY72 acknowledged. YANKY72 checked on the R04 frequency at FL180. R04 acknowledged.

2005 R04 switched YANKY72 to the ZTL Maxwell Sector (R14). YANKY72 acknowledged. YANKY72 checked on the R14 frequency at FL180. R14 acknowledged.

2016 R14 switched YANKY72 to Columbus Approach. YANKY72 acknowledged.

No More Follows

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE August 14, 2017	REPORT NO ZME-ARTCC-0277
	NAME OF REPORTING FACILITY Memphis ARTCC (ZME)	

14. CHRONOLOGICAL SUMMARY OF FLIGHT

July 10, 2017

ALL TIMES BELOW ARE COORDINATED UNIVERSAL TIME
UNLESS OTHERWISE SPECIFIED

2033 YANKY72 checks on frequency with Memphis ARTCC (ZME) Columbus Low and Hamiliton Low Altitude Radar Control Position (R12/13) at 18,000 feet requesting 20,000 feet. R12/13 asks if that is YANKY72 requesting 22,000 feet.

2034 YANKY72 responds affirmative. R12/13 responds roger, stand by. R12/13 calls Columbus Approch (CBM) requesting control of YANKY72. CBM releases YANKY72. R12/13 climbs YANKY72 to 22,000 feet. YANKY72 acknowledges.

2039 R12/13 calls traffic to YANKY72. YANKY72 acknowledges.

2040 YANKY72 requests 20,000 feet, R12/13 clears YANKY72 to 20,000 feet. YANKY72 acknowledges. R12/13 calls Kewanee Low and Jackson Low Altitude Radar Control Position (R65/66) to advise YANKY72 is stopping at 20,000 feet. R65/66 acknowledges. R12/13 switches YANKY72 to freqency 132.5. YANKY72 acknowledges.

2041 YANKY72 checks on R65/66 frquency at 20,000 feet. R65/66 acknowledges.

2046 R65/66 switches YANKY72 to frequency 135.87. YANKY72 acknowledges. YANKY72 checks on Helena Low and Greenville Low Altitude Radar Control Position (R15/67).

2047 R15/67 acknowledges.

2050 R15/67 calls YANKY72 three times. No acknowledgement.

2051 R15/67 calls YANKY72 on Guard Frequency. No acknowledgement. R15/67 calls YANKY72. No acknowledgement.

2053 R15/67 calls YANKY72. No acknowledgement.

2055 R15/67 calls YANKY72. No acknowledgement. Helena/Greenville Low Altitude Radar Associate Control Position (D15/67) calls Greenville Tower and asks if they establish communications with YANKY72 to advise. Greenville Tower acknowledges.

2056 R15/67 calls YANKY72. R15/67 asks BTQ485 if he sees smoke, BTQ485 acknowledges. R15/67 asks BTQ485 to deviate over towards the smoke. BTQ485 acknowledges. D15/67 calls Greenwood Tower asks if they establish communications with YANKY72 to advise. Greenwood Tower acknowledges.

2059 R15/67 asks BTQ485 if he sees anything at his 12 o'clock and 5 miles.

2100 BTQ485 says he sees a blackish smoke cloud in the center of a agricultural field.

2101 BTQ485 says there ia an aircraft circling the smoke. R15/67 says we are looking for a C130.

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE August 14, 2017	REPORT NO ZME-ARTCC-0277
	NAME OF REPORTING FACILITY Memphis ARTCC (ZME)	

14. CHRONOLOGICAL SUMMARY OF FLIGHT

2102 BTQ485 says aircraft circling is definitely not large enough to be a C130. R15/67 asks BTQ485 if he can make out what is burning. BTQ485 says it does not look like the field is burning, it looks like something hit there or was placed there then set on fire.

2103 BTQ485 asks R15/67 if wants him to make another pass. R15/67 says yes if you have enough time. BTQ485 acknowledges.

2107 BTQ485 says black smoke looks like fuel or rubber, 40 yards long and several cars are on the side of the road.

2113 D15/67 calls Fort Worth ARTCC and coordinates status of YANKY72. Fort Worth ARTCC acknowledges.

2114 R15/67 vectors ALLEY55 to assist with event. ALLEY55 acknowledges.

2115 R15/67 descends ALLEY55 to 5,000 feet. ALLEY 55 acknowledges. ALLEY55 sees black smoke. R15/67 clears ALLEY55 to deviate towards that smoke. ALLEY55 acknowledges.

2116 R15/67 asks ALLEY55 to verify what is causing the smoke.

2121 R15/67 switches ALLEY55 to R65/66.

2122 ALLEY55 checks on R65/66. R65/66 acknowledges.

2125 ALLEY55 says he sees smoke and something burning but cannot make out what it is.

2131 R15/67 records a relief briefing and says R15/67 lost radar and communication with YANKY72.

2136 PRIDE44 checks on R65/66 and says there is a lot of smoke south of Highway 82, but can't identify if it is an aircraft.

2137 R65/66 calls Greenwood Tower asking if they have communications with cropdusters to the west. R65/66 advises that a C130 may have crashed. Greenwood Tower advises an ag aircraft may have crashed.

2138 R65/66 asks Greenwood Tower to confirm it was an agriculture plane. Greenwood Tower replies i'll call you back.

2141 Greenwood Tower calls R65/66 and advises an ag pilot thinks it was a C130 that went down.

No More Follows

SECTION 3.
Review of Services Memo(s)

Federal Aviation Administration

Memorandum

Date: July 17, 2017

To: Memphis Air Route Traffic Control Center

(b) (6)

From: (b) (6) Manager, Washington Air Route Traffic Control Center

Subject: **INFORMATION:** Review of Services Memo
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

ZDC ARTCC conducted a review of services concerning YANKY72 and was determined to have routine services. As a supporting facility with routine services I certify the following data has been retained in accordance with FAA Order 8020.16. Additionally, I certify that the following originals/digital copies are on file in this office.

FAA Form 7230-4
FAA Form 7230-10
FAA Form 8020-6-1
Personnel Log(s)
Certified Original Copy(ies) of Voice Recording(s)
Certified Working Copy(ies) of Voice Recording(s)
Facility Layout Chart(s)
National Track Analysis Report
SAR and Adaptation Files
Weather Products

Federal Aviation Administration

Memorandum

Date: July 14, 2017

To: Memphis Air Route Traffic Control Center

From: (b) (6), Manager, Jacksonville Air Route Traffic Control Center

Subject: **INFORMATION:** Review of Services Memo
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

ZJX ARTCC conducted a review of services concerning YANKY72 and was determined to have routine services. As a supporting facility with routine services I certify the following data has been retained in accordance with FAA Order 8020.16. Additionally, I certify that the following originals/digital copies are on file in this office.

FAA Form 8020-6-1
Certified Original Copy(ies) of Voice Recording(s)
Certified Working Copy(ies) of Voice Recording(s)
Email accident notification
ERAM SAR files

Federal Aviation Administration

Memorandum

Date: July 14, 2017

To: Memphis Air Route Traffic Control Center

From: (b) (6) tlanta Air Route Traffic Control Center

Subject: **INFORMATION:** Review of Services Memo
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

ZTL ARTCC conducted a review of services concerning YANKY72 and was determined to have routine services. As a supporting facility with routine services I certify the following data has been retained in accordance with FAA Order 8020.16. Additionally, I certify that the following originals/digital copies are on file in this office.

FAA Form 7230-4
FAA Form 7230-10
FAA Form 8020-6-1
Personnel Log(s)
Certified Original Copy(ies) of Voice Recording(s)
Certified Working Copy(ies) of Voice Recording(s)
Facility Layout Chart(s)
National Track Analysis Report
Surveillance Track History Report
Input Output Log Report
Weather Products

Federal Aviation Administration

Memorandum

Date: August 14, 2017

To: Memphis Accident File ZME-ARTCC-0277

From: (b) (6) Manager, Memphis Air Route Traffic Control Center

Subject: **INFORMATION:** Review of Services Memo
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

ZME ARTCC conducted a review of services concerning YANKY72 and was determined to have pertinent services. As the holding facility with pertinent services I certify the following data has been retained in accordance with FAA Order 8020.16. Additionally, I certify that the following originals/digital copies are on file in this office.

FAA Form 7230-4
FAA Form 7230-10
FAA Form 8020-6
FAA Form 8020-6-1
FAA Form 8020-9
FAA Form 8020-3
Personnel Log(s)
Certified Original Copy(ies) of Voice Recording(s)
Certified Working Copy(ies) of Voice Recording(s)
Facility Layout Chart(s)
Transcription(s) of Voice Recording(s)
National Track Analysis Report
Surveillance Track History Report
Input Output Log Report
Command Syntax Report
Mandatory Occurrence Report
ERAM Map Adaptation
Weather Products
ERAM SATORI Maps
SAR DATA
SATORI

ZME-ARTCC-0277
YANKY72

***

SECTION 4.

FAA Form(s) 7230-4, Daily Record of Facility Operation

DAILY RECORD OF FACILITY OPERATION

PAGE NO: Page 1 of 1

DATE: Jul 10, 2017

CHECKED: (b) (6)

AIR TRAFFIC MANAGER: Sarah M. Mcvay

LOCATION	IDENTIFICATION	TYPE FACILITY	OPERATING POSITION
Memphis, TN	ZME	ARTCC	ZME Watch Desk

	UTC TIME	REMARKS
	0500	(b) (6) and (b) (6) on. WCLC, CFPL: NONE -- CK
	0630	NAS Certified. -- CK
	0727	Stuck flight plan report received and vetted. -- CK
	1035	(b) (6) on. WCLC -- DE
	1225	WX/TFC/EQUIP Briefing Complete. -- DE
	1404	Stuck flight plan report received and vetted. -- DE
	1845	(b) (6) on. WCLC. -- AA
	2011	WX/TFC/EQUIP Briefing Complete. -- AA
	2200	ZDC declared ATC ZERO due to environmental hazard. -- RP
	2211	Stuck flight plan report received and vetted. -- AA
M	2307	ZME-M-2017/07/10-0001 -- AAL212R -- PU
	0157	ZDC ATC Limited. -- RP
M	0204	ZME-M-2017/07/10-0003 -- YANKY72 -- AA
M	0224	ZME-M-2017/07/10-0004 -- SNAP89 -- RP
	0239	Digital Audio Legal Recorder (DALR) Checks Complete. -- AA
	0300	(b) (6) nd (b) (6) on. WCLC. -- BM
M	0404	ZME-M-2017/07/10-0005 -- FDX1316 -- BM
M	0437	ZME-M-2017/07/10-0006 -- ENY3340 -- WC
	0459	COB -- BM

CLS

I CERTIFY that entries above are correct, that all scheduled operations have been accomplished except as noted, and that all abnormal occurrences and conditions have been recorded.

(b) (6)

FAA Form 7230-4

Air Traffic Mandatory Occurrence Report

ZME-M-2017/07/10-0003

1. Reporting FAC ID	2. Date UTC (dd/mm/yyyy)	3. Time UTC	4. Significant Occurrence?
Z M E	1 0 0 7 2 0 1 7	2 1 0 0	● Yes O No

5. MOR reported by (select one):

O Controller providing services
O CIC
O External Facility Referral
O FLM
O Aircraft Owner/Operator
O Hotline (Describe in summary)
O Internal Facility Review
O Electronically Detected
O Other (Describe in summary)

Brasher warning given? O Yes O No Training in progress? ● Yes O No

EMERGENCY MORs

H1. MOR type ï¿½ in-flight emergency conditions involving (select one):

O Medical emergency
O Inflight equipment malfunction
O Pilot Disorientation
O VFR in/on top IFR conditions
O Fuel quantity
O Bird strike
● Other (descr be in summary)

H1a. Aircraft information:

Aircraft ID	Aircraft type/suffix	IFR/VFR:	Facility communicating with A/C	Position communicating with A/C	Frequency
YANKY72	C130/l	O IFR O VFR	ZME	R15	135.87

H1b. Malfunctioning equipment component:

Only complete for mechanical MORs

H1c. Passenger or crew condition:

Only complete for medical MORs

H1d. Medical assistance aboard:

O Yes
O No
O Unknown

H2. MOR type ï¿½ in-flight security conditions involving (select one):

O Laser light illumination
O Hijack
O Bomb threat

H2b. Nearest major city:

Only complete for laser light illuminations

H2c. Altitude:

H2d. Route information:

Departed	Destination	Diverted to
KNKT	KNJK	

H2e. Location (lat/long or fix/radial distance);

H2f. Time DEN notified (UTC):

Air Traffic Mandatory Occurrence Report

ZME-M-2017/07/10-0003

SUMMARY

J1. Summary ï¿½ provide a brief summary for all MORs in this section that will provide enough information for QA to understand what occurred. Include information about items that require additional information in the specific MOR you are reporting.

AT 2050:13 R15 lost radio and radar contact with YANKY72 KNKT..KNJK. After attempting to contact the aircraft several times the FLM reported the event to the OMIC. OMIC issues ALNOT and aircraft start reporting smoke in the vicinity of the last radar position of YANKY72. Leflore county sheriff (b) contacted and confirms downed aircraft in that area. All information passed to ATM, ROC, DEN, RCC. NATCA. All other details of this event covered in SRT and dash 9.

Air Traffic Mandatory Occurrence Report

ZME-M-2017/07/10-0003

SEPARATION		
Was this a loss of separation?		
O Yes O No	Applicable Separation Rule: _____	

Separation Used:

O Course Divergence O MARSA O Mode C Interlace O Opposite Course (Report Passing) O Other Facility

O Procedure/Waiver O Report/Observe Leaving Altitude O Terminal Transition O Tower Visual Separation

O VFR Aircraft O Visual Approach O Visual Separation O Other

RISK ANALYSIS		
Was this a Risk Analysis Event?		
O Yes O No	RAE Score: _____	

PILOT DEVIATION		
Was this a possible pilot deviation?		
O Yes ● No	Preliminary Number: _____	

SURFACE EVENT		
Was this a possible Surface Event?		
O Yes O No	Classification: _____	

VEHICLE/PEDESTRIAN DEVIATION		
Was this a possible Vehicle/Pedestrian Deviation?		
O Yes O No	Preliminary Number: _____	

NMAC		
Was this a NMAC?		
O Yes O No	NMAC Number: _____	

Air Traffic Mandatory Occurrence Report

ZME-M-2017/07/10-0003

QA SUMMARY

QA REVIEWED. NORMAL ATC SERVICE PROVIDED.

SECTION 5.

Personnel Log(s)

PERSONNEL LOG	REGION	FACILITY	AREA ID	DATE
	ASO	ZME	AREA 6	MONTH: JUL DAY: 10 YEAR: 2017

NAME	CODE	T ME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6)	R	06:00	14:00	08+00			00+33	04+21	
	R	06:00	14:00	08+00			00+41	04+47	
	R	06:00	14:00	08+00			01+05	05+30	
	R	06:00	14:00	08+00			00+52	03+55	
	R	06:30	14:30	08+00			01+42	04+39	
	R	06:30	14:30	08+00			01+36	04+01	
	R	06:30	14:30	16+00			01+07	04+55	
	54	22:30	06:30						
	R	06:30	14:30	08+00			01+43	05+12	
	R	06:47	14:47	08+00			00+59	04+04	
	R	06:51	14:51	08+00			01+16	05+14	
	R	07:00	15:00	08+00			08+00	00+00	
	R	07:00	15:00	08+00			08+00	00+00	
	R	08:50	18:50	10+00			01+20	06+20	
	9	13:15	13:45	08+30			02+08	06+20	
	R	13:45	21:45						
	R	13:20	21:20	08+00			00+49	05+37	
	R	13:20	21:20	08+00			00+50	04+34	
	R	13:23	21:23	08+00			01+04	03+46	
	R	13:30	21:30	08+00			01+06	04+28	

SUPERVISORY CERT FICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERT FY THAT THE ABOVE ENTRIES ARE CORRECT
(Signatures and times in charge are noted on FAA Form 7230-4, Daily Record of Facility Operation)

Form 7230-4 (Dec 08) **Official Version** **FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552**

ZME-ARTCC-0277
YANKY72

PERSONNEL LOG		REGION		FACILITY		AREA ID			DATE
		ASO		ZME		AREA 6			MONTH: JUL DAY: 10 YEAR: 2017

NAME	CODE	TIME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6) [redacted]	R	14:05	22:05	08+00			00+49	04+10	
[redacted]	R	14:20	22:20	08+00			00+30	04+27	
[redacted]	R	14:20	22:20	08+00			00+41	05+20	
[redacted]	R	14:20	22:20	08+00			01+37	04+25	
[redacted]	R	14:20	22:20	08+00			01+26	05+52	
[redacted]	R	22:05	06:05	08+00			00+08	04+05	
[redacted]	R	22:05	06:05	08+00			00+09	07+51	
[redacted]	R	22:05	06:05	08+00			00+08	03+49	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	
[redacted]					08+00	Leave	00+00	00+00	

SUPERVISORY CERTIFICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERTIFY THAT THE ABOVE ENTRIES ARE CORRECT
(Signatures and times in charge are noted on FAA Form 7230-4, Daily Record of Facility Operation)

PERSONNEL LOG

REGION	FACILITY	AREA ID	DATE
ASO	ZME	AREA 6	MONTH: JUL | DAY: 10 | YEAR: 2017

NAME	CODE	T ME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6)					08+00	Leave	00+00	00+00	
	78	12:10	20:10	08+00			00+35	04+56	
	57	13:30	20:00	06+30			00+32	03+40	

SUPERVISORY CERT FICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERT FY THAT THE ABOVE ENTRIES ARE CORRECT
(Signatures and times in charge are noted on FAA Form 7230-4, Daily Record of Facility Operation)

Form 7230-4 (Dec 08) **Official Version** **FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552**

ZME-ARTCC-0277
YANKY72

PERSONNEL LOG	REGION	FACILITY	AREA ID	DATE
	ASO	ZME	AREA 4	MONTH: JUL DAY: 10 YEAR: 2017

NAME	CODE	T ME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6)	R	06:00	14:00	08+00			00+37	04+26	
	R	06:00	14:00	08+00			00+46	03+43	
	R	06:00	14:00	08+00			00+27	04+39	
	R	06:00	14:00	08+00			01+23	04+38	
	R	06:00	14:00	08+30			00+25	06+46	
	9	14:00	14:30						
	R	06:30	14:30	08+00			00+32	04+50	
	R	06:30	14:30	08+00			01+55	03+37	
	R	06:30	14:30	08+00			00+35	04+35	
	R	06:30	14:30	08+00			01+56	03+51	
	R	06:30	14:30	08+00			00+00	06+26	
	R	06:32	14:32	08+00			02+00	05+26	
	R	06:53	14:53	08+00			02+15	05+17	
	R	06:57	14:57	08+00			01+08	04+27	
	R	07:00	15:00	08+00			08+00	00+00	
	R	11:30	19:30	08+00			00+32	04+21	
	9	12:20	14:20	08+30	01+30	Leave	04+56	03+14	
	R	14:20	20:50						
	9	12:20	14:20	10+00			04+41	03+45	
	R	14:20	22:20						
	R	13:20	21:20	08+00			02+17	03+47	

SUPERVISORY CERT FICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERT FY THAT THE ABOVE ENTRIES ARE CORRECT
(Signatures and times in charge are noted on FAA Form 7230-4, Daily Record of Facility Operation)

PERSONNEL LOG	REGION	FACILITY	AREA ID	DATE
	ASO	ZME	AREA 4	MONTH: JUL DAY: 10 YEAR: 2017

NAME	CODE	T ME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6)	R	13:20	21:20	08+00			05+00	02+34	
	R	13:20	20:50	07+30	00+30	Leave	03+47	02+16	
	R	13:20	21:20	08+00			01+38	05+01	
	R	13:20	21:20	08+00			00+39	04+42	
	R	13:45	21:45	08+00			00+59	02+26	
	R	14:20	22:20	08+00			00+39	04+45	
	R	14:20	22:20	08+00			04+42	02+24	
	R	14:20	22:20	08+00			00+48	04+42	
	R	14:35	21:30	06+55	01+05	Leave	00+35	03+45	
	R	22:05	06:05	08+00			00+13	04+40	
	R	22:05	06:05	08+00			00+16	05+26	
	R	22:05	06:05	08+00			00+07	05+42	
					08+00	Leave	00+00	00+00	
					08+00	Leave	00+00	00+00	
					08+00	Leave	00+00	00+00	
					08+00	Leave	00+00	00+00	
					08+00	Leave	00+00	00+00	
	50	14:20	22:20	08+00			00+47	03+58	

SUPERVISORY CERT FICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERT FY THAT THE ABOVE ENTRIES ARE CORRECT
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Form 7230-4 (Dec 08) **Official Version** **FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552**

PERSONNEL LOG

REGION	FACILITY	AREA ID	DATE
ASO	ZME	AREA 4	MONTH: JUL DAY: 10 YEAR: 2017

NAME	CODE	T ME ON	TIME OFF	HOURS ON DUTY	HOURS ON LEAVE	LEAVE TYPE	HOURS NON POSITION DUTIES ASGNDE	HOURS POSITION DUTIES ASGNDE	REMARKS FOR: ALL ABSENCES FROM FACILITY, TRNG, TDY AND NON POSITIONAL DUTIES
(b) (6)									

SUPERVISORY CERT FICATE	NAME	CODE	TIME ON	TIME OFF	INTLS	NAME	CODE	TIME ON	TIME OFF	INTLS

THE SIGNATURES ABOVE CERT FY THAT THE ABOVE ENTRIES ARE CORRECT
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ZME-ARTCC-0277
YANKY72

SECTION 6.

FAA Form(s) 7230-10, Position Log, or automated equivalent

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R12	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1201		R14	R
1202	(b) (6)	1330	C		
1331		1512	C		
1513		1553	C		
1554		1727	C		
1728		1829	C		
1830		1919	C		
1920		2114	C		
2115		2158	C		
2159		2306	C		
2307		0007	C		
0008		0045	C		
0046		0113	C		
0114		0157	C		

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
R - Trainee/Developmental Certification/ Evaluation
T - Trainee/Developmental

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R12	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0158	(b) (6)	0309	C		
0310		0459	C		

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FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R65	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500	(b) (6)	0808	C		
0809		0900	C		
0901		1059	C		
1100		1200	C		
1201		1232	C		
1233		1327	C		
1328		1447	C		
1448		1548	C		
1549		1631	C		
1632		1717	C		
1718		1749	C		
1750		1819	C		
1820		1919	C		
1920		2019	C		

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FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R65	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
2020	(b) (6)	2122	C		
2123		2222	C		
2223		2241	C		
2242		2336	C		
2337		0025	C		
0026		0128	C		
0129		0144	C		
0145		0304	C		
0305		0459	C		

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FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R15	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1216		R65	R
1217	(b) (6)	1424	T		
1217		1424	C		
1425		1458	C		
1459		1703	T		
1459		1703	C		
1704		1747	C		
1748		1851	T		
1748		1851	C		
1852		1919	C		
1920		1951	C		
1920		1951	T		
1952		2025	C		
2026		2133	C		

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FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R15	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
2026	(b) (6)	2133	T		
2134		2229	C		
2230		2243	C		
2244		0459		R65	R

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FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D15	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1830		R15	R
1831	(b) (6)	1851	C		
1831		1851	T		
1852		1919		R15	R
1920		1938	C		
1920		1938	T		
1939		2010		R15	R
2011		2134	C		
2011		2134	T		
2135		0136		R15	R
0137		0209		D65	RA
0210		0459		R15	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	6OSIC	O	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1059		Closed	
1100	(b) (6)	1153	S		
1154		1300	C		
1301		1424	S		
1425		1454	C		
1455		1721	S		
1722		1759	C		
1800		1844	S		
1845		1948	S		
1950		2041	C		
2042		2045	C		
2046		0121	S		
0122		0204	C		
0205		0244	S		

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	6OSIC	O	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0245		0459		Closed	

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	A13	A	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1150		D13	RA
1151	(b) (6)	1310	C		
1311		1345		D13	RA
1346		1439	C		
1440		1526		D13	RA
1527		1645	C		
1646		1649		A31	A
1650		1721	C		
1722		1758		D13	RA
1759		1907	C		
1908		0459		D13	RA

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FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	A31	A	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		D31	RA

CODE:

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FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	A32	A	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		2340		D32	RA
2341	(b) (6)	0259	C		
0300		0459		A31	A

CODE:

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FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D12	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R12	R

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FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D13	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R13	R

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FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D14	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1802		R14	R
1803	(b) (6)	1813	C		
1814		1920		R14	R
1921		1922	T		
1921		1922	C		
1923		2044	T		
1923		2044	C		
2045		2125		R14	R
2126		2234	T		
2126		2234	C		
2235		0459		R14	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D30	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1259		R30	R
1300		1308		D31	RA
1309		0103		R30	R
0104		0123		D31	RA
0124		0459		R30	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D31	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1259		R31	R
1300	(b) (6)	1308	C		
1309	[redacted]	2253		R31	R
2254	[redacted]	2311	C		
2312	[redacted]	2312		Closed	
2313	[redacted]	0103		R31	R
0104	[redacted]	0123	C		
0124		0459		R31	R

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FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D32	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1527		R32	R
1528	(b) (6)	1550	C		
1551		1804		R32	R
1805		1819	C		
1820		2000	C		
2001		2032		R32	R
2033		2126	C		
2127		2201		R32	R
2202		0002	C		
0003		0048		R32	R
0049		0149	C		
0150		0459		R32	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D42	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1802		R42	R
1803		1814		D14	RA
1815		1920		R42	R
1921		2044		D14	RA
2045		2125		R42	R
2126		2234		D14	RA
2235		0459		R42	R

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
R - Trainee/Developmental Certification/ Evaluation
T - Trainee/Developmental

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H12	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R12	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H13	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R13	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H14	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R14	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H30	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R30	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H31	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R31	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H32	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R32	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H42	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R42	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R13	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1125		R14	R
1126		1720		R12	R
1721	(b) (6)	1829	C		
1830		1855	C		
1856		1906	C		
1907		0459		R12	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R14	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500	(b) (6)	0559	C		
0600		1059	C		
1100		1129	C		
1130		1131	C		
1132		1154	T		
1132		1154	C		
1155		1256	R		
1155		1256	C		
1257		1257		6OSIC	O
1258		1308	C		
1309		1350	C		
1351		1547	C		
1548		1628	C		
1629		1807	C		

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R14	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
1808	(b) (6)	1907	C		
1908		1931	C		
1932		2005	C		
2006		2045	C		
2046		2204	C		
2205		2259	C		
2300		2342	C		
2343		0026	C		
0027		0040	C		
0041		0459		R12	R

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R30	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1345		R31	R
1346	(b) (6)	1353	C		
1354		1410	C		
1411		1525	C		
1526		1633	C		
1634		1749	C		
1750		1834	C		
1835		1854	C		
1855		2013	C		
2014		2120	C		
2121		2211	C		
2212		2304	C		
2305		2350	C		
2351		0006	C		

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R30	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0007		0459		R31	R

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R31	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500	(b) (6)	0841	C		
0842		0845	C		
0846		1059	C		
1100		1207	C		
1208		1234	C		
1235		1349	C		
1350		1446	C		
1447		1622	C		
1623		1713	C		
1714		1823	C		
1824		1919	C		
1920		1946	C		
1947		2123	C		
2124		2230	C		

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R31	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
2231	(b) (6)	2340	C		
2341		0019	C		
0020		0043	C		
0044		0126	C		
0127		0234	C		
0235		0304	C		
0305		0459	C		

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R32	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1104		R31	R
1105	(b) (6)	1131	C		
1132		1335	C		
1336		1435	C		
1436		1551	C		
1552		1647	C		
1648		1819	C		
1820		1938	C		
1939		2025	C		
2026		2126	C		
2127		2231	C		
2232		2343	C		
2344		0033	C		
0034		0126	C		

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R32	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0127	(b) (6)	0149	C		
0150		0236	C		
0237		0459		R31	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R42	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0040		R14	R
0041		0459		R12	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	4OSIC	O	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1059		A15	A
1100	(b) (6)	1201	S		
1202		1227	C		
1228		1444	S		
1445		1513	C		
1514		1709	S		
1710		1752			
1753		1753		CLOSED	
1754		1859	S		
1900		1924	S		
1925		1959	S		
2000		2053	C		
2054		2244	S		
2245		0459		Closed	

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	A15	A	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1129		D46	RA
1130	(b) (6)	1334	C		
1335		1400		D46	RA
1401		1547	C		
1548		1627		D46	RA
1628		1901	C		
1902		0459		D46	RA

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	A43	A	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		A15	A

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D43	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		0740		D46	RA
0741		1304		R43	R
1305	(b) (6)	1329	C		
1330		1439		R43	R
1440		1445	C		
1446		1720		R43	R
1721		1854	C		
1855		1919		R43	R
1920		1935	C		
1936		2015		R43	R
2016		2018	C		
2019		2205		R43	R
2206		2235	C		
2236		0134		R43	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D43	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0135	(b	0155	C		
0156		0459		R43	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D45	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0740		D46	RA
0741		1205		R45	R
1206		1227		D46	RA
1228		1819		R45	R
1820		1827		D46	RA
1828		0459		R45	R

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D46	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500	(b) (6)	1205		R46	R
1206		1318	C		
1206		1318	T		
1319		1354		R46	R
1355		1514	C		
1355		1514	T		
1515		1644		R46	R
1645		1807	C		
1645		1807	T		
1808		1819		R46	R
1820		1828	C		
1829		1859	C		
1829		1859	T		
1900		0459		R46	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D65	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0136		R65	R
0137	(b) (6)	0207	C		
0208		0459		R65	R

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D66	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0136		R66	R
0137		0209		D65	RA
0210		0459		R66	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	D67	RA	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1830		R67	R
1831		1851		D15	RA
1852		1919		R67	R
1920		1938		D15	RA
1939		2010		R67	R
2011		2134		D15	RA
2135		0136		R67	R
0137		0209		D65	RA
0210		0459		R67	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H15	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R15	R

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(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H43	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R43	R

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H45	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R45	R

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R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H46	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R46	R

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H65	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R65	R

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H66	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R66	R

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	H67	H	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R67	R

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R43	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1100		R46	R
1101	(b) (6)	1129	C		
1130		1203	C		
1204		1246	C		
1247		1341	C		
1342		1459	C		
1500		1535	C		
1536		1624	C		
1625		1719	C		
1720		1745	C		
1746		1821	C		
1822		1826	C		
1827		1937	C		
1827		1937	T		

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R43	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
1938	(b) (6)	2018	C		
2019		2103	C		
2019		2103	T		
2104		2144	C		
2145		2204	C		
2145		2204	T		
2205		2243	C		
2244		2334	C		
2335		0026	C		
0027		0105	C		
0106		0136	C		
0137		0220	C		
0221		0307	C		
0308		0459		R46	R

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R45	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500		1227		R46	R
1228	(b) (6)	1236	C		
1237		1329	C		
1330		1404	C		
1405		1528	C		
1529		1625	C		
1626		1700	C		
1701		1741	C		
1742		1752	C		
1753		1807	C		
1808		1827		R46	R
1828		1921	C		
1922		2027	C		
2028		2055	C		

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R45	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
2056	(b	2146	C		
2147		2246		R46	R
2247	(b) (6)	2320	C		
2321		0004	C		
0005		0104	C		
0105		0459		R46	R

CODE:

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R46	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED (9) POSITION IDENTIFIER	WHERE COMBINED (10) POSITION TYPE
0500	(b) (6)	0659	C		
0700		1059	C		
1100		1103	C		
1104		1129	C		
1130		1133	C		
1134		1142	C		
1143		1205	C		
1206		1311	C		
1312		1405	C		
1406		1514	C		
1515		1612	C		
1613		1635	C		
1636		1808	C		
1809		1824	C		

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
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T - Trainee/Developmental

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R46	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
1825	(b) (6)	1937	C		
1938		2021	C		
2022		2050	C		
2051		2144	C		
2145		2235	C		
2236		2316	C		
2317		2348	C		
2349		0030	C		
0031		0130	C		
0131		0217	C		
0218		0304	C		
0305		0316	C		
0317		0459	C		

CODE:

C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
R - Trainee/Developmental Certification/ Evaluation
T - Trainee/Developmental

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POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R66	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		0459		R65	R

CODE:

C - ATCS/ATA
S - Supervisor/Staff Spec
T - Trainee/Developmental
M - Trainee/Developmental Monitoring
R - Trainee/Developmental Certification/ Evaluation

FAA Form 7230-10 (6-94) NSN: **0052-00-024-6102** **Electronic Version (OmniForm)**

POSITION LOG

(1) FACILITY ID	(2) POSITION IDENTIFIER	(3) POS	(4) DATE
ZME	R67	R	07/10/2017

(5) TIME ON	(6) INITIALS	(7) TIME OFF	(8) CODE	WHERE COMBINED	
				(9) POSITION IDENTIFIER	(10) POSITION TYPE
0500		1216		R65	R
1217		2243		R15	R
2244		0459		R65	R

CODE:

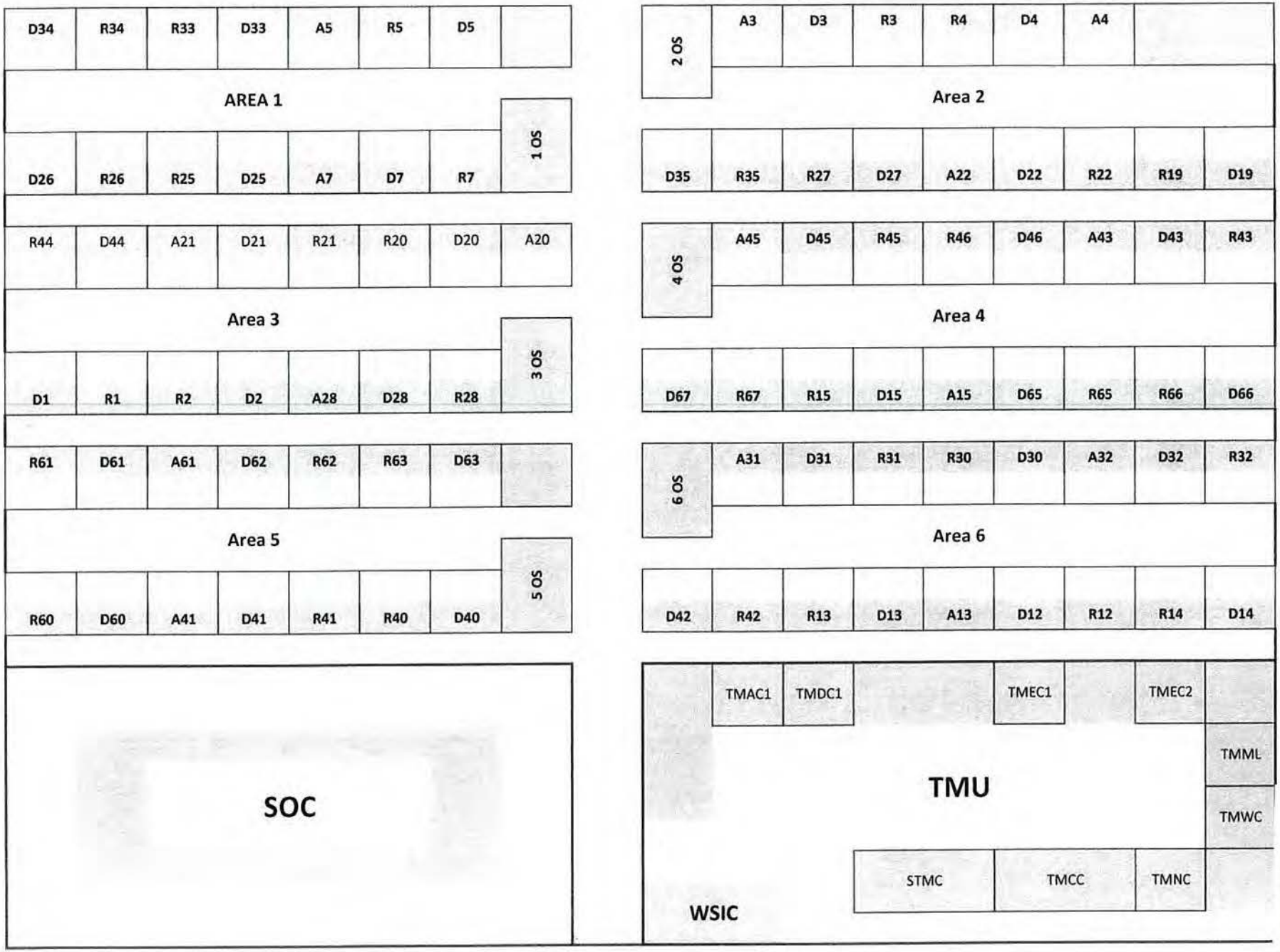
C - ATCS/ATA
M - Trainee/Developmental Monitoring
S - Supervisor/Staff Spec
R - Trainee/Developmental Certification/ Evaluation
T - Trainee/Developmental

FAA Form 7230-10 (6-94) NSN: 0052-00-024-6102 Electronic Version (OmniForm)

FOR OFFICIAL USE ONLY Public Availability to be determined under 5 U.S.C. 552

SECTION 7.

Facility Layout Chart(s)



ZME-ARTCC-0277
YANKY72

Memphis ARTCC DSR Control Position Diagram updated June 11, 2015

SECTION 8.

Transcription of Voice Recording(s)

Federal Aviation Administration

Memorandum

Date: August 14, 2017

To: Aircraft Accident File ZME-ARTCC-0277

From: Memphis Air Route Traffic Control Center

Subject: **INFORMATION**: Partial Transcript
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

This transcription covers the Memphis Air Route Traffic Control Center (ARTCC) R15-67 R position for the time period from July 10, 2017, 2016 UTC, to July 10, 2017, 2153 UTC.

Agencies Making Transmissions	Abbreviations
YANKY72	YANKY72
Memphis ARTCC Helena Low Altitude Radar Control Position	R15
BTQ485	BTQ485
ALLEY55	ALLEY55

I certify that the following is a true transcription of the recorded [redacted] craft Accident involving YANKY72.

(b) (6)

Support Specialist
ZME

2016
(2017-2045)
2046
2046:56 YANKY72 memphis center yanky seven two on thirty five eight seven
2047

2047:01 R15 yanky seven two memphis center roger
2048
2049
2050
2050:12 R15 yanky seven two memphis center

2050:36 R15 yanky seven two memphis center

2050:51 2051	R15	yanky seven two memphis center how do you hear
2051:07	R15	yanky seven two memphis center on guard yanky seven two memphis center on guard contact memphis center one three five point eight seven
2051:48 2052 2053	R15	yanky seven two memphis center how do you hear
2053:13	R15	yanky seven two memphis center how do you hear
2053:19 2054 2055	R15	yanky seven two memphis center
2055:18 2056	R15	yanky seven two memphis center
2056:05	R15	yanky seven two memphis center how do you hear
2056:13	R15	boutique four eighty five memphis
2056:15	BTQ485	boutique four eighty five go ahead
2056:17	R15	do you see anything out at your ah two o'clock one to two o'clock in about one six miles at ah i don't know smoke or anything out that way
2056:30	BTQ485	yeah we do actually we got some ah blackish smoke rising bout that that direction
2056:47	R15	boutique uh four eighty five can you deviate over that way
2056:51	BTQ485	affirmative we can ah do you want us to go down
2056:54	R15	boutique four eighty five ah just ah if you don't mind just maintain ah eight thousand i guess and fly heading of one zero zero and let me know if you see anything out that way
2057:06	BTQ485	okay eight thousand and one zero zero on the heading we will go over there and check it out boutique four eighty

***

		five
2058		
2059		
2059:56	R15	boutique four eighty five are you seeing anything at your twelve o'clock in about ah five---six miles
2100		
2100:01	BTQ485	yes it's definitely a smoke cloud blackish color ah from here it looks like it's out directly center of a uh agricultural field
2101		
2101:10	R15	boutique four eighty five go ahead
2101:12	BTQ485	yeah there is a aircraft circling ah the plume of smoke at this time down there
2101:24	R15	boutique four eighty five roger
2101:35	R15	boutique four eighty five can you make out the type of aircraft
2101:38	BTQ485	the one that's flying around
2101:40	R15	affirmative
2101:41	BTQ485	ah alright one second
2101:44	R15	boutique four eighty five we're looking for a c one thirty
2102		
2102:28	BTQ485	center boutique four eighty five
2102:31	R15	boutique four eighty five go ahead
2102:33	BTQ485	yeah ah the aircraft that are flying around it are definitely not as large as a c one thirty so i'd say negative on that
2102:42	R15	boutique four eighty five roger can you make out what what's burning

***

2102:49	BTQ485	ah negative it doesn't it does not look like it's the field itself that's burning it does look like it's uh something that was either hit there or placed there and then set on fire so i don't want to say for sure
2103:11	BTQ485	do you need us to do another pass
2103:23	R15	boutique four eighty five if you have time we could ah we could use the help but ah do you want like a lower altitude or
2103:32	BTQ485	yeah we need we'll we go down to six thousand we got time for one more pass boutique four eighty five
2103:39	R15	boutique four eighty five descend and maintain six thousand
2103:42	BTQ485	six thousand boutique four eighty five
2103:45	BTQ485	and are we cleared for a turn around here
2103:47	R15	boutique four eighty five you are cleared to make a right three sixty
2103:52	BTQ485	boutique four eighty five thanks
2104		
(2105-2106)		
2107		
2107:41	BTQ485	center boutique four eighty five
2107:42	R15	boutique four eighty five go ahead
2107:45	BTQ485	yeah ah it's very dark black smoke like ah fuel or rubber ah i would say it's probably forty yards long black ah smoke coming from the fire ah there'e quite a few cars on the road next to it right now ah piling up there
2108:09	R15	boutique four eighty five roger thanks for your help

***

2108:12	BTQ485	you're welcome we're going to head direct nashville at this time boutique four eighty five
2108:16	R15	boutique four eighty five cleared to the nashville airport via direct climb and maintain flight level two three zero
2108:21	BTQ485	climb and maintain two three zero and ah direct nashville boutique four eighty five
2108:25	R15	boutique four eighty five thanks for your help
2108:27	BTQ485	you're welcome
2109		
(2110-2113)		
2114		
2114:20	R15	alley five five memphis center
2114:23	ALLEY55	go for alley five five
2114:25	R15	alley five five uh i was wondering if you can check something out for me it is at your zero four five (unintelligible) zero four five heading (unintelligible) black smoke
2114:37	ALLEY55	zero four five alley five five
2114:47	R15	alley five five do you have the can you accept a lower altitude
2114:52	ALLEY55	affirm alley five five
2114:58	R15	alley five five descend and maintain five thousand
2115		
2115:01	ALLEY55	five thousand alley five five
2115:33	ALLEY55	center alley five five
2115:35	R15	alley five five go ahead

***

2115:37	ALLEY55	yeah there looks like we see some black smoke off our nose---we could drive in further uh to make sure
2115:50	R15	alley five five you are cleared to deviate towards that smoke maintain five thousand
2115:55	ALLEY55	deviate toward the smoke maintain five thousand alley five five
2116:00	R15	alley five five uh and if you can verify what is causing the smoke we were talking to a c one thirty in that area and we were just checking to make sure it is not that aircraft
2116:09	ALLEY55	alley five five affirm heading that way
2117		
(2118-2119)		
2120		
2120:58	ALLEY55	center alley five five uh we like to request three thousand if able
2121:04	R15	alley five five descend and maintain four thousand
2121:08	ALLEY55	alley five five four thousand
2121:10	R15	alley five five descend and maintain three thousand one hundred
2121:14	ALLEY55	alley five five three thousand one hundred
2121:56	R15	alley five five contact memphis center one three two point five
2122:00	ALLEY55	one three two point five alley five five
2122		
(2123-2152)		
2153		

End of Transcript

***

Federal Aviation Administration

Memorandum

Date: August 14, 2017

To: Aircraft Accident File ZME-ARTCC-0277

From: Memphis Air Route Traffic Control Center

Subject: **INFORMATION**: Partial Transcript
Aircraft Accident, YANKY72
Itta Bena, MS, July 10, 2017

This transcription covers the Memphis Air Route Traffic Control Center (ARTCC) D15-67 RA position for the time period from July 10, 2017, 2016 UTC, to July 10, 2017, 2153 UTC.

Agencies Making Transmissions	Abbreviations
YANKY72	YANKY72
Memphis ARTCC Helena Low Altitude Radar Control Position	R15
Memphis ARTCC Helena Low Altitude Radar Associate Position	D15
Greenville Tower	GLH TWR
Greenwood Tower	GWO TWR
BTQ485	BTQ485
Fort Worth ARTCC Monroe Low	ZFW
ALLEY55	ALLEY55

I certify that the following is a true transcription of the recorded conversations pertaining to the subject Aircraft Accident involving YANKY72.

(b) (6)

Support Specialist
ZME

2016
(2017-2045)
2046
2046:56 YANKY72 memphis center yanky seven two on thirty five eight seven
2047

2047:01 R15 yanky seven two memphis center roger
2048
2049

2050
2050:12 R15 yanky seven two memphis center

2050:36 R15 yanky seven two memphis center

2050:51 R15 yanky seven two memphis center how do you hear
2051

2051:07 R15 yanky seven two memphis center on guard yanky seven two memphis center on guard contact memphis center one three five point eight seven

2051:48 R15 yanky seven two memphis center how do you hear
2052
2053
2053:13 R15 yanky seven two memphis center how do you hear

2053:19 R15 yanky seven two memphis center
2054
2055
2055:18 R15 yanky seven two memphis center

2055:22 D15 greenville greenville eighty one

2055:25 GLH TWR greenville

2055:26 D15 hey if you hear anything from a yanky seven two can you please let us know

2055:31 GLH TWR yanky seven two

2055:32 D15 he's a c one thirty that we lost out east of you and we thinking he may ah tryin land somewhere we don't know if something went wrong or not

2055:39 GLH TWR okay and ah how far east was he

2055:41 D15 ah about thirty miles

***

2055:42	GLH TWR	oh okay
2055:43	D15	alright (unintelligible)
2055:44	GLH TWR	thanks whiskey fox
2056		
2056:05	R15	yanky seven two memphis center how do you hear
2056:10	D15	tower eighty eight
2056:18	GWO TWR	go ahead
2056:19	D15	yeah let us know if you talk to a yanky seven two it's a c one thirty we lost up at twenty thousand feet west of ya about twenty miles we don't know what's going on he may try and land somewhere
2056:29	GWO TWR	alright
2056:30	D15	alright thanks
2056:32	BTQ485	ah blackish smoke raising bout that that direction
2056:47	R15	boutique uh four eighty five can you deviate over that way
2056:51	BTQ485	affirmative we can ah do you want us to go down
2056:54	R15	boutique four eighty five ah just ah if you don't mind just maintain ah eight thousand i guess and fly heading of one zero zero and let me know
2058		
2059		
2059:56	R15	boutique four eighty five are you seeing anything at your twelve o'clock in about ah five---six miles
2100		
2100:01	BTQ485	yes it's definitely a smoke cloud blackish color ah from here it looks like it's out directly center of a uh agricultural field
2101		

***

2101:10	R15	boutique four eighty five go ahead
2101:12	BTQ485	yeah there is a aircraft circling ah the plume of smoke at this time down there
2101:24	R15	boutique four eighty five roger
2101:35	R15	boutique four eighty five can you make out the type of aircraft
2101:38	BTQ485	the one that's flying around
2101:40	R15	affirmative
2101:41	BTQ485	ah alright one second
2101:44	R15	boutique four eighty five we're looking for a c one thirty
2102		
2102:28	BTQ485	center boutique four eighty five
2102:31	R15	boutique four eighty five go ahead
2102:33	BTQ485	yeah ah the aircraft that are flying around it are definitely not as large as a c one thirty so i'd say negative on that
2102:42	R15	boutique four eighty five roger can you make out what what's uh burning
2102:49	BTQ485	ah negative it doesn't it does not look like it's the field itself that's burning it does look like it's uh something that was either hit there or placed there and then set on fire so i don't want to say for sure
2103:11	BTQ485	do you need us to do another pass
2103:23	R15	boutique four eighty five if you have time we could ah we

***

		could use the help but ah do you want like a lower altitude or
2103:32	BTQ485	yeah we need we'll we go down to six thousand we got time for one more pass boutique four eighty five
2103:39	R15	boutique four eighty five descend and maintain six thousand
2103:42	BTQ485	six thousand boutique four eighty five
2103:45	BTQ485	and are we cleared for a turn around here
2103:47	R15	boutique four eighty five you are cleared to make a right three sixty
2103:52	BTQ485	boutique four eighty five thanks
2104		
(2105-2106)		
2107		
2107:41	BTQ485	center boutique four eighty five
2107:42	R15	boutique four eighty five go ahead
2107:45	BTQ485	yeah ah it's very dark black smoke like ah fuel or rubber ah i would say it's probably forty yards long black ah smoke coming from the fire ah there'e quite a few cars on the road next to it right now ah piling up there
2108:09	R15	boutique four eighty five roger thanks for your help
2108:12	BTQ485	you're welcome we're going to head direct nashville at this time boutique four eighty five
2108:16	R15	boutique four eighty five cleared to the nashville airport via direct climb and mainatin flight level two three zero
2108:21	BTQ485	climb and maintain two three zero and ah direct nashville

***

		boutique four eighty five
2108:25	R15	boutique four eighty five thanks for your help
2108:27	BTQ485	you're welcome
2109		
(2110-2112)		
2113		
2113:09	D15	monroe forty eight
2113:13	ZFW	monroe
2113:14	D15	yeah you got strips on yanky seven two
2113:19	ZFW	i do
2113:19	D15	alright
2113:20	ZFW	actually yeah i do
2113:21	D15	alright he he may come over to you we don't know we lost him west of greenwood and there's a big fire on the ground so he might have crashed we don't reaaly know what happened but we didn't want to violate your airspace if he is still flying he we don't know what happened we lost radio and radar
2113:36	ZFW	okay
2113:36	D15	so we'll let you know
2113:38	ZFW	alright
2113:38	D15	alright
2113:39	ZFW	(unintelligible)
2114		

***

2114:20	R15	alley five five memphis center
2114:23	ALLEY55	go for alley five five
2114:25	R15	alley five five uh i was wondering if you can check something out for me it is at your zero four five it would be a zero four five heading and see if you can fly in that direction to see if you see any black smoke
2114:37	ALLEY55	zero four five alley five five
2115		
2115:33	ALLEY55	center alley five five
2115:35	R15	alley five five go ahead
2115:37	ALLEY55	yeah there looks like we see some black smoke off our nose---we could drive in further uh to make sure
2115:50	R15	alley five five you are cleared to deviate towards that smoke maintain five thousand
2115:55	ALLEY55	deviate toward the smoke maintain five thousand alley five five
2116:00	R15	alley five five uh and if you can verify what is causing the smoke we were talking to a c one thirty in that area and we were just checking to make sure it is not that aircraft
2116:09	ALLEY55	alley five five affirm heading that way
2117		
(2118-2119)		
2120		
2120:58	ALLEY55	center alley five five uh we like to request three thousand if able
2121:04	R15	alley five five descend and maintain four thousand
2121:08	ALLEY55	alley five five four thousand

***

2121:10	R15	alley five five descend and maintain three thousand one hundred
2121:56	R15	alley five five contact memphis center one three two point five
2122:00	ALLEY55	one three two point five alley five five

2122
(2123-2152)
2153

End of Transcript

***

SECTION 9.

FAA Form(s) 8020-3, Facility Accident/Incident Notification Record

FACILITY ACCIDENT/INCIDENT NOTIFICATION RECORD

Aircraft Identification: YANKY72
Date: 7/10/17
Airport: GWO

The order and number of calls will be determined by the situation involved.

	Phone No.	Time	Initials: Caller	Initials: Recipient
Airport Emergency Equipment	Fire & Police 662-237-9283			
Additional Emergency Equipment	GWO twr 662-453-9442			
Search and Rescue	DSN 523-5955/5105/5347/5348/5349	2105		
*Washington Operations Center (WOC)	202-267-3333	2103		
Regional Operations Center (ROC)	404-305-5180	2103		
Air Traffic Manager	(b) (6)	2115		
Flight Standards District Office (FSDO)	601-664-9800			
System Safety Investigations				
National Transportation Safety Board (NTSB)				
System Maintenance Organization Manager	8304			
Law Enforcement Leflore county	Sheriff 662-237-9283 662-453-5741	2105		
National Weather Service (NWS)	601-936-2189	2110		
Military Authority	FBO 662-455-4111, 662-392-3988			
Airport Authority	(b) (6)			
Aircraft Operator	Air Carrier Office / GA (Check FAA Website)			
Operational Control Center (OCC)	Atlantic OCC 770-210-7800			

(b) (6)

Form Updated By (Name, Title, Facility): (b) (6) Date: 10/28/2016

*Accidents requiring telephone notification to Washington shall be made immediately following notification for emergency equipment and/or search and rescue.

FAA Form 8020-3 (12-10) Supersedes Previous Edition

ZME-ARTCC-0277
YANKY72

SECTION 10.

Weather Products

Memphis ARTCC

Weather Products 7/10/2017 UTC

SPECI KGWO 102053Z AUTO VRB03KT 10SM CLR 33/19 A3000 RMK AO2 SLP158 T03280194
56015

METAR KGWO 102153Z AUTO 29004KT 10SM CLR 33/21 A3000 RMK AO2 SLP156 T03330211

I certify the attached copy of the METARSs originated from the APG-link to archived weather is an accurate copy of the original.

(b) (6)

Support Specialist
ZME

Convective SIGMETs

```
760
WSUS32 KKCI 101955
SIGC
-MKCC WST 101955
CONVECTIVE SIGMET 52C
VALID UNTIL 2155Z
MS LA TX AND LA CSTL WTRS
FROM 20NE AEX-10SSW HRV-70W LEV-50NNW LCH-20NE AEX
AREA TS MOV FROM 18015KT. TOPS ABV FL450.
```

Center Weather Advisories

```
FAUS21 KZME 102023
ZME1 CWA 102020
ZME CWA 101 VALID UNTIL 102100
FROM 45S MHZ-40S MEI
AREA SHRA/TS...10 NM WIDE...MOVG FM 19010KT. MAX TOPS FL310.
MOD PCPN  LIKELY.
```

AIRMETs

```
WAUS43 KKCI 101534 AAA
-CHIT WA 101534 AMD
AIRMET TANGO UPDT 3 FOR TURB VALID UNTIL 102100

AIRMET TURB...MO IL IN KY TN
FROM CVG TO HNN TO HMV TO 20S VXV TO 20E BNA TO 50WSW BWG TO
40NNE DYR TO 20ESE FAM TO 50W PXV TO 60S AXC TO CVG
MOD TURB BTN FL280 AND FL400. CONDS CONTG BYD 21Z ENDG 21-00Z.


WAUS43 KKCI 102045
-CHIT WA 102045
AIRMET TANGO UPDT 4 FOR TURB AND LLWS VALID UNTIL 110300

AIRMET TURB...IN KY TN
FROM CVG TO HNN TO HMV TO 20SSW VXV TO BNA TO 40SW IIU TO CVG
MOD TURB BTN FL280 AND FL400. CONDS ENDG 21-00Z.


WAUS44 KKCI 101445
-DFWT WA 101445
AIRMET TANGO UPDT 2 FOR TURB VALID UNTIL 102100

AIRMET TURB...TN MO IL IN KY
FROM CVG TO HNN TO HMV TO 20S VXV TO 20E BNA TO 50WSW BWG TO
40NNE DYR TO 20ESE FAM TO 50W PXV TO 60S AXC TO CVG
MOD TURB BTN FL280 AND FL400. CONDS CONTG BYD 21Z ENDG 21-00Z.
```

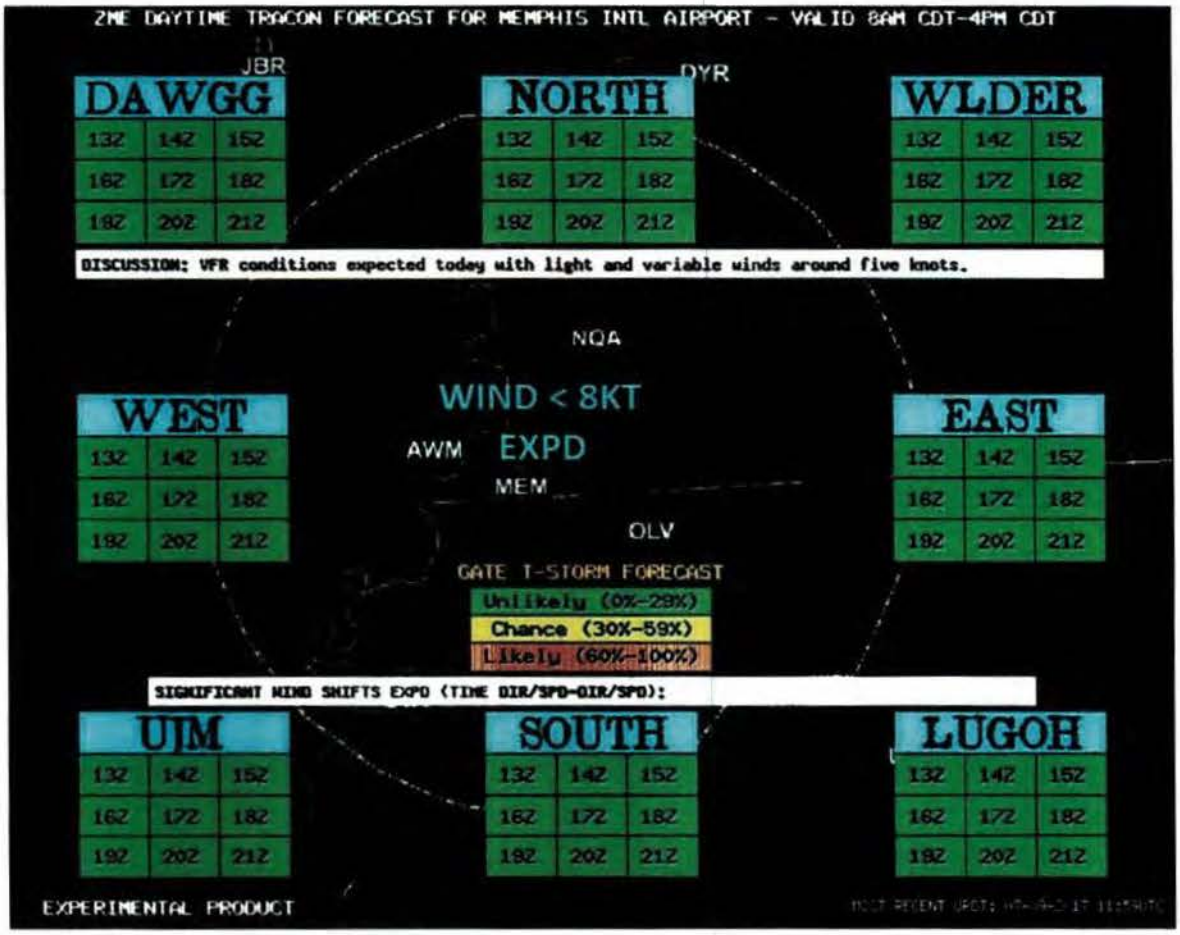
```
WAUS44 KKCI 102045
-DFWT WA 102045
AIRMET TANGO UPDT 3 FOR TURB VALID UNTIL 110300

AIRMET TURB...TN IN KY
FROM CVG TO HNN TO HMV TO 20SSW VXV TO BNA TO 40SW IIU TO CVG
MOD TURB BTN FL280 AND FL400. CONDS ENDG 21-00Z.
```

Text FAs

```
KY
W...SCT-BKN CI. 01Z SCT CI. OTLK..VFR.
CNTRL...SCT060 BKN CI. 00Z SCT CI. OTLK...VFR.
E...SCT-BKN070 TOP 090. 03Z SCT CI. OTLK...VFR 09Z MVFR BR.

AR
SKC OR SCT050-060. 00Z SKC. OTLK...VFR 10Z MVFR BR SWRN PTNS.

TN
W...SKC. OTLK..VFR.
CNTRL-E...SKC OR SCT CI. OTLK...VFR.

MS
N HLF...SKC OR SCT CI. OTLK...VFR.
S HLF...SCT035. TIL 01Z ISOL -TSRA SRN PTNS. CB TOP FL430.
OTLK...VFR.
```

Weather Impact Graphic issued by CWSU ZME at 18Z

Memphis TRACON Forecast issued by CWSU ZME at 12Z



SECTION 11.

Other

UTC (Zulu) Time Conversion Chart

UTC (Zulu)	PST/ ALDT	PDT/ MST	MDT/ CST	CDT/ EST	EDT/ AST	ALST	HST
0000*	1600	1700	1800	1900	2000	1500	1400
0100	1700	1800	1900	2000	2100	1600	1500
0200	1800	1900	2000	2100	2200	1700	1600
0300	1900	2000	2100	2200	2300	1800	1700
0400	2000	2100	2200	2300	0000*	1900	1800
0500	2100	2200	2300	0000*	0100	2000	1900
0600	2200	2300	0000*	0100	0200	2100	2000
0700	2300	0000*	0100	0200	0300	2200	2100
0800	0000*	0100	0200	0300	0400	2300	2200
0900	0100	0200	0300	0400	0500	0000*	2300
1000	0200	0300	0400	0500	0600	0100	0000*
1100	0300	0400	0500	0600	0700	0200	0100
1200	0400	0500	0600	0700	0800	0300	0200
1300	0500	0600	0700	0800	0900	0400	0300
1400	0600	0700	0800	0900	1000	0500	0400
1500	0700	0800	0900	1000	1100	0600	0500
1600	0800	0900	1000	1100	1200	0700	0600
1700	0900	1000	1100	1200	1300	0800	0700
1800	1000	1100	1200	1300	1400	0900	0800
1900	1100	1200	1300	1400	1500	1000	0900
2000	1200	1300	1400	1500	1600	1100	1000
2100	1300	1400	1500	1600	1700	1200	1100
2200	1400	1500	1600	1700	1800	1300	1200
2300	1500	1600	1700	1800	1900	1400	1300
2400	1600	1700	1800	1900	2000	1500	1400

The time *0000 and 2400 are interchangeable. The time 2400 is associated with the date of the day ending, and 0000 with the day just starting.

UTC = Coordinated Universal Time, or Zulu
PST = Pacific Standard Time (UTC - 8 hours)
ALDT = Alaskan Daylight Time (UTC - 8 hours)
PDT = Pacific Daylight Time (UTC - 7 hours)
MST = Mountain Standard Time (UTC - 7 hours)
MDT = Mountain Daylight Time (UTC - 6 hours)
CST = Central Standard Time (UTC - 6 hours)
CDT = Central Daylight Time (UTC - 5 hours)
EST = Eastern Standard Time (UTC - 5 hours)
EDT = Eastern Daylight Time (UTC - 4 hours)
AST = Atlantic Standard Time (UTC - 4 hours)
ALST = Alaskan Standard Time (UTC - 9 hours)
HST = Hawaiian Standard Time (UTC - 10 hours)

ZME-ARTCC-0277

YANKY72

84TH RADAR EVALUATION SQUADRON (RADES) ANALYSIS (SCOA)

SCIENTIFIC & TECHNICAL INFORMATION (STINFO)

FORENSIC DATA ANALYSIS

- REQUESTOR: USAF HAF AFSEC

- 84 RADES/SCOA
Ph: Comm (801) 777-6052 , DSN 777-6052

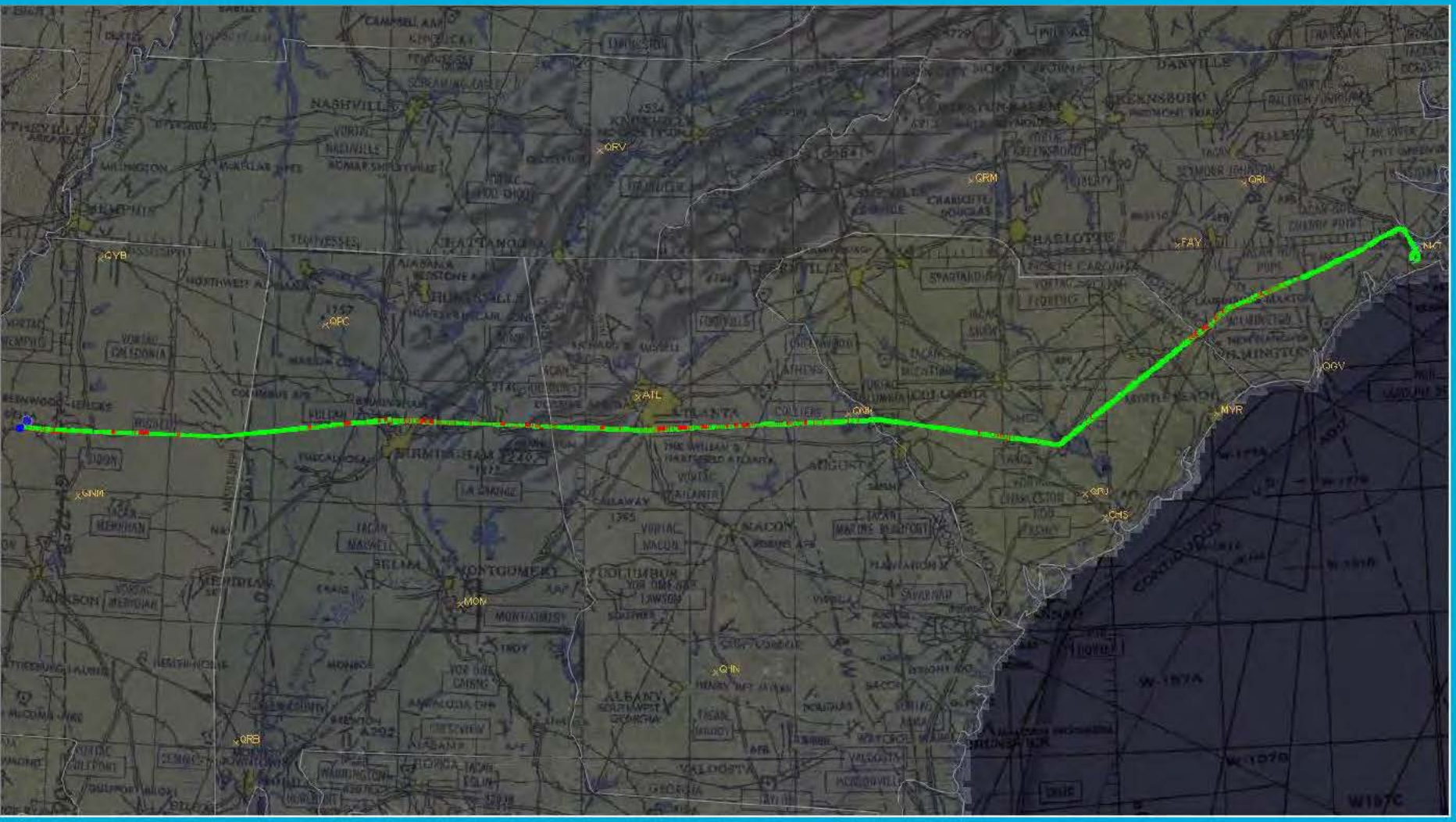
DATE OF REPORT: 14 Jul 2017

10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- **ENTIRE RECORDED FLIGHT PATH OF KC-130**

(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")

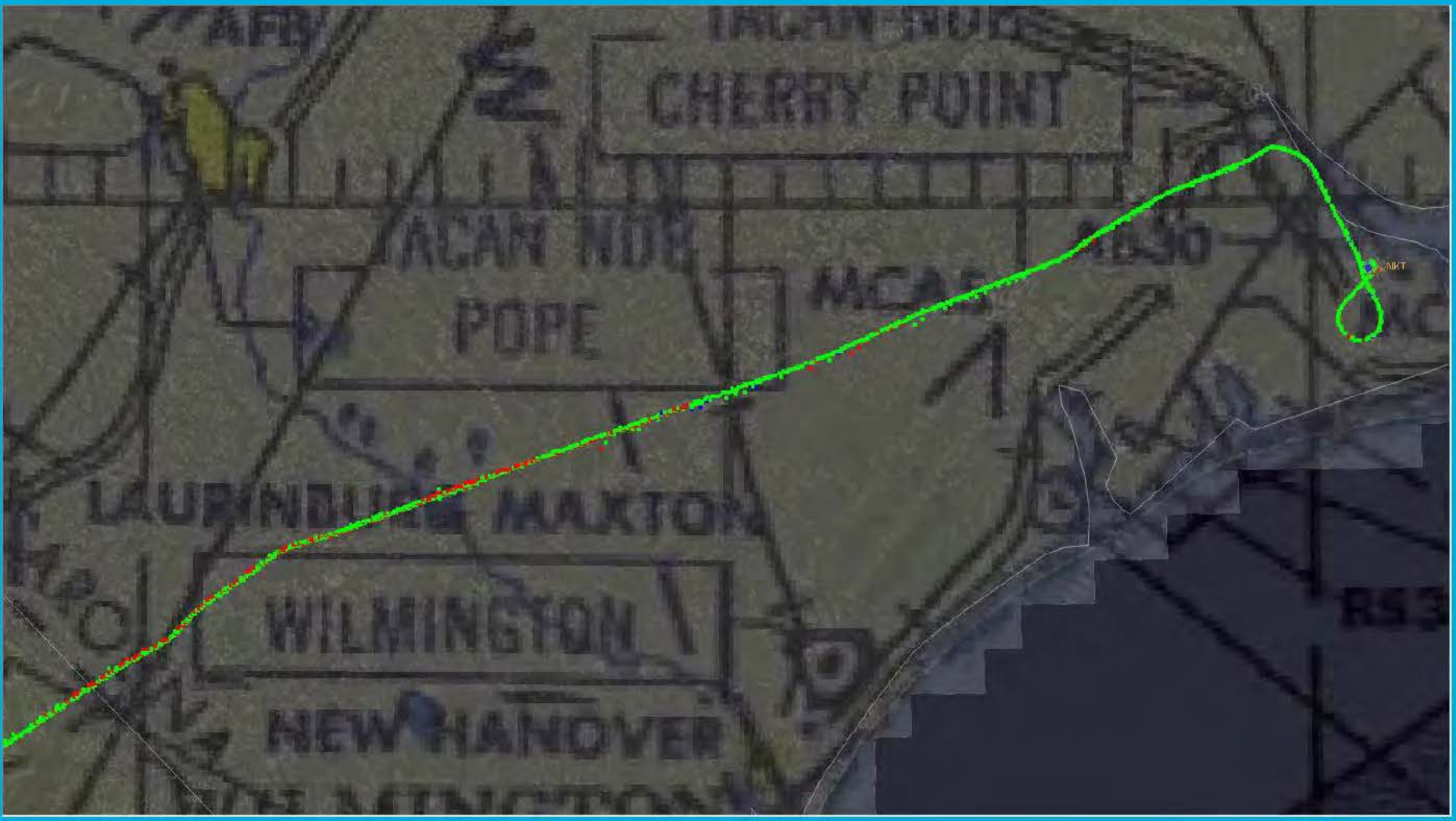


84 RADES/SCOA

10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

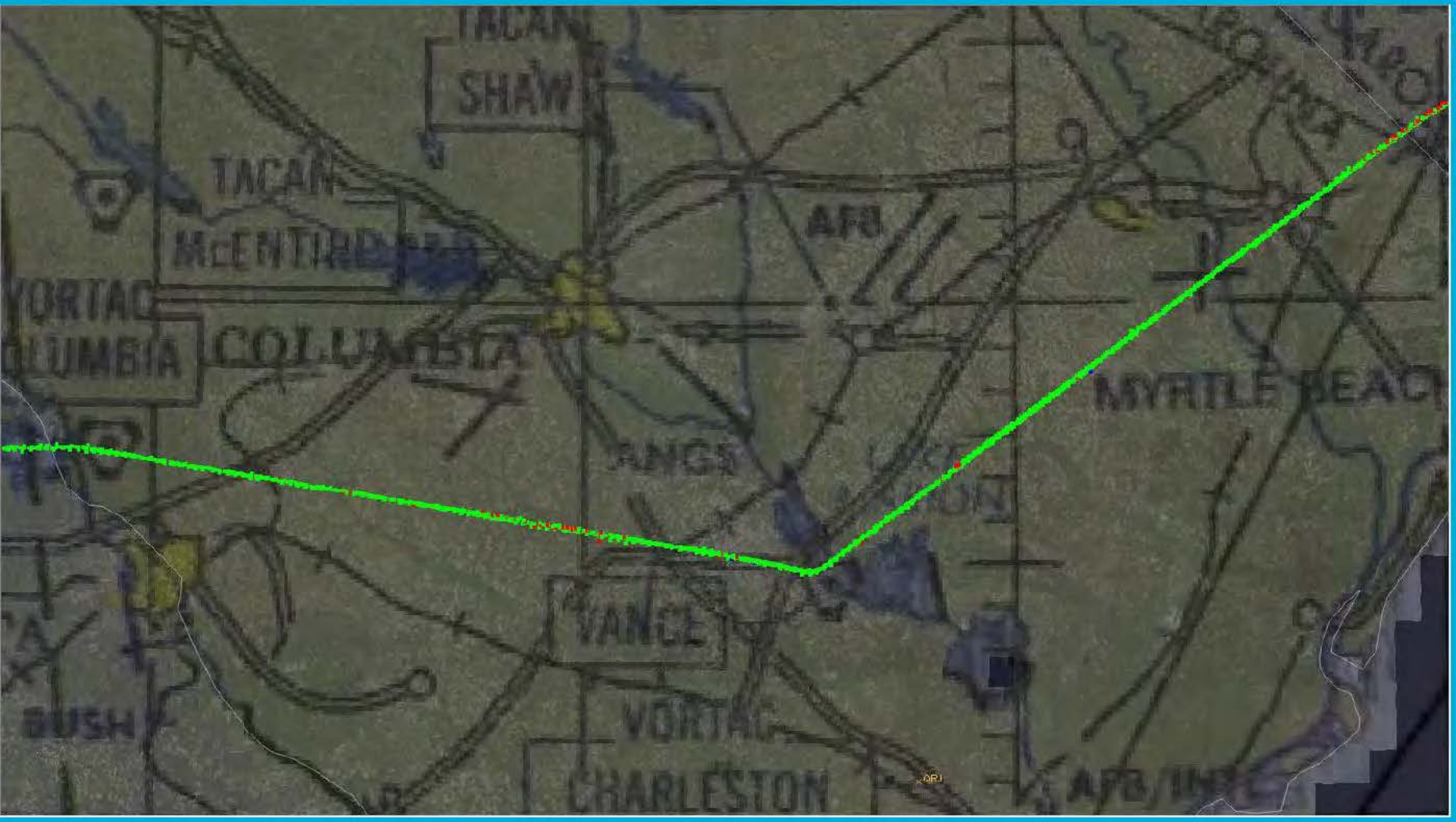
- RECORDED FLIGHT PATH OF KC-130 – NORTH CAROLINA PORTION
(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")



10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

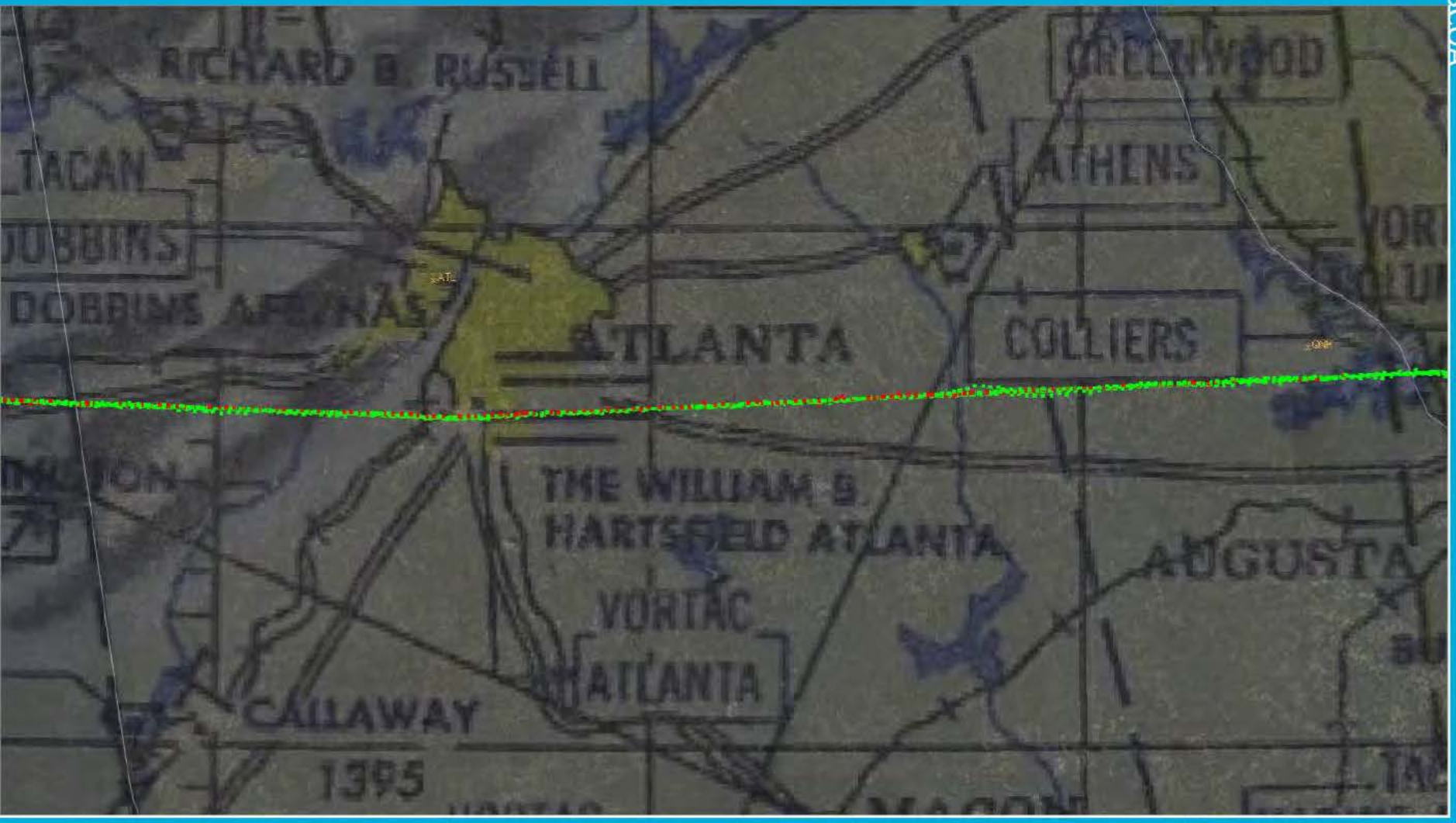
- RECORDED FLIGHT PATH OF KC-130 – SOUTH CAROLINA PORTION
(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")



10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

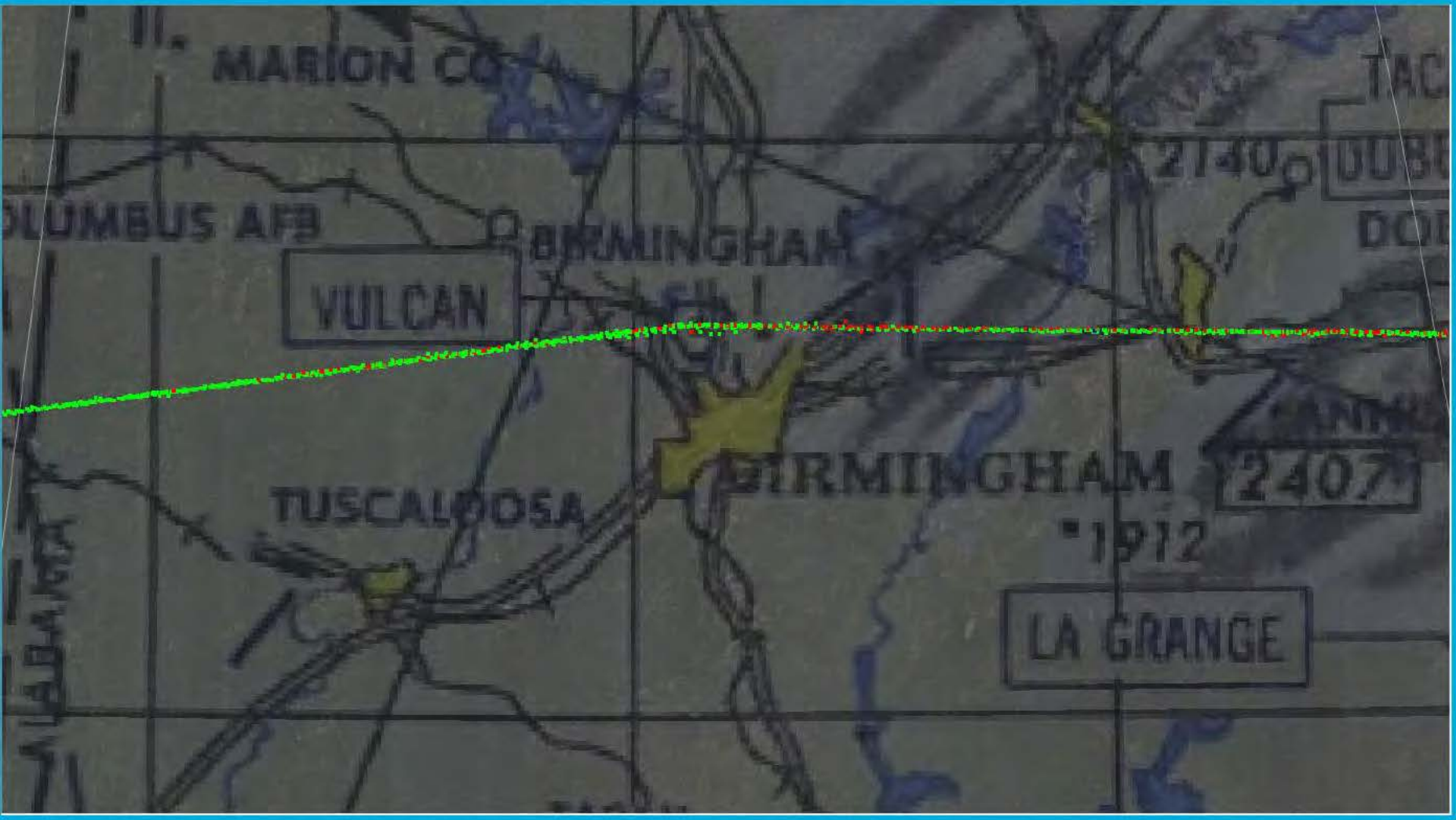
- RECORDED FLIGHT PATH OF KC-130 – GEORGIA PORTION
(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")



10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- RECORDED FLIGHT PATH OF KC-130 – ALABAMA PORTION
(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")



10 JUL 17 KC-130 (CLASS A MISHAP)

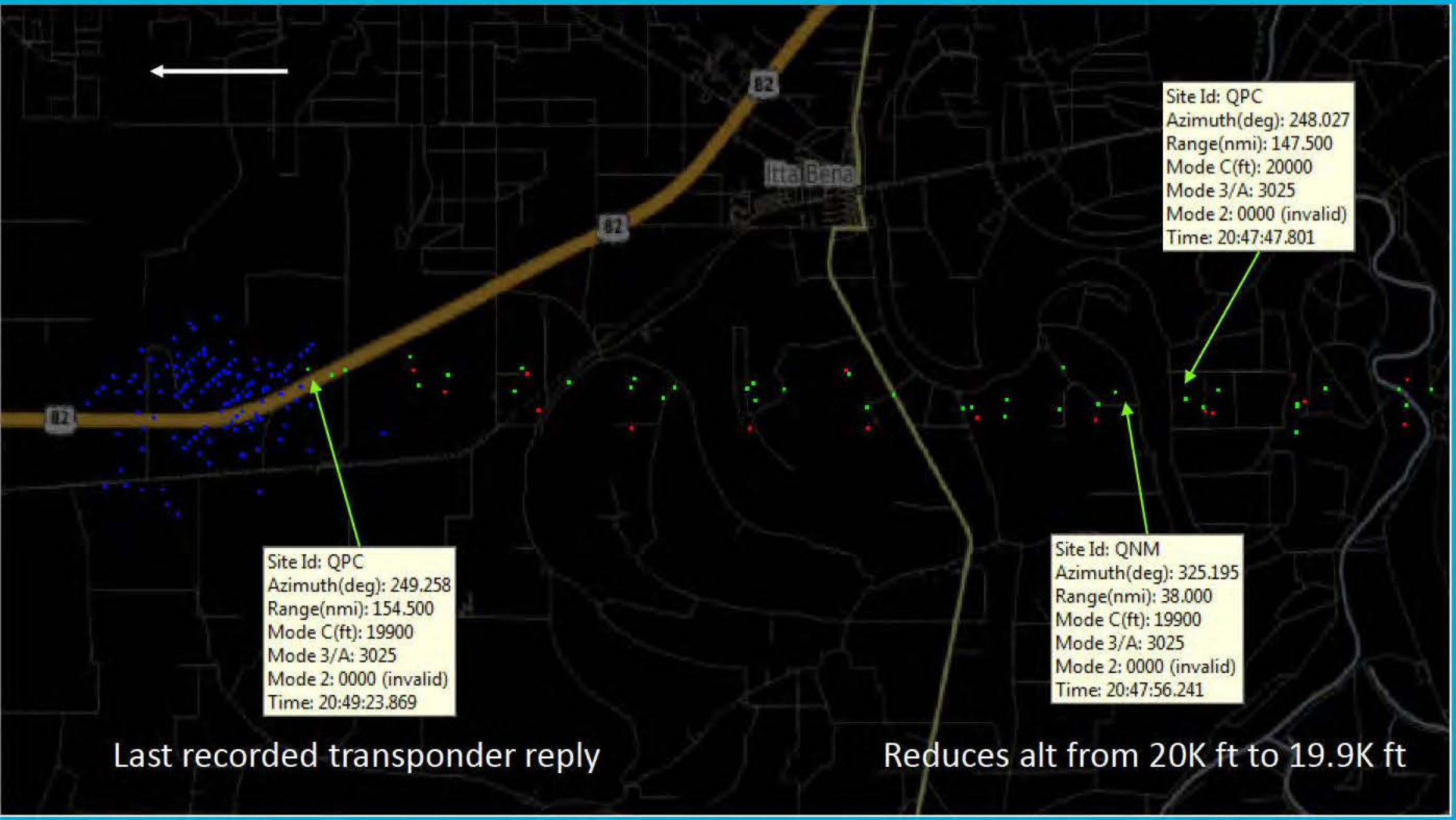
INCLUDES:

- RECORDED FLIGHT PATH OF KC-130 – MISSISSIPPI PORTION
(ALL DATA POINTS PROVIDED IN FILENAME "10JUN17_KC-130CLASSA_MS.CSV")

10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- RADAR SITE DATA FROM: 5086_AEX / 5591_QNM / 5097_QPC / 5166_QRB / 5423_QYB
- LAST 2 MIN 3 SEC (APPROXIMATE) OF KC-130 FLIGHT DATA
- SEARCH ONLY HITS DEPICTING POTENTIAL DEBRIS FIELD



10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- EMBEDDED MP4 VIDEO OF APPROX LAST 2 MIN FLIGHT PATH OF KC-130 AT 20X SPEED

* DOUBLE-CLICK ON PICTURE TO OPEN AND PLAY VIDEO

Last 2 min at 20 x speed.mp4

10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- RADAR SITE DATA FROM: 5086_AEX / 5591_QNM / 5097_QPC / 5166_QRB / 5423_QYB

- SEARCH ONLY HITS DEPICTING POTENTIAL DEBRIS FIELD

10 JUL 17 KC-130 (CLASS A MISHAP)

INCLUDES:

- EMBEDDED MP4 VIDEO OF SURROUNDING AIRSPACE DURING KC-130 INCIDENT AT 20X SPEED
  * DOUBLE-CLICK ON PICTURE TO OPEN AND PLAY VIDEO

Surrounding area last 2 min at 20x speed.mp4

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Materials Engineering Report

Materials Engineering Division (AIR-4.3.4)
In-Service Support Center
Fleet Readiness Center East, Cherry Point, North Carolina

Report Number:	**CP6811083MER1**	**Date Submitted:**	**July 2017**
Analyst:	(b) (6)	**Submitted By:**	(b) (6)
Analyst's Phone #:	(b) (6)	**Submitter's Phone #:**	(b) (6)
Reference ID:		**Submitter's Organization:**	**4.3.1**

Analysis/Service Requested: Document the wreckage observations pertaining to the Center Fuselage Structure and the right outboard section of the Horizontal Stabilizer of Class A mishap aircraft 165000.

1. Background Information:

On July 10, 2017 KC-130T aircraft BuNo 165000 experienced an in-flight breakup at approximately 20,000 foot altitude resulting in loss of the aircraft and crew. Per the request of the Naval Safety Center, the C-130 Fleet Support Team arrived on-site in Greenwood, Mississippi July 12, 2017, to provide assistance for the aircraft recovery, reconstruction, and mishap investigation. Materials engineering support was requested for the reconstructive effort and arrived on July 19, 2017. The aircraft debris field was geographically split into two locations; the North site and the South site. The North site consisted of aircraft structure and components forward of Fuselage Station (FS) 477, the Right Hand (RH) outer section of the horizontal stabilizer, RH elevator, propeller assemblies (Propeller) and Reduction Gearboxes (RGB) from engines #2 and #3, and multiple individual propeller blades and airfoil fragments. The debris field was essentially a straight line from East to West with the quantity of parts and components increasing in the Westerly direction. The South site (referred to as the Main Wreckage Site in this report) contained the remaining structure and components of the fuselage aft of FS 477, Left Hand (LH) wing, RH wing, center wing, cargo ramp, cargo door, vertical stabilizer, rudder, center and LH outer section of horizontal stabilizer, LH elevator, main landing gear, all four engines, and the Propellers and RGBs from engines #1 and #4. The aircraft structure located at the main wreckage site was recovered however it is not documented in this report since the structure remained in-tact until ground impact and a large portion was consumed by fire. The Propellers, RGBs, and engines were recovered for investigation and the findings are recorded in separate reports.

Prepared By:	Date Completed:	Approved By:	Date Approved:
	11/3/2017		11/3/2017

Distribution:

NAVAIR Cherry Point Materials Engineering Report CP6819585MER1 documents the failure analysis performed on Blade 4 from Propeller #2. This blade liberated in flight as a consequence of fatigue cracking that initiated from intergranular cracking at the root end of the blade. Wreckage reconstruction revealed that the center fuselage incurred damage on both sides of the aircraft that was attributed to intrusion from two different propeller assemblies, one site occurred from the liberated blade and one from Propeller Assembly #3 that departed the right wing. This report documents the material observations specific to the center fuselage section spanning FS 245 thru FS 477, the RH outer section of the horizontal stabilizer, and the control cables for the engine throttles, propeller condition, aileron, elevator, and rudder.

2. Analysis of Reconstruction:

Large and small pieces of the fuselage forward of the center wing structure were recovered from the North site. The center fuselage section between FS 245 and FS 477 was recovered as one floor panel, two fairly intact side panels, four large upper section pieces and numerous smaller pieces of side and upper structure. The flight station forward of FS 165 was mostly consumed by ground fire. The forward fuselage section from FS 165 thru FS 245 was recovered in multiple pieces but was not included in the reconstruction effort of the center fuselage due to the mangled condition of the parts.

The left and right sides of the center fuselage showed damage from the intrusion of two separate propeller blades. Damage on the left side occurred at FS 377 coincident with the propeller arc plane. The damage was consistent with a liberated blade (identified as Blade 4 of Propeller #2) impacting in a near vertical orientation with the tip cutting through the side skin approximately 36” below the upper Left Buttock Line (LBL) 61 longeron and the root end of the blade impacting approximately 19” above LBL 61. Intrusion resulted in overload failure of the LBL 61 longeron on both sides of the point of impact at FS 377. The interior of the fuselage right side panel showed damage that was attributed to the liberated blade passing through the occupiable space of the fuselage and attempting to exit the structure. This damage occurred near Water Line (WL) 200 between ring segments at FS 383.67 and FS 397. Exit of the blade through the right side panel appeared to have been prevented by a robust stanchion bracket from a troop seatback support beam stowage assembly. The airfoil of Blade 4 from Propeller #2 exhibited damage consistent with the reconstructed attitude of blade entry into the left side of the fuselage.

The right side fuselage structure incurred significantly greater damage as a consequence of intrusion of Propeller Assembly #3, which departed the right wing due to overload failure of the propeller RGB case. The intruding blade of this propeller assembly entered approximately 33” below the upper Right Buttock Line (RBL) 61 longeron. The intrusion caused overload failure of the RBL 61 longeron to each side of blade impact and continued upward to exit approximately 10” below RBL 20 longeron. Embedding of Propeller #3 in the upper section pushed the upper structure aft resulting in an accordion-like buckling failure of RBL 20 longeron. As a consequence of the outward buckling of the upper panel and loss of both longerons RBL 61 and RBL 20, a large upper section panel from the propeller strike at FS 350 aft to FS 477 appeared to have immediately liberated. The propeller strike may have also promoted liberation of a side panel section below RBL 61 longeron and aft to the wheel well fairing.

The fuselage section forward of the intrusion damage collapsed as a unit toward the left resulting in both side panels to tear away from the floor panel. The behavior of the side panels to separate in tandem suggests that the upper section was attached, at least in part, during collapse of the fuselage section forward of the intrusion damage. Entrapment of the intruding blade from the left against the right side panel also indicates that the center fuselage structure was relatively intact prior to blade

impact from the left side of the aircraft and that fuselage collapse followed after the attempted exit of the blade through the right side panel and the additional propeller impact from the right. Although consumed by ground fire, distortion of the primary structure aft of the blade intrusion area indicates that the center wing structure was sufficiently intact to resist liberation of the upper and side structures as a consequence of the intrusion damage. The forward fuselage section separated from the FS 245 bulkhead by tearing away in tension along the upper rivet pattern and shearing either the bulkhead attachment fasteners or failing the chine angle, bending away to the right with respect to the center section. Although not reconstructed in detail due to investigative time constraints, there was sufficient evidence to indicate that the forward fuselage structure was at least relatively intact when it separated from the center fuselage section because the structure on the left and right sides behaved in tandem. There was no evidence of in-flight fire damage within the center section of the fuselage nor was there evidence of stray ammunition discharge.

The RH outer section of the horizontal stabilizer and RH elevator liberated as a consequence of impact from Propeller #3. One blade from the propeller impacted with sufficient force to cut through the leading edge, front beam assembly and middle interior stringer at Horizontal Stabilizer Station (HSS) 130. The adjacent blade impacted the leading edge at HSS 180 but did not reach the front beam assembly. Separation of the RH outer section of the horizontal stabilizer occurred coincident with the HSS 130 impact. The RH elevator was considered to be securely attached prior to separation of the RH outer section of the horizontal stabilizer and separated as a consequence of the horizontal stabilizer damage.

3. Center Fuselage Section FS 245 – FS 477:

Description of Construction:

The forward fuselage section consists of the skin and structure forward of FS 245. The center fuselage section consists of structure between FS 245 and FS 737 less the center wing structure between FS 517 and FS 597. The all-metal structure is composed of bulkheads, rings, longerons, truss members and intercostals and other supporting members. Schematics of center fuselage structure, annotated with the terminology used in this report and simplified for clarity, are provided in Figures 1 and 2.

The barrel-shape center fuselage construct has side panels that attach to an upper section along the upper Buttock Line (BL) 61 (there are upper and lower longerons at BL 61 for each side of the fuselage, references to BL 61 longeron for this discussion speak to the upper longeron). The upper section basic construct has a center panel attached to upper side panels along LBL 20 and RBL 20 longerons. BL 61 and BL 20 longerons are longitudinal stiffeners with a basic I-beam cross-section and attaches to the upper skin by means of a dual rivet pattern along the upper leg and to the side skin by a dual rivet pattern along the lower leg. The side and upper sections are reinforced vertically by ring segments (alternatively called rings or segments) spaced at regular intervals (3 per 20” span). The ring segments are a T-shape modified with an additional stiffening leg at the interior end of the ring segment. The ring segments are riveted to the skin along the aft leg of the ‘T’ and stiffened by an L-bracket. At 20” intervals, each ring is stiffened and riveted on both the forward and aft legs of the T-form. Also at each major 20” interval, the upper and side ring segments are tied across the longeron by a strap. The two intermediate rings between each major segment are truncated in length short of reaching the BL 61 longeron attachment and do not strap the side rings across to upper rings. An example of the construction at the union between the side and upper section is shown in Figure 3 for clarification.

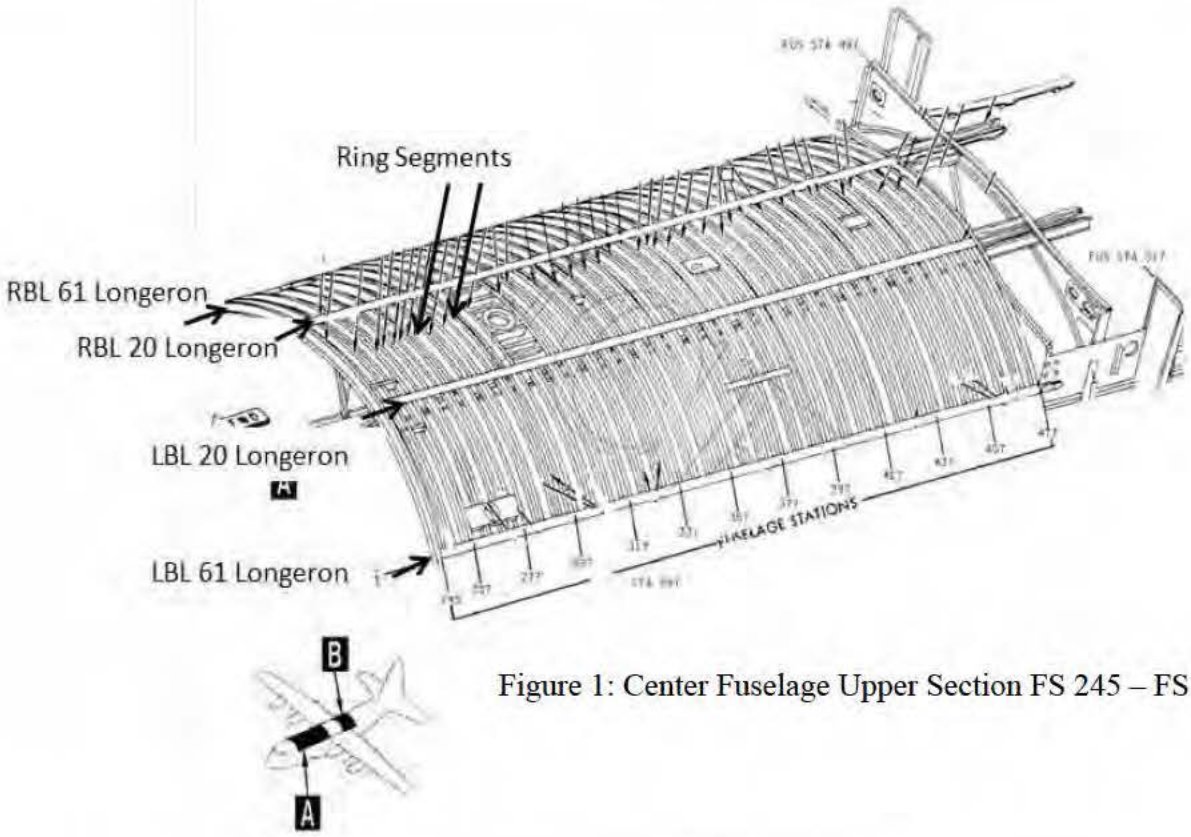


Figure 1: Center Fuselage Upper Section FS 245 – FS 477

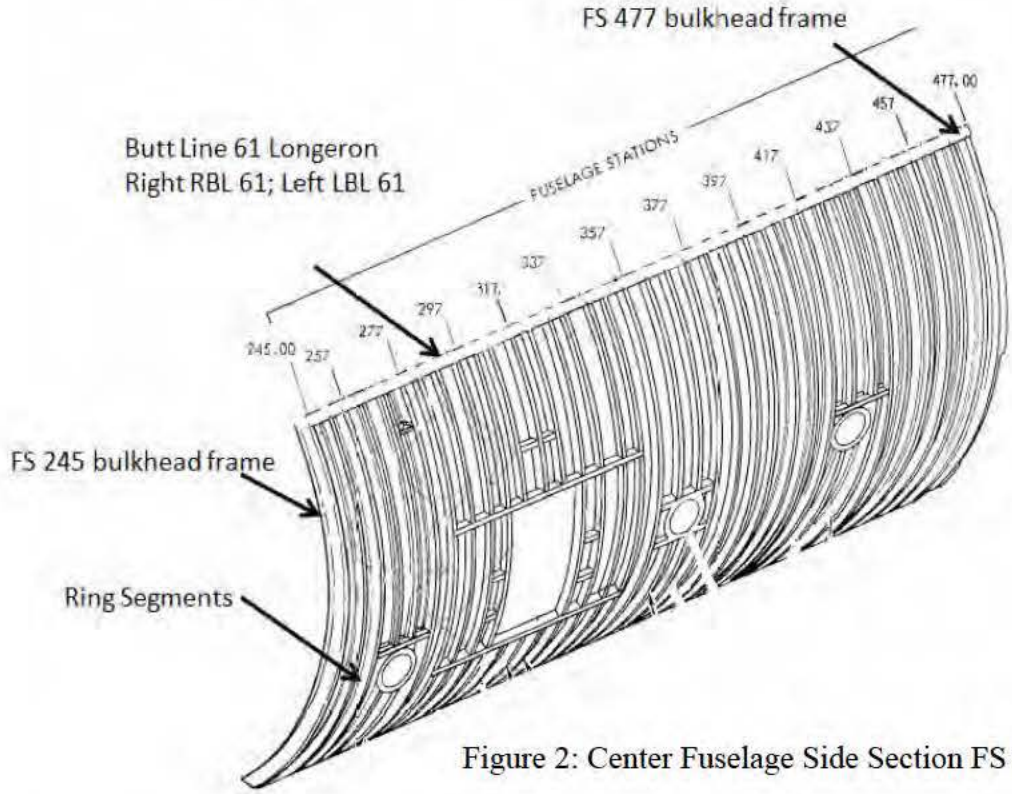


Figure 2: Center Fuselage Side Section FS 245 – FS 477

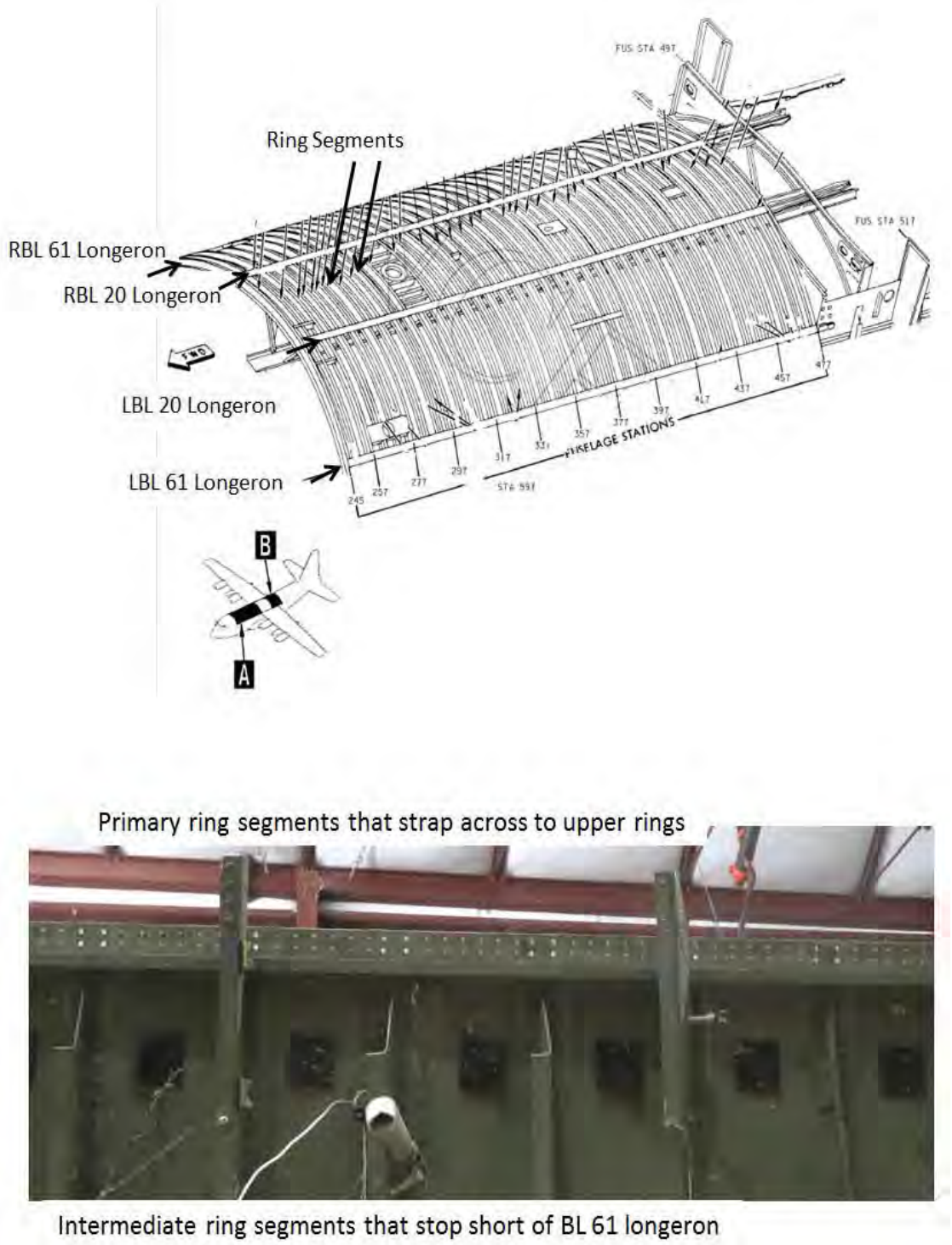


Figure 3: View of RH side panel near BL 61 showing interior configuration as it attaches to the upper panel

Recovered Wreckage, Center Fuselage Section:

The center fuselage structure evaluated in detail for this investigation is shown in Figures 4-6 and as reconstructed in Figures 7-9.

The left side was recovered as one largely intact panel from floor to upper LBL 61 longeron, extending in length from FS 245 to FS 390 (to include the crew escape hatch). The right side was recovered as a largely intact panel extending in length from FS 245 to FS 390 (to include the crew escape hatch), with two additional pieces aft to FS 437 and small skin pieces liberated from the vicinity of FS 363.67 to FS 390.33. The floor panel piece extended from FS 245 to FS 457.

The upper section was recovered as four large panels and numerous smaller pieces that were liberated from the two areas of intrusion. The forward-most large upper panel was intact from FS 245 to FS 330.33 with exception that a triangular piece containing the mast antenna was liberated from the left upper section. The adjacent upper panel was fairly intact between FS 330.33 and FS 383.67 and continued forward with a partial panel section on the left side to FS 297. The third panel of upper section was divided into two main sections, left and right split along RBL 20 longeron. The left section extended from FS 390 to FS 477 and the right section (comprised of two pieces) extended from FS 363.67 to FS 437 and FS 403.67 to FS 477. Additional smaller pieces of upper section comprised the region between FS 330 to FS 383.67 on the right side and FS 377 to FS 390 on the left. One region was unaccounted for between FS 383.67 and FS 397 extending from the fuselage center line to the RBL 20 longeron.

Propellers #2 (left-wing, inboard) and #3 (right-wing, inboard) were recovered from the North site. Two diametrically opposed blades separated from Propeller #2; Blade 4 as a consequence of fatigue cracking at the root end and Blade 2 by overload. All blades remained attached to Propeller #3 until ground impact, when Blade 3 failed at the root via overload. The basic blade condition for the two liberated propeller assemblies is as follows:

Prop 1		Prop 2		Prop 3		Prop 4	
Blade 1	Ground impact fail; tip not recovered	Blade 1	Intact	Blade 1	Intact	Blade 1	Ground impact fail
Blade 2	Ground impact fail	Blade 2	Depart in flight Fatigue	Blade 2	Intact	Blade 2	Intact
Blade 3	Intact	Blade 3	Ground impact fail	Blade 3	Ground impact fail	Blade 3	Intact
Blade 4	Ground impact fail	Blade 4	Depart in flight Overload	Blade 4	Intact	Blade 4	Ground impact fail

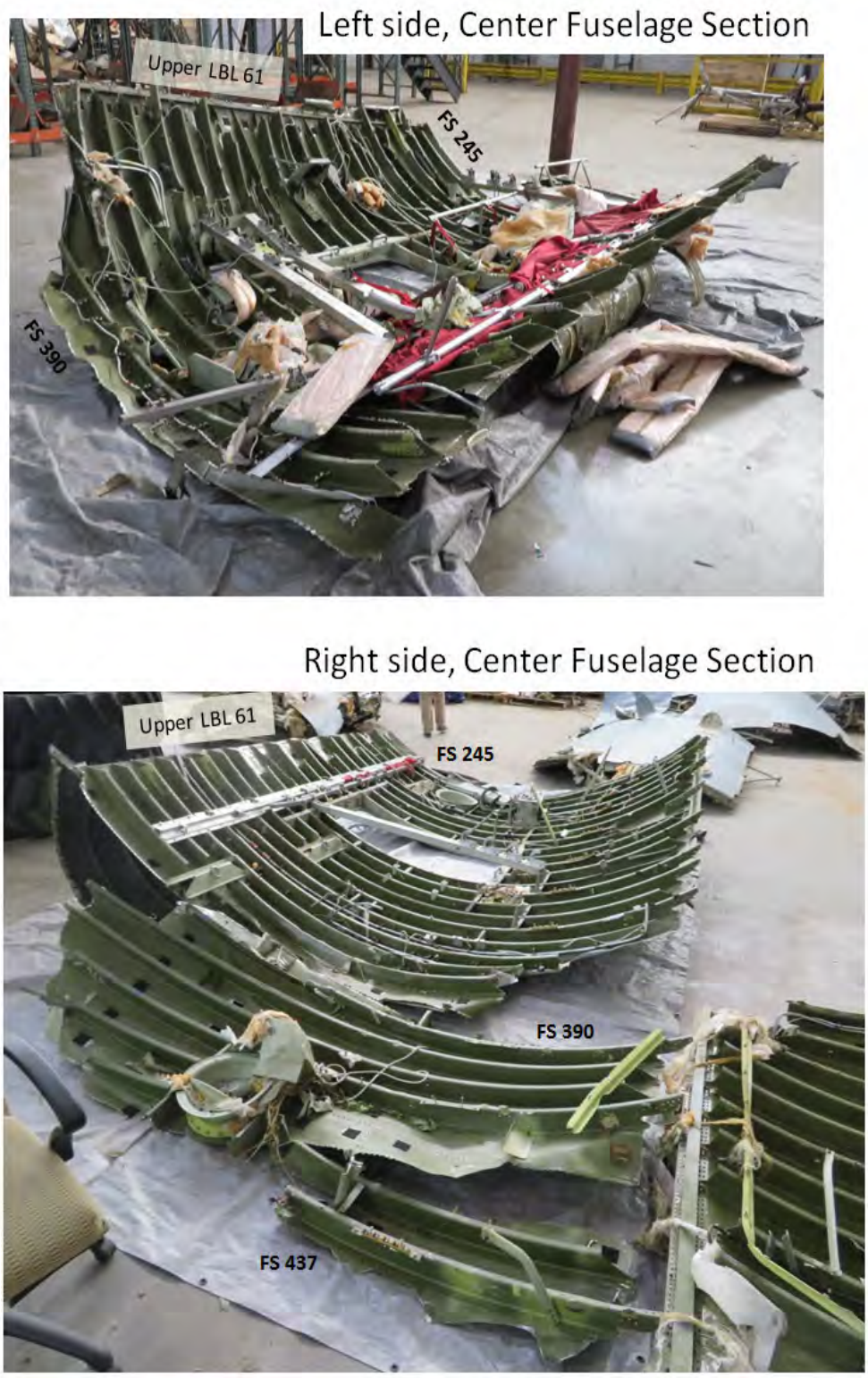


Figure 4: Center Fuselage Side Section Panels

Figure 5: Center Fuselage Upper Section Forward of Center Wing Box

Figure 6: Center Fuselage Floor Section Forward of Center Wing Box

Figure 7: Center Fuselage Side Structure, FS 245 – FS 477

Figure 8: Center Fuselage Side and Upper Section, FS 245 – FS 477

Figure 9: Center Fuselage Upper Section, FS 245 – FS 477

Left Center Fuselage Blade Intrusion Damage:

Structural damage attributed to intrusion by Blade 4 from Propeller #2 occurred in a near vertical plane at FS 377 coincident with the propeller arc plane. The hole in the side fuselage was bounded at the lower edge near WL 222 (approximately 36" below LBL 61 longeron) and at the upper edge approximately 19" above LBL 61 longeron. The width of the intrusion was bounded between FS 377 and FS 397 (Figures 10-11). The fuselage side panel was crushed inward above and below LBL 61 longeron. Red paint transfer on the exterior skin surface at the lower bounds of the intrusion damage was attributed to the red paint stripe at the tip of the liberated Blade 4 from Propeller #2, which showed corresponding abrasive scars at the tip of the airfoil. A 14" long section of LBL 61 longeron liberated from the side structure between FS 370 to FS 384. The middle of the longeron section was slightly bowed in the upward direction, had impact damage spanning 1.5" in the middle of the lower cap and failed by overload 7" to each side of the impact damage. Failure of the upper LBL 61 longeron was attributed to impact from the trailing edge of the blade, which had a triangular piece of similar geometry missing from the edge of the airfoil. Figure 12 shows a closer view of the left side fuselage damage at the blade impact site and views of the liberated piece of longeron shown next to trailing edge foil damage on Blade 4 from Propeller #2. The lower photo shows re-alignment of a mock full-scale blade oriented with the blade tip at the lower boundary of the intrusion damage. The triangular piece missing from the trailing edge of the blade foil aligns precisely with the impact on the LBL 61 longeron at FS 377. Distortion of the longeron indicates that the local fuselage structure was sufficiently intact to offer resistance to failure of the longeron upon impact from the blade.

The upper fuselage section damage above LBL 61 longeron, between FS 377 and FS 397, was bounded approximately 19" above LBL 61 longeron and fragmented into multiple pieces with each piece showing abrasion and inward crushing from an object intruding into the structure. Much of the outer skin surrounding the damage had black material transfer that appeared rubber-like in nature. The structure was sliced inward along the edge of FS 377 ring segment and forced inward, tearing out a small panel piece approximately 17" in length between FS 377 and FS 390. A 17" long piece of skin (ice shield) also tore away in tension from FS 377 forward to FS 363 as the structure was forced inward. Skin panels to each side and immediately above the intrusion were rolled outward pulling away from rivets along the ring segments.

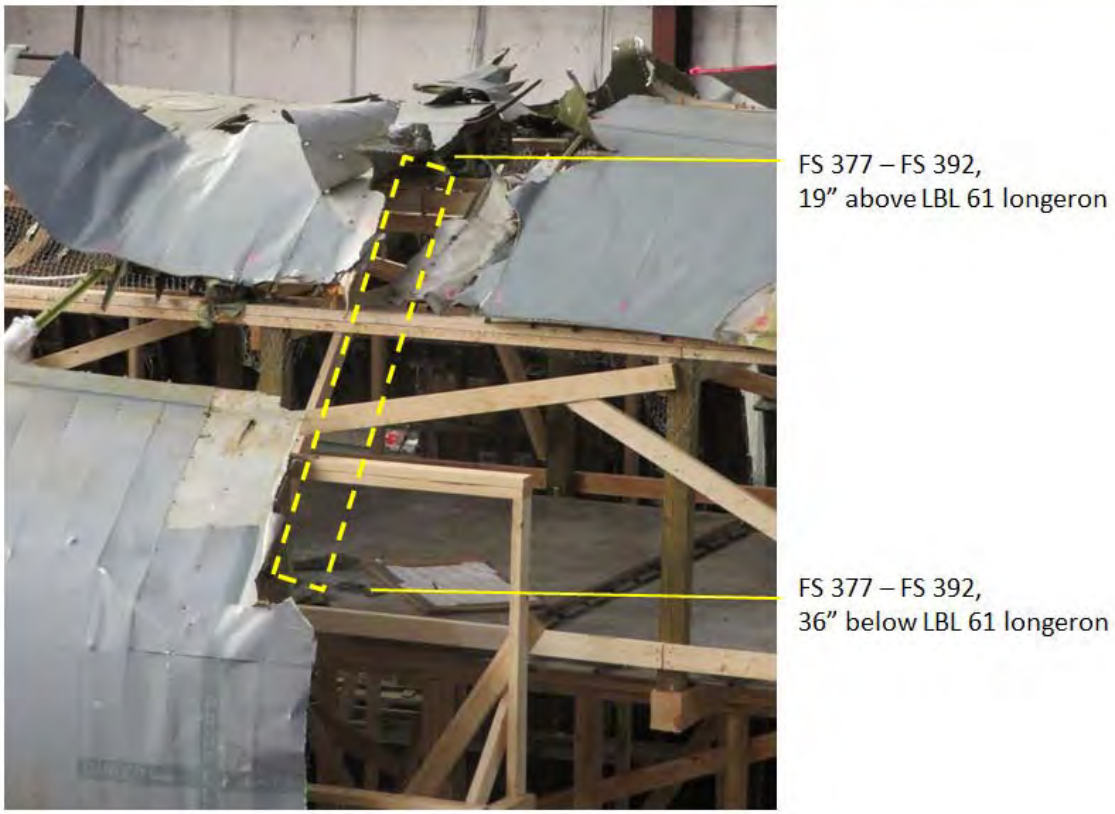


Figure 10: Center Fuselage Upper Section, FS 245 – FS 477

Figure 11: Blade 4 of Propeller #3 Impact Site on LH side of Center Fuselage

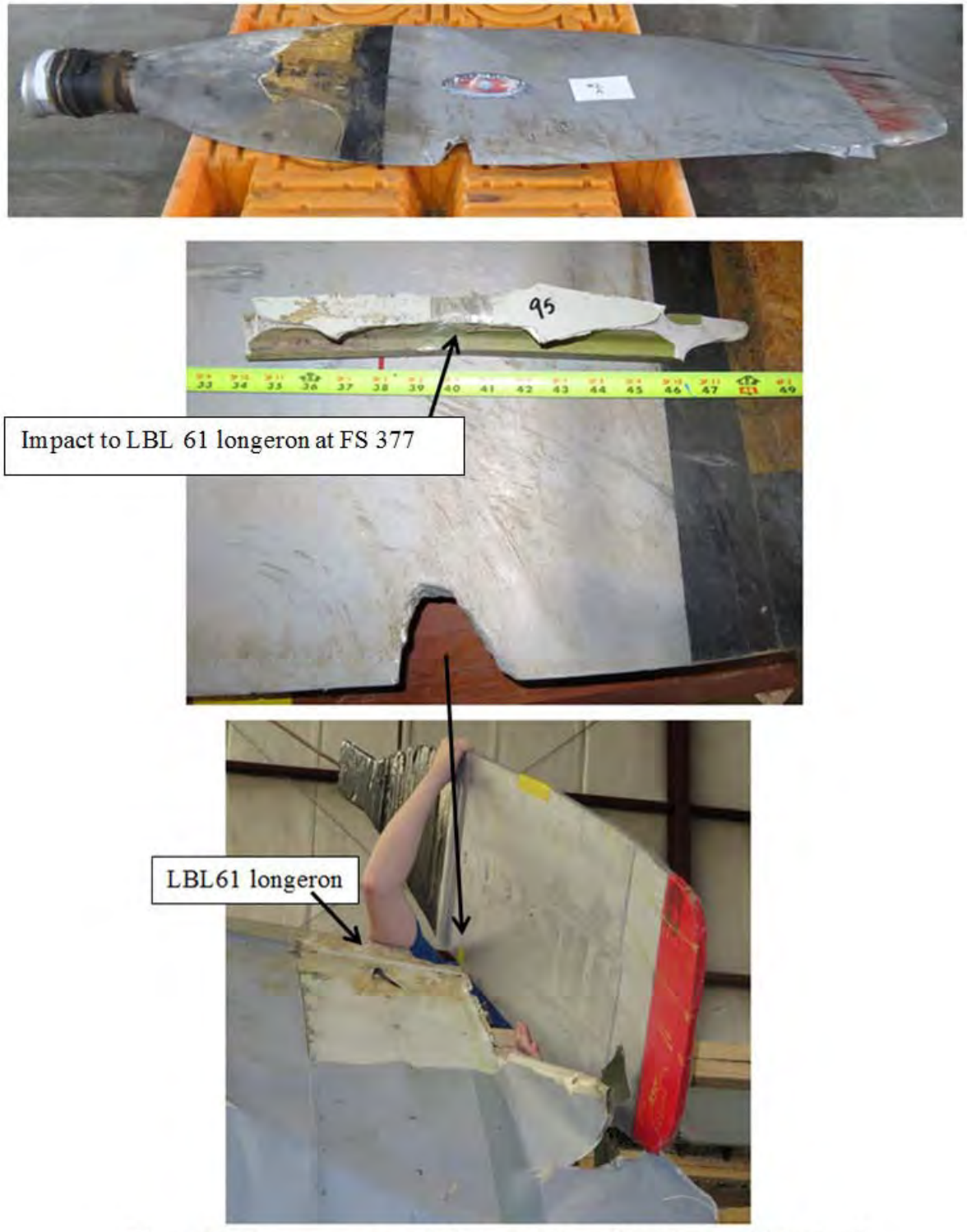


Figure 12: Reconstruction of Blade 4 of Propeller #2 to LH Side Panel

Evidence of Blade 4, Propeller #2, transiting through the center fuselage occupiable space and impacting the fuselage right side structure was found near WL 200, between FS 383.67 and FS 397 ring segments. The damage of interest is annotated in Figure 13 showing an interior and exterior view of the right side structure. The skin between FS 383.67 and FS 390.33 ring segments was dented outward and heavily scored over a 10" distance at approximately WL 200. FS 383.67, FS 390.44 and FS 397 ring segments were crushed downward against the skin and FS 390 ring segment was split lengthwise between WL 180 and WL 220. The two intercostals attached to FS 397 ring segment were flattened against the wall and all three ring segments were heavily abraded and had black material transferred to the contact area. The center fuselage right side skin separated along FS 390.33 just behind the strike location. As shown in a closer view in the lower left photo of Figure 13, the skin separated by tearing along the rivet pattern with fastener tear-out directly aft at each dome nut fastener.

The lack of bulk structural distortion at the WL 200 impact site suggests the liberated blade was prevented from passing completely through the side structure. The stanchion bracket for a troop seatback support beam stowage assembly (P/N 3326704) mounted between FS 377 and FS 397 ring segments was bent into a cup-shape that closely conformed to the root end contours of the liberated blade and showed black material transfer near the forward upper edge. The heavy aluminum bracket in Figure 14 shows the damage attributed to impact from Blade 4, Propeller #2. A parachute stowage support structure mounted in the same area (matched to tubes attached to side panel) also showed buckling damage and one parachute cover had black material transferred across the fabric cover (Figure 15). (No laboratory chemical comparison was performed on the black material transfer due to the obvious physical conformity between the blade and bracket damage).

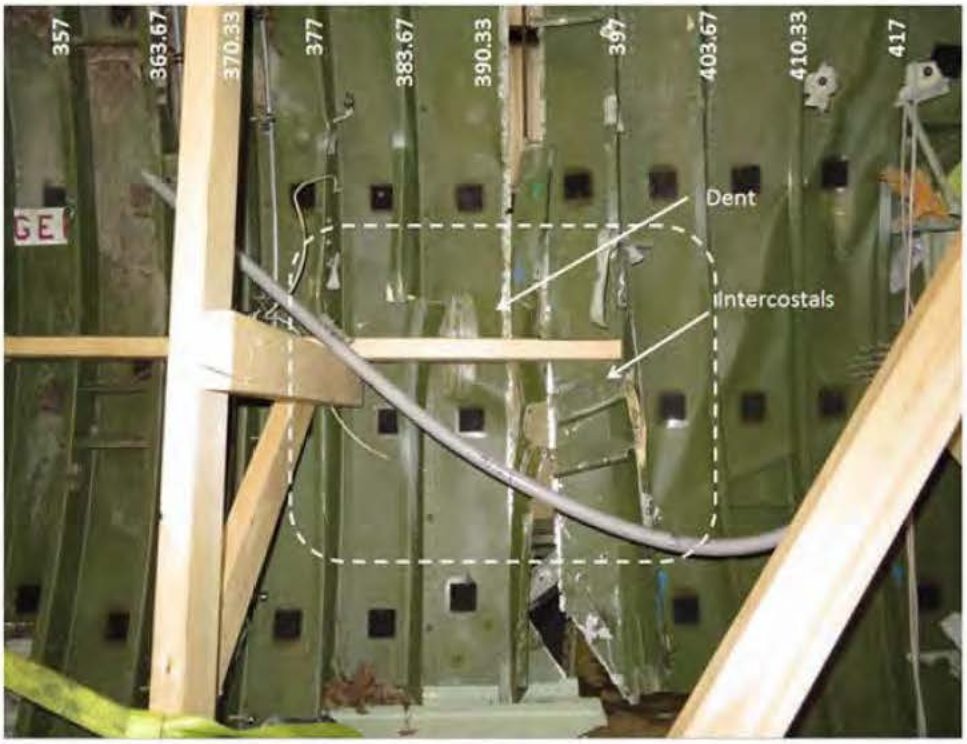


Figure 13: Center Fuselage Section Right Side

Impact damage from Blade 4 of Propeller #2 impacting RH side panel near WL 200 between FS 377 – FS 397

Liberated Blade 4, Propeller #2

Figure 14: Troop Seatback Support Beam Stowage Bracket, P/N 3326704

Figure 15: Parachute Stowage Support Structure and Cover

Showing crush damage and black material transfer likely from contact with the butt end of Blade 4 from Propeller 2

Right Center Fuselage Blade Intrusion Damage:

The right side and upper sections of the center fuselage showed intrusion damage oriented at a diagonal across the upper side of the aircraft (Figures 16-20). The lower boundary of the hole was near FS 383.67, approximately 33" below RBL 61 longeron; the upper boundary was approximately 20" below RBL 20 longeron near FS 350. The side panel was crushed inward and red paint (attributed to the tip strip on a blade) was transferred to the exterior skin near the lower bounds of the hole (Figure 18). The side skin was sliced upward to RBL 61 longeron producing a saw-tooth edge along the slice with the tooth direction rolled inward and pointing upward (Figure 19). The RBL 61 longeron twisted upwards and split lengthwise from FS 363.67 forward to FS 317 as the blade transited through the structure and failed in overload between FS 363.67 and FS 370.33 ring segments. The side skin below RBL 61 longeron, between FS 370 and FS 390, was forced inward and crushed aft and tore along the rivet pattern of FS 390 ring segment upward to RBL 61 longeron. The upper section tore along the rivet pattern of FS 330.33 ring segment, between RBL 61 longeron and RBL 20 longeron, and liberated two pieces of upper section in front of the impact. The upper panel behind the impact was crushed aft by Propeller #3 and caused RBL 20 longeron to fail in overload, in an accordion-like manner at alternating ring segments from FS 350.33 to FS 383.67.

Failure of RBL 61 and RBL 20 longerons and accordion-like buckling aft of the impact site, prompted liberation of upper section from FS 363.67 aft to FS 477 and bounded by RBL 61 and RBL 20 longerons. This section lifted upward and rolled outward, bending to the right along the upper leg of RBL 61 longeron, evidenced by creasing of the upper skin following the edge of RBL 61 longeron between FS 370 and FS 450. The upper section separated by shear overload of the dual rivet pattern along the RBL 20 longeron upper leg between FS 403.67 and FS 437.00. The RBL 20 longeron failed via torsional bending overload upward and to the right at FS 437. The side skin separated from this panel by tensile pull-out along the RBL 61 longeron lower leg. RBL 61 longeron failed in torsional overload near FS 450 allowing the panel to depart upward and to the right. As shown in Figure 20, the aft end of this upper panel section was buckled diagonally from FS 423 at RBL 61 longeron to FS 437 at RBL 20 longeron and the RBL 61 lower longeron was deflected outward and up at the aft point of fracture at FS 450. Severe distortion of the structure surrounding the impact site indicates that the right side and upper fuselage section was structurally rigid at the time of propeller intrusion and the structure offered resistance to liberation of large panel pieces aft of the strike.

The fuselage side section panel aft of the strike bulged outward from FS 390 to FS 430 and the side skin split along FS 390 in tension from RBL 61 longeron downward to the wheel well fairing. This section of side panel tore away from the fuselage in the aft and right direction as evidenced by the diagonal buckling crease angled upward and aft from the wheel well fairing to RBL 61 longeron near FS 447. It was not determined when this panel departed other than it separated after or in concert with liberation of the adjacent upper panel between FS 363.67 and FS 477.

Figure 16: Right Center Fuselage Section, FS 245 – FS 477

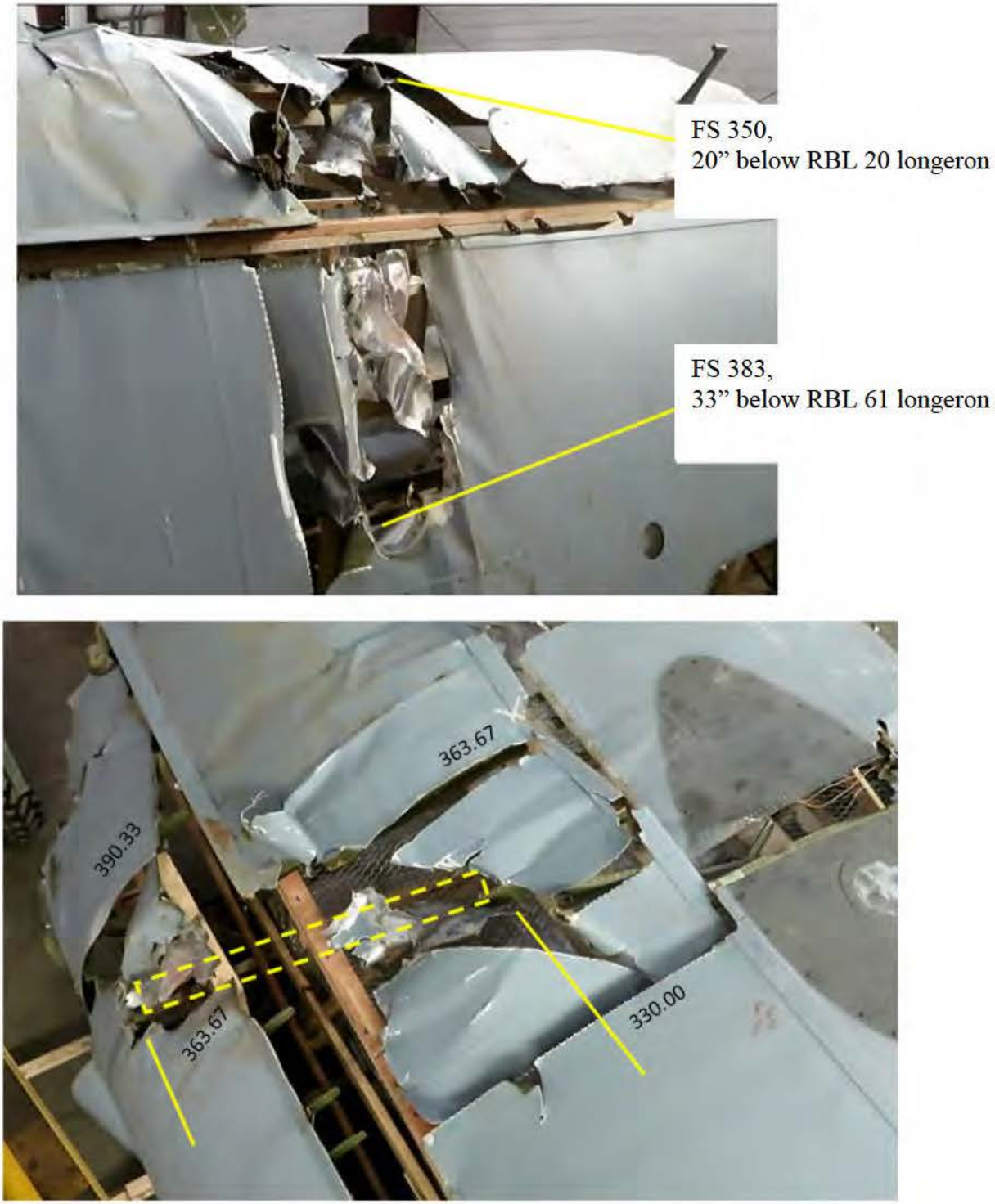


Figure 17: Overhead view of Right Side Center Fuselage Section
Damage attributed to Intrusion of the liberated #3 Propeller

Figure 18: Right Side Impact Damage

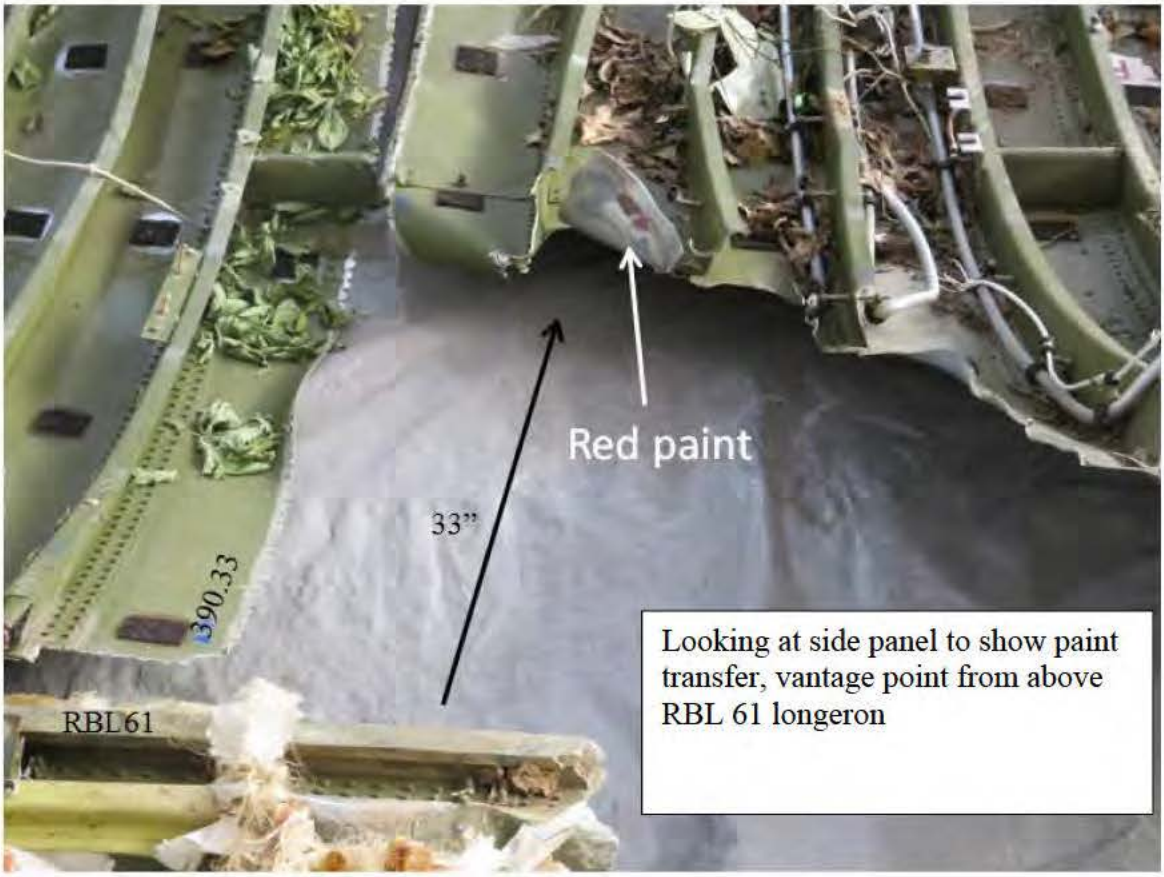


Figure 19: Lower Boundary of Propeller Intrusion

Figure 20: Closer view of Fuselage Center Section Upper Surface STA 330-477

Disassociation of Center and Forward Fuselage Structure:

Analysis of the Observations: The manner of disassociation of the center fuselage structure and the forward fuselage structure was determined by visually examining the attachments along the side panel to upper section and the side panel to the floor. The cumulative damage suggests that the center fuselage between FS 245 and FS 477 collapsed to the left with respect to the floor, behaving as a fairly rigid barrel-structure. Side panel separation from the floor and fragmentation of the remaining upper section likely occurred in concert as the structure collapsed to the left. The forward fuselage section forward of FS 200 was largely consumed by ground fire. Structure between FS 200 and FS 245 was recovered in multiple, heavily mangled pieces from the North site. Due to the condition, this structure was not evaluated in detail during reconstruction of the center fuselage wreckage. The fuselage structure forward of FS 245 separated from the bulkhead and frame assembly by tensile tearing across the top frame attachment and departing away from the floor bulkhead toward the right.

Findings/Observations: As described previously, it appeared that a large panel of upper section between FS 363.67 and FS 437 departed up and to the right as an immediate consequence of the intrusion from Propeller #3. Aft of the propeller intrusion on the right side of the fuselage, the side skin split from RBL 61 upper longeron to the floor panel. The skin separated through the rivet pattern of FS 390.33 ring segment in nearly pure tension, as demonstrated by dome nut/screw tear out in the aft direction at every fifth fastener. The split in the side panel occurred immediately aft of both sites of major structural damage caused by attempted exit of the liberated blade from Propeller #2 and the intrusion damage caused by Propeller #3. The side structure aft of the split was deflected outward above the main landing gear wheel well causing a diagonal crease angled upward and aft to the RBL 61 longeron (Figure 21). It was not definitive if this skin split was a consequence of the Propeller #2 blade impact, intrusion of the Propeller #3 or final disassociation of the center fuselage section.

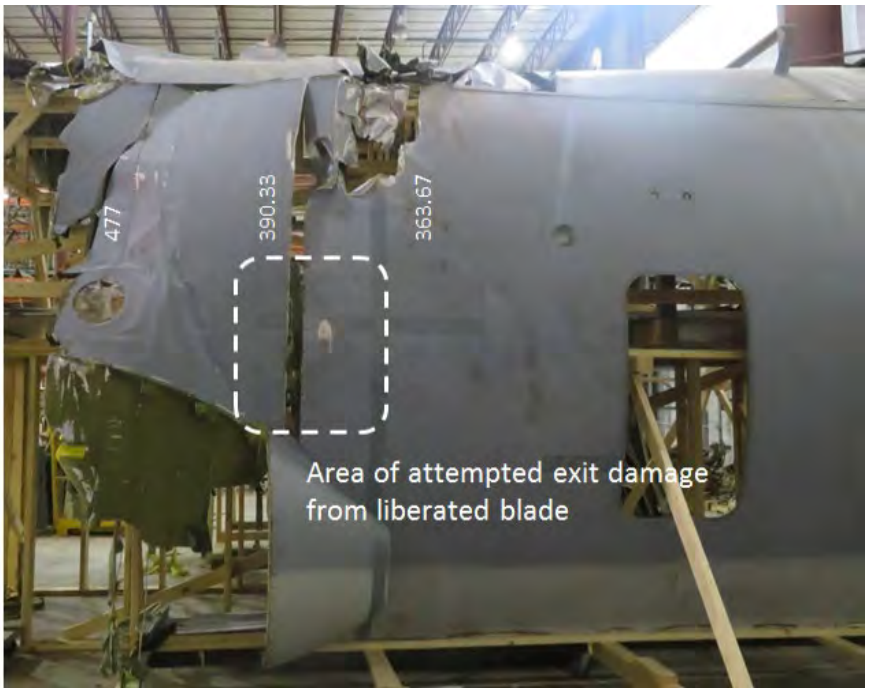


Figure 21: Right Center Fuselage Section

The RBL 61 upper longeron bent in the upward direction and failed in overload through the entire cross section at the propeller impact site near FS 367. The body of the longeron was torn away from the side panel from FS 367 forward to FS 317 where it fractured again through the cross section via torsional overload. The lower leg of the longeron along this section remained with the side panel. The right side panel forward of the propeller strike was relatively intact to FS 245. The crease formed along the upper edge of RBL 61 longeron aft of FS 363.67 (Figure 22), attributed to the aft panel departing up and toward the right, was not present on the section forward of the strike indicating that the forward upper section remained attached immediately after the propeller strike. Separation of the upper panel from the side panel between FS 245 and FS 317 occurred by shear along the dual rivet pattern in the RBL 61 longeron upper leg. Separation of the ring segment tying across the longeron between upper and side panels forward of FS 317 failed in tension.

Figure 22: Right Center Fuselage Section

On the left side of the fuselage forward of the strike damage, the separation behavior of the upper section from the side panel was fairly similar to that observed on the right. Separation occurred mainly by shear failure of the dual rivet pattern along the RBL 61 and LBL 61 longeron upper legs. Failure of the joint tying the upper ring segments to side ring segments showed increased tensile bending beyond that observed on the right side, evidence of the upper section collapsing onto the left side along the LBL 61 longeron. At FS 257, the upper skin tore along the ring segment from LBL 61 to the upper forward corner of the mast antenna brace support block spanning fore-aft on the interior of the upper structure. The skin tear continued diagonally upward to LBL 20 near FS 277, aft along the lower edge of the longeron to FS 297 and then downward to LBL 61, liberating a triangular piece containing the mast antenna. The antenna brace was slightly twisted to the left within the structure at the forward end, further evidence of the structure collapsing toward the left as a relative unit.

FS 297, 303.33, and 310.33 ring segments were broken approximately 7" to the left of LBL 20 from what appeared to be an object transiting from aft to forward, inside to outside splitting the upper section lengthwise just below LBL 20 longeron. This upper side structure between FS 290 and FS 330, which was attached to the upper panel piece extending aft to FS 377, was peeled outward bending about FS 343.67 (Figure 23). The upper skin pulled through the rivet pattern away from the FS 297-FS 310.33 ring segments below the lengthwise split and was locally bent over to the left.

Aft of the intrusion damage from the liberated blade of Propeller #2, the LH fuselage side panel separated from the upper section by fracture of the LBL 61 longeron lower leg, with the longeron remaining attached to the upper panel aft to FS 477. This panel showed minimal distortion with exception of skin peeling upward at FS 390 in the immediate vicinity of the blade intrusion.

Red paint was found transferred to the edges of multiple ring segments on the right upper section interior between FS 397 and FS 417. The paint was analyzed by FTIR (Fourier-transform Infrared Spectroscopy) to be alkyd-based, dissimilar in chemistry to the epoxy-based red paint collected from multiple places on Blade 4 from Propeller #2. The alkyd-based paint transfer was also dissimilar in chemistry to the polyvinylchloride sticker attached to the airfoil surface of Blade 4. The paint transfer on the upper section interior was likely sourced from spray paint used to mark wreckage recovered in the field that possibly transferred to the upper section during transit to the hanger.

The control cables for the engine throttles, propeller condition, aileron, elevator, and rudder were recovered severed into a variety of lengths either by failure during the break-up or during wreckage recovery and relocation to the hanger site. The cable sections were generally not identifiable as to function nor were total lengths for each cable verified. All cable sections were examined at 50x stereoscopic magnification during the hanger reconstruction effort for evidence of propeller blade contact. If evidence of contact was present it was not discerned on any length of recovered cable.

Figure 23: Left Upper Section

Evidence of how the side panels separated from the floor panel was gathered from examination of the floor structure. The basic construct of the floor panel to side attachment is shown in Figure 24. A chine assembly forms the side closure of the floor structure along each side and a bulkhead assembly provides rigidity to the front of the panel at FS 245. The fuselage side structure attaches to the floor by bolting to floor fittings at each of the primary ring segments (FS 257, FS 277, FS 297, etc.). The fuselage side skin attaches along the length of the floor panel by a dual rivet pattern to the chine outboard leg, with the chine overlapping the side skin. The belly skin attaches by a double rivet pattern along the chine inboard leg, again with the chine overlapping the belly skin.

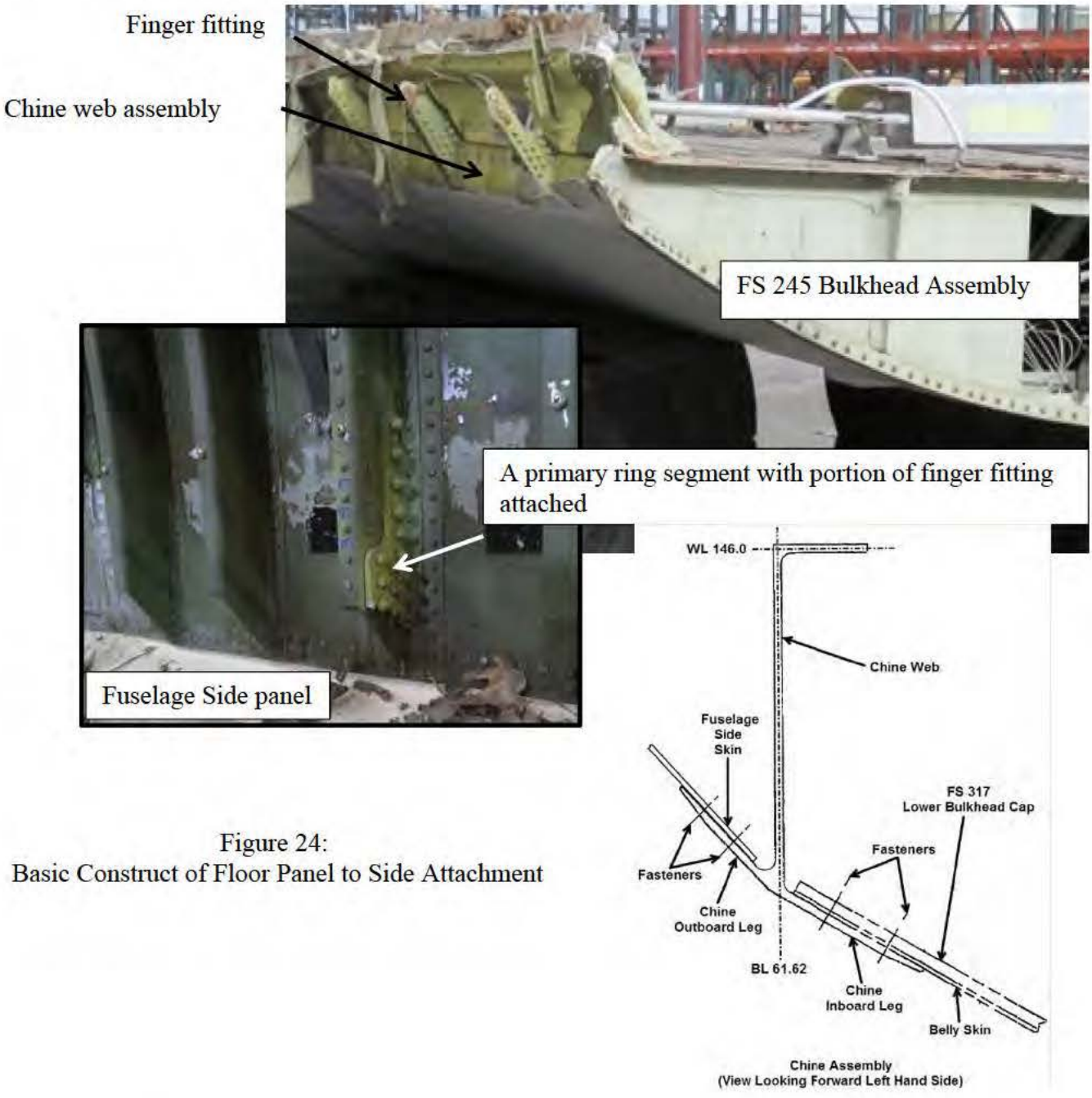


Figure 24:
Basic Construct of Floor Panel to Side Attachment

The center fuselage floor panel from FS 245 to FS 457 (Figure 25) was recovered from the North site. The forward end of the panel was relatively intact; the FS 245 bulkhead was secure as an assembly and showed minimal distortion (Figure 26). The center-to-forward fuselage attachment at the FS 245 bulkhead separated by stripping of the attach bolt threads at the right side and overload failure of the chine assembly across the production splice joint on the left. The chine assembly was bent approximately 20 degrees to the right. The attachment bolt at the right side was similarly bent to the right basically mirroring the deflection of the left chine fracture. The barrel nut was properly oriented within in the left chine assembly with the barrel seated to the aft side of the housing as required. There was no evidence of rubbing or rivet working at either bulkhead attachment. The similarity in distortion at the left and right sides of the floor panel attachment between the center and forward fuselage suggests that the lower fuselage structure immediately forward of FS 245 acted as a fairly rigid structure as it separated to the right away from the FS 245 bulkhead. The cockpit structure forward of FS 200 was essentially consumed in ground fire. Multiple pieces of heavily mangled fuselage structure between FS 200 and FS 245 were not reconstructed during this evaluation.

The aft end of the floor panel structure was crushed in an accordion-like manner in the downward direction with the belly skin buckling between the ring segments from FS 357 to the end of the panel at FS 457 (Figure 27). On the left side, the chine assembly was torn completely out of the floor panel aft of FS 397 and fractured from top to bottom midway between FS 377 and FS 397 ring segments. The belly skin split away from the floor cap along FS 377 across the bottom of the floor panel. The most forward belly skin buckle occurred near FS 377 with the belly skin tearing away from the chine assembly by fracture of the chine inboard leg between FS 337 and FS 377. On the right side, the floor collapsed downward by collapse of the chine assembly and buckling of the belly skin at near FS 390.33. The fuselage side skin remained attached to the floor panel in the wheel well area from FS 397 to FS 457.

Figure 25: Floor Section, Center Fuselage FS 245 – FS 457

Right Side, FS 245

Left Side, FS 245

Figure 26: Floor Panel Forward End

Left Side, FS 357 – FS 457

Right Side, FS 357 – FS 457

Figure 27: Floor Panel Aft End

The left side panel of the center fuselage tore away from the floor panel leaning to the left. Views of each fitting are shown in Figure 28. Fractures of all floor fittings and ring segments were visually verified as overload. At the front of the panel, the FS 245 bulkhead fitting failed in tension just above the lowest bolt in the chine attachment. Minimal to no distortion was associated with fracture of this fitting. FS 257 ring segment separated by tensile failure of the chine floor fitting across the lowest bolt holes. Failure of ring segments at FS 277, FS 297, FS 317 and FS 337 occurred by tearing across the upper bolt hole in the floor fitting. Failure of the FS 357, FS 377, and FS 397 primary ring segments occurred through the lowest bolt hole of the floor fitting. The chine assembly was torn completely out of the floor panel aft of FS 397 failing the floor fittings inboard of the chine. The chine assembly collapsed and tore around the lower edge of the FS 357 and FS 377 fittings and ruptured completely through the cross section just aft of FS 397. As the panel rolled outward, the ring segments were forced inward to crush against the chine assembly aft of FS 317. The intermediate ring segments and floor fittings crushed against the chine assembly denting the chine web near FS 310, puncturing it aft of FS 317 and forcing the fitting completely through the web aft of FS 357. Between each primary ring segment where the two intermediate frames are not joined to the floor, panel separation occurred by overload failure of the chine assembly outboard leg. Most of the fuselage skin between FS 285 to FS 337, with exception of a panel to each side of FS 283.67 ring segment, rolled outward approximately 11” above the lower edge (Figure 29). The damage collectively suggests that the fuselage left side panel departed the floor rolling outward toward the left.

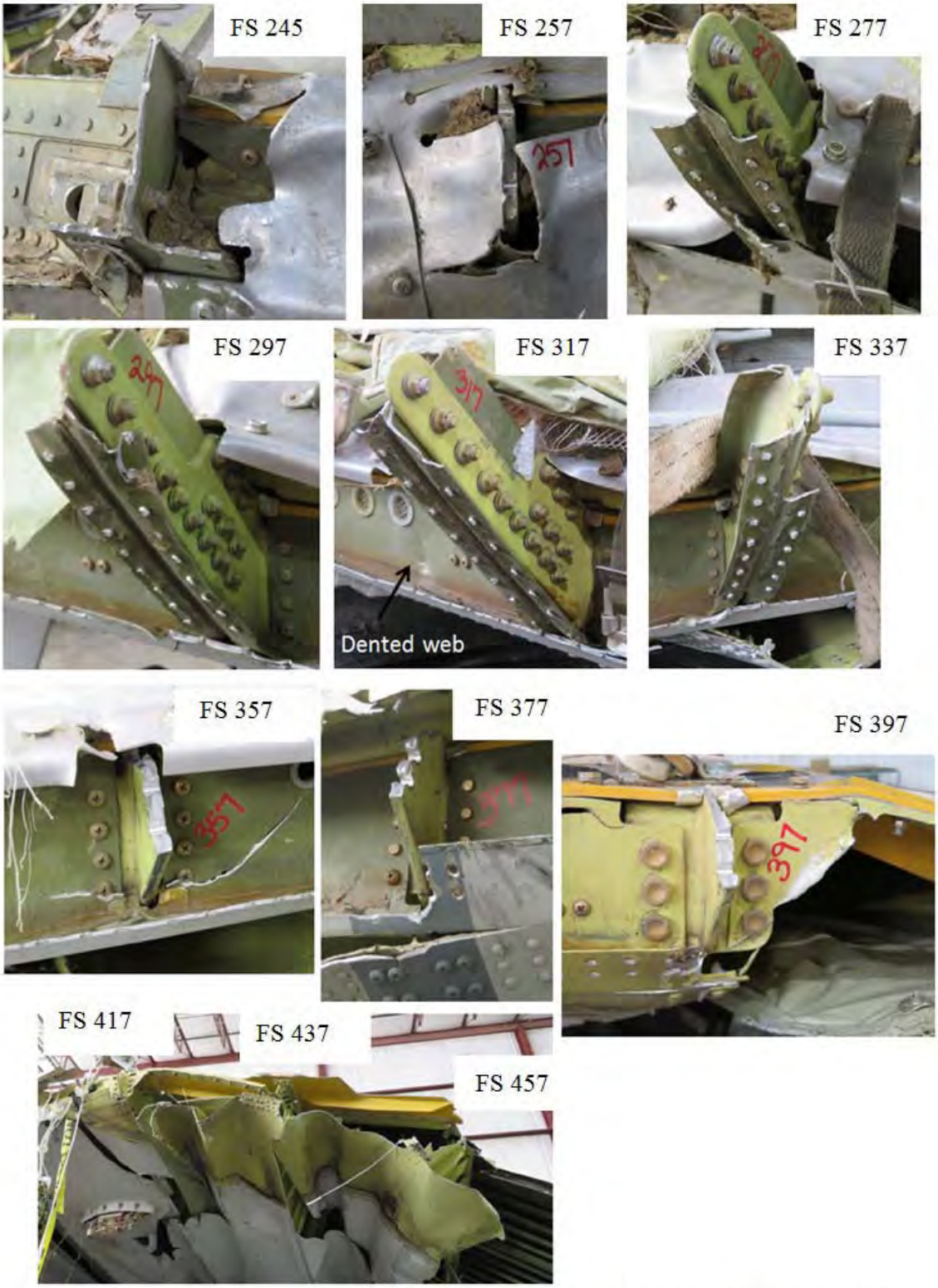


Figure 28: Left Side Floor Fitting to Ring Segment Joint along Chine Assembly

Figure 29: Left Side Panel, Center Fuselage Section

The right side panel of the center fuselage separated from the floor panel by collapsing toward the left. Views of each fitting are shown in Figure 30. Fractures of all floor fittings and ring segments were visually verified as overload. The FS 245 bulkhead fitting and side panel ring segment failed in tension near the plane of the bulkhead upper cap. At the lower end of the FS 257, FS 277, FS 297, and FS 337 primary ring segments, the skin panel tore away from the floor fitting by tensile tear-out along the vertical rivet pattern on each side of the fitting. The ring segments failed via tensile bending overload through the upper bolt hole in the floor fitting. FS 357 and FS 377 ring segments failed across the floor fitting at the lowest set of bolt holes near the chine assembly (indicative of higher loading and/or higher strain rate than failure at the forward ring segments to drive failure into the stronger structure). Near FS 390, the chine assembly collapsed as a consequence of the floor panel buckling downward at the aft end. The fuselage side skin tore upward from FS 390 across to the third set of rivets attaching FS 397 ring segment to the floor fitting, upward through three rivets in the forward leg of the fitting, then diagonally across to the top of the floor fitting and continued aft past FS 417 under the wheel well fairing (Figure 31). FS 397 ring segments failed in tension immediately above the floor fitting. The floor fitting and FS 417 ring segment failed in tension immediately above the chine assembly through the lowest set of bolt holes. The chine assembly and floor fittings from FS 457 to FS 471 were torn out of the floor panel.

Figure 30: Right Side Floor attachment along Chine Assembly

Figure 31: Right Side Floor Fitting separation aft of FS 390

4. Right-hand Outboard Section of the Horizontal Stabilizer and Elevator

Description per the NAVAIR 01-75GAA-3 Structural Repair Manual for the KC-130T Aircraft: The horizontal stabilizer is an all-metal structure consisting of a box beam, leading edges, trailing edges and tip structures. The leading edges consist of outer skin, beaded inner skin, and rib formers attached to upper and lower front beam caps by piano-type hinges. The box beam structure consists of front and rear beams and ribs covered by upper and lower skins. The stabilizer bulkhead at fuselage station 1041 is subjected to cabin pressures. The elevator is a full-cantilever, all-metal structure attached to the horizontal stabilizer rear beam by five hinge fittings. The structure consists of clad aluminum skins, front and rear beams, intercostals and ribs. The trim tab is hinged to the elevator trailing edge. Figure 32 is provided as reference for terminology used in this report with aspects of the construction simplified for clarity.

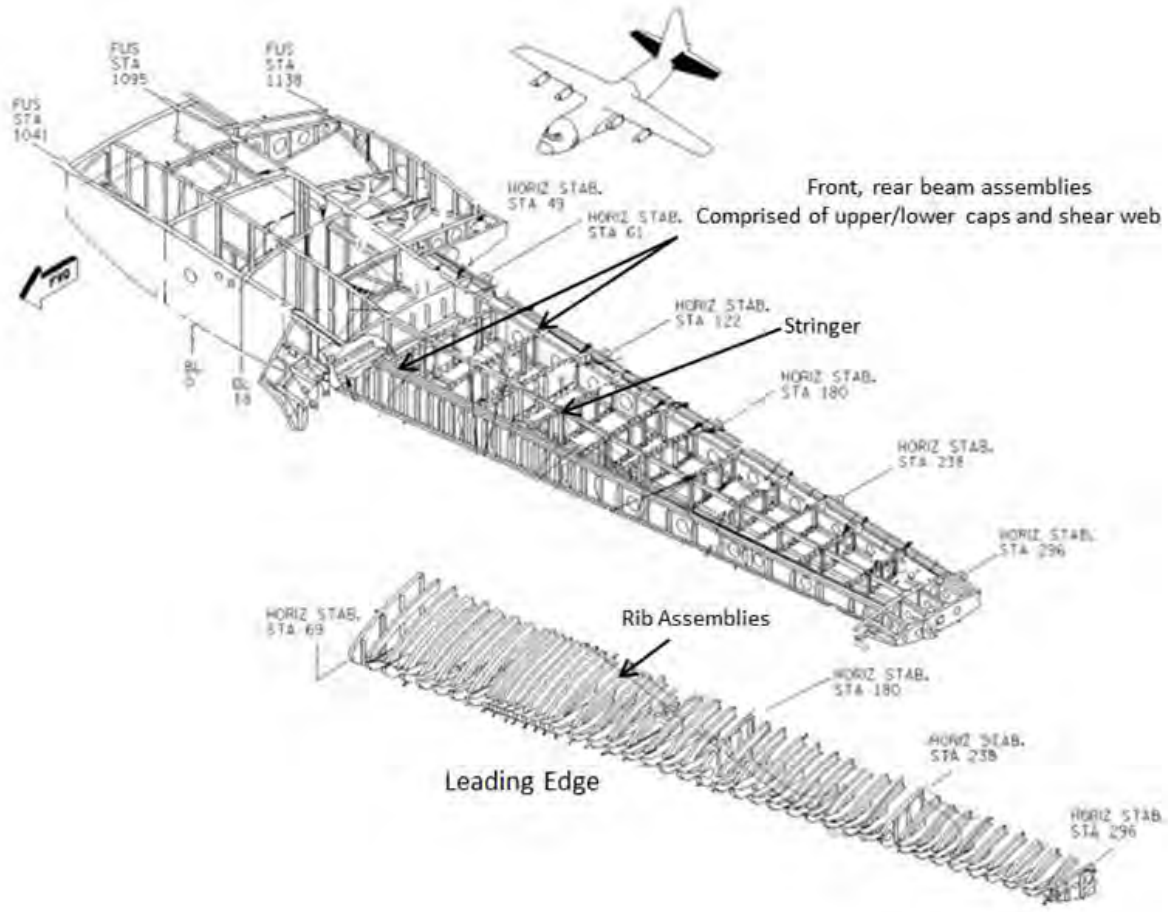


Figure 32: Schematic of Horizontal Stabilizer and Elevator

Analysis of Observations: The RH outer section of the horizontal stabilizer departed during flight as a consequence of impact from Propeller #3. The elevator appeared to have been secure to the stabilizer and separated as a consequence of liberation of the RH outer section of the stabilizer. The propeller impact sliced through approximately 75% of the stabilizer chord-wise section separating the front beam assembly and internal stringer. Overload failure of the remaining structure and rear beam assembly resulted in separation of the RH outer section of the horizontal stabilizer. Initial propeller impact occurred at HSS 130 with Blade 1 oriented such that the airfoil tip end presented to the leading edge. The span of the blade pushed aft through the stabilizer and rotated downward on contact with the front beam assembly to slice through the lower surface. During this repositioning of the propeller transiting through the stabilizer, the adjacent Blade 2 impacted near HSS 180. This blade presented trailing edge first to the stabilizer and sliced through the leading edge, halting before contact with the front beam.

The right elevator was considered to be securely attached prior to separation from the stabilizer. Damage indicated that the elevator twisted span wise outboard of HSS 122 and separated upward and outboard with respect to the stabilizer (or the outer end of the stabilizer deflected downward with respect to the elevator).

Reconstruction:
Figure 33 documents reconstruction of the RH outer section of the horizontal stabilizer and RH elevator (the inboard piece of lower skin was cut from the center structure to facilitate evaluation in proximity to the liberated pieces). One large section of horizontal stabilizer structure, a section of stabilizer rear beam assembly, two pieces of right elevator and two detached hinge fittings were recovered from the North site. The large stabilizer section extended from HSS 130 to the tip; the rear beam section extended between HSS 122 and HSS 180 with approximately 5" of lower skin attached. The outboard elevator sections extended from HSS 190 to the tip and the inner section extended from HSS 120 to HSS 190. Structure inboard of the break remained attached to the stabilizer center section and fuselage until ground impact. The upper skin of section HSS 61 - HSS 130 tore away but was recovered in proximity to the center section at the main wreckage site.

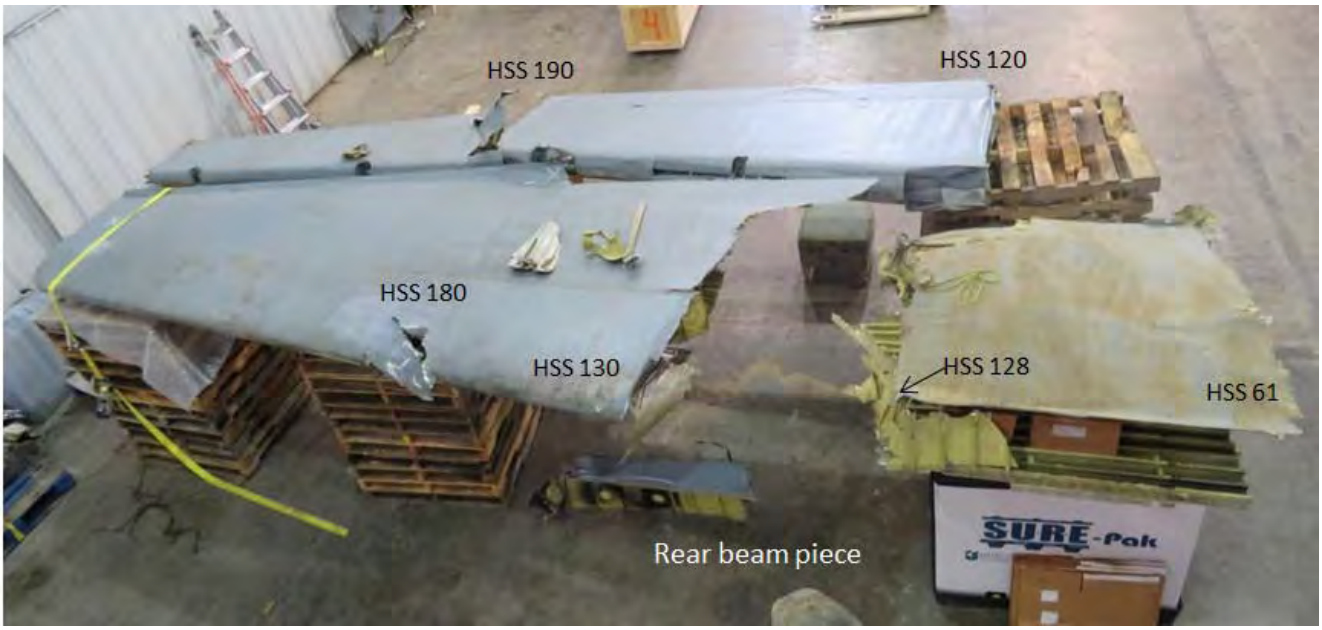


Figure 33: Right Outboard Section of Horizontal Stabilizer and Elevator

Structural failure of the RH outer section of the horizontal stabilizer occurred at HSS 130 as a consequence of impact with the propeller assembly, which separated from the wing in flight due to failure of the RGB case. Blade 1 from Propeller #3 appeared to have impacted the leading edge of the stabilizer presenting the trailing edge first. The blade sliced through the upper skin, front beam assembly and internal stringer constituting approximately 75% of the chordal cross-section of the stabilizer. The leading edge skin was crushed downward and outward against the rib at HSS 130. The upper skin showed saw-tooth curls running aft to the front beam characteristic features of structure being sliced by an object passing through it. The lower skin inboard of HSS 130 was torn in the downward direction and the anti-icing heater ejector tube was severed and pushed aft against the front beam. The dissimilarity in damage between upper skin and lower skin separation suggests that the intruding blade transited spanwise through the upper skin structure and upon contact with the front beam rolled downward to force the lower structure outward. The blade continued through the stabilizer structure to completely slice through the front beam assembly and internal stringer. Red paint transferred along the upper skin structure and front beam further support blade tip entry attitude of the propeller assembly. The upper skin aft of the stringer tore diagonally inboard to the trailing edge near HSS 122 and the lower skin tore outboard to HSS 180 resulting in liberation of a section of the rear beam assembly.

Figure 34: HSS 130 Impact Damage
Leading Edge of Horizontal Stabilizer RH outer section

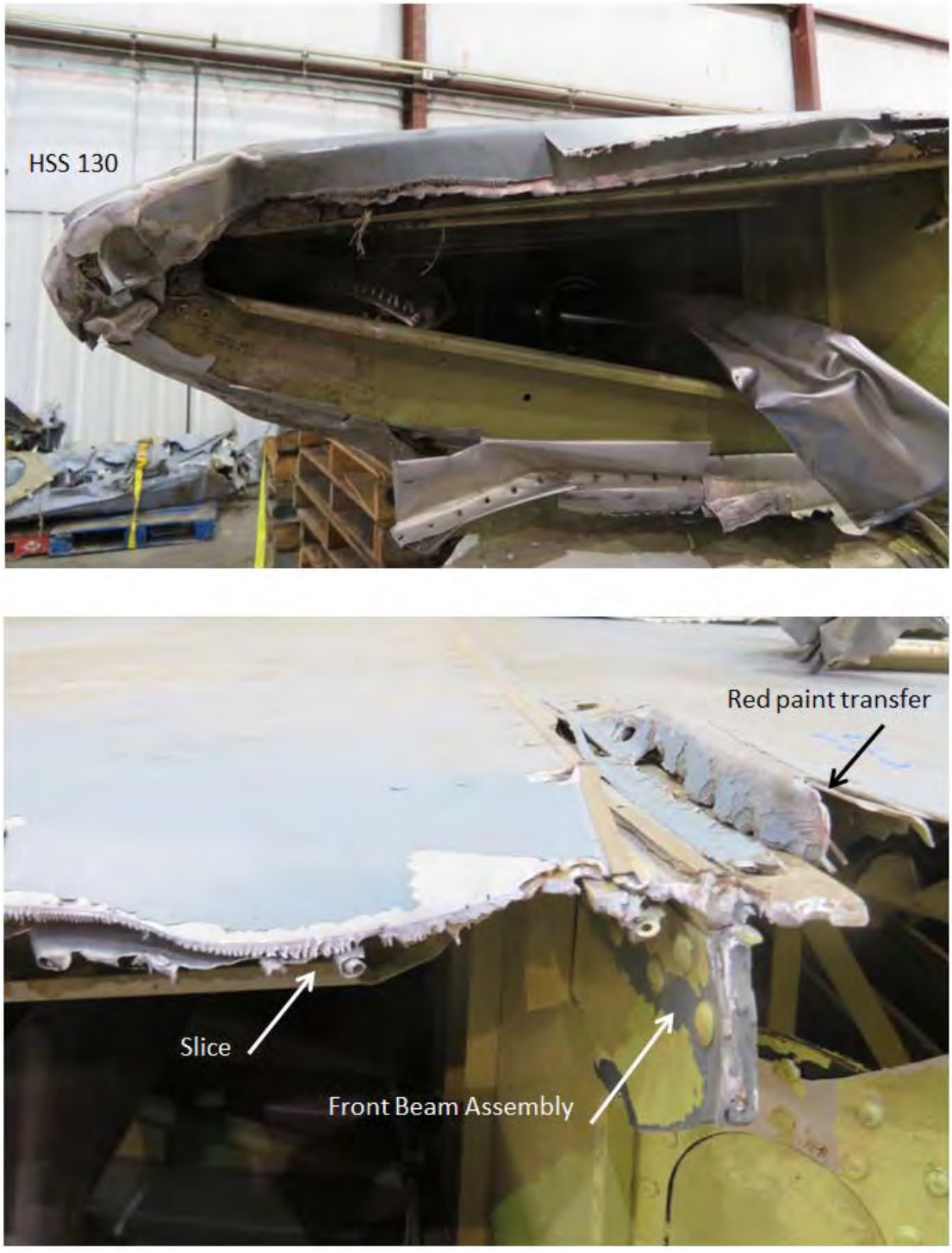


Figure 35: HSS 130 Impact Damage

The horizontal stabilizer also had leading edge damage between HSS 174 and HSS 180, shown in Figure 36. As at HSS 130, the narrow slice was consistent with the geometry of the airfoil edge of a propeller blade. The intrusion sliced through the leading edge at a diagonal angled outboard from bottom to top. Intrusion forced the leading edge to buckle downward between HSS 174 and HSS 180 and then sliced through the anti-icing ejector tube, stopping short of cutting the front beam assembly. A linear imprint crushed into the upper skin surface of the buckled leading edge structure was of similar geometry as the trailing edge of a propeller blade.

Figure 36: HSS 180 Impact Damage
Leading Edge of Horizontal Stabilizer RH Outer Section

The RH stabilizer section inboard of HSS 130 remained attached to the center section until ground impact. The upper skin structure between HSS 61 and HSS 128 was recovered from the Main Wreckage Site in proximity to the empennage and tore away at ground impact. A 20" piece of front beam between HSS 102 and HSS 122 remained attached to the lower skin structure as was the rear beam between HSS 61and HSS 122. The front beam between HSS 61 and HSS 120 was not included in the stabilizer hanger reconstruction. The inboard piece of lower structure was cut from the fuselage to facilitate examination with the RH outer section of the stabilizer. A 58" section of the rear beam between HSS 122 and HSS 180 was recovered from the North site along with two hinge fittings that detached from HSS 180 and HSS 239 of the horizontal stabilizer. The fitting inboard of the break and at the stabilizer tip (HSS 122 and HSS 299) remained attached to the rear beam although the hinge pin fractured at the tip of the elevator.

Figure 37 documents the #3 Propeller that was recovered from the North site. All four blades remained attached to the propeller assembly until ground impact. Blade 1 (Figure 38) was in the feathered position on recovery and the foil was bent along the span in the direction advancing rotation. Blade 2 (Figure 39) was in a low to negative pitch position on recovery. Blade 3 fractured by overload on ground impact and multiple pieces constituting 19" of the tip end were recovered from the North site but distant from the Propeller impact site. Blade 4, was in a near feathered pitch position on recovery and the tip end fragmented on ground impact.

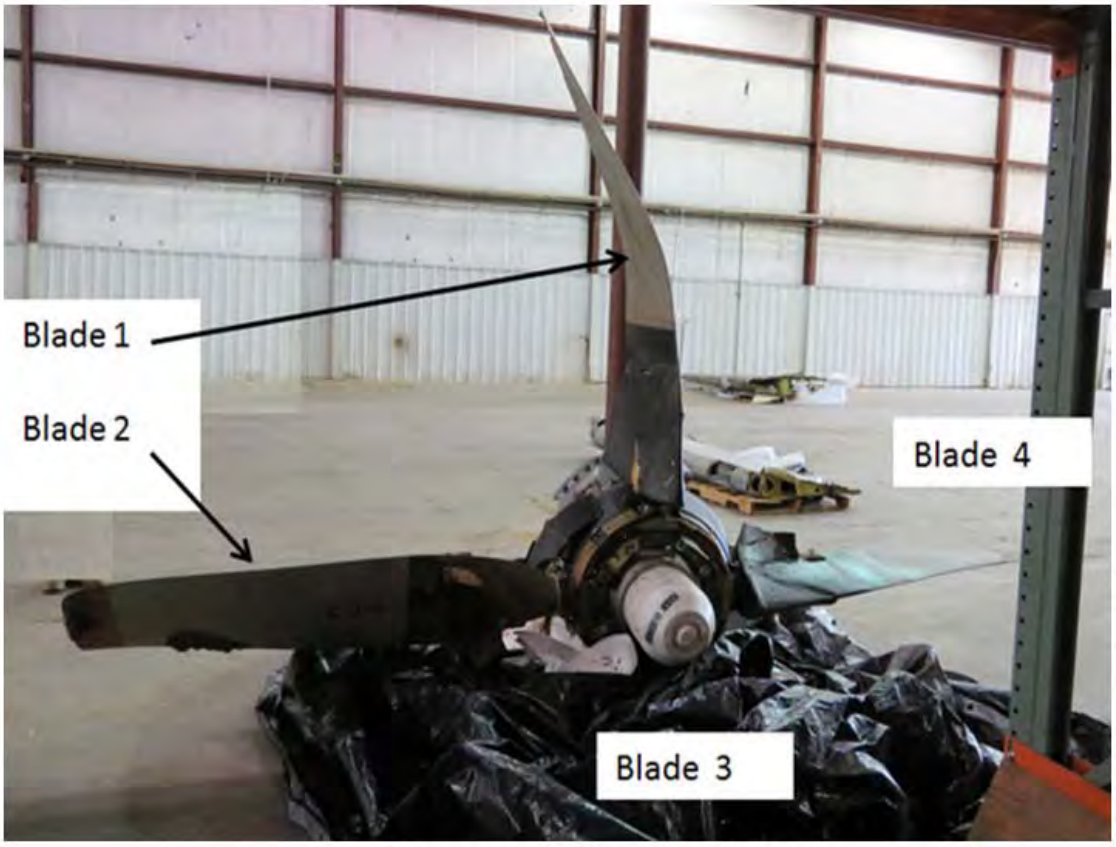


Figure 37: Propeller Assembly #3

Upper airfoil surface

Lower airfoil surface

Figure 38: Propeller #3, Blade 1

Figure 39: Propeller #3, Blade 2

Based on blade scars, Blade 1 was the most likely candidate to have impacted the stabilizer at HSS 130 and by association, Blade 2 was most likely to have impacted at HSS 180 (Blade 4 showed no contact with structure; Blade 3 is in the wrong orientation to Blade 1 to create the damage at HSS 180). The damage on Blade 1 corresponds well with the stabilizer damage at HSS 130 with the blade impacting tip first and pushing through the stabilizer along the span of the blade. As shown in the left photo of Figure 38, approximately 15" of the trailing edge was missing from the tip of Blade 1 and the impact damage was oriented from tip crushing inboard. The crush damage appeared characteristic of impact with robust structure like the front beam spar cap and stringer. Both surfaces of the blade airfoil had abrasive scars oriented in the spanwise direction extending from tip toward root which rotated abruptly toward the trailing edge just inboard of the sticker. Similarly, the trailing edge of Blade 2 airfoil was crushed approximately 20-25" from the tip end and had chordwise abrasive scars running from trailing edge toward leading edge.

Using a crude mock-up of a propeller assembly, and recognizing that a flat blade does not fully replicate the true contours of an airfoil, the scar damage and tip crushing witnessed on Blade 1 was replicated by pushing a blade through the stabilizer with the airfoil oriented spanwise then rotating downward after passing through the front beam assembly. A sequence of the reconstructed evolution of propeller impact based on blade scar damage and stabilizer damage is shown in Figure 40. As the mock-up propeller rotates downward, the trailing edge of Blade 2 contacts the stabilizer leading edge at HSS 180 in the approximate location to account for the trailing edge damage witnessed on Blade 2. Reconstruction of the mock-up blades against the leading edge damage to conform to the stabilizer signatures revealed that both blades likely impacted with approximately 40-45 degree pitch attitude.

Figure 40: Reconstructed sequence of Propeller #3 impact to Horizontal Stabilizer

Descriptions of the elevator attach points outboard of the stabilizer break are detailed as follows:

- HSS 122 (Figure 41): The stabilizer rear beam web inboard of HSS 122 buckled downward and the hinge fitting and supporting rib assembly collapsed outboard. The hinge fitting bearing was destroyed and the bearing outer race was crushed around the upper quadrant on the outboard side due to binding against the elevator pin. This damage serves to indicate that the hinge deflection occurred as the elevator separated from the stabilizer during flight and not as a consequence of ground impact. The leading edge of the elevator showed two impact marks from the hinge being forced against the elevator after separation from the pin. One impact was oriented relatively parallel to normal alignment and the second was angled inboard at the lower edge indicating that the fitting rotated outboard with respect to the elevator. The upper and lower skins of the leading edge showed no interference with the trailing edge of the stabilizer. The pin showed multiple signatures of interference against the hinge bearing inner race, both located inboard of normal hinge position and evidence of elevator separation. The first impact occurred with slight hinge separation along the pin but squarely seated and the second occurred with more hinge separation and angled similar to the recovered orientation of the HSS 122 hinge as collapsed on the stabilizer rear beam

Figure 41: Elevator Hinge Fitting HSS122

- HSS 180 (Figure 42): The hinge fitting was torn out of the stabilizer by overload of the upper and lower support attachments to the rear beam and stabilizer trailing edge. Distortion of the attachment brackets and the direction of rivet tear-out indicate that the hinge was pulled outboard and aft to separate from the rear beam. On the elevator, the upper edge was crushed upward at the outboard corner of the pin housing support due to over-travel of the elevator in the upward direction relative to the stabilizer. The hinge bearing was intact and rotated freely. The inner race was crushed on the inboard side but orientation to the elevator pin could not be reestablished because the inner race was free to rotate within the housing. The hinge pin was intact. The elevator leading edge and lower skin corner were dented inward consistent with the hinge fitting arm crushed flat across the surface.

Figure 42: HSS 180 Elevator Hinge Attachment

- HSS 238 (Figure 43): The hinge fitting separated by shearing the rivets to the upper and lower supports due to the hinge being pulled aft. The hinge rolled inboard to locally tear the rear beam web and fold the web flat against the fitting. The hinge bearing was intact and free to rotate. The elevator pin was intact and the upper skin surrounding the pin housing was deflected upward due to interference with the hinge.

Figure 43: HSS 238 Elevator Hinge Attachment

- HSS 296 (Figure 44): The outboard hinge fitting remained attached to the rear beam. The pin failed via overload bending in the upward direction. The hinge bearing was destroyed and the outer ring captured within the hinge fitting was crushed at the upper quadrant on the outboard face, consistent with the elevator/pin deflecting upward with respect to the stabilizer. The upper skin surrounding the pin housing was bent upward in the same location as HSS 180 and HSS 238 but more extensively, signifying increasing twist along the elevator.

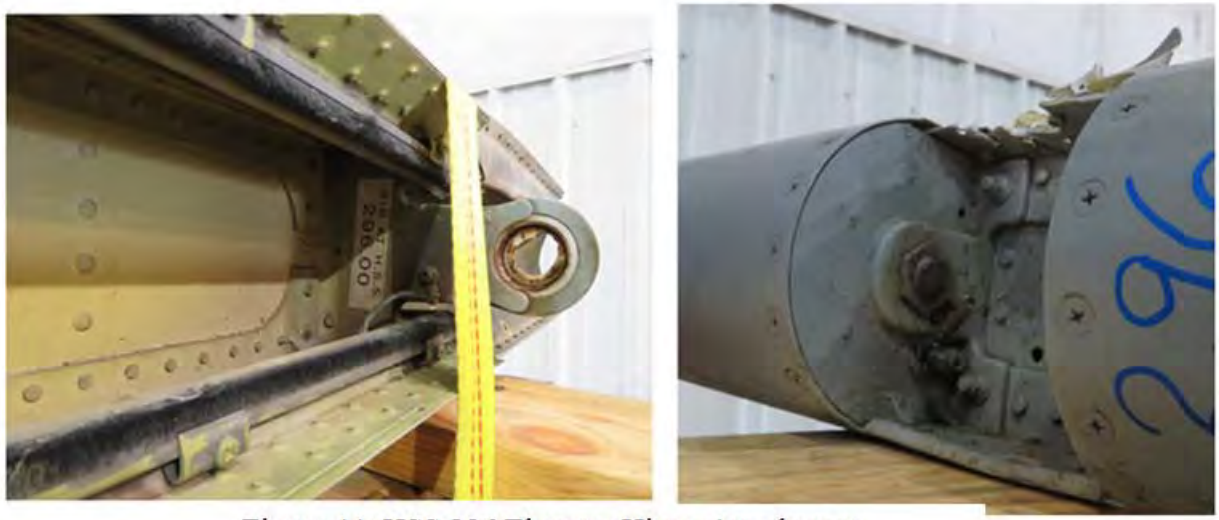


Figure 44: HSS 296 Elevator Hinge Attachment

Both elevator sections from HSS 61 to the tip were recovered from the North site. The break at HSS 190 occurred by compressive buckling, likely as a consequence of separation of the right outboard section of the horizontal stabilizer. The trim tab was intact and secure to the trailing edge. A semicircular dent in trim tab swept outboard between HSS 95 HSS 130. Based on the red paint transfer and similarity in geometry to a fragment of airfoil tip from Propeller #3, Blade 3, the trailing edge damage was likely a consequence of impact with a liberated fragment of Blade 3 airfoil rather than impact with an intact blade. (Figure 45)

Figure 45: Lower Surface of Elevator near HSS 95 – HSS 130
Blade tip fragment from Propeller #3, Blade 3

Examination of the blade damage on Propeller #3 in context to the intrusion damage witnessed by the horizontal stabilizer and the right side of the center fuselage, it is likely that Blade 3 embedded into the fuselage structure creating the intrusion damage to the side and upper sections. This conclusion was reached more as a matter of deduction rather than based on specific correlation of damage between the blade and fuselage signatures. As previously described, damage witnessed by Blades 1 and 2 of Propeller #3 correlate well with the damage witnessed by the horizontal stabilizer. Blade 4 exhibited no evidence of contact with airframe structure. Blade 3, which remained attached to Propeller #3 until ground impact, was fragmented at the outboard end and showed severe abrasive damage across the chord on the lower third of the airfoil surface. The airfoil tip fragments from Blade 3 were recovered from the North wreckage site and distant from the impact site of Propeller #3. The damage observed to the Blade 3 airfoil was considered consistent with impact against airframe structure. Figure 46 documents damage on one of the larger tip fragments showing large gouges and abrasive scoring across the chord approximately 9” from the tip end of the blade.

Figure 46: Propeller #3, Blade 3
Damage likely caused by intrusion into center fuselage airframe structure

Materials Engineering Report

Materials Engineering Division (AIR-4.3.4)
In-Service Support Center
Fleet Readiness Center East, Cherry Point, North Carolina

Report Number:	**CP6819585MER1**	**Date Submitted:**	**18 July, 2017**
Analyst:	(b) (6)	**Submitted By:**	(b) (6)
Analyst's Phone #:	(b) (6)	**Submitter's Phone #:**	(b) (6)
Reference ID:	**WC2EI-PROP-0021-17M**	**Submitter's Organization:**	**4.4.2.5**

Analysis/Service Requested: Failure Analysis
System: KC-130T
Part Nomenclature: Aircraft Propeller Blade
Part Number: A7111D-2
Serial Number: N844995A

Summary

This report discusses the failure investigation of a propeller blade (PN A7111D-2; SN N844995A) that departed from KC-130T BuNo 165000 at cruise on July 10, 2017 over Greenwood, Mississippi. The subject blade came from prop #2 (PN 54H60-111; SN N244247); the #4 blade position.

- Intergranular attack was present within the bushing bore and not removed at the last overhaul dated Sept, 2011.
  - Evidenced by anodize coating extending into intergranular cracking (IGC).
- An intergranular radial crack propagated from IGC through 64% of the shank wall cross section for a length of about 2.7"
- Fatigue initiated from the outer bound of the radial crack and propagated circumferentially for an arc length of 100º prior to catastrophic overload failure and blade departure.

Prepared By:	Date Completed:	Approved By:	Date Approved:
(b) (6)	5 Oct, 2017	(b) (6)	5 Oct, 2017

Distribution: 4.3.4.1, submitter

1. Purpose and Background

This report discusses the failure investigation of a propeller blade (PN A7111D-2; SN N844995A) that departed from KC-130T BuNo 165000 at cruise on July 10, 2017 over Greenwood, Mississippi. The subject blade came from prop #2 (PN 54H60-111; SN N244247); the #4 blade position. Analysis of the reconstructed aircraft fuselage is detailed in Materials Engineering Report CP06811083MER1. An assessment of the additional 15 blades associated with this mishap can be found in Materials Engineering Report CP6829129MER1. A necrology of failures compiled by the OEM, UTC Aerospace Systems (UTAS, formerly Hamilton Sundstrand), cites numerous instances of radial cracks in the bushing and taper bore regions (Appendix A). Corrosion pitting is also often detailed. Although the last failure in the necrology is dated 2010, one blade overhaul facility (Warner Robins Air Logistics Complex) reported scrapping 11 blades (10 Air Force, 1 Navy) this past year for radial cracking. Blade SN N844995A is the first known occurrence of a radial crack which did not propagate fully though the blade shank's thickness prior to initiating a circumferential fatigue crack.

The blade is made from an aluminum forging and consists of a butt end, shank, and airfoil (Figure 1). The upset forged taper bore portion of the blade's shank serves to lighten the blade and hold the blade plug and balancing lead. An aluminum bronze bushing is press fit into the bore, located by two drive pins and secured by two screws. The bushing translates rotational loads to the blade and is used to adjust the blade pitch. The highly stressed fillet located in the outer diameter (OD) of the blade shank ("OD Fillet") is cold rolled to improve the fatigue performance of the blade.

The galvanic couple formed by an aluminum-aluminum bronze interface (blade-blade bushing interface) is more reactive than the commonly known to avoid aluminum-steel interface (Figure 2). Currently several surface treatments are used at this interface meant to protect against corrosion and prevent stress corrosion cracking (SCC) propagation. These include a compressive residual stress layer imparted by either shot peening or low plasticity burnishing (LPB). The purpose of the compressive layer is to counteract any tensile stresses (residual stresses from forging process, hoop stresses from bushing press fit, on wing blade bending, etc.) which may promote the propagation of a crack by SCC mechanisms. To mitigate corrosion which leads to intergranular cracking and potentially SCC, the entire taper bore (including bushing bore) is to be anodized and receive a Permatreat coating. The bushing is to be wet installed with epoxy primer with the intent to isolate the dissimilar metals and prevent galvanic effects.

In addition to the numerous surface treatments/protection schemes and because of the many corrosion related radial cracking failures of these blades, some corrosion mitigation practices have been implemented. Currently the propellers are rotated every 56 days. Since, at rest, the #1 blade position is always at 12 o'clock, the 56 day rotation is meant to redistribute the hydraulic fluid which in theory coats the blade taper bores and prevents moisture/other electrolytes from collecting; thereby, preventing corrosion. If this rotation is missed the blades need to be pulled from the prop for an eddy current inspection of the taper bore (bushing still installed) every 100 hours until the next overhaul. This inspection could find radial cracks that extend past the outboard tip of the bushing. Outboard and inboard directions are with reference to the propeller system unless otherwise indicated. Outboard indicating the direction towards blade tip, and inboard indicating direction towards the blade butt. Aside from prop rotation and the conditional eddy current inspection the blades are overhauled every 5000 hours.

The subject blade was manufactured in 1983 and was last overhauled in September of 2011. For clarification purposes the taper bore, bushing bore, and other associated surfaces will be as annotated in Figure 3. At the Sept 2011 overhaul the blade came in with a shot peened taper and bushing bore. The blade was then reworked which included reprocessing the bushing bore by LPB at Warner Robins Air

Logistics Complex. Following the 2011 overhaul the blade was installed in the current prop in the #4 position. There are at least two instances of the prop slightly exceeding 56 days before being rotated (idle 60 days in Feb and Apr 2012) with no indication of taper bore eddy current inspections being performed. The prop was installed on BuNo 165000 in Oct 2014 at the #2 position (with the subject blade in position #4) and had accumulated approximately 1316 hours since last overhaul prior to failure.

2. Analysis

Material Analysis

Per applicable engineering drawings the blade is to be manufactured from aluminum alloy 7076 per HS26 and heat treated to the T6 condition. Chemical analysis performed via Optical Emission Spectroscopy showed the blade chemistry met drawing requirements. The material hardness was required to be 140 HB minimum at the shank end. The hardness of the subject blade was 88 HRB, corresponding to approximately 147 HB per ASTM # E 140, conforming to the drawing requirements. The electrical conductivity of the subject blade material measured 33 %IACS comparable to typical values cited for 7076-T6 (approximately 35 %IACS) found through internet searches. Unlike other wrought aluminum alloys there is no published conductivity range for 7076-T6 in AMS 2658.

Visual Analysis

A circumferential fatigue crack located in the OD fillet liberated the blade tip/airfoil and shank from the butt end. For ease of transportation the large airfoil was removed from the fractured shank prior to shipping the part to the Materials Lab in Cherry Point, NC. Figure 4 shows the reduced blade shank and butt end fractures of the subject blade in the condition which they were received by the lab. The fatigue propagated on two planes separated by a radial crack that extended (verified by eddy current) 2.25” into the taper bore. The separation of fatigue planes by the radial crack indicates the radial crack was present prior to fatigue initiation and influenced the propagation of the circumferential fatigue crack.

The fatigue fracture surface from the blade shank can be seen after cleaning by acetate tape replicas (used to strip dirt/loose debris from the fracture surface) followed by ultrasonic cleaning in ethanol, in Figure 5. The fatigue crack extended 5.5” around the circumference for an arc length of approximately 100º with initiation at the outer bound (outer here referencing towards shank OD) of the radial crack located at the 30º blade index marking. A discussion of the fatigue fracture surface features and propagation can be found in the subsequent *Fractography* section. The radial crack was fully opened in the lab revealing an intergranular fracture topography. Once opened (Figure 6) the fatigue could be seen initiating directly from the outer bound of the radial crack before propagating outward (towards OD) and circumferentially on two planes as previously shown in Figure 5. A discussion of the radial fracture surface features can also be found in the subsequent *Fractography* section. The entire radial crack fracture surface is shown in Figure 7. Relevant dimensions for the radial and fatigue cracks are shown in Figure 8. The radial crack initiated from the shank’s inner diameter (ID) and did not break through the outer diameter before initiating the fatigue crack. The fatigue crack initiated from the outer bound of the radial crack, propagated towards the OD and circumferentially on two planes roughly 1-1.25” below the outboard tip of the bushing. At the time of failure the total length of the radial crack was approximately 2.7” with about 1.25” extending past the outboard tip of the bushing (inspectable crack length with bushing installed). Historically radial cracks tend to reach lengths around 5-6” and break through to the OD before initiating a circumferential fatigue crack. The subject crack, roughly 3” in length, progressed through only 64% of the blade shank’s cross section before fatigue initiated and is the first known occurrence of fatigue initiating from a radial crack not fully through the blade shank’s wall thickness.

Although an exact origin could not be identified, geometry of the radial crack suggested an origin near the outboard end of the bushing seat (indicated in Figure 7, & Figure 8). This area is considered a "hot spot" as far as corrosion related failures are concerned (referred to as "distal end of bushing seat" in necrology – Appendix A). It is in this area that pitting (a precursor to intergranular cracking) is usually concentrated and numerous historical radial cracks have been found. In this area, on the subject blade, a circumferential band of flakey material was observed (Figure 9, also indicated in Figure 6). Sectioning through this band revealed intergranular cracking (IGC) emanating from tunnel-like corrosion pits beneath the surface. On top of and within the pits/IGC was a gold colored, non-conductive surface coating chemically confirmed via EDS (Figure 10) to be anodize. Also observed in the band of IGC and additionally throughout the bushing seat were gold bottomed craters. Metallurgical cross sections through some of the craters revealed them to also be corrosion pits covered in anodize. The presence of anodize within corrosion pits and the band of IGC provides clear evidence that the corrosion damage was present and subsequently processed over at the Sept 2011 overhaul.

An assessment of the protective surface coatings observed on the subject blade's taper bore showed the previously discussed anodize coating present throughout the taper and bushing bore (although anodize was coated over preexisting corrosion) but no indication of the Permatreat coating that should have also been applied to the entire taper and bushing bore surfaces. Additionally, there was no evidence of epoxy primer (from wet installation of the bushing) within the bushing bore. The lack of Permatreat and primer coverage is a non-compliance with NAVAIR manual requirements.

The taper bore plug was removed along with the lead wool used to balance the blades. Corrosion was noted on the aluminum parts of the plug as well as within the lead wool (Figure 11).When the lead wool was placed in plastic bag moisture collected within the bag. Prior to receipt by lab, the airfoil was sectioned from the shank fracture (approximately 12" outboard of fracture surface) which exposed the outboard tip of the taper bore (plugged portion) to the atmosphere. Reportedly the shank was immediately packaged for shipment. While possible that the electrolyte/moisture was introduced during the time the taper bore had been exposed to the atmosphere, it cannot be dismissed that electrolyte/moisture may have been trapped or migrated into the outboard, plugged portion of the taper bore.

Metallography

A metallographically prepared cross section was made through the band of IGC (Figure 12). Tunnel like pits can be seen following the grain flow from the forging process, running roughly 45 degrees from the surface (ID surface of the bushing bore). The tunnel-like pits extended to depths of 15 thou (0.015") before transitioning to more hairline-like IGC. IGC was observed to depths in excess of 50 thou and also ran roughly 45 degrees to the surface.

Fractography

Representative Scanning Electron Microscope (SEM) images of the radial crack can be seen in Figure 13. The fracture surface had an intergranular topography covered in heavy corrosion product that required the use of acetate replicating tape to strip from the surface. As previously mentioned, fatigue could be seen initiating from intergranular fracture topography at the outer bound of the radial crack. At the approximate origin of the radial crack were layers of flakey material similar to what was observed at the band of IGC on the bushing bore surface (Figure 9) and in the cross sectional view (Figure 12). This suggests that the radial crack was formed as the network of IGC connected/coalesced and propagated through the thickness of the blade shank.

Historically the intergranular radial cracks occurring in blade taper or bushing bores have been classified as stress corrosion cracks (Appendix A). Stress corrosion cracking (SCC) is a form of IGC that propagates rapidly, usually leading to catastrophic failures as the tight/hairline-like nature of the intergranular cracking is difficult to inspect for. Stress corrosion requires the presence of an electrolyte, a sustained tensile force, and a susceptible material. The compressive stress layer imparted by either LPB, in the case of the subject blade, or shot peening acts as a hurdle to any applied tensile stresses (such as hoop stresses from bushing press fit, blade bending with prop at rest, residual stresses from the forging process, etc.). It is possible for intergranular corrosion attack to penetrate through the compressive layer and then form a crack that propagates by SCC mechanisms but numerous radial cracks have originated from pits much smaller than the depth of the compressive layer. And, although these cracks have been occurring as far back as the 1970's a clear understanding of what forces are driving the SCC are still not understood. Furthermore, a 2010 report by Hamilton Sundstrand (now UTAS) on the SCC Resistance of 7076-T6 forgings showed the material to be highly resistant to SCC. Because SCC propagates more rapidly than IGC the conservative approach would be to treat these cracks as SCC. Until a better understanding of the forces driving the crack and material susceptibility/electrolyte chemistry are understood (see *Bushing Analysis* for discussion on presence of lead in bushing bore) the subject report remains at an intergranular radial crack classification. Nonetheless the taper and bushing bore surfaces must be protected from corrosion to prevent these types of cracks from occurring.

The fatigue initiated subsurface, at the outer bound of the radial crack where it propagated towards the OD, breaking through that surface first, as well as splitting onto two circumferential planes. The longer of the two fatigue planes extended approximately 65mm from the origin (tip of radial crack). The fatigue was characterized into three regions; the first extended from the origin to about 35mm, approximately when the fatigue crack broke through to the ID, and consisted entirely of fatigue fracture with no indications of ductility (overload fracture). Between 35 and 50 mm the fracture was mostly fatigue but ductility began to present and increased with distance from the origin. Finally between 50 and 65 mm the fatigue fracture was highly unstable with large amounts of ductility/overload and some fatigue scattered throughout. A macroscopic map of the fatigue fracture surface is shown in Figure 14 and representative SEM images are provided in Figure 15. Representative striations at various distances from the fatigue origin are shown in Figure 16.

Striation counting work was performed in the Materials Lab at Sikorsky's Stratford, CT location using a transmission electron microscope and acetate tape replicas from the fracture surface. Summary of the work can be found below in Table 1.

Following discussions with UTAS stress analysis expertise it was determined that propagation of the fatigue crack is motivated by the blade flexing/bending/twisting stresses which are largest in magnitude in the direction of the 1P Moment vector. The exact location and magnitude of the 1P Moment vector is dependent on flight conditions such as takeoff/cruise, altitude, etc. Since the initiation of the fatigue crack is dictated by the location of the radial crack, and the propagation of the fatigue is motivated by a dynamic 1P Moment vector, the critical (circumferential) crack length prior to catastrophic overload has been shown to vary throughout historical instances ranging anywhere from 90º to 300º. For reference, a sketch of the subject fatigue crack with respect to the 1P Moment vector at climb conditions is shown in Figure 17.

Table 1 – Fatigue Striation Density

KC- 130T BuNo 165000			
Blade SN N844995A			
Distance from origin (mm)	Striations per micron		Crack Velocity (mm/cycle)
15	15.25		6.56E-05
16	20.6		4.85E-05
24	13.2	6.5 coarse	7.58E-05
25	11.5		8.70E-05
26	11.4		8.77E-05
30	9.1		1.10E-04
31	11.6		8.62E-05
31.7	11.6		8.62E-05
42	14.9		6.71E-05
44	16.4		6.10E-05
55	10.6	4 coarse	9.43E-05
56	6.2		1.61E-04
58	8	4.5 coarse	1.25E-04
59	5.4	3 coarse	1.85E-04
60	5.92	3 coarse	1.69E-04
62.5	6.6	3.6 coarse	1.52E-04
64	6.4		1.56E-04

Residual Stress Analysis

To verify the compressive stress layer from the LPB process X-ray diffraction (XRD) analysis was used. XRD was performed at Technology for Energy Corporation (TEC) Materials Testing Division in Knoxville, TN. A total of five locations were tested. Within the LPB processed bushing bore, locations at approximate distances of 0.1", 1.5" and 3" from the butt end were tested. One location in the shot peened taper bore ("Outboard shotpeen") was tested as well as an exterior location to verify cold rolling was performed on the OD fillet ("Cold Roll-fillet Region"). Results, shown in Figure 18, are less than values cited in Lambda Report No 12794 detailing the development of the LPB rework procedure for these blades with depths of compression on the order of 0.05" and maximum compressive stresses on the order of –90 ksi. A smaller depth of compression was recorded for the LPB-3" region, the area where the band of IGC was found. Additional residual stress testing is being performed in this region to better understand the stress state of the material.

Precision Measurement

A series of measurements were made on the subject blade's butt end pre and post bushing removal as well as on the bushing, post removal at the Precision Measurement Center located at Cherry Point, NC. The results were disseminated to the PROPS IPT in separate documents and can be located by contacting an appropriate team member.

Bushing Analysis

The subject blade's bushing is shown, after removal from the butt end and hot wash cleaning, in Figure 19. There was no visual indication of primer from wet installation on the outboard 2+ inches of the bushing OD. Comparison to several other recently removed bushings supported the claim that some visual indication of primer would be evident even after service if primer had been applied to the surface. The lack of primer on the outboard end of subject bushing is a non-conformance to manual requirements that the entire bushing OD (press fit surface) be coated. Surface roughness measurements performed in the lab in the longitudinal direction on the bushing OD resulted in an Ra of 58.5 µin. Two circumferential overload (confirmed via SEM) cracks located diametrically opposite the radial crack and fatigue origin were likely caused during the liberation of the blade tip. The upper/outboard crack had an arc length of 95º, and the lower/inboard crack was 90º long. The two fracture surfaces and representative SEM images showing dimpled overload fracture are provided in Figure 20.

A wear step present within the bushing ID inboard-most 0.5" extended for approximately 90º arc length. The maximum height/depth of the wear step was located adjacent to the "A" index, the height was recorded by PMC.

Chemical analysis of a dark spot observed on the bushing OD (indicated by green arrow in Figure 19) showed the substance to be lead. Similar lead flakes have reportedly been found on Air Force bushings, details of which can be found in Report No. AFRL/RXS 17-023. Lead may have been transferred to the bushing bore surface when the blade was being balanced. The exact significance of this finding is unknown; however, lead may contribute to galvanic effects or potentially effect electrolyte chemistry and have a direct impact on initiation/propagation of the radial crack and warrants further investigation.

Although not explicitly stated on the drawing, through email correspondence the bushing material was determined to be aluminum-bronze consistent with AMS4870. OES analysis found the subject bushing material to conform. Fourier-transform Infrared Spectroscopy (FTIR) and X-ray Fluorescence (XRF) of the primer substance found it consistent with MIL-PRF-23377, conforming to instructions in NAVAIR 03-20C-4. Details of this analysis can be found in Materials Engineering Report CP6829129MER5.

3. Discussion

Evidence of inadequate removal of corrosion damage drove the investigation to a review of the blade's overhaul manual. While a full interrogation of the NAVAIR 03-20C-4 manual was not within the scope of this report a limited review of the revision that the subject blade was processed to, as well as the current manual identified examples of conflicting direction or vague/confusing statements that could offer an opportunity for insufficient detection of corrosion or otherwise misprocessing of blade hardware. This is based upon a strict interpretation of the manual irrespective of traveler documents or artisan intervention.

Ever since the implementation of the LPB process in 2010 it became the preferred method of imparting compressive stresses to the bushing bore. So, whenever a blade with a shot peened taper bore would come in for overhaul, along with whatever rework it required, the bushing bore would be reprocessed with LPB. Following the 03-20C-4 manual dated Sept 2010 (manual in place at time of Sept 2011 overhaul) the blade would receive a series of non-destructive inspections prior to LPB. The blade bushing, and plug would be pulled and any lead wool would be removed. To remove lead that smeared/transferred onto the taper bore surface as well as adhesive residue, instructions are to glass bead blast the entire taper bore including the bushing seat. Instructions follow to mask certain areas and then

blast the taper bore “except smooth areas”. This is concerning, because blades that have already received LPB would have a smooth bushing bore, and blades that have not yet received LPB could potentially have a smooth bushing bore if some reaming was performed to achieve proper bushing fit. The current (2017) 03-20C-4 manual was checked to see if this contradiction had been cleared up and the same exact language exists. Now that LPB is considered the preferred treatment this is particularly concerning since the majority of blades will have smooth, LPB processed bushing bores and language such as this leaves interpretation open to whether or not the artisan should blast the bushing bore. Furthermore, the intent on whether or not the bushing bore should be blasted and concerns with blasting on top of LPB, etc. are not understood.

Following the glass blasting is a caustic etch and desmut; laboratory trials showed this process did not remove anodize/Permatreat coatings so, if the bushing bore was not glass blasted the old anodic and Permatreat coatings would still be present. Borescope is the first prescribed inspection looking for corrosion, gouges and scratches at 10X. Extensive instructions follow calling for operator breaks at prescribed intervals, recertification on inspection standards. Mock borescope inspections performed in the lab surfaces that had Permatreat and anodize proved extremely difficult due to high reflectivity, and coloration differences. The type of tunnel-like pitting observed (Figure 9, Figure 12) appeared only as small pinpricks to the surface and could very easily be missed or mistaken for nothing with surface coatings present.

The next inspection is fluorescent penetrant inspection (FPI) to find cracks. As a precursor to the inspection the old anodic coating from the entire blade would be stripped (also removing Permatreat). Instructions are to inspect for “linear or aligned indications” and confirm indications with eddy current. Examples of the FPI indications for the band of IGC on the subject blade are shown in Figure 21. These indications would not be cause for rejection per the 2010 manual or current manual revisions. Additionally the manual does not specify a dwell time which allows artisans to use the minimum time per NAVAIR 01-1A-16-1/T.O. 33B-1-1 of 30 minutes. Best practices to inspect for SCC/IGC, which is well known to be the mode of fracture for these radial cracks (reference radial cracking necrology – Appendix A), as prescribed in NAVAIR 01-1A-16-1/T.O. 33B-1-1 is a minimum 240 minute dwell. The longer dwell time is to account for the very tight nature of IGC and allow the penetrant maximum time to seep into the hairline fractures (Figure 12) and allow for the best chance to find the crack.

The use of eddy current to confirm these indications would not be ideal either. Eddy current is optimized to find a crack running perpendicular to the surface. Because of how the taper and bushing bore is formed (upset forging) the grain flow runs approximately 45º to the surface. The mechanism by which aluminum alloys corrode is intergranular, so the corrosion and subsequent cracking will follow the grain flow and run 45º to the surface. Eddy current over the band of IGC, where IGC is known to be at least 50 thou deep, was only picking up roughly a 5 thou indication, barely above the noise level, and certainly not a cause for rejection.

After inspections a flow chart is referenced to determine if the blade requires rework. If the bushing bore does not have LPB, and no corrosion was found in the aforementioned inspections, the blade would go directly to LPB with no instructions to ream off old shot peening texture and existing compressive stresses. It is currently not understood how LPB over shot peening texture would affect the bushing bore surface and what the stress state/transitions would be beneath the surface.

In addition to the manual’s FPI inspection inadequacies, best practices to inspect for corrosion in aluminum alloys per NAVAIR 01-1A-509-2 include a glass blasting procedure prior to inspection.

Results of this process on the band of IGC are shown in Figure 22 where the corrosion damage is immediately noticed on the blasted surface. Corrosion indications revealed by this process during inspection would require rework. Following rework the surface would be glass blasted again until no corrosion indications were found or the blade exceeded its rework limits. This blasting procedure is meant to enhance the surface for inspection and not to remove or clean corrosion damage. Further development of this process is still being pursued.

Additional scrutiny of the current (2017) 03-20C-4 manual found another contradiction in the STRIPPING OF ANODIC COATING section. It states both in the same section that it is and is not mandatory to strip the entire anodic coating to facilitate inspection (Figure 23).

In addition to the direct contradictions found in the current and prior manuals there are numerous other instances where the language can be left to artisan interpretation. One section will explicitly call out taper and bushing bore surfaces and another section will only refer to taper bore (one example in 2017 manual WP 005 00 pg 12 lines a(5) versus b), the latter leaving interpretation open as to whether or not to include the bushing bore surface.

Understanding that ultimately the processing steps are governed by the travelers organized by the respective blade overhaul facilities, the processing order outlined in the document governing those travelers, in other words the 03-20C-4 manual, allow for potential quality escapes. One such example presents in WP 005 00 section 13E, when just prior to shot peening the taper bore (taper bore as defined in Figure 3) instructions are to mask the bushing bore. The taper bore would then be shot peened, and with no instructions to remove masking artisans are told to do a bluing check for bushing fit. Assuming the artisan removed the masking to perform the bluing check this would lead to the taper bore and the bushing bore, since masking was removed, to be anodized prior to LPB. And again it is open to interpretation whether or not anodize would be stripped prior to LPB.

This is not meant to be a definitive list of concerns but meant to address the need for further scrutiny and cleanup of the NAVAIR 03-20C-4 blade overhaul manual.

4. Conclusions

This report discusses the failure investigation of a propeller blade (PN A7111D-2; SN N844995A) that departed from KC-130T BuNo 165000 at cruise on July 10, 2017 over Greenwood, Mississippi. The subject blade came from prop #2 (PN 54H60-111; SN N244247); the #4 blade position.

- Intergranular attack was present within the bushing bore and not removed at the last overhaul dated Sept, 2011.
    - Evidenced by anodize coating extending into intergranular cracking (IGC).
- An intergranular radial crack propagated from IGC through 64% of the shank wall cross section for a length of about 2.7”
- Fatigue initiated from the outer bound of the radial crack and propagated circumferentially for an arc length of 100º prior to catastrophic overload failure and blade departure.

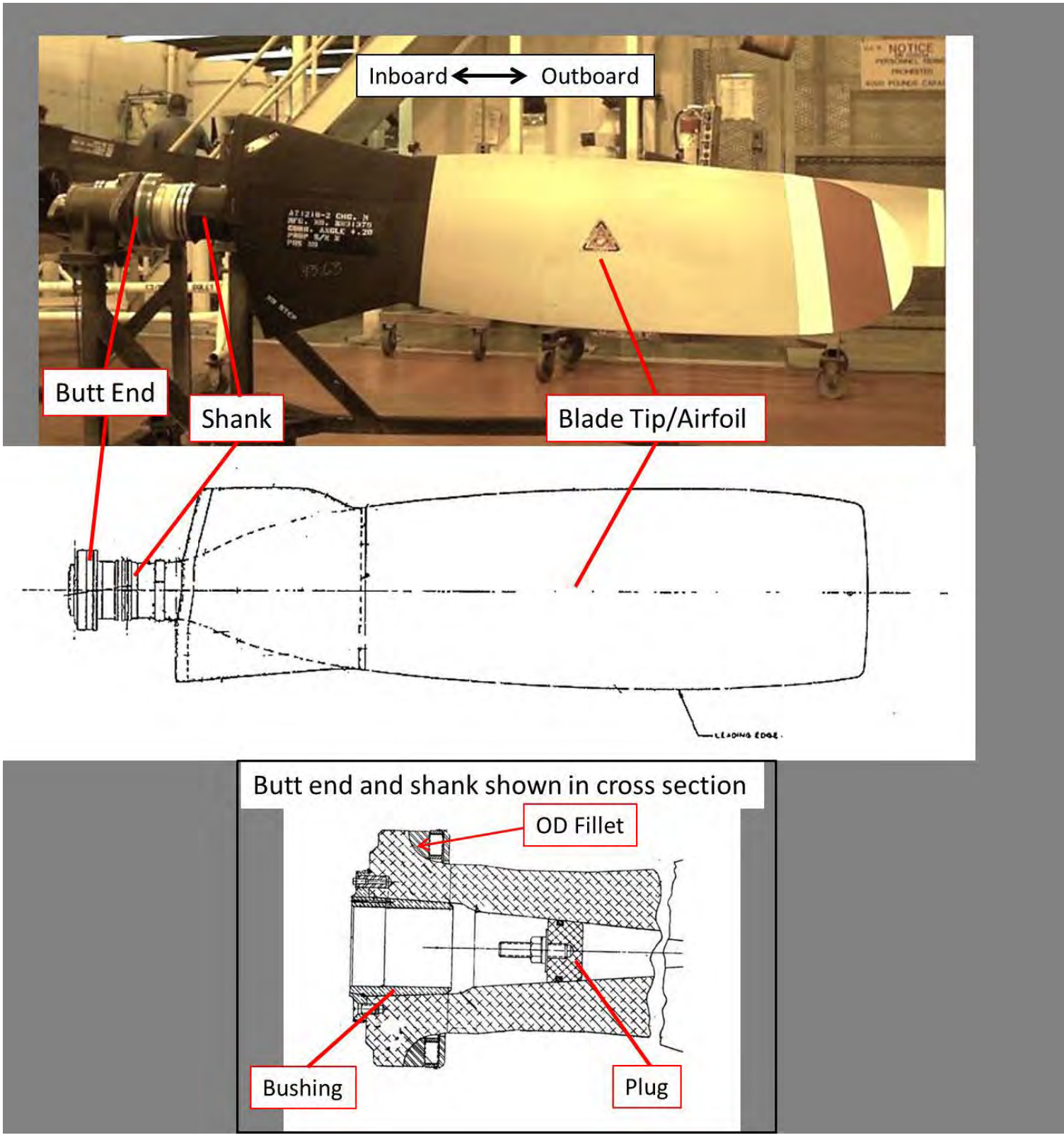


Figure 1 - A7111D-2 Propeller Blade and Cross Section

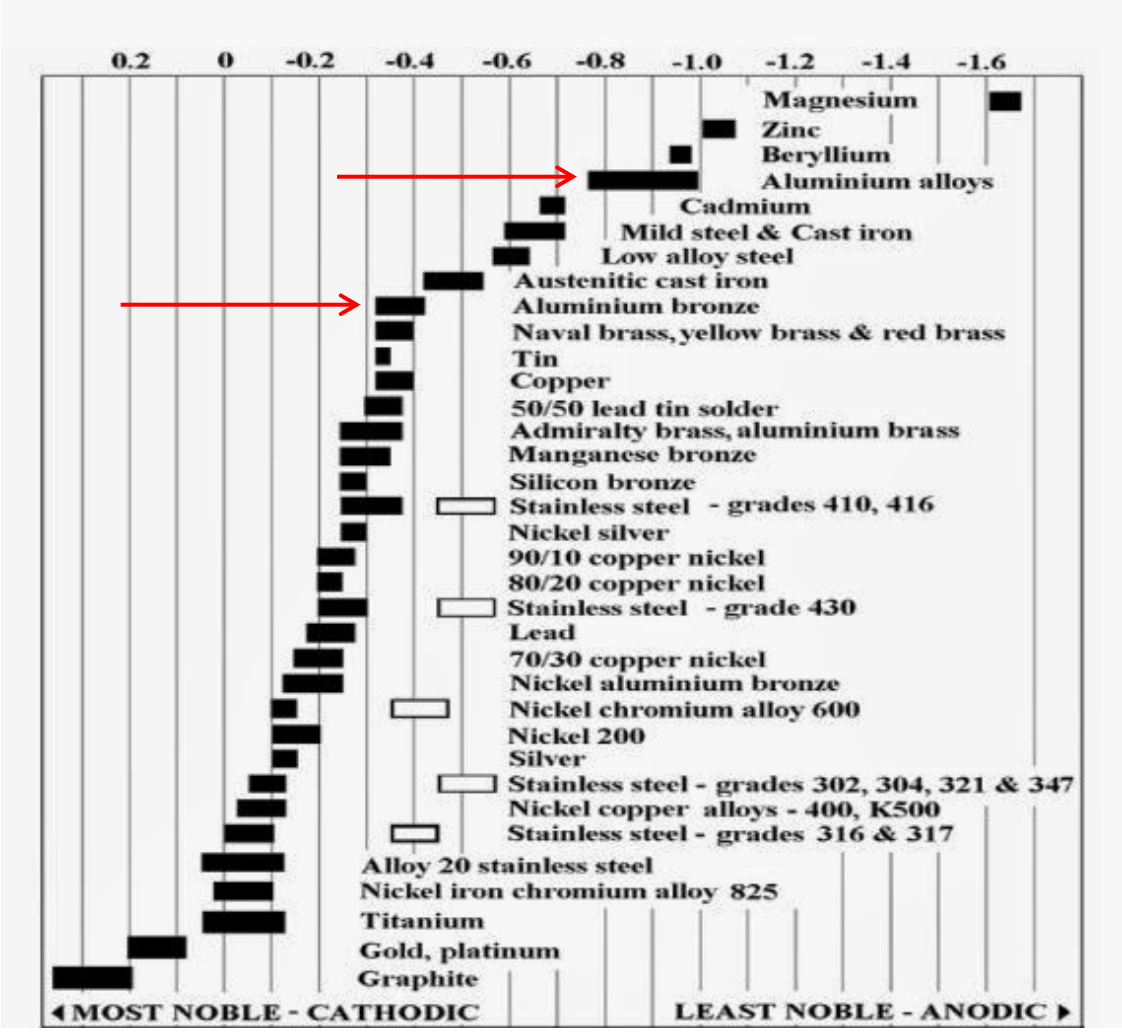


Figure 2 - Galvanic series for metals and alloys in seawater

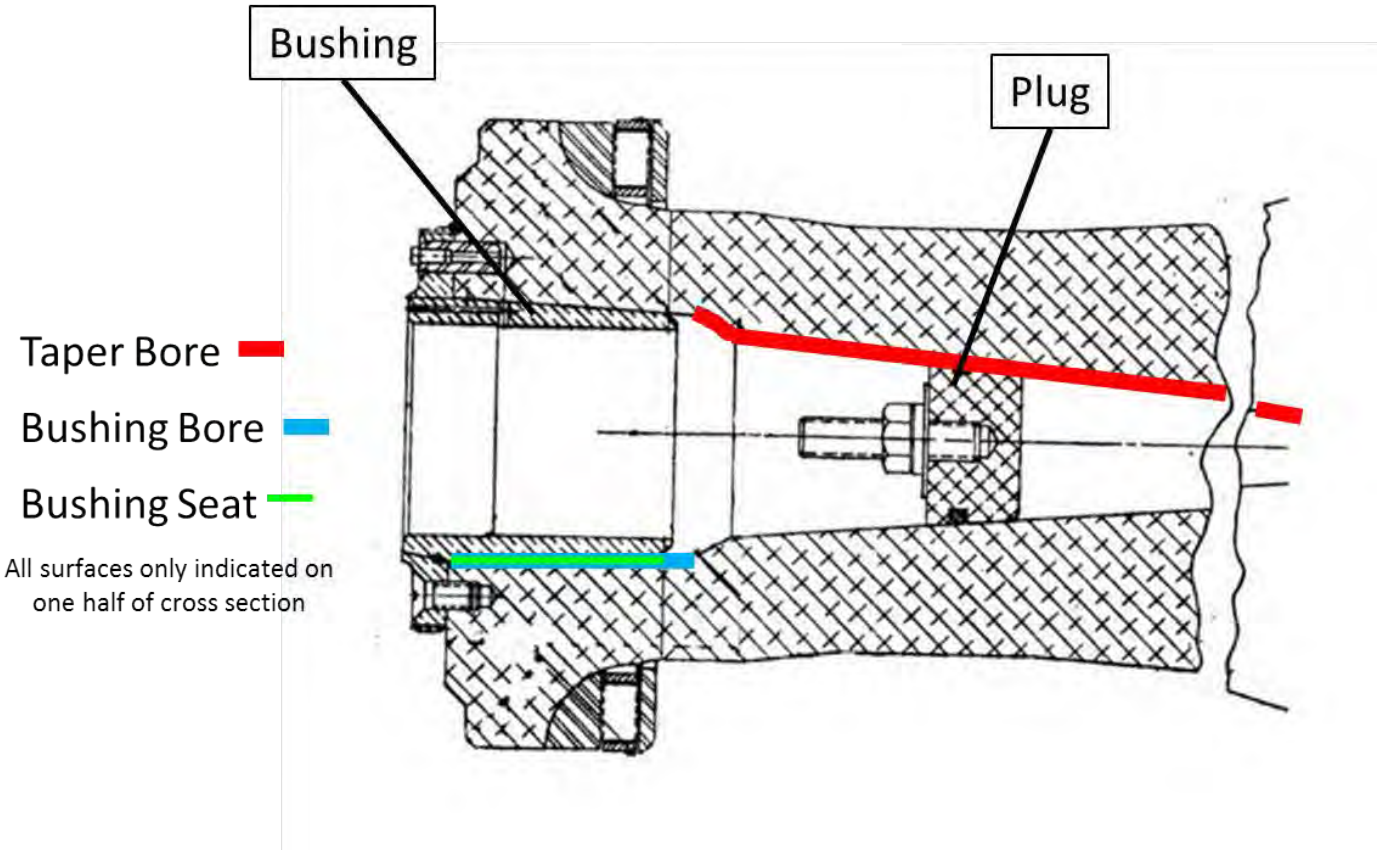


Figure 3 – Taper and Bushing Bore Surfaces Annotated

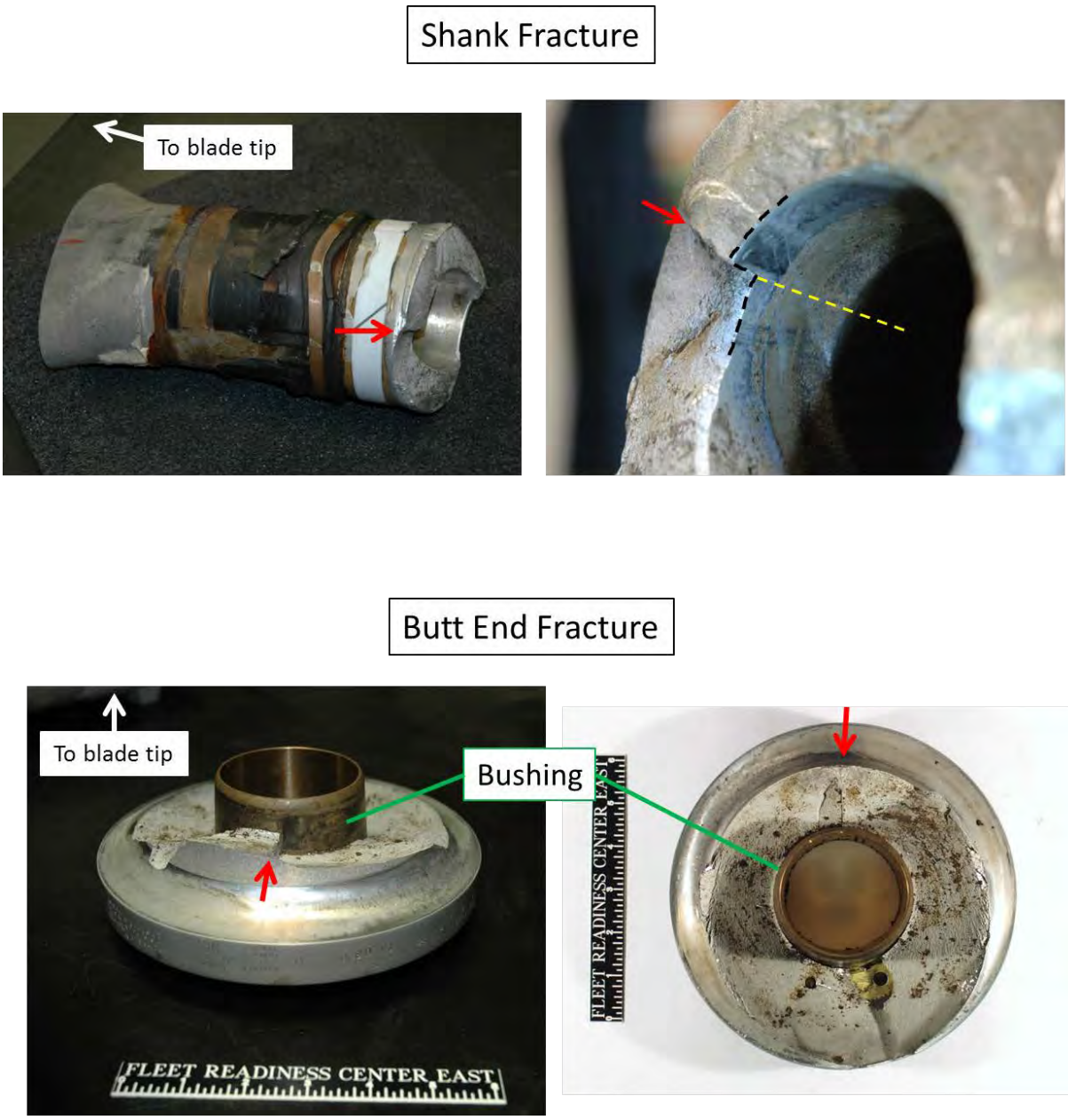
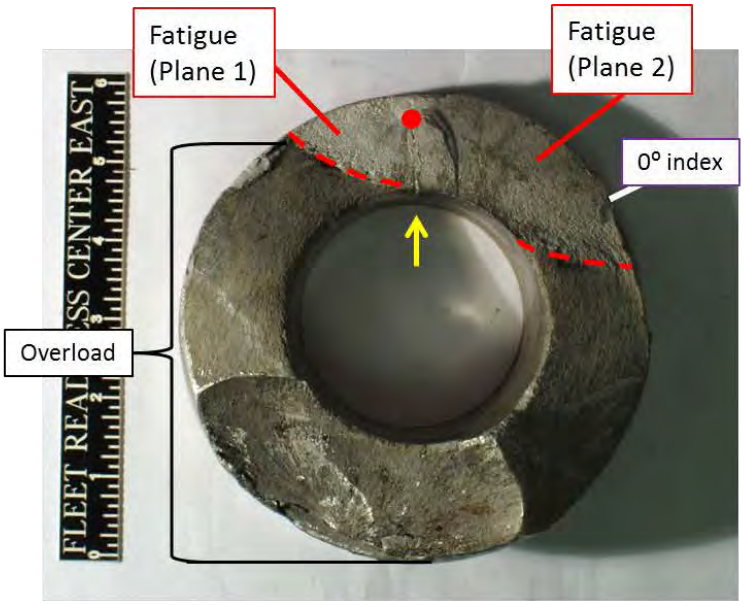


Figure 4 - Blade tip and butt ends in condition received by lab. Red arrows indicates radial crack. Yellow dotted line shows radial crack length extending into taper bore. Note separation of fatigue planes through step formed by radial crack indicated by black dotted line top right image.



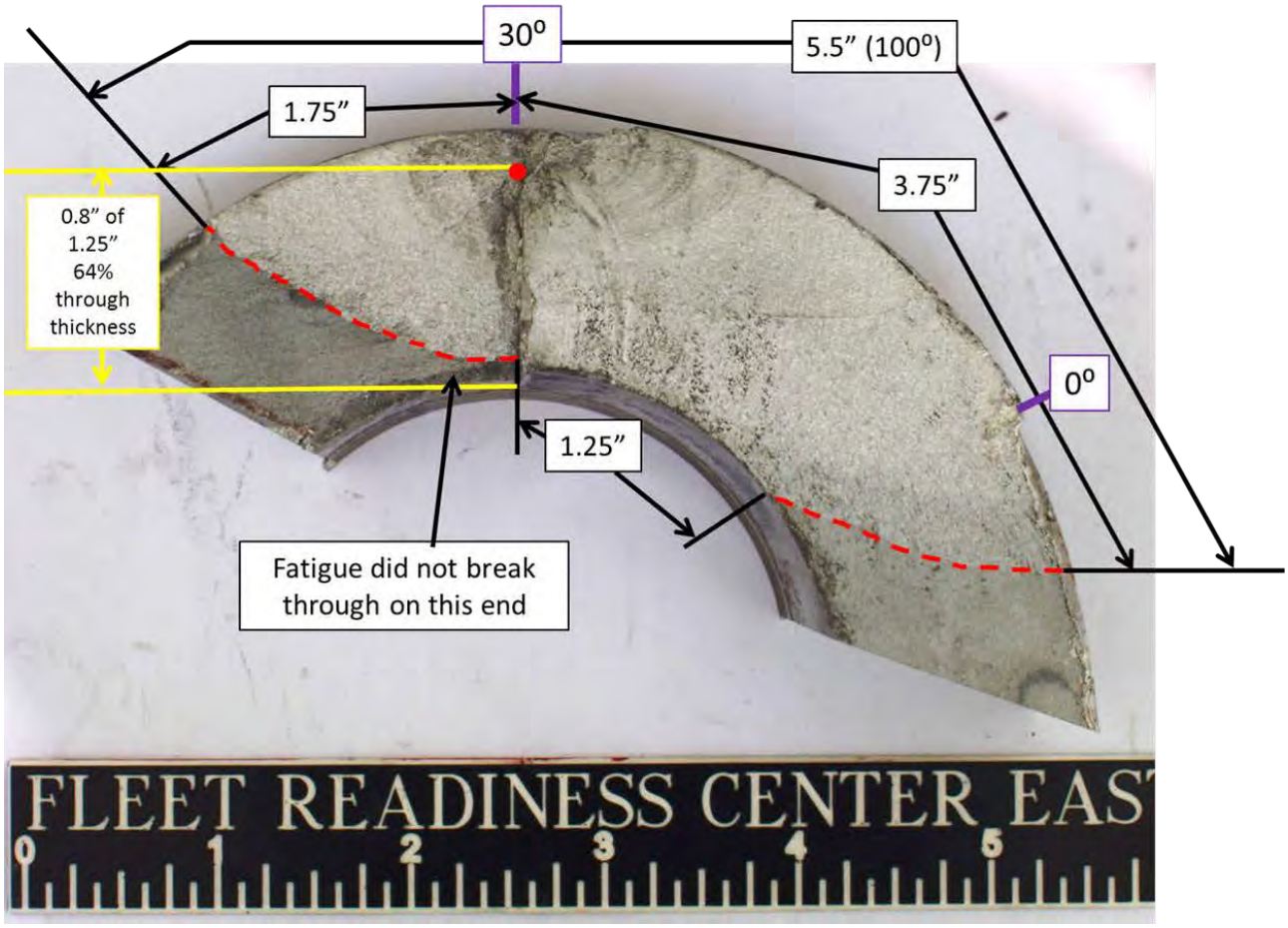
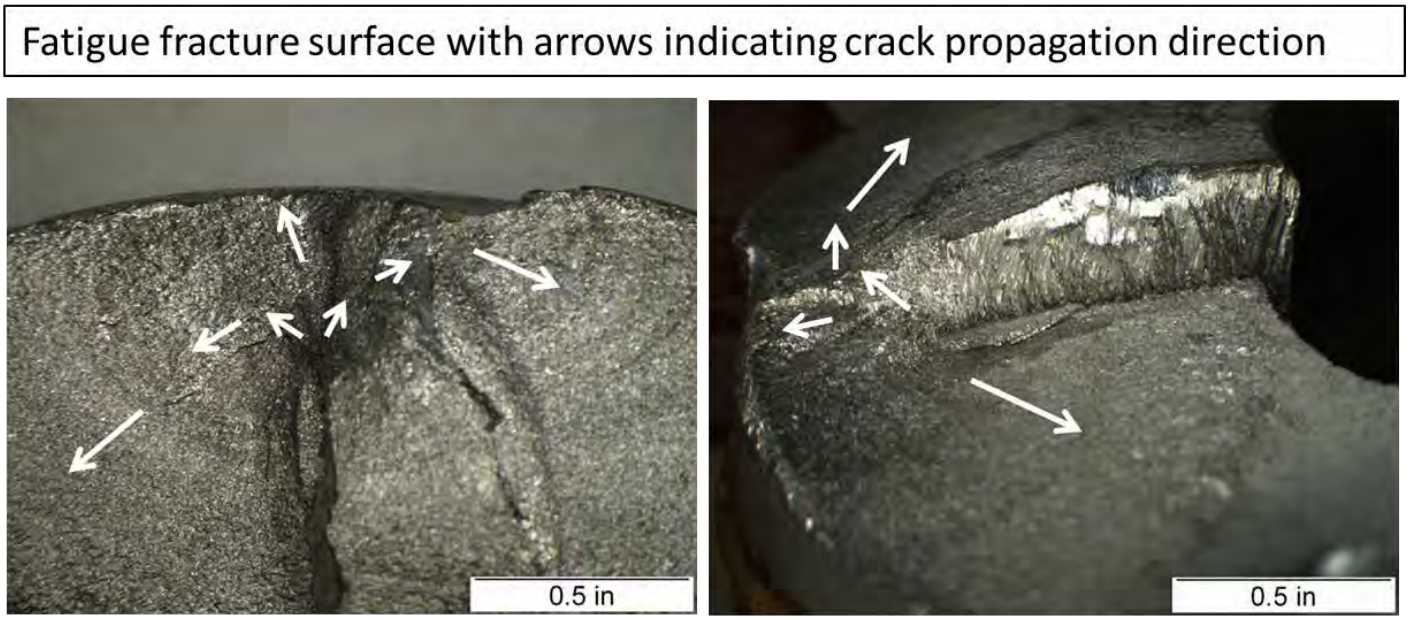


Figure 5 - Fatigue fracture surface indicated by red dotted line and associated dimensions. Blade degree indices annotated in purple boxes. Fatigue origin indicated by red dot. Yellow arrow (top image) indicates radial crack location and yellow dimensions (bottom image) are with respect to radial crack.



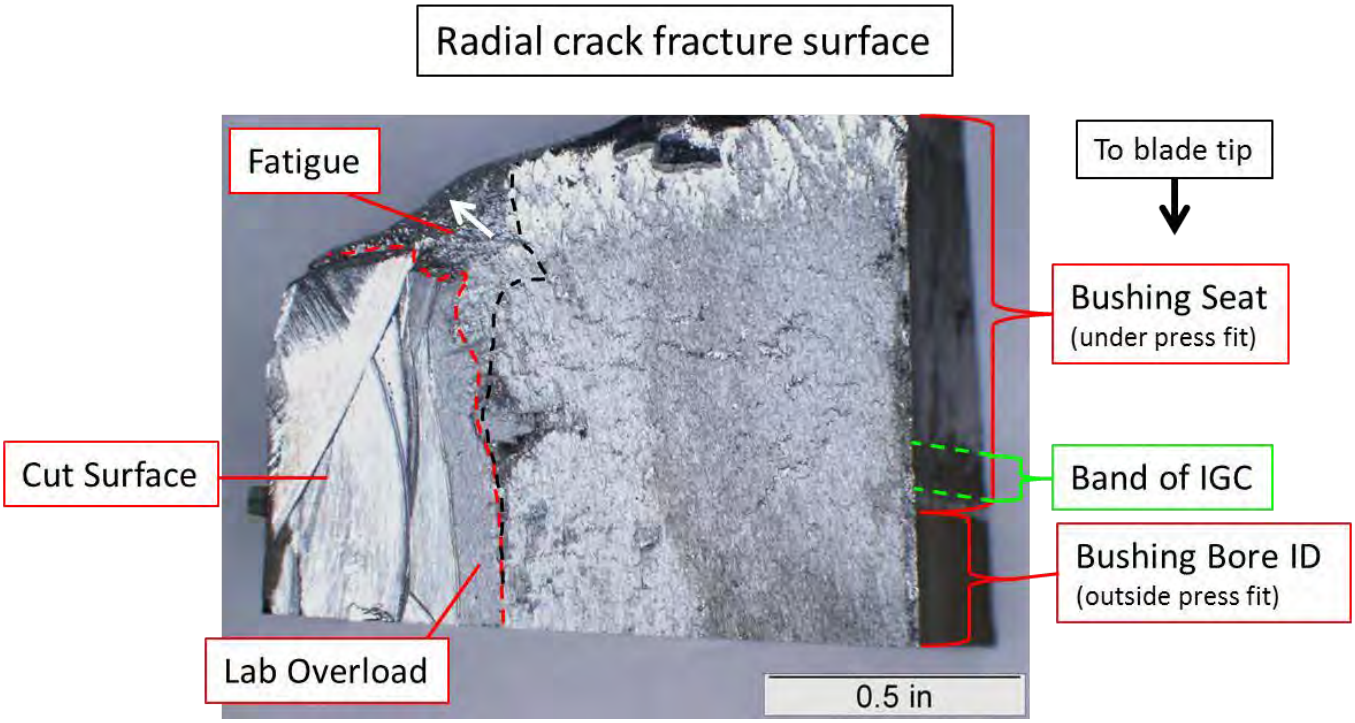


Figure 6 - Initiation and propagation of circumferential fatigue crack from intergranular radial crack.

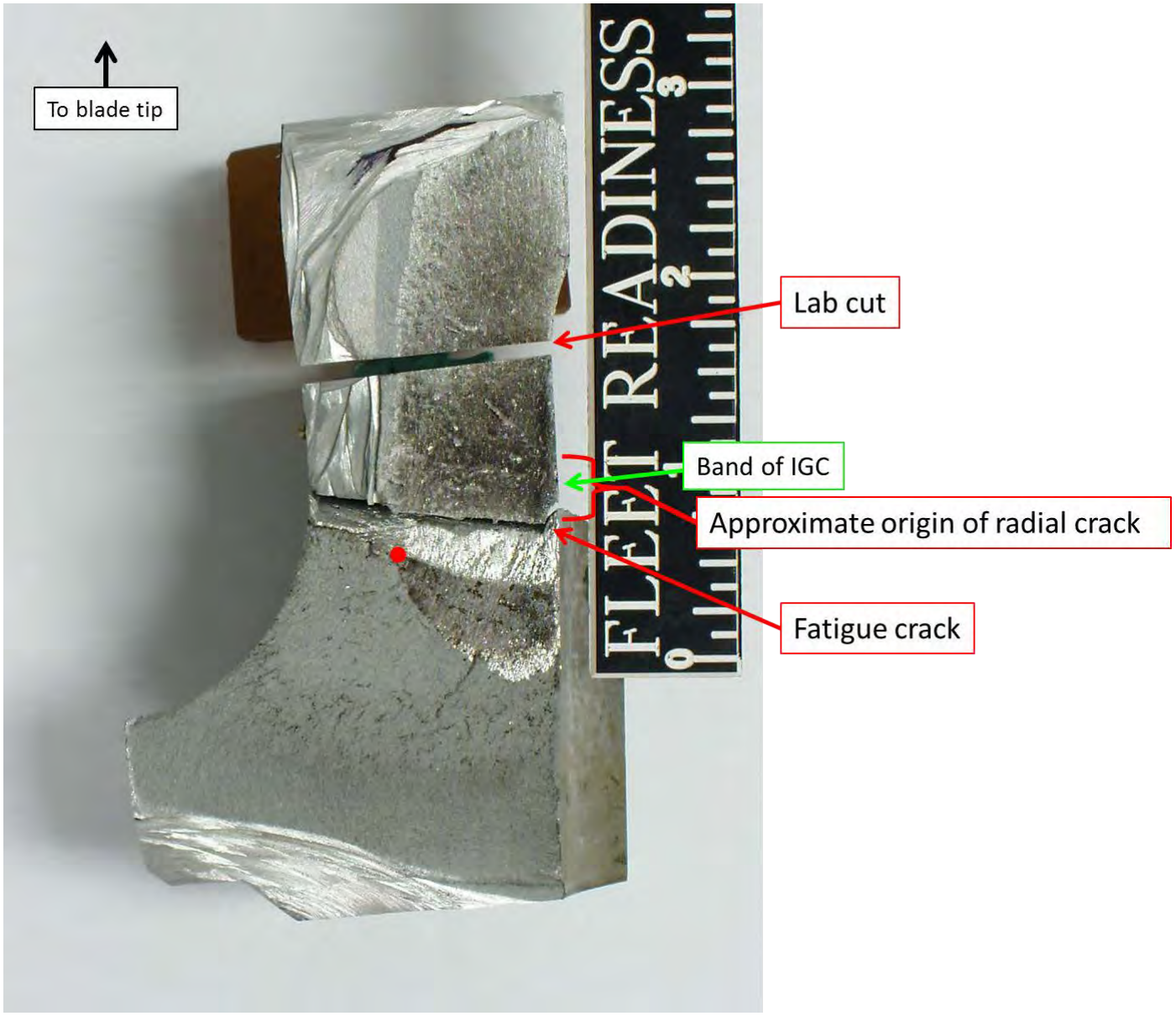


Figure 7 - Intergranular radial crack fracture surface. Red dot indicates fatigue origin. Blade shank ID (taper and bushing bore surfaces) is on right.

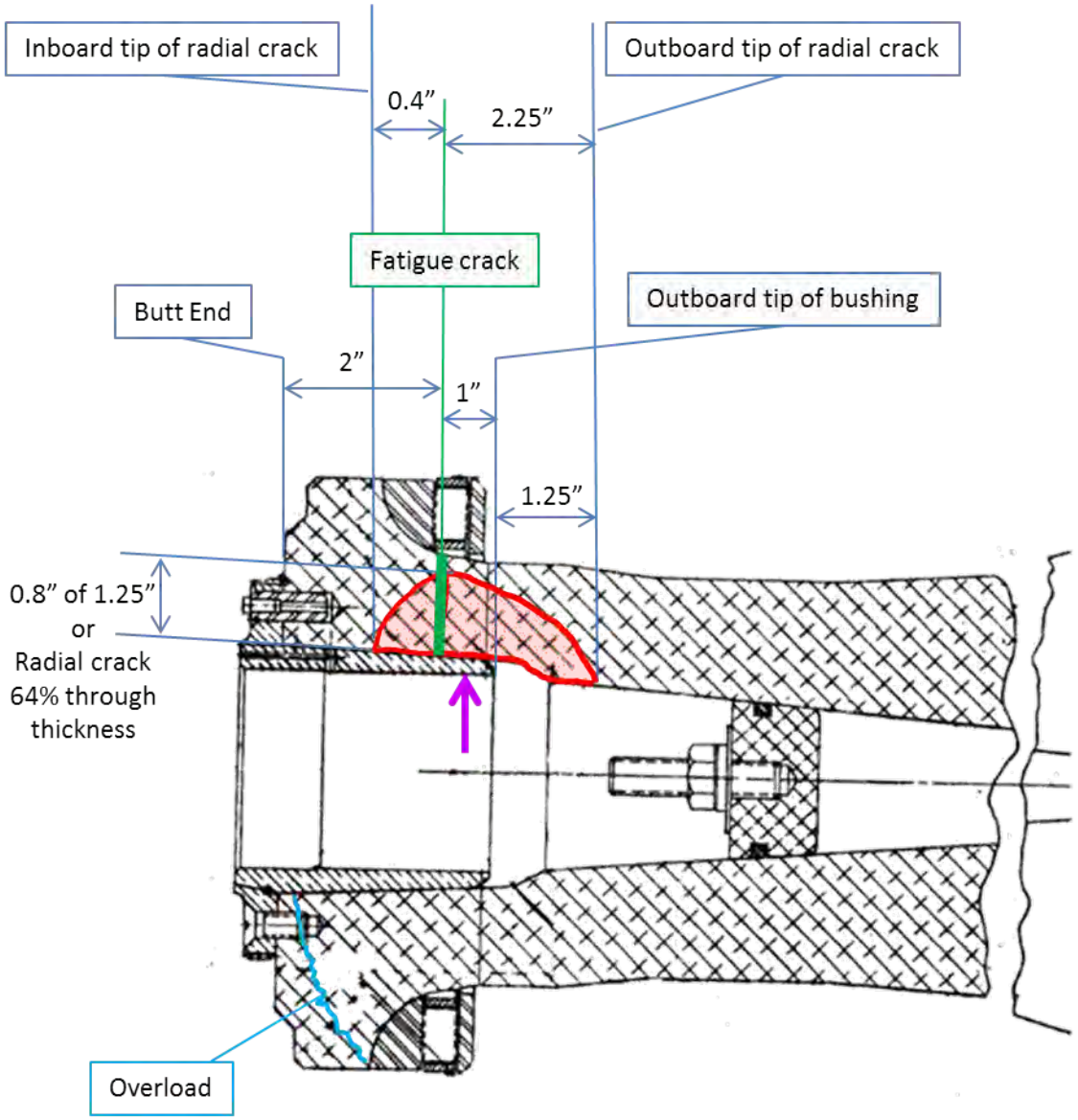


Figure 8 – Schematic showing radial and fatigue crack location in cross section and relevant dimensions. Purple arrow indicates approximate origin of radial crack.

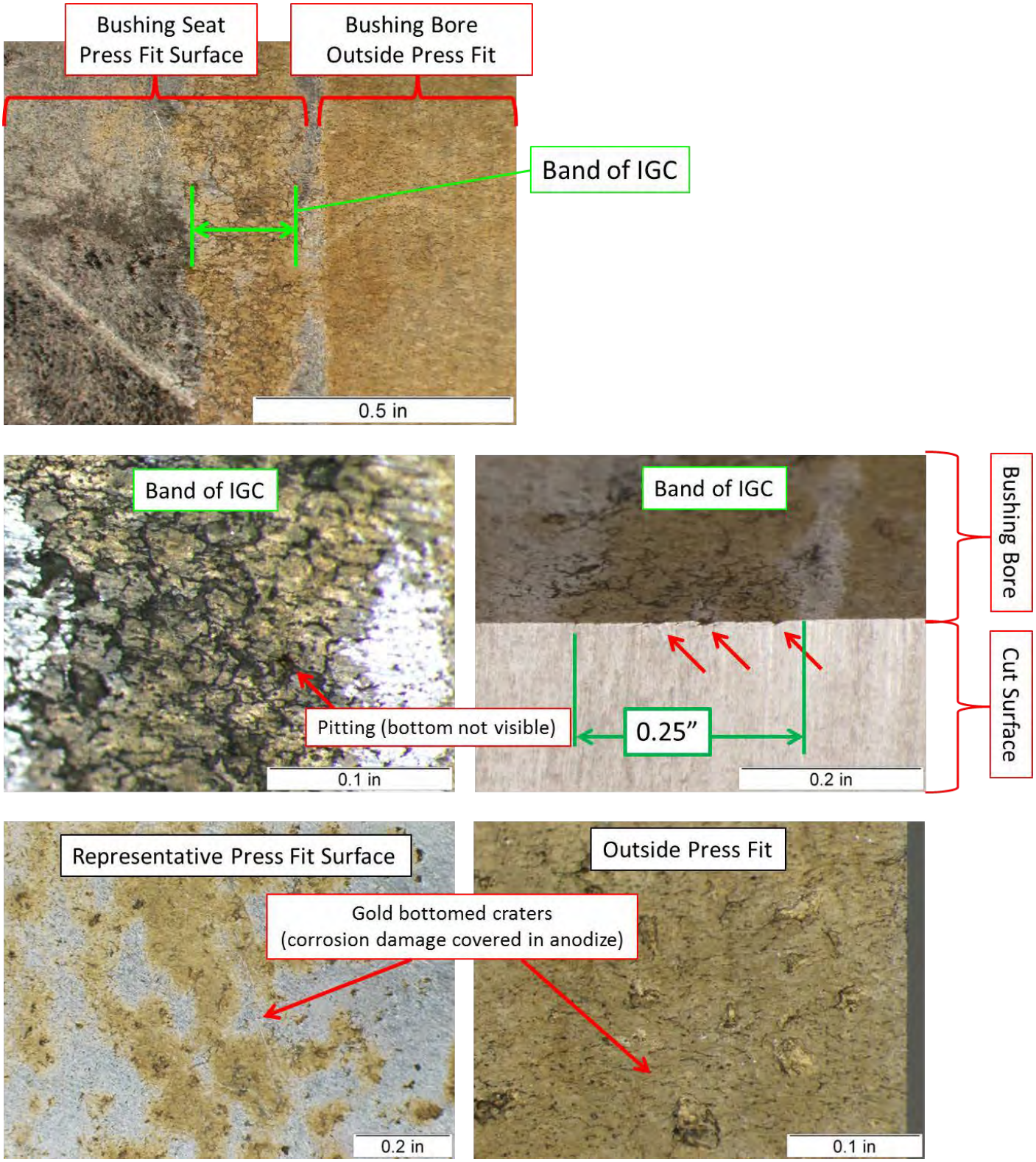


Figure 9 -Bushing bore surfaces – Note changing scale bars

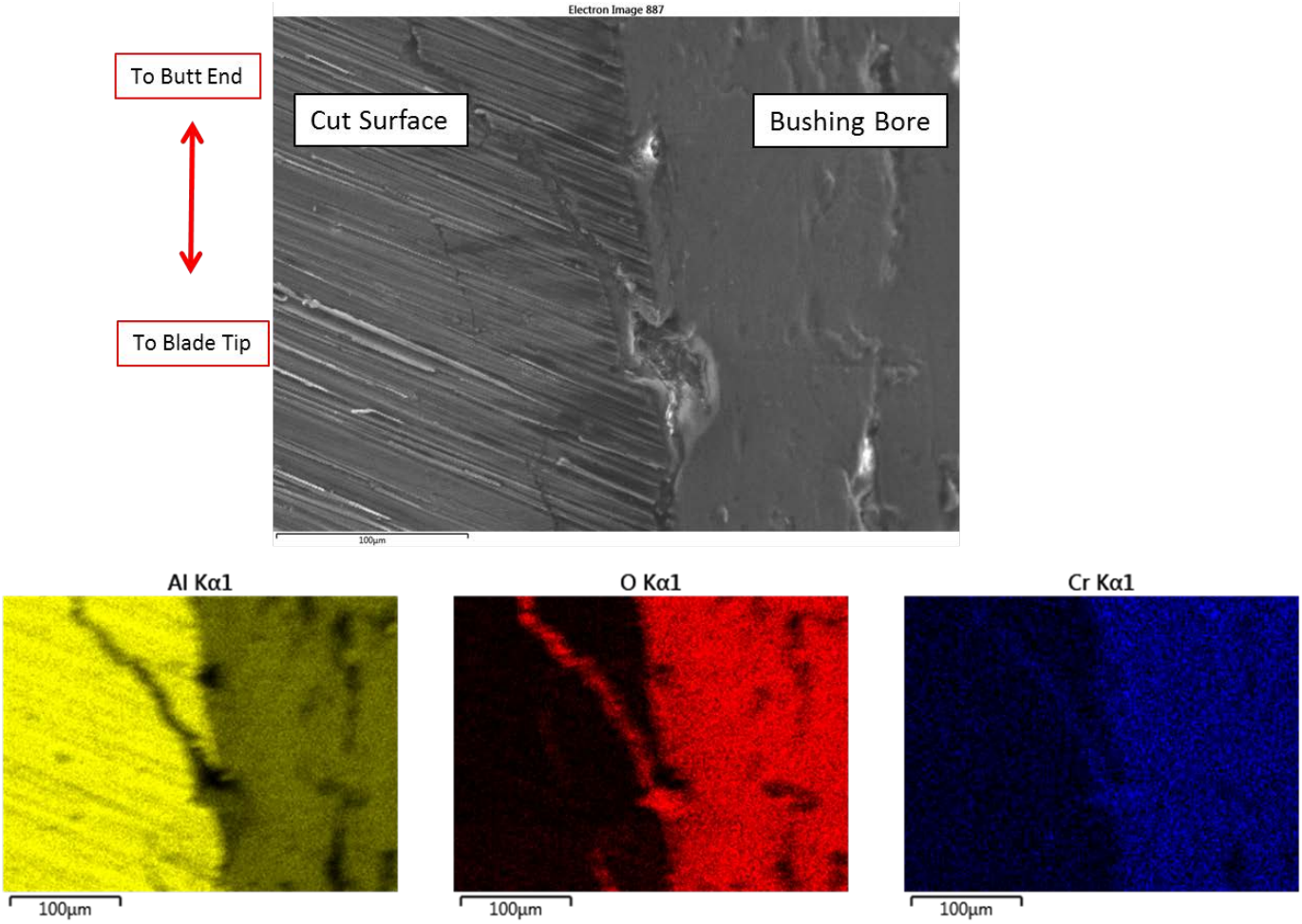
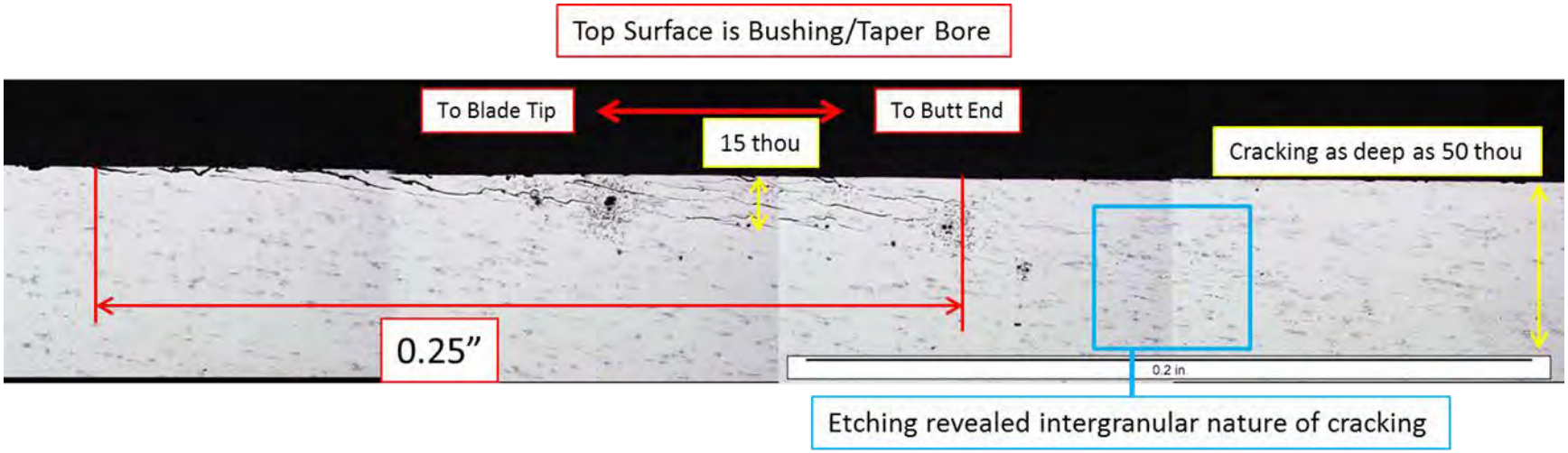


Figure 10 - Chemical analysis with elemental mapping software showing anodize within pits/cracks in band of IGC. Top is SEM image with surfaces indicated.

Figure 11 - Taper bore plug and lead wool showing corrosion damage



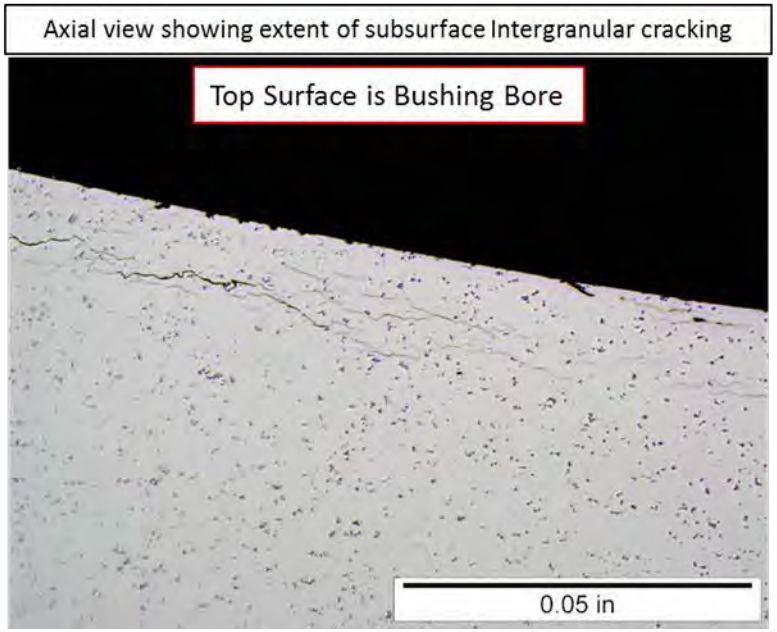


Figure 12 – Longitudinal (top) and Axial (bottom) views of metallurgically prepared cross sections through band of IGC (As-polished)

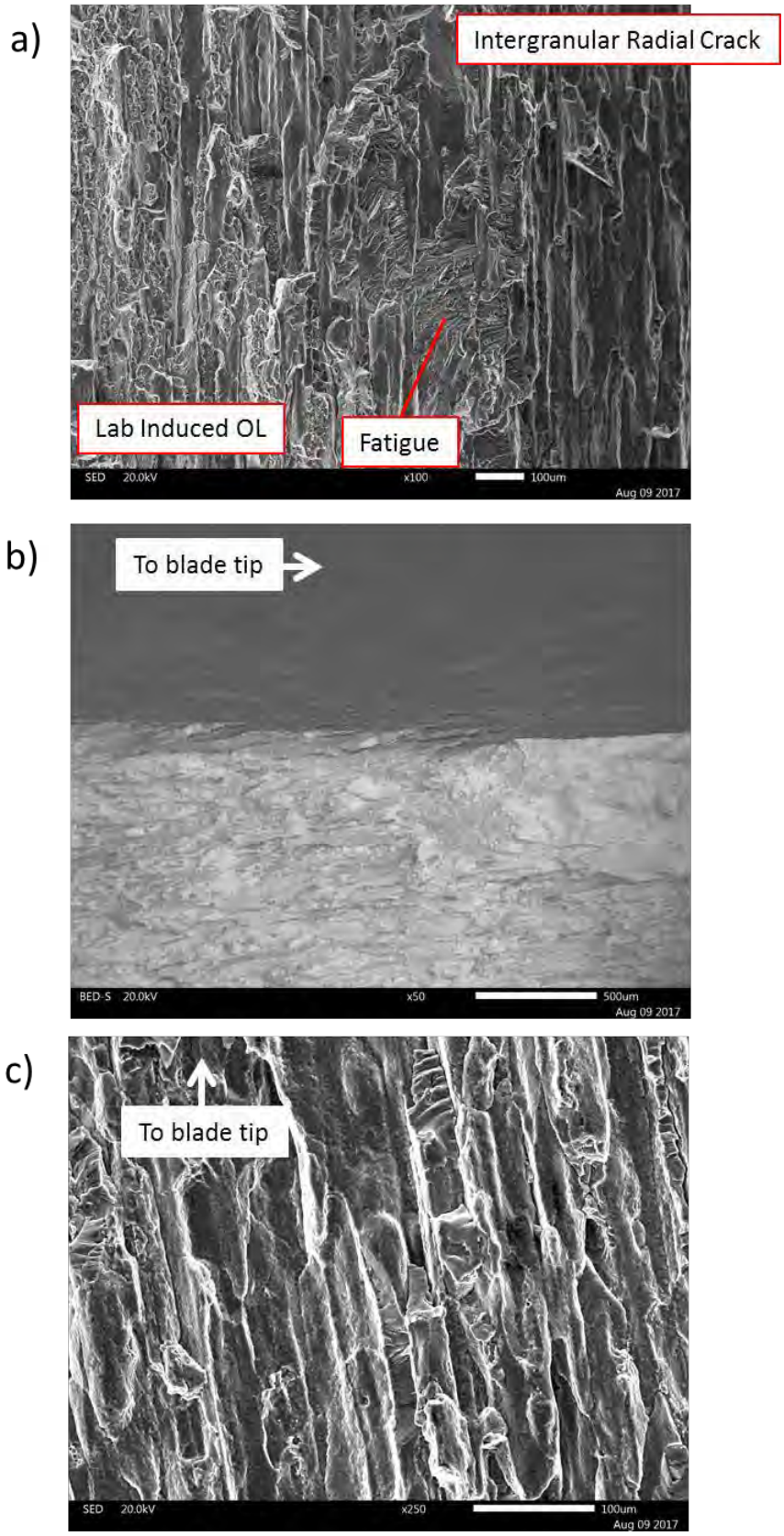


Figure 13 - Representative SEM images from intergranular radial crack; a) Fatigue initiating from outer bound of radial crack; b) Backscattered SEM image showing approximate origin of radial crack (topography similar to Figure 12a); c) Representative fracture surface

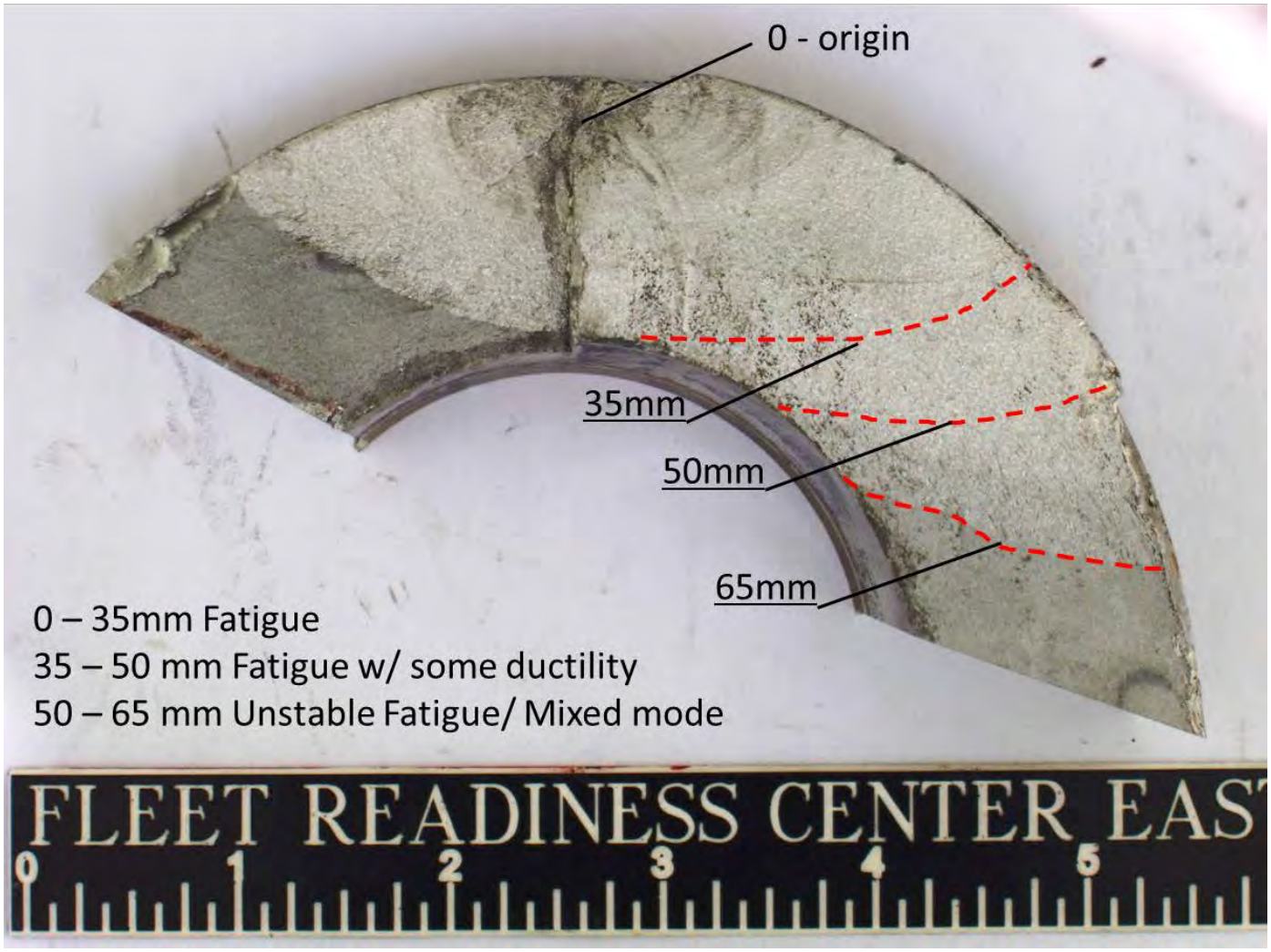


Figure 14 - Fatigue Fracture Surface. From 0-35mm only fatigue fracture observed. 35-50mm ductility (overload) began to present. 50-65mm was mixed mode fracture with some fatigue within overload fracture.

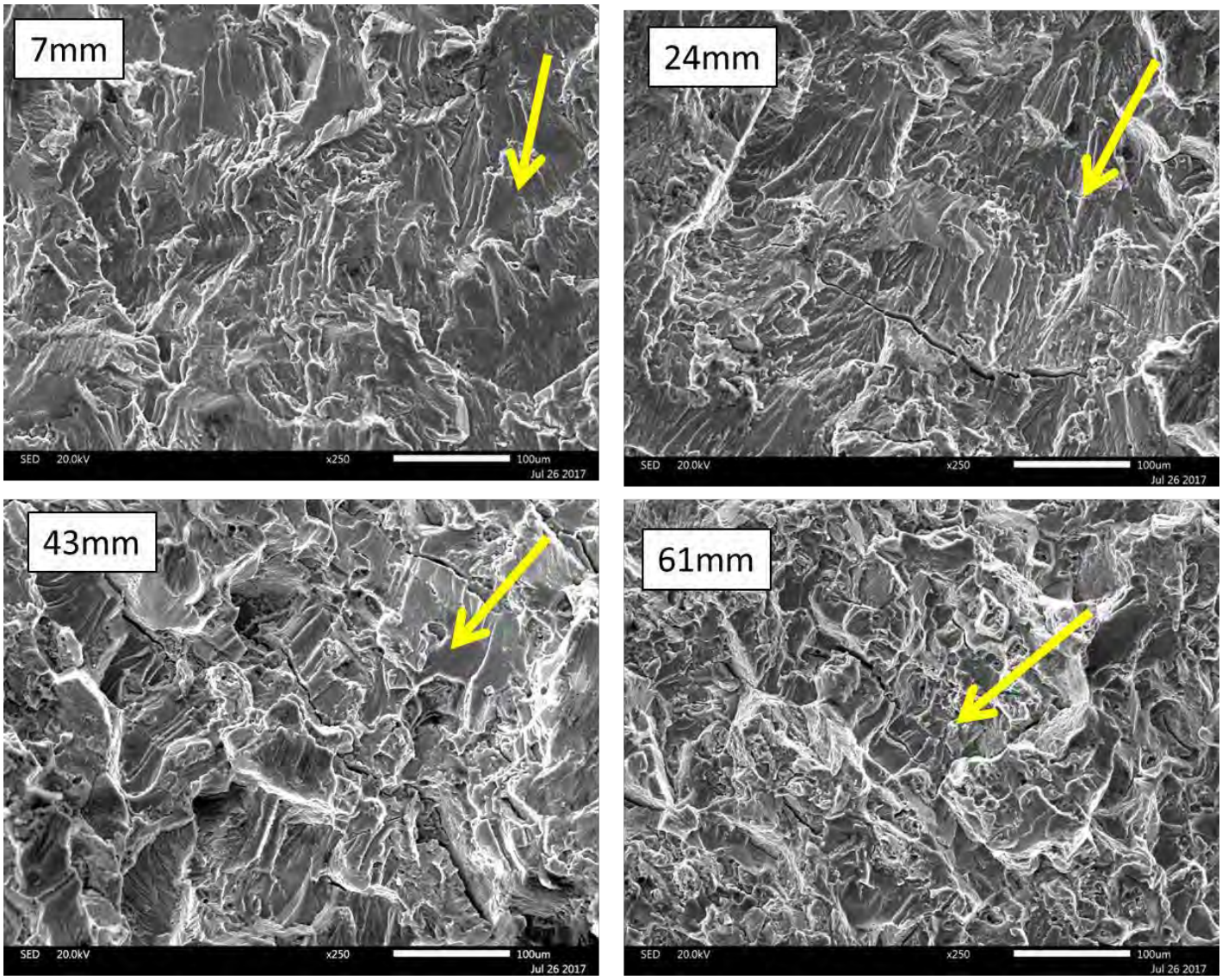


Figure 15 - Representative SEM images from various locations along fatigue fracture surface. Number indicated is distance from origin. Yellow arrow indicates fatigue propagation direction. All Images 250X

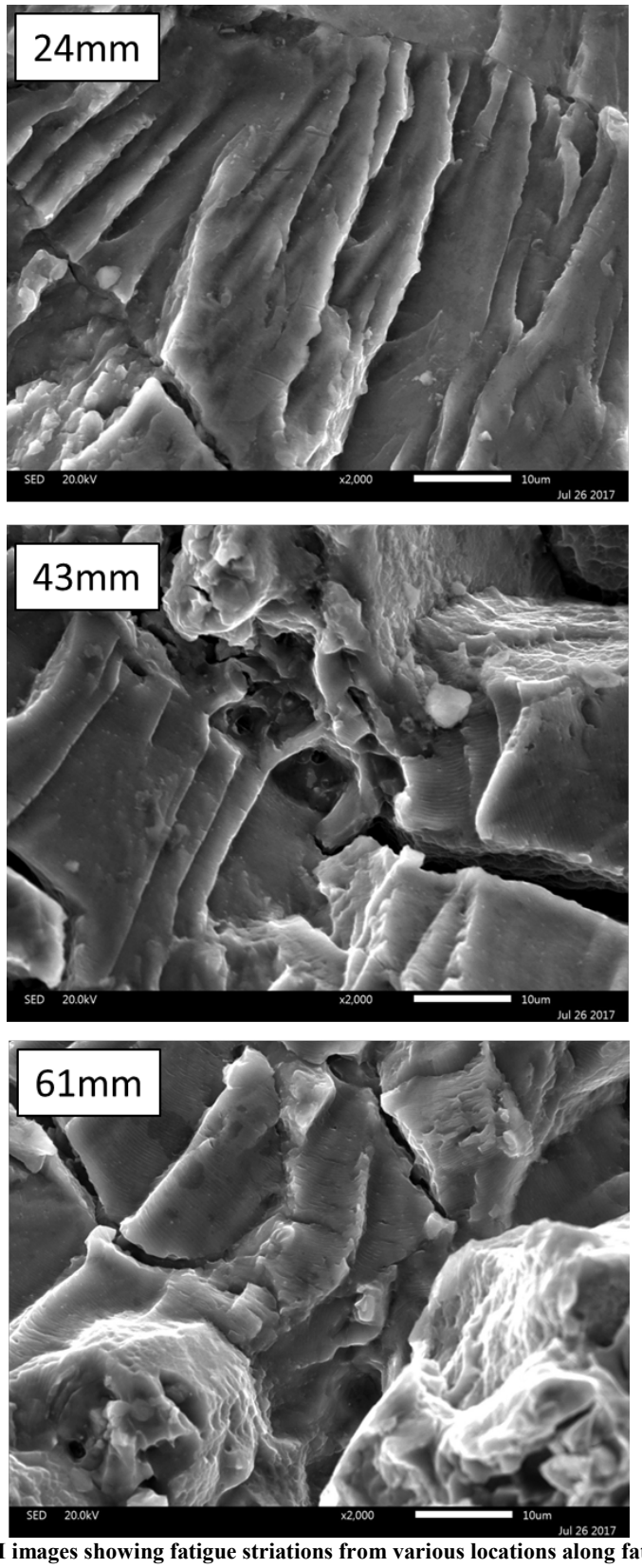


Figure 16 - Representative SEM images showing fatigue striations from various locations along fatigue fracture surface. Number indicated is distance from origin.

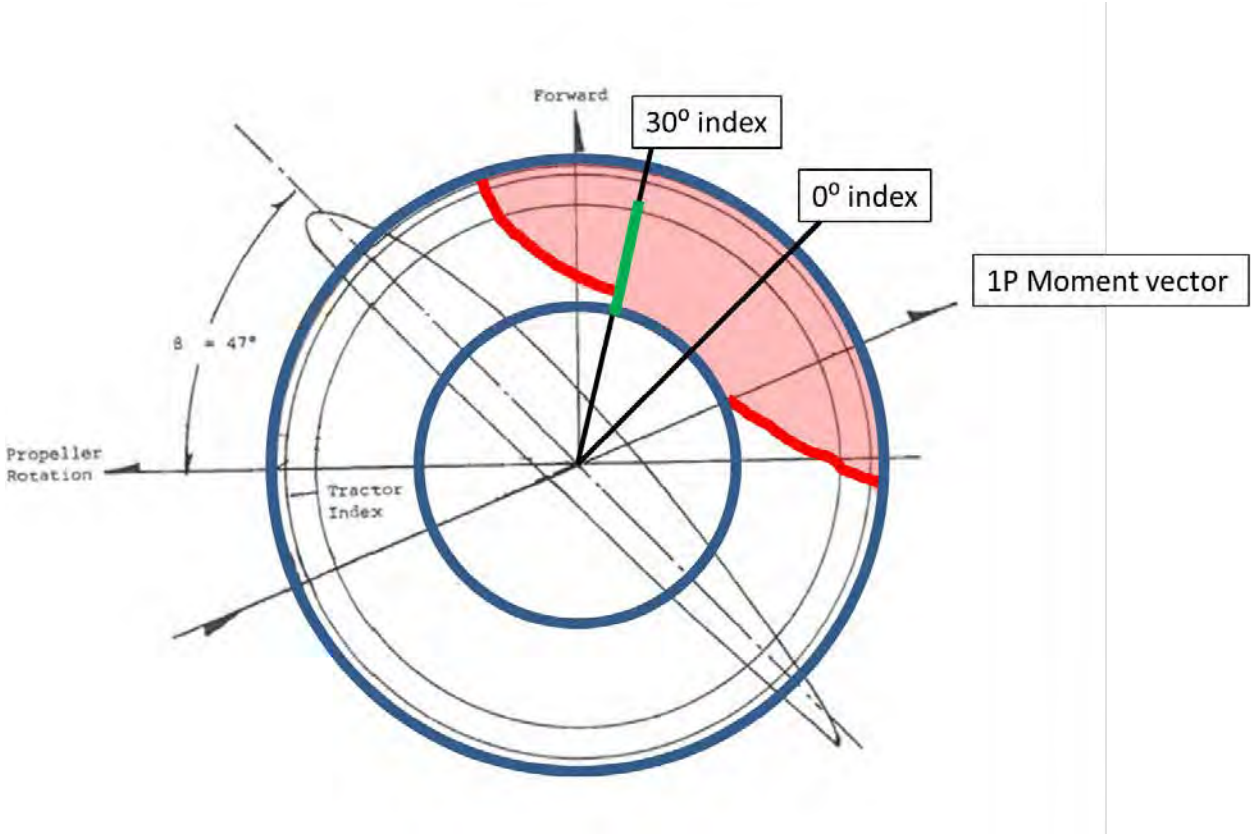
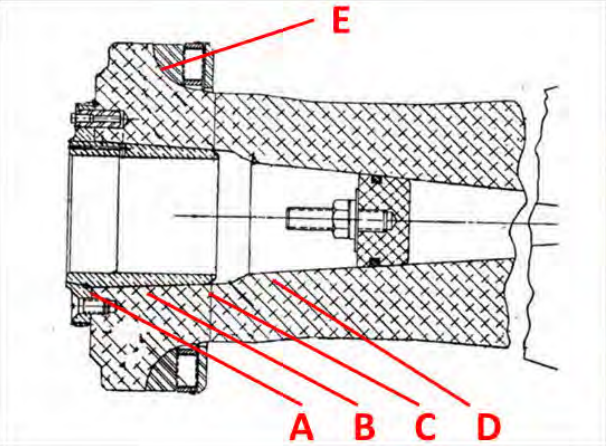


Figure 17 - Sketch of subject fatigue crack (red) and radial crack (green) with respect to 1P Moment vector and blade angle at climb conditions. View is from hub looking towards blade tip, airfoil shown at 42" reference station.



Location	Surface Stress (ksi)	Max Compressive Stress (ksi)	Compressive Depth (in)
A: LPB-0.1"	-33.81	-62.22	0.035
B: LPB-1.5"	-46.62	-70.06	>0.060
C: LPB-3"	-22.60	-62.79	0.030
D: Outboard Shotpeen	-27.85	-58.72	0.040
E: Cold Roll – OD Fillet	--29.54	-55.33	>0.040

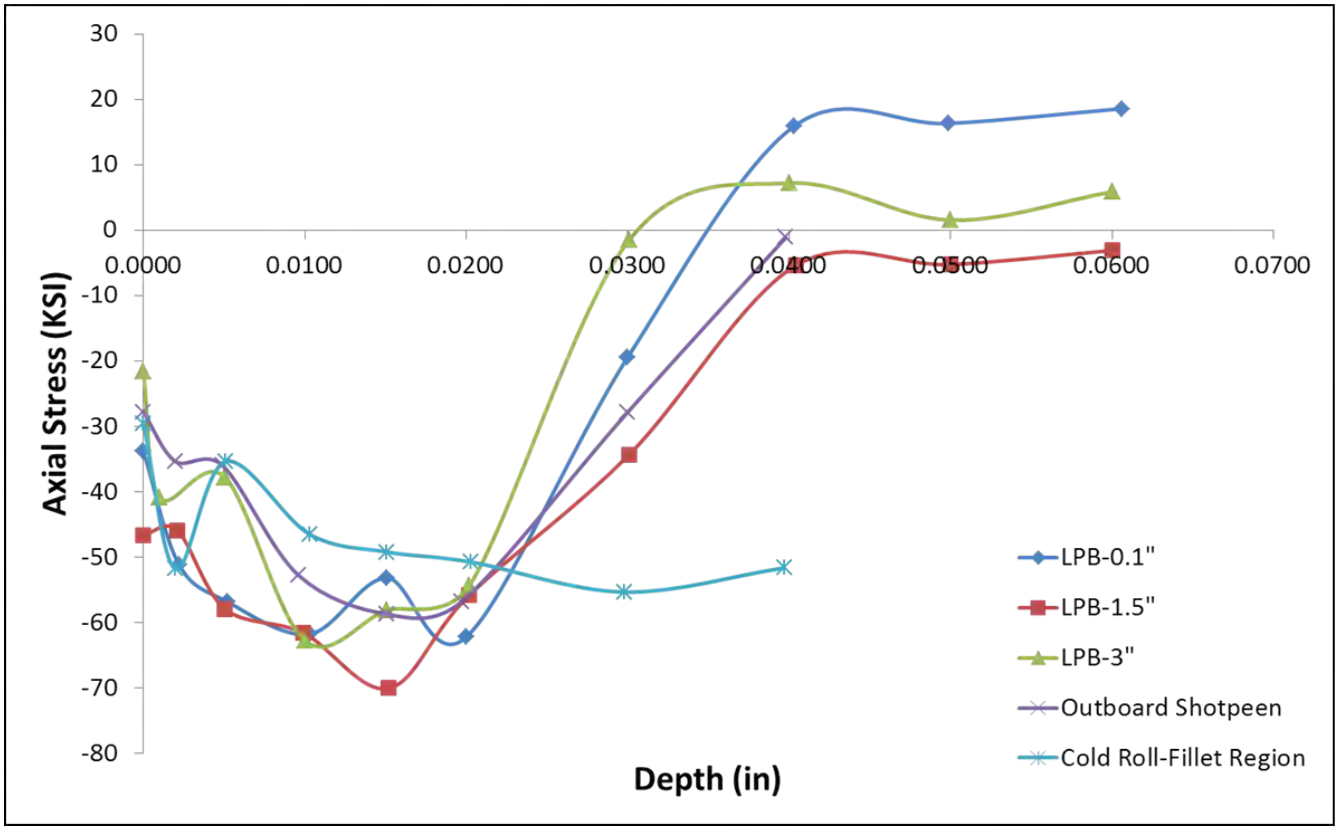


Figure 18 - Residual Stress Analysis XRD Results. Approximate locations shown in cross section.

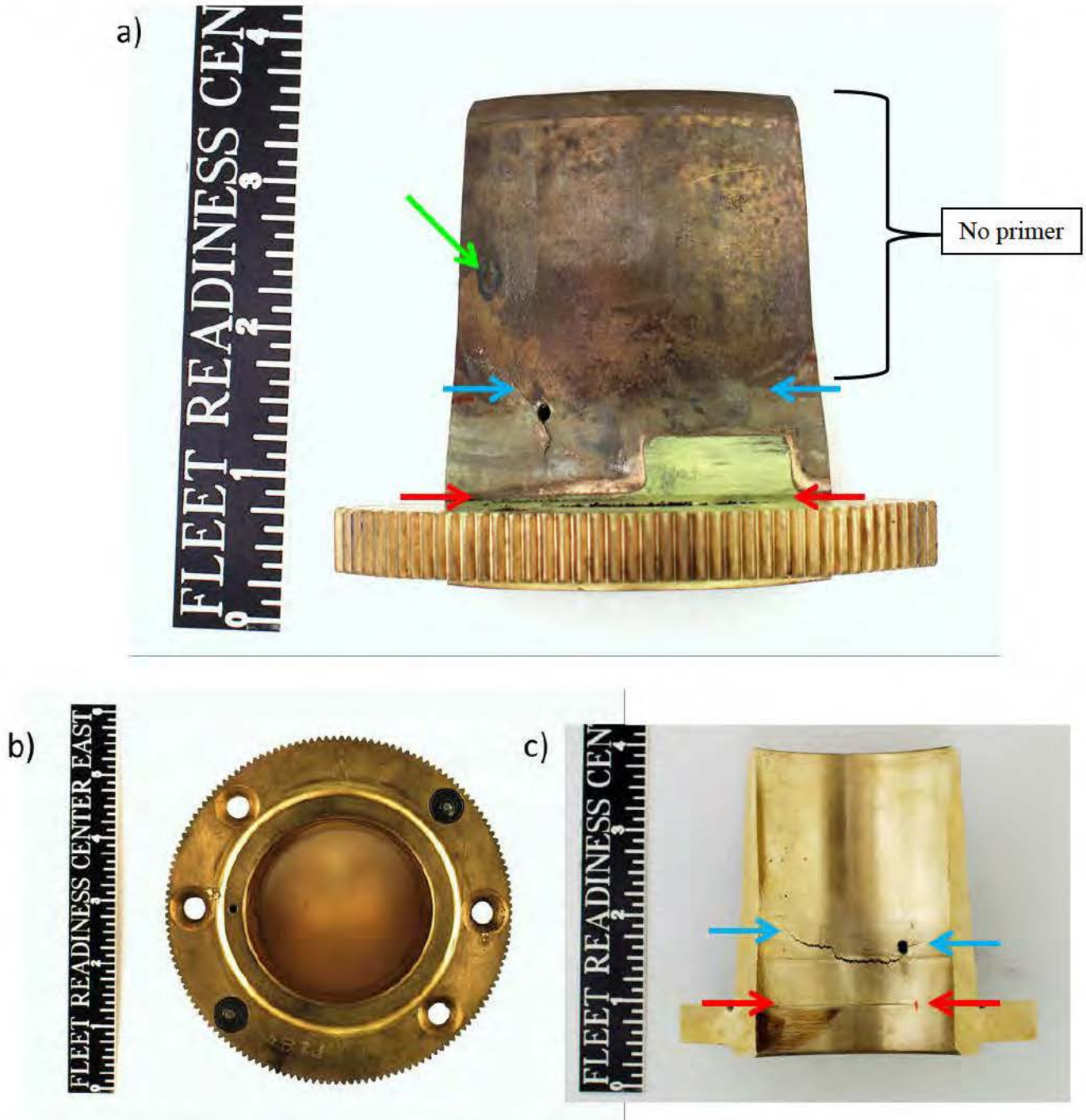


Figure 19 - P2B4 Blade Bushing; a) View from side showing crack locations; b) View looking outboard; c) Looking at ID of cracked section. Green arrow indicated lead flake. Blue arrows bracket outboard crack and red arrows bracket inboard crack.

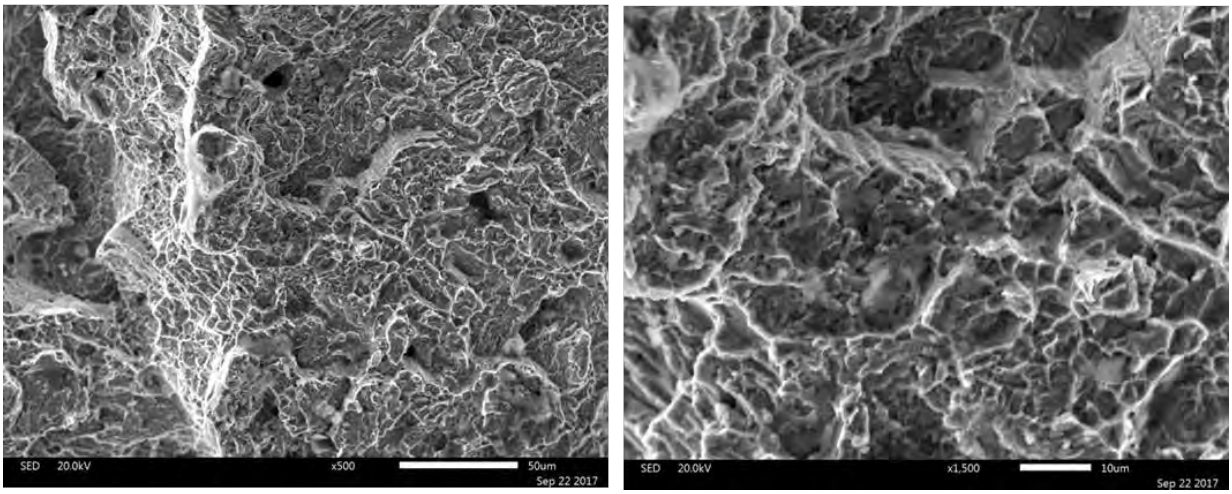


Figure 20 - Bushing fracture surfaces (view looking outboard) and representative SEM Images at 500X (left) and 1500X (right)

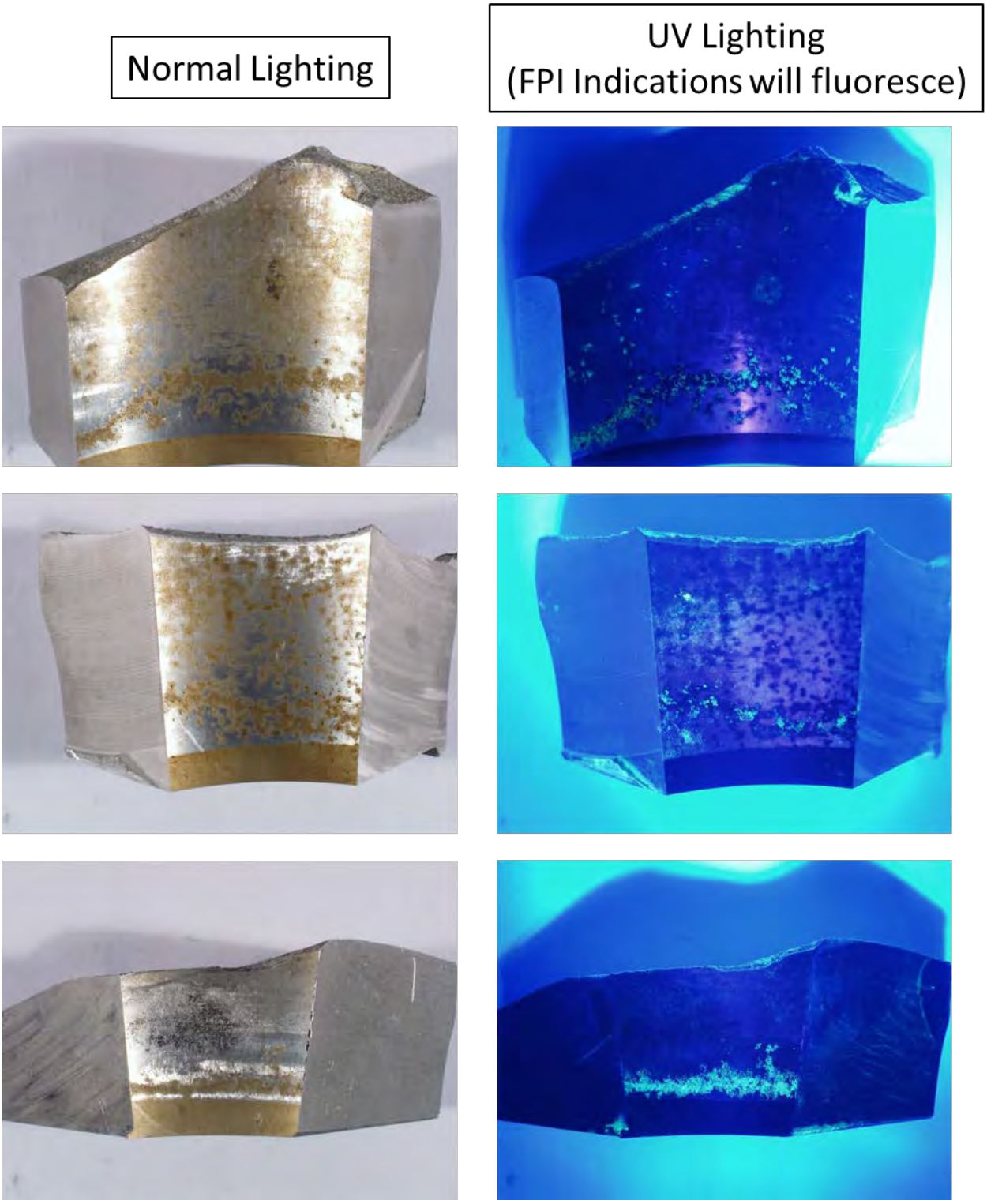


Figure 21 - FPI Indications from band of IGC on subject blade. In all images bushing bore surface is shown and circumferential fracure is upper surface. Blade tip direction is down.

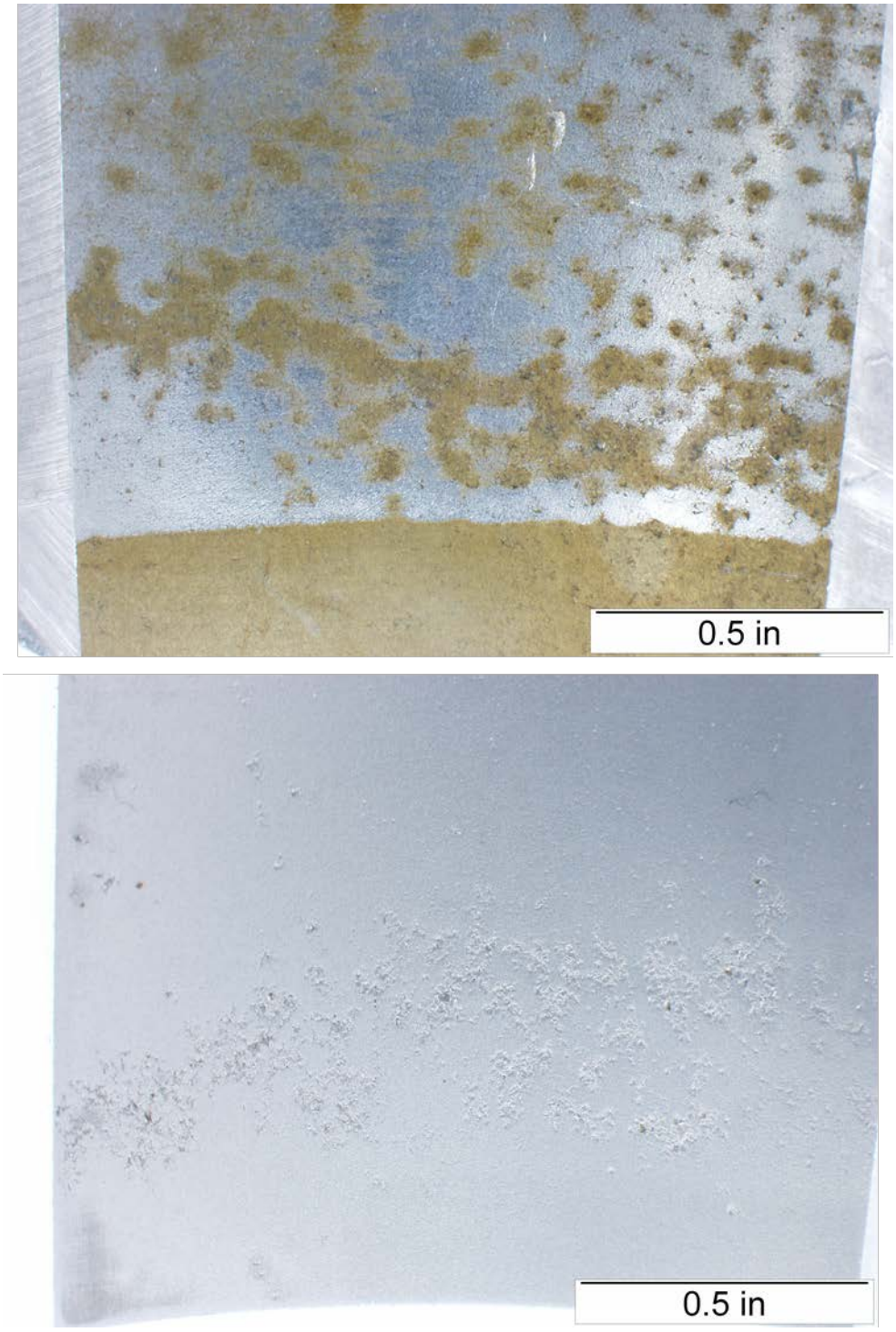


Figure 22 - Adjacent bushing bore surfaces containing band of IGC. Top) No Alteration, anodize still present; Bottom) Surface after gentle glass blasting which removed surface coatings and enhanced visible indication of corrosion damage

SODIUM HYDROXIDE 8
ASTM D456

CAUTION

For blades with formed foam fairings, it is necessary to completely remove residual foam from blade surface in accordance with PLASTIC FORMED FAIRING REMOVAL, this WP, because foam can cover cracks and they will not be detected during fluorescent penetrant inspection.

It is mandatory that entire blade surface including blade butt taper bore, fillet, bushing screw holes and drive pin holes be stripped of its old anodic surface at overhaul (before inspection) to facilitate inspection and rework procedures.

NOTE

De-oxidizing (stripping) of blades and caustic etch are two entirely separate processes and should not be construed to be related.

22. STRIPPING OF ANODIC COATING AND CAUSTIC ETCH. Use sodium hydroxide for removal of anodic coating as follows to strip areas including filter, taper bore, butt OD, butt face, blade bushing screw holes and drive pin holes.

CAUTION

Do not, under any circumstances, immerse in etch solution soda blades with fairings (3, Figure 1), rubber parts, corrosion barriers, teflon strips (24), bushing (23), drive pins (22), screws (10) or threaded screw inserts attached.

NOTE

It is not necessary to strip anodize prior to fluorescent penetrant inspection.

a. Prior to etching and cleaning, slide thrust washers toward tip of blade as far as possible with washers remaining loose on blade. Retain in position away from shank end by use of wooden or cork wedges inserted between ID of thrust washers and blade.

SODIUM HYDROXIDE 8
ASTM D456

b. Immerse blade in 16 oz. of sodium hydroxide per gallon water for 10 minutes to assure removal of all existing anodize coating

c. Immediately following etch, thoroughly cold water rinse the blade.

(1) Check for presence of anodize coating with a continuity tester. Lack of continuity indicates residual coating and blade must be restripped.

CAUTION

Repeat anodic coating stripping process only one time, if necessary.

(2) If anodize coating is still present, steps b through step c, substep (1) can be repeated only one time.

NOTE

It is not necessary to caustic etch prior to fluorescent penetrant inspection.

d. A caustic etch of blades in preparation for fluorescent penetrant inspection may be performed as follows:

(1) Fill the etch tank 1/2 full of water.

(2) Slowly and with constant agitation, add 15-16 ounces of sodium hydroxide per gallon of final solution volume.

(3) Immerse the blade into the etch solution until a black smut is formed for a length of time not to exceed 30 seconds.

(4) Thoroughly cold water rinse.

DE-SMUT SOLUTION 9
ISOPREP 184

(5) De-smut the etched area by immerging into a 20-25% by volume Isoprep 184 solution or equivalent.

Figure 23 - Excerpt from current (Change 11 dated 3.2017) 03-20C-4. Contradicting statements within same section are indicated.

Appendix A (pg 1 of 3)

Necrology of Intergranular Cracks in Taper and Bushing Bores of 7076-T6 Propeller Blades
Excerpt from Hamilton Sundstrand Report HSER29567

Item	Propeller Model	Blade P/N	Blade S/N	Installation	History	Remarks	Report
1	43E60-623	R6917A-14	N 898884	U. S. Air Force C-123K	315.7 Hours TSO	Origin at 0.040 inch deep corrosion pit	FI 78-06
2	43D50-651	7107D-0	N 805681	Royal Malay Air Force DHC-4A	1.3 Hours TSO	Origin at shallow corrosion pit .In storage for 18 months	FI 79-60
3 (1)*	54H60-91	7111A-2	N 758148	U. S. Air Force C-130B	54.2 Hours TSO	Taper bore had been machined; crack origin not present	FI 80-46
4 (2)	54H60-77	7121B-2	N 772298	National Oceanic and Atmospheric	0 Hours	Shallow corrosion at origin. In storage for 24 months following overhaul	FI 82-09
5 (3)			N 772297	Agency WP-3D	TSO	Mate to Item 4. Both leaked oninitial run-up on aircraft	Not examined
6	43E60-623	6917A-14	N 808853	U. S. Force C-123K	2,411.7 Hours TSO	Origin at 0.015 inch deep corrosion pit	FI 82-22
7 (4) [F1]**	54H60-111	7111D-2	N 767858	U. S. Marine Corps KC-130F	664.5 Hours TSO	Origin at corrosion pit in taper bore. Crack bifurcated in fillet area and propagated circumferentially around in fatigue	HSER 10311
8 (5) [F2]	54H60-117	A7111D-2	N 794659	Transamerica Airlines L-382	15,909.6 Hours TSO	Origin in fretted material. Crack turned to chordal orientation in fillet area and propagated in fatigue	FI 86-27
9 (6) [F3]	54H60-77	7121A-2	N 781479	U. S. Navy Engine Test Stand at Alameda NAD	≈ 1,000 Hours TT	Origin at a band of corrosion. Used sparingly between 1976 and 1988. Crack turned to chordal orientation in fillet and propagated in fatigue	FI 88-60
10 (7)	54H60-91	A7111E-2	N 755009	U. S. Air Force C-130	3,329.6 Hours TSO	Origin at distal edge of bushing seat. A second crack was removed and not returned	FI 90-10
11 (8) [F4]	54H60-77	A7121B-2	N 812274	U. S. Navy P-3C	109.6 Hours TSO	Blade fractured in fatigue across retention fillet; distal section not recovered. In storage for 55 months prior to final installation	FI 95-61

Appendix A (pg 2 of 3)

Necrology of Intergranular Cracks in Taper and Bushing Bores of 7076-T6 Propeller Blades
Excerpt from Hamilton Sundstrand Report HSER29567

Item	Propeller Model	Blade P/N	Blade S/N	Installation	History	Remarks	Report
12 (9) [F5]	54H60-111	7111A-2	N 795090	U. S. Navy C-130T	183.5 Hours TSO	Origin at corrosion pit at distal end of bushing seat. Crack turned in fillet to chordal orientation and propagated in fatigue. In storage for 48 months prior to final installation	FI 96-34
13 (10) [F6]	54H60-77	7121A-2	N 771344	U. S. Navy P-3C	5,705 Hours TSO	Origin at distal end of bushing seat. Crack turned to chordal orientation in fillet and propagated in fatigue	FI 98-48
14 (11) [F7]	54H60-111	7111A-2	N 795485	U .S. Marine Corps	3,401 Hours	Origin near distal end of bushing seat. Crack turned toward chordal orientation in retention fillet. In "on-wing" storage for 25 months	FI 04-27
15 (12)			N 795486	KC-130F	TSI	Crack through shank Mate to Item 14	
16 (13) [F8]	54H60-111	7111D-2	N 795488	U. S. Navy C-130T	510.3 Hours	Origin of radial crack at distal end of bushing seat. Crack turned toward chordal orientation with extensive fatigue crack propagation. Had been in off-wing storage for 2 weeks in 1998 and for 7 months in 2000-2001	FI 04-32
17 (14) [F9]	54H60-77	7121B-2	N 812067	U. S. Navy P-3C	2,626 Hours TSO	Two radial cracks with origins at the distal end of the bushing seat. One crack turned towards the radial orientation and propagated for a short distance in fatigue	FI 08-12 WL 11074
18 (15)	54H60-77	7121B-2	N 812420	Pacific Propeller Engine Test Stand	Unknown	Origin of radial crack at distal end of bushing seat	----
19 (16) [F10]	54H60-111	7111D-2	N 793341	Royal Saudi Air Force C-130H	1,090 Hours TS SB 136	Origin of radial crack at distal end of bushing seat .	FI 08-14 HSER 29566

Appendix A (pg 3 of 3)

Necrology of Intergranular Cracks in Taper and Bushing Bores of 7076-T6 Propeller Blades
Excerpt from Hamilton Sundstrand Report HSER29567

Item	Propeller Model	Blade P/N	Blade S/N	Installation	History	Remarks	Report
20 (17) [F11]	54H60-77	7121A-2	N 812826	U. S. Navy P-3C	≈ 60 Hours since on-wing inspection TT & TSO Unknown	One radial crack with origin under bushing near distal end. Crack turned in fillet and propagated in fatigue Idle in on-wing storage for 6 months	FI 08-16 HSER 29565 WL 1438
21 (18) [F12]	54H60-117	7111E-2	N 801444	*Fuerza Aérea Argentina*(Argentine Air Force)C-130H	2,666 Hours TSO	One radial crack through the section of the shank with origin on taper bore. Crack turned and propagated in fatigue for a short distance	FI 08-17 HSER 29566 WL 490

HSER 29567

* (number) indicates numeration for 54H60 model propeller blades only.
** [F number] indicates numeration for those 54H60 blades radial intergranular crack turned in the blade fillet to become a fatigue crack.

SCC study

(b) (6)

From: (b) (6)
Sent: Friday, August 24, 2018 12:31 PM
To: (b) (6)
Cc: (b) (6) Maj (b) (6)
Subject: FW: Detection of Radial Crack past bushing
Signed By: (b) (6)

-----Original Message-----
From: (b) (6) CIV FRC-East, 4.4.2.5
(b) (6)
Sent: Friday, August 17, 2018 2:23 PM
To: (b) (6) LtCol (b) (6)
Subject: RE: Detection of Radial Crack past bushing

LtCol (b) (6)

I agree that it could also be stated that there is no guarantee the crack had not grown past the bushing. Since we do not understand the crack growth rates on P2B4 for both the radial crack and the fatigue crack. The radial crack may or may not have been past the bushing if inspected at any time prior to the mishap flight.

V/R
(b) (6)

(b) (6)
(b) (6)
NAVAIR-4.4.2.5
FRC East ISSC: Cherry Point, NC
(b) (6)
(b) (6)
(b) (6)

-----Original Message-----
From: (b) (6) LtCol (b) (6)
Sent: Friday, August 17, 2018 11:40
To: (b) (6) CIV (b) (6)
Subject: Detection of Radial Crack past bushing

(b) (6)

Thanks again for your help.

With respect to the possibility of the radial crack having grown past the distal end of the installed bushing.

It is your position that there is no guarantee that the radial crack had grown
past the bushing and therefore could not have been detected.

But after our team reviewed data points collected throughout this investigation, we realized that the
blade flew 73.3 hours and that a majority of that time the circumferential fatigue crack was growing up until the liberation on 10 July 2017. This means that there is a distinct possibility/probability that the radial crack had grown past the bushing while the plane was not flying and was in its phase inspection between 1 March 2017 and 24 May 2017.

So from a logical perspective it could also be stated that there is no guarantee that the
radial crack had not grown past the bushing and could have been detected.

Thanks again for all your help,

LtCo (b) (6)

LtCol (b) (6)
4th MAW
JAGMAN IO
(b) (6)
(b) (6)
(b) (6)

LtCol (b) (6)
4th MAW
JAGMAN IO
(b) (6)
(b) (6)
(b) (6)

(b) (6)

From: (b) (6)
Sent: Monday, January 29, 2018 4:03 PM
To: (b) (6)
Cc: (b) (6)
(b) (6)
Subject: FW: Radial Crack and Circumferential Crack Growth Rates
Signed By: (b) (6)

Pretty Heavy Stuff.

Semper Fi

LtCo(b) (6)

-----Original Message-----
From: (b) (6)
[mailto(b) (6) y.mil]
Sent: Monday, January 29, 2018 3:57 PM
To: (b) (6) usmc.mil>
Subject: Radial Crack and Circumferential Crack Growth Rates

(b) (6)

To answer your question about crack growth rates:

1. Since the radial crack had not grown to the outer shank of the propeller, and due to the location of the circumferential fatigue crack no on wing eddy current inspection would have detected the crack which caused blade 4 from propeller 2 to liberate.

2. There is no evidence or data from the investigation to characterize how fast the radial crack and circumferential crack formed and grew; such that there is no way to tell whether removing the prop during the ISO in May 2017 and conducting the intermediate level inspection per tech data (magnifying glass for the outer shank or internal eddy current inspection) would have discovered either the radial crack or circumferential crack which propagated allowing the blade to liberate.

3. It is less likely that during the November 2014 ISO inspection, removing the prop and conducting the intermediate level inspection per tech data (magnifying glass for the outer shank or internal eddy current inspection) would have discovered either the radial crack or circumferential crack which propagated allowing the blade to liberate.

V/R
(b)

Enclosure ( )

(b) (6)
(b) (6)
NAVAIR-4.4.2.5
FRC East ISSC: Cherry Point, NC
(b) (6)
(b) (6)
(b) (6)

(b) (6)

.om: (b) (6)
Sent: Monday, April 16, 2018 7:16 AM
To: (b) (6)
Cc:
Subject: RE: crack growth
Signed By: (b) (6)

(b) (6)

Since the crack growth rates are unknown, we do not know if that on the morning of 10 July 2017 the corrosion pitting, intergranular cracking, radial crack, or circumferential crack had grown past the bushing and would have been visible in the blade taper bore.

Sorry for not getting you a response on Friday.

V/R

(b) (6)

(b) (6)
(b) (6)
NAVAIR-4.4.2.5
.RC East ISSC: Cherry Point, NC
(b) (6)

-----Original Message-----
From: (b) (6)
Sent: Friday, April 13, 2018 9:50 AM
To: (b) (6) RC-East, 4.4.2.5
Cc: (b) (6)
(b) (6)
Subject: crack growth

(b) (6)

Thanks for your help.

Just to review our conversation.

There is no evidence that suggests that, on the morning o 10 July 2017, that
he

Corrosion Pitting

Enclosure ( )

Intergranular Cracking
Radial Crack or
Circumferential Crack

Had grown past or was visible inside the taper bore past the bushing bore.

Please confirm,

Thanks

LtCol (b) (6)
4th MAW
JAGMAN IO
(b) (6)

(b) (6)

From: (b) (6)
Sent: Thursday, April 5, 2018 11:04 AM
To: (b) (6)
Subject: (b) (6)
Signed By: (b) (6)

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: (b) (6)

(b) (6)

-----Original Message-----
From (b) (6)
Sent: Thursday, April 5, 2018 10:47 AM
To (b) (6)
Subject: (b) (6)

(b) (6)

Enclosure ( )

(b) (6)
(b) (6)
(b) (6)

UNITED STATES MARINE CORPS
OFFICE OF THE STAFF JUDGE ADVOCATE
MARINE FORCES RESERVE
2000 OPELOUSAS AVENUE
NEW ORLEANS, LOUISIANA 70114-1500

IN REPLY REFER TO:
5830
FRC-E
15 Aug 18

From: (b) (6) Fleet Readiness Center East, Cherry Point, NC
To: on Mishap Investigation Team

Subj: KC-130T MISHAP (VMGR-452) STATEMENT

1. Background:

a. My Primary Billet is the Propeller Integrated Product Team Leader at Fleet Readiness Center East (FRC-East), Cherry Point, NC. I previously served as the C-130 and P-3 Propeller Senior Engineer.

b. I hold academic degrees and/or certifications in Mechanical Engineering (BS) from Western New England University. I hold DAWIA Level 3 certification in Systems Engineering (SPRDE-SE) and have completed the US Air Force Jet Engine Mishap Investigation Course.

c. I have worked with FRC-East for 7 years all with the Propeller Team. I previously worked for 2 years with the Defense Contract Management Agency (DCMA) at UTC Aerospace Systems (Hamilton Sundstrand) supporting propeller systems. I have worked on and around C-130s for 7 years and specifically the propellers and their blades for 9 years.

2. Depot Level Maintenance on C-130 Propeller Blades:

a. The Warner Robins Air Logistics Complex (WR-ALC) blade overhaul procedure for U.S. Navy and U.S. Marine Corps propeller blades in 2011 required the following: (1) blade tear down, bushing and plug removal and cleaning; (2) glass bead blast of taper bore; (3) caustic soda etch; (4) borescope inspection of taper bore; (5) FPI of taper bore, screw holes and drive pin hole; (6) taper bore back-up inspection by eddy current; (7) meandering winding magnetometry (MWM); (8) taper bore ream; (9) beveled thrust ring grinding; (10) thrust ring inspection - mag particle; (11) butt face cut; (12) cold roll retention fillet; (13) airfoil shot peen; (14) airfoil grit blast; (15) low plasticity burnishing (LPB) of taper bore; (16) chromic acid anodizing; (17) permatreat taper bore; (18) foam application; (19) fairing rubber goods, heater installation; (20) balancing; (21) fit check of bushing; (22) wet installation of bushing; (23) final build-up and balance check; (24) disassembly; (25) application of preservative and packaging. These procedures would be performed IAW the NAVAIR Technical Manual 03-20C-4.

b. During the required overhaul process on U.S. Navy and U.S. Marine Corps C-130 propeller blades, technicians at WR-ALC have a duty to determine the presence of corrosion in the taper bore area. The manual creating this duty and governing the overhaul process in 2011 is NAVAIR Technical Manual 03-20C-4, Change 6 (dated 15 August 2011) (Depot Maintenance With Illustrated Parts Breakdown – Aluminum Alloy Propeller Blades). The three inspections in the 2011 overhaul process used to determine the presence of corrosion on a blade are (1) the borescope inspection, (2) the florescent penetrant inspection (FPI), and (3) the eddy current inspection.

c. I cannot verify and do not know if WR-ALC conducted eddy current inspections in 2011 as required in technical data.

d. Per the Engineering Investigation conducted on propeller two blade four (P2B4), corrosion was present in the taper bore when the blade went in to WR-ALC for overhaul in 2011. I am confident of this fact because of the presence of anodize in corrosion pits and in intergranular cracking (IGC) on the blade. Anodizing the blade is a step in the overhaul process and would have last occurred at WR-ALC in 2011. The anodizing liquid seeped into the existing corrosion pits and IGC and essentially fossilized the pits and cracks. Based on the amount and location of anodize in the taper bore of P2B4 and the other steps in my post-mishap analysis of the blade, I believe the corrosion was advanced enough in 2011 that it should have been detected by a properly trained technician conducting the standard overhaul procedures IAW NAVAIR 03-20C-4 for Navy blades at WR-ALC in 2011.

e. The anodization process involves immersing the propeller blade in a series of solutions to clean and electrolyticially coat the surface of the blade and taper bore to provide corrosion protection.

f. If corrosion is detected on a blade, the corrosion should be annotated and then removed by the same or another technician at WR-ALC. In 2011, the removal of any identified corrosion should have been verified by another technician per NAVAIR Technical Manual 03-20C-4, Change 6.

g. The corrosion and IGC on P2B4 in 2011 should have been removed during overhaul at WR-ALC IAW NAVAIR 03-20C-4, but it was not.

h. This crack on P2B4 is the first known occurrence of a circumferential fatigue crack initiating from a radial crack which had not grown to pass fully through to the outer diameter blade shank wall of a propeller produced by UTC Aerospace Systems.

i. The manual governing the blade overhaul process in 2011 (NAVAIR Technical Manual 03-20C-4, Change 6) contained some inadequate explanations and contradictions. However, technicians assigned to conduct the overhaul process at WR-ALC in 2011 would have had enough training, experience, and observation skills to detect the corrosion on P2B4 IAW NAVAIR 03-20C-4 despite deficiencies in the manual.

j. Regarding quality control (QC) for Air Force blades at WR-ALC, a "second stamp" check only occurs for "flight safety" steps in the process. The borescope inspection or the FPI were not considered a flight safety step in 2011 therefore would not have received a second stamp inspection.

k. The only QC requirements the Navy imposed upon WR-ALC in 2011 were the "QA" checks stated at various steps in NAVAIR 03-20C-4.

l. Based on my personal experience and knowledge of WR-ALC and the blade overhaul process, I believe that deficiencies and concerns to include corrosion observed in the 2017 Navy audit corroborate the existence of these same and/or similar deficiencies in 2011.

3. Intermediate and Operational Level Maintenance Actions on C-130 Propeller Blades

a. Eddy current inspections are the only intermediate-level and operational-level maintenance actions that could detect a crack that was not visible on the outer surface of a blade.

b. An eddy current inspection tool should use 150 kilohertz on this type of blade IAW NAVAIR 03-20CBBJ-2.

c. An off-wing eddy current inspection can only detect a crack that has extended beyond the distal end of the installed bushing. A bushing is not authorized to be removed below the depot level.

d. An on-wing eddy current inspection could not have detected the crack on P2B4 since the crack was not within the detectable region of the blade shank. Furthermore, an on-wing eddy current inspection can only inspect a very small area of the blade shank outer diameter.

e. An off-wing eddy current inspection could theoretically have detected the radial crack by probing the taper bore (inner surface) – but only if the crack had extended beyond the distal end of the installed bushing and was within the detection depth at the time of the inspection.

f. Since the fatigue crack never went past the bushing, an off-wing eddy current inspection on P2B4 could not have detected the fatigue

crack, unless it had propagated to the outer diameter of the blade shank.

g. The growth rate of a radial crack is variable and unknown. A crack can potentially grow significantly during a single flight. Therefore, the crack may or may not have been detectable by an off-wing eddy current inspection even on the morning of the final flight.

h. Regarding the missed 56-Day Conditional Inspection in 2012, the benefit of the inspection (agitating hydraulic fluid) would have had little or no impact on the growth of the IGC and cracks because of the extent of the corrosion and IGC that existed in 2011. Additionally, hydraulic fluid helps prevent corrosion, but has little to no effect on existing corrosion.

i. An off-wing eddy current inspection of the taper bore should be conducted any time a propeller is broken down during intermediate-level maintenance generally, at a Marine aviation logistics squadron (MALS) IAW NAVAIR 03-20CBBJ-2.

j. Corrosion pits can lead to intergranular cracking (IGC). On P2B4 the IGC grew into a Radial crack (crack with orientation running from ID to OD and spreading axially towards the blade butt and the blade tip). A circumferential (orientation about the circumference of the blade shank) fatigue crack developed from the radial crack.

4. I have limited knowledge of the implementation of the DMISA. I don’t know of any regularly scheduled quality audits or records documenting quality audits of WR-ALC.

5. As a result of this mishap, the Air Force has convened an Independent Review Team (IRT), which I am a supporting member. The purpose is to aid in assessing operational risk to the USAF C-130 fleet, and identify and improve the blade overhaul process at WR-ALC.

a. The IRT has upgraded and improved the borescope process to include adding robotics which capture and inspect the taper bore. This step will be verified and inspected by a human technician which now has a higher definition and resolution image to identify corrosion and pitting.

b. The IRT also is upgrading and improving the eddy current inspection to try to provide automation and sensitivity to the screening process. This will increase the coverage area as well as allow the blade to be completely covered and allow the technician the ability to inspect the whole taper bore.

c. The IRT upgraded FPI inspection to incorporate robotics and to completely submerge the blades within the chemical substance (penetrant). Additionally, they have increased the time the blade is

within the substance (penetrant) to four hours of dwell time before the technician reviews the blade for corrosion and cracks.

d. The IRT will incorporate the glass bead blast, MWM, permatreat, epoxy coating, and wet bushing installation to all blades and not just U.S. Navy blades.

e. The IRT is updating the mapping process (work control documents) with regard to the blade overhaul process to automate and computerize the annotation and tracking of deficiencies within one centralized electronic file. This will allow the deficiency to be tracked and inspected for completion.

f. Technical Manuals between NAVAIR the USAF and UTAS are being updated to reflect the same overhaul process and procedures between services.

(b) (6) I can be reached at (b) (6) or (b) (6) for any further quest erns.

(b) (6)

DEPARTMENT OF THE AIR FORCE
HQ WARNER ROBINS AIR LOGISTICS CENTER (AFMC)
ROBINS AIR FORCE BASE GEORGIA

OC[illegible] 98

MEMORANDUM FOR SEE DISTRIBUTION

FROM: 78 ABW/XPRC

SUBJECT: Finalized Memorandum of Agreement (MOA) #R-546, Naval Air Systems Command Liaison

Attached is the finalized MOA between Robins AFB and the Naval Air Systems Command Liaison located in WR-ALC/LB. Point of contact is [redacted]

[redacted]
Chief, 78th Air Base Wing Manpower

Attachment:
#R-546

DISTRIBUTION:
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78 ABW/LGT
78 MDG/SGSR
78 CS/SCXP
HQ AFMC/XP-AO

MEMORANDUM OF AGREEMENT

BETWEEN

NAVAL AIR SYSTEMS COMMAND

PROGRAM MANAGER AIR 207

Patuxent River MD

AND

WARNER ROBINS-AIR LOGISTICS CENTER

C-130 SYSTEM PROGRAM OFFICE

ROBINS, AIR FORCE BASE

Warner Robins GA

17 July 1998

1. **PURPOSE:** This Memorandum of Agreement (MOA) establishes the relationship between Warner Robins-Air Logistic Center (WR-ALC), Robins Air Force Base GA, and the Naval Air Systems Command (NAVAIR), Program Manager Air 207 (PMA207), Patuxent River MD. The position, covered in this MOA, will be filled with a Department of Navy (DoN) Civilian GS-0343-13, as a Technical Representative. The position will be placed in residence in the US Air Force (USAF) C-130 System Program Office (SPO). The Technical Representative serves as the central point of contact within the SPO for C-130 matters pertinent to the Navy.

2. **AGREEMENTS:**

a. Robins AFB and/or WR-ALC Functions and Responsibilities:

(1) WR-ALC/LB will provide adequate office supplies, furniture, equipment, and space, (Bldg. 300 Bay "G") equivalent to WR-ALC co-workers of the same rate/grade, to include personal computer software and LAN components to enable connection(s) to WR-ALC systems, E-mail and INTERNET. Provide services relating to the operation of ADP associated equipment, publications distribution, and reference library, on a non-cost reimbursable basis.