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Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

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Wade Noble	Chairman	Rich Burtell	Witness
Jim Henness	Vice Chair	Sean Hood	Attorney representing Freeport-McMoRan Copper and Gold, Inc.
Bill Allen	Commissioner	Joy Herr-Cardillo	Attorney for the Arizona Center for Law in the Public Interest
Jim Horton	Commissioner		
George Mehnert	Director		
Fred Breedlove	Attorney representing the Commission		

Chairman Noble: Hearing on the Santa Cruz River before the Navigable Stream Adjudication Commission. Mr. Mehnert, will you call the roll?

Mr. Mehnert:

Roll Call	Response
Chairman Noble	present
Vice Chair Henness	here
Commissioner Allen	here
Commissioner Horton	is not here yet, but I believe is probably on his way.

Chairman Noble: Commissioner Allen, we welcome you this morning. Would you take just a moment and tell us a little bit about yourself?

Comm. Allen: Well, I've been involved with boundary issues, not navigable stream issues, but boundary issues for a long long time. I worked on the Missouri River, worked on the Mississippi River, and I worked on some minor streams in Missouri, worked on the Colorado River, and worked for the State Land Department for twelve years before I went to work with Bill Stevens and Associates. That was, I was there for four years, then set up my

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own firm and ultimately ended up as I am now, working for myself.

Chairman Noble: We are glad to have you and we look forward to working with you. Item No. 4 on our agenda is approval of the minutes for November 21, 2013.

Unknown: I move their approval, Mr. Chairman.

Chairman Noble: Okay. Without objection the minutes are approved. Item No. 5 is the San Pedro River Report and we'll turn the time over to Mr. Breedlove for a discussion.

Mr. Breedlove: Okay. Thank you Chairman. The report is almost finished. It was delayed when my son was born two weeks ago. I was hoping to have it wrapped up and ready to publish for the hearing, but it is not. So it will be soon.

Chairman Noble: Thank you very much. Do the Commissioners have any questions for Mr. Breedlove on this issue?

Unknown: Nope.

Chairman Noble: That brings us to Item No. 5. The hearing regarding the Santa Cruz River.

Unknown: [Inaudible]

Chairman Noble: I'm sorry, I'm reading Santa Cruz, we did Santa Fe.

Unknown: [Inaudible]

Chairman Noble: Yeah.

Unknown: It's Santa Cruz.

Chairman Noble: Scared me, I was an IEDA meeting and announced that we had done the Santa Cruz.

[Chuckling by several]

Mr. Mehnert: At least you didn't send 200 agendas out to people and said the Gila River entry.

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Chairman Noble: Chuckling

[Chuckling by several]

Chairman Noble: No, sir, George, I didn't do that.

Okay. We would like to take testimony with regard to the Santa Cruz River. We have informally let it be known that the Commission asks those who are presenting testimony to be brief. At our scheduling conference we will probably adopt some rules as to length of time. We would advise you that it is our intent to adopt rules of an hour for direct, and ½ hour each for cross. Although we do not have such rules in place at this time, we would hope that we could at least consider that as an opportunity. We do that because the Commission has received the documentary evidence, has reviewed the documentary evidence, and has reviewed the documentary evidence from past hearings on the rivers that we will be considering. Are there any members from or are there any persons here today from this area in Pima County or elsewhere along the Santa Cruz River that would have comments for this hearing?

George did we get anybody who signed in to make comments?

Mr. Mehnert: No we did not.

Chairman Noble: Then, could you show us who has witnesses that they would like to testify this morning.

Mr. Hood: Good morning Mr. Chairman, this is Sean Hood appearing on behalf of Freeport-McMoran. We are here today to present testimony from Mr. Rich Burtell concerning the Santa Cruz. And, we certainly intend to restrict ourselves as best as possible for these time suggestions. I'm not aware of any other witnesses.

Chairman Noble: Are there any other witnesses that Mr. Hood is not aware of? That he might allow to testify if they wanted to?

The famous lawyer joke, "I'll be brief."

[Chuckling by several]

Well then, Mr. Hood, let's begin.

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Mr. Hood: Thank you, Mr. Chairman.

Chairman Noble: Where do you want to – how do you want to position it?

Mr. Hood: The short answer is whatever is best for the Commission, Mr. Chairman. Although, I guess, we were considering putting him in the witness box. But, it's really your decision.

Chairman Noble: You're considering this to be the witness box.

Mr. Hood: That's what I had in mind.

Chairman Noble: We can't see him from there.

Mr. Hood: Okay. We can put a microphone there, and he's got a microphone there.

Chairman Noble: I can pull as much phone over as we both have one.

Mr. Hood: No. It's good enough. That's okay.

Chairman Noble: Is that going to work for you? To be able to sit next to him and examine him?

Mr. Hood: I can turn my chair a little bit. And I think we will make do, unless it's awkward for you.

Mr. Burtell: Nor, or I could sit there.

Mr. Hood: Maybe that would work better. He'll just slide across the aisle, and that way we can face each other …

Chairman Noble: Okay.

Mr. Hood: … without sitting in each other's laps. That will be fine.

Chairman Noble: Let's get comfortable on this issue. We do appreciate this hearing room. This is great accommodations.

And, by the way. Are any of those that need other accommodations, that perhaps may not be able to hear as well? We do not have a sound system for amplification of voice, so, Mr. Hood and Rich will be pointing towards the Commission, and

therefore, it may be difficult for some who are behind them to hear. If it is difficult to hear, we could advise you to bring chairs up here and face him so you can hear them. Whatever works well for you. Proceed, Mr. Hood.

Mr. Hood: Thank you, Mr. Chairman. Good morning, Mr. Burtell.

Mr. Burtell: Good Morning.

Mr. Hood: Would you please introduce yourself to the Commission.

Mr. Burtell: My name is Rich Burtell, and I am the principle and owner of Plateau Resources.

Mr. Hood: And just for the Commission's benefit, I also wanted to mention that with us here today although she had to step out briefly, is Shilpa Hunter-Patel from Freeport-McMoRan. She is the senior water counsel for Freeport, she will be joining us again momentarily.

Rich, very briefly, what were you asked to do in connection with this matter?

Mr. Burtell: Freeport asked that I evaluate whether the Santa Cruz River was navigable in its ordinary and natural condition at or before statehood from the, in its entirety from its headwaters in Canelo Hills all the way to its confluence with the Gila River.

Mr. Hood: I want to just, because we are going to try and be a little more streamlined, I want to be very brief on this first point. But can you just briefly summarize your opinion? We'll go back to them in greater detail as we work through your report.

Mr. Burtell: Sure, in light of PPL Montana, I recommend that the Santa Cruz River be divided into three segments. And I found that for each one of those segments, what I refer to as the upper, middle, and lower Santa Cruz River, I found that none of those segments, in my opinion would be determined to be navigable.

Mr. Hood: In their ordinary, natural conditions?

Mr. Burtell: In their ordinary, natural conditions on or before statehood.

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Mr. Hood: And, you've reviewed the report that was submitted by the Arizona Center for Law in the Public Interest last Friday.

Mr. Burtell: Yes, I received Mr. Hjalmarson's report that was provided to me last Friday, and had a chance to look through that, and although I find it very interesting none of his findings in any way changed my conclusions regarding the navigability of the Santa Cruz.

Mr. Hood: Can you very briefly walk through in your qualifications.

Mr. Burtell: Yeah. I got my undergraduate degree in geology from the University of Pittsburgh. That was followed by a master's degree from the University of Arizona – go Wildcats. After I left college I worked with the U.S. Geological Survey for a year before embarking on a career in the consulting industry for I guess about ten or eleven years. Before I joined ADWR, where I worked from 1999 through 2011 I headed up the adjudication group there, and that is the Gila and LCR general stream adjudications as opposed to navigable stream commission adjudications. And, in early 2011, I left ADWR and formed my own company and continue in that capacity now.

Mr. Hood: And, a note for the record that Mr. Burtell's curriculum vitae is attached. It is Attachment A to his report that's in the record.

Should we proceed?

Chairman Noble: Please proceed.

Mr. Hood: Mr. Burtell, I want to back up briefly to you work with ADWR.

Mr. Burtell: Sure.

Mr. Hood: And you said you were there for 11 to 12 years.

Mr. Burtell: Eleven years, yeah that's correct.

Mr. Hood: And for the bulk of that time, you were the manager of the adjudication section?

Mr. Burtell: That's correct, and in the adjudication, again, that adjudication is little different than the one that we had before us here. But there are a lot of similarities as well. In that is both, among other things,

look at historic stream flow conditions across the state. We also looked at how water was used in those streams. Historically and currently. As we know in this Navigable Stream Commission, historic water usage is certainly a topic of great interest – and it needs to be looked at. Well that's something that I looked at quite a bit at ADWR. So there are a lot of parallels between the two adjudications, even though they are officially different.

Mr. Hood: I want to talk, to give you a road map, I want to talk a little bit about your general methodologies, then we'll talk about the structure of your report. And then, we'll actually walk through your report and then we'll have everybody on their way.

Chairman Noble: I might have some cross. There might be a little bit.

Mr. Hood: I thought you said no cross-examinations today?

Mr. Hood: Again, we will talk about specific analysis of each segment in turn, but in general terms what was your methodology for evaluating the navigability or in this case the non-navigability of the Santa Cruz?

Mr. Burtell: What I tried to do for each one of the three segments, what I refer to as the upper, middle, and lower segments or reaches of the Santa Cruz River, is I tried to compile different lines of evidence to again examine this question about whether or not these reaches were either used or susceptible to being used for a highway for commerce. The lines of evidence said I would use from this historic account from stream flow data. It is also included boating accounts that had been entered into evidence. So, I looked at these multiple lines of evidence and what I found in general, was that there was consistencies between these lines of evidence. But what I was hoping to do for the Commission is to provide not just one line of evidence but again, multiple lines of evidence related to navigability of these reaches.

Mr. Hood: And all of these lines of evidence lead you to the same conclusion?

Mr. Burtell: Yes. They lead me to the conclusion that again, all three reaches or at least at how I segmented the river would be determined to be non-navigable in their ordinary and natural conditions.

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Mr. Hood: Mr. Chairman I have copies of Mr. Burtell's report that I could hand out to the Commission if that would be useful.

Chairman Noble: That was previously submitted I thought.

Mr. Hood: It is in the record but I have a copy for each of the Commissioners if it would be helpful to walk through.

Chairman Noble: We find that helpful.

Mr. Hood: Great.

Chairman Noble: And you might put the, if there's one left.

Mr. Noble: Oh sure. Thank you.

Chairman Noble: Mr. Mehnert, is Mr. Horton on his way?

Mr. Maynard: I couldn't hear him on the phone.

Chairman Noble: Okay.

Mr. Hood: Okay, Mr. Burtell, let's now talk very briefly about the overall organization of your declaration and then we'll jump into the first segment that you looked at.

Mr. Burtell: Sure. Um, if the Commissioners, if it would help, they could turn to the second page of my declaration. You will see a contents page which outlines how I organized the report. Moving past the introduction then I have a brief discussion about my rationale towards segmenting the Santa Cruz River into the upper middle and lower reaches, and then I proceed to address each one of those reaches one by one, upper followed by middle, followed by the lower. And you can see as I mentioned previously, the lines of evidence that I gathered regarding navigability in each one of those and then I wrapped up with some conclusions.

Supporting those lines of evidence I have a series of tables and figures. The tables do a couple of things they compile stream flow data that I found during my study. It also summarizes the historic accounts that various folks made over the years as they passed through the region. So those are summarized in tables. Then I have a series of figures. The figures are generally can be divided

into a couple of groups show where the locations of gauging stations were or where the historic accounts were made, and then there is also some figures that are rating curves where I relate the discharge of the stream to its average depth. So, that is generally how you could look at the figures. And then lastly, I have a few attachments, some maps that showed stream flow conditions as well as newspaper articles regarding recent boating.

Mr. Hood: Okay. Mr. Burtell would you turn to Figure 1 please. Figure 1 is titled "general Location Map."

Mr. Burtell: This is a figure I identified in reference it's listed on the bottom and it's as good a map that I could find that showed the entire water port with several helpful features by town as well as mountain ranges, tributary, etc. As I go through my testimony, many of the comments that I make are with regard to one of these places, so I'll probably suggest that _____ folks refer back to this _____. I'm assuming that you guys have already been through _____ and the Santa Cruz River you know where these places are, but this was helpful to me.

Mr. Hood: And by reference to Figure 1, I want to briefly discuss how you segmented the river for purposes of organizing your analysis and that is just to make it clear for the record…that's why you segmented you, are not opining that any segment is navigable but you broke it down by characteristics, by similar analysis…

Mr. Burtell: Yeah. As per PPL Montana, there certainly is a benefit in my opinion of breaking what is a very long river, I think over 200 miles in its entirety or almost 200 miles, into different segments based on similar characteristics. In the first reach…and I would say that three segments that I recommend are largely the same as the segments that were recommended by the State Land Department. The only difference between my segmentation and theirs is where the middle segment ends and the lower segment begins. I pushed mine a little further downstream. My upper segment goes from the Canelo Hills. The Santa Cruz River as the Commission knows is a bit unusual in terms of flow direction. It starts in the Canelo Hills and flows south. My upper reach is from the Canelo Hills down to where it crosses into Mexico. Then as you can see on this map it swings back around into the United

States and then flows north from there up to the confluence with the Gila.

My middle reach is from the Mexican border up to what I refer to as Santa Cruz Flats, which is adjacent to the Picacho Mountains. That's my middle reach.

And then my lower reach is from Santa Cruz Flat down to the confluence. My difference with the State Land Department is they had their middle reach stopping in the Marana area which is some 20 miles or so further south.

Mr. Hood: What was your reason for extending your middle reach from the Marana area to Santa Cruz Flats?

Mr. Burtell: One of the characteristics of the Santa Cruz River in the middle reach is that it is definable. There is a defined channel that has been mapped. I looked at and there is an appendices in my report from old General Land Office map that was prepared in the late 1800s, early 1900s that showed the defined channel reach past Marana all the way up into Santa Cruz Flats. So the original surveyors they went out into this area, they were actually able to map the defined reach. So in my opinion, the river was defined in that area and there is no reason to stop it at Marana. Once you hit Santa Cruz flats, however, the channel loses its definition, it is no longer called the Santa Cruz River it is called the Santa Cruz Flats. The river actually becomes very dispersed and spreads out, so that's the difference.

Mr. Hood: And then if you…as you proceed north from the Santa Cruz Flats, they actually become Santa Cruz Wash, it is still not called a river. Is that right?

Mr. Burtell: Yeah. Further past the current town of Casa Grande, the Santa Cruz Flats start to concentrate flow again and you form what's now called Santa Cruz Wash. It's still not a very well defined river per se. It is called wash because it had several tributaries or several separate branches if you will. It is not until about the last 10 miles before the confluence with the Gila River where the flow is concentrated again and it is then called a river again; at least as per mapping by the U.S. Geological Service.

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Mr. Hood: In comparison to the way Mr. Hjalmarson organized his assessment, my understanding is he was at one reach, not three. Is that accurate?

Mr. Burtell: That is correct. He…his analysis focused on the middle reach again from the border with Mexico up to or near Picacho Peak. He makes mention of flow conditions right above…right at the mouth the Santa Cruz River before it joins the Gila River to calculate what he thinks is the average predevelopment flow. But he doesn't do any further analysis that I could see in his report for that lower reach. His focus on looking at stream depths and navigability potential was for the middle reach.

Mr. Hood: So he made no opinions that you saw in his report about navigability for what would be your upper reach or your lower reach?

Mr. Burtell: Not that I recall from his report.

Mr. Hood: Okay, let's turn…referenced in your report, now we are on Page 3, roman numeral three the upper reach, why don't you walk us through…walk us through the upper reach and what your analysis was and then finally, what your conclusions are there.

Mr. Burtell: Sure. For the upper reach I had two primary lines of evidence. One was historic account and the second was through flow data.

The historic accounts we're rather fortunate I think, to have a couple of accounts that were made in the…of men that lived within that area, there is a land grant in that area and they were at the land grant in the 1830s and 1840s. That's the time when there was great Apache unrest in the area, and as I indicate in my report these men witnessed some pretty difficult times with the Apaches. The area was largely abandoned due to that Apache unrest. There was a boundary…or I should say there was a land commission lawsuit, and so these men were asked to testify related to conditions in the land grant during that time. And as I indicate in my report what these two gentleman said. They lived in Mexico but worked in the land grant area, was that the occurrence, if there was flow, there was perennial flow in that upper reach. But was only sporadic, a mile or two of perennial flow over about a 12 mile reach from the Canelo Hills where the head waters were down to the border with

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Mexico. So over that stretch they recalled during the time when the area was largely abandoned during these Apache unrest that there is only about a mile or two of perennial flow.

So, in my opinion from the perspective of navigability that would not be conducive for a highway for commerce.

The other thing that I looked at was stream flow records. There happens to be a USGS stream flow gauge right near the border near the little town of Lochiel. This is an area where…where the Santa Cruz River does have regular flow. The USGS, I've been to the gauge, they established a gauge there I think in 1948 and they have monitored flow there to present. So what I did was I looked at the stream flow data, now I am cognizant of the fact that, that stream flow data that was collected after statehood and the charge before us is to look at stream flow conditions on or before statehood. But I feel strongly that using later data can be of great value to the Commission as long as were aware of how that data may or may not be affected by diversions. So what I did is I looked at that data, I was also able to find that there was very limited agricultural activity up above the gauge. USGS reports a couple hundred acres of agriculture. And on top of that, more recently that agriculture was irrigated well pumpage not direct surface water diversion.

So what I did is in light of that, I looked at the stream flow records and if you referred to one of my tables, Table 1 in my report, what I did is I compiled the median stream flows from that gauge…from that gauge from 1948 to present and I looked at the median flows for each month, a median flow as we discussed in the San Pedro hearing is a good indication of typical flow conditions, it's not affected by very high stream flow events. And you can see these median flows that have been measured at this gauge are less than a CFS. So very, very minor amount of water that typically flowed past the gauge month by month. And even if you were to add in the effect of that irrigation of a couple hundred acres, you would not expect more than a couple of CFS of water that might be diverted out of the river that you would add on to these flows. So, needless to say, less than 10 CFS, less than 5 CFS likely, is flowed past this gauge prior to any development.

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Mr. Hood: Very briefly Mr. Burtell, can you put in to context what a stream of 5 CFS looks like relative to other streams that are indeed navigable?

Mr. Burtell: Yeah…when you consider…and…I have been to the gauge site. When you look at the actual stream it's not much wider than this desk, at Lochiel…at the Lochiel gauge, and half a foot at most depth. In fact, often less than that. You compare to that to the streams that have been deemed navigable, let's say the Green River or the Grande River in Utah, those rivers…the average or typical flow is on the order of thousands of CFS, 2,000, 5,000 CFS. We are talking a stream here that is less than 10 CFS. So, we are talking two orders of magnitude lower flow. And this might be a reason why the Center in its brief did not urge the Commission, at least my reading of their September 2012 brief, did not urge the Commission to even consider this reach from a navigability perspective, nor did the Center's expert address this reach at all. And then the last thing I did with this stream flow data is to relate these stream flows to the depth of water in the stream. I looked at field measurements where the USGS actually went out to the stream and did direct measurements of the width of the stream, its depth and many cross sections, cross section points across the stream and its velocity and using that data you can calculate what the average depth of the stream is for different stream flow measurements.

And if you turn to my Figure 3 in my report, you will see that it if a plot and I can point out this is a plot that is very similar to what Fuller who is the State expert could use the same spot where you look at multiple field measurements of stream flow, and you compare that to the mean or average depth of the stream And what this plot is to do is very useful is that it shows for a long period of time, over 30 years, how the average depth of the stream has varied with its discharge. So what you can do then is you can take typical discharge rate, which I spot here in Y axis, is to simply move across and look at the range of data points and try to get a sense of how deep the flow is associated with those discharge rates.

And I'd like to make a point, and we'll go into more of this I think with the middle, is that I purposely chose to plot as much data as I could from this period because I wanted to see what the range of

depths were with changes in discharge. I wasn't trying to look at one year or a certain period of time. I wanted to try get past the full range of variability of how the depth of the stream varies from discharge. And when you do that and look at the discharge rates at the Lochiel guage the average depth of the stream never exceeds a foot.

Mr. Hood: Let me follow-up on a couple of items. First of all, can you identify with specificity the page you were just referring to with the X and Y axis plotted?

Mr. Burtell: Oh, in my report?

Mr. Hood: Whatever you were referring to.

Mr. Burtell: Oh, I mentioned in the Fuller report that Fuller does a similar analysis as I do where he thought multiple field measurements versus discharge. And if you look at his report for the San Pedro River, which was I think evidence No. 16, you will see that Fuller and his report where he developed rating curves similar to mine for the San Pedro River, he did the same thing that I did. He looked at multiple field measurement points over time and plotted those and then even drew a line through the points. Just to try to get a sense of essential tendency.

Mr. Hood: What page are you referring to in the full report?

Mr. Burtell: This is starting on page 7-11 of the San Pedro report by Fuller, prepared on behalf of State Land Department through pages 7-18.

Mr. Hood: The different stream that you were referring to is because of the similar methodology?

Mr. Burtell: Yeah, he followed the same approach I did, looking at multiple USGS field measurements, plotted those to try to come up with a relationship of how flow varies in the average depth.

Mr. Hood: And just so we have it on the record – the figure that you were referring to and comparing to what Fuller had done, that figure, figure 3 in your report.

Mr. Burtell: Figure 3 in my declaration.

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Mr. Hood: That's correct. And I want to back up to the historic accounts, you were talking about it being in a period when the area was largely abandoned due to Apache unrest, can you just very briefly, I think it somewhat fairly self-explanatory, but explain why it's relevant that the area was largely abandoned. From the ordinary natural perspective.

Mr. Burtell: Certainly the task before the Commission is to evaluate stream flow conditions in their natural absent drought and flood events, but also, I'm sorry, that ordinary. But also its natural condition and natural condition being defined as I had read the Arizona Court of Appeals Ruling as absent major diversions. So this was a period of time due to the Apache unrest it was difficult for people to be in the area at all. So there was little if any agriculture going on because people simply feared for their safety to even be in the area. Because of that and I indicate here the Apaches drove off the livestock and certainly made it difficult for them to go back.

Mr. Hood: And you also, referring again to your Table 1, which is your stream flow data table, you talked about using median versus mean – and mean is also sometimes referred to as average – can you just briefly and you touched upon this by using the median, it put you in a position where you're not being thrown off by extremely high flood events that will skew an average discharge rate.

Mr. Burtell: I think it's critical we discussed this at length at the San Pedro hearing that because the Commission has asked to look at the natural – I keep getting messed up – the ordinary stream flow conditions minus or absent drought, drought events or large floods. Using median flows is a good tool to try to evaluate ordinary stream flow conditions because those large flood events, they can skew your average flows to a much higher value. You take those higher flows largely out of the equation by looking at what's typical in the middle in terms of the flow event. So median flows are much more characteristic of ordinary stream flow conditions and that is what I used here. But not to be confused with, so that's median flow, but when it comes to looking at the depth of water in the stream, what, and perhaps we'll get into this in more detail, but what many others have done including U.S. Supreme Court has looked at average stream flow conditions.

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Mr. Hood: We're talking now about cross section and what is the average depth of cross section?

Mr. Burtell: So flow being how much water is passing through the cross section, but in terms of what the depth is, what people who've evaluated navigability typically look at is the mean or the average depth in that cross section.

Mr. Hood: So maybe this will help to explain it, but you're looking at median flows when you're looking at a period of time so you're not being thrown off by a large flood event, whereas when you're talking about a cross section you're really looking at one location at one time what is the depth and you want to look at the average depth.

Mr. Burtell: And the reason why that is, is that the streams in Arizona and actually in most places are not a smooth parabola or are not in any way smooth or regular. They are usually very irregular. So, if you're trying to navigate such a stream, you likely won't have the benefit of knowing where the deepest point is. You're going to be kind of stuck floating down there hoping you're in the right spot in the river. Previous navigability determinations including the Utah case focused on the mean depth or the average depth, knowing that that's a better indication of what someone who is boating up the river will likely have to deal with. Because that person won't know exactly where the deepest part in the channel is.

Mr. Hood: With respect to the upper reach, were you able to identify anyhistory of navigation?

Mr. Burtell: No. This area, in fact not the upper region, neither the upper or middle or lower reach there's been any evidence historically of boat travel. As the center brought up and we'll discuss it in some detail in the middle reach, there has been recent evidence of recreational building in the middle reach, but no historical evidence.

Mr. Hood: Is that more recent recreational boating reliant upon effluent?

Mr. Burtell: It's relying on two things. The accounts that the center provided to the commitment was – there's two reaches of the Santa Cruz River now that are effluent dominated. There's the Nogales International Waste Water Treatment Plant that discharges I believe it's about

20 or 30 CFS effluent into the Santa Cruz that creates I think it's about a 20 mile reach of effluent flow. And then there's also the Roger Road Treatment Plant here in Tucson that discharges more on the order of 50 CFS into the river, and that also creates an effluent dominated reach. And these more recent boating accounts have occurred along those reaches and also during flood events in the winter time and in the summer monsoons and big winter storms when you could get flood waters from previous flows going down the Santa Cruz.

Mr. Hood: Okay. So with respect to the flood events, that's not ordinary; with respect to the effluent, that's not natural?

Mr. Burtell: Because again the Commission's task is looking at ordinary and natural conditions, I don't think any, I would find it surprising that any court would find an effluent dominated reach to be a natural stream flow condition.

Mr. Hood: Okay, let's move to middle reach now and describe what you looked at here and what your analysis was and your conclusions.

Mr. Burtell: The middle reach has got some starts on page 5, and I have a lot more discussion here, but this again was the focused of the center's expert's analysis, the middle reach. This reach again extends from the Mexican border up to Santa Cruz Flats. There were three lines of evidence that I used here. And I could point out there were a lot more data for this reach because there was a lot more activity and settlement in this area.

I compiled and I tabulated, and we'll go through some of it, and I think as similar to San Pedro we're quite fortunate that we have some good historic accounts of what was going on in this area. My study of streams across Arizona, we are not all fortunate to have so much data to indicate how the stream flow was a long time ago as we were in the Santa Cruz. I tabulated that. So we have some very good historic accounts and I'll go into that in more detail.

We also have some good stream flow measurements in my opinion that also paint a picture of a very shallow stream.

And then we also have boating accounts. Again, in general lack of historical boating accounts and the more recent boating accounts being of a recreational nature and again associated with either flood events or on effluent dominated reach.

Mr. Hood: The historic accounts that you looked at and tabulated those are set forth in Table 2, is that right?

Mr. Burtell: Yes, and if I could ask the Commission to turn to Table 2 and again, I'll just say I think we are very fortunate to have a stream where you can go so far back in time when a variety of folks that went up and down the river were missionaries, military, boats, surveyors, the 49ers on their way to the California gold fields, many of these folks wrote diaries and we're very fortunate in my opinion to have their data or their account of what they saw when they went up the river. And I tabulated those in Table 2.

But I need to point out there's even more than this. What these accounts are is I was very particular in trying to find an account when the account was made during the time when they were harvesting their crops in the autumn or it was a time in the winter when there was little or no irrigation going on. Also, in the winter time the plants aren't transpiring. So this would be a period of time when you would expect the greatest flow in the river after a storm event going through. There simply wasn't much if any diversion going on and naturally the plants weren't transpiring. So when you look at my accounts, and I put the location, again, starting from the border with Mexico all the way up to Picacho Peak, I put where the location is, I put where the date is and again I encourage you to look at these dates. They are very early. Again, many of them are times of year when it could be the harvest period or in the winter time when they weren't growing stock. You also see, for example, I have May 1849, you might say well wait that's right in the middle of the irrigation season, the plants are transpiring. When the 49er passed up through this region the Apache unrest was at its height and what these 49ers saw as they passed up along the Santa Cruz River is an area largely abandoned. So some of the perspective of looking at the natural conditions of the stream, that is after the impact from man's diversion, 1849 was a good year. Not a good year if you were there. A good year for us historically from the perspective of diversions. And Apache

unrest continued right up and through the 1850s. Right up until the late 1850s when military bases got established and prior to the Civil War. When the Civil War started, we were right back to a lot of Apache unrest so I complied these accounts with that understanding.

There are more accounts and the additional accounts are consistent with these, but again I wanted the Commission to be able to focus and have at their disposal records when there was little if any diversions coming off the river, which again I think will help in your evaluation of the ordinary conditions of the stream.

Mr. Hood: Natural.

Mr. Burtell: I'm sorry.

Mr. Hood: Natural.

Mr. Burtell: As to these accounts, if I could indulge the Commission, there's a couple I'd like to you that I think are particularly provocative. The first one I'll start with is, is it's at the top, it's the second description down. It was made in 1804 by a man named Zuniga. And he was a Mexican official based in Tucson. And what he does in 1804 is he was writing to his superiors and trying to describe what the general conditions of the river was. And I think he does an excellent job of describing what he saw out there. Now, of course he was describing the river during all times of the year, and he says our major river is the Santa Maria Suamca, also referred to as the Santa Cruz River, which arises 95 miles to the southeast from the spring near the presidio in Santa Cruz. That's in Mexico. From its origin it flows past the Santa Cruz Presidio, the abandoned ranches of Divisaderos, Santa Barbara, San Luis, and Buena Vista, as well as the abandoned missions of Guevavi and Calabasas, the Pima Mission of Tumacacori, and the Tubac presidio.

Here's the key: when rainfall is only average or below, it flows above ground to a point some five miles north of Tubac and goes underground all the way to San Xavier del Bac. Only during years of exceptionally heavy rain, rainfall does it water the flat land between Tubac and San Xavier.

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What's critical about that in my opinion is he's looking at a time when many of the missions in the development along that portion of the Santa Cruz were abandoned, he's saying that in an average year the flow only goes up to Tubac area and then it goes underground all the way up to San Xavier. So from the perspective of navigability, there would need to be, and I calculated it, over 20 mile portage from that point all the way up to San Xavier. And that's assuming of course that there's even enough flow, which I feel there's not, and we'll get into that in a bit, that there's even enough flow in the river. But even where there was any regular flow it stops somewhere north of Tubac and didn't start again until San Xavier. So that's a long stretch where there wasn't any water in the stream during a time when the area was largely abandoned.

Mr. Hood: And that San Xavier is, just so there's no confusion, is spelled X-A-V-I-E-R, but it's pronounced San Xavier?

Mr. Burtell: That's my understanding. San Xavier, I think that's how you – I have been pronouncing it wrong all along.

The next account that I would ask the Commission to look at is a, it's down towards the middle, and it's an account made by someone by Powell. He was one of the 49ers that passed through the area. He passed through in October of 1849, and he was discussing the occurrence of flow from the San Xavier or San Xavier mission up to Tucson. And he said, the road from San Xavier to camp, one mile north, one mile short of Tucson, was level, running through mesquite etc. We encamped in a grassy bottom, much covered with saline efflorescence. The river has divided to a mere brook, the grassy banks of which are not more than two yards apart.

So he's passing through the area when again, he's upstream of Tucson, upstream of where there's diversions, at a time when there's a lot of Apache unrest, and he's describing a very shallow river.

Mr. Hood: This is early in October 1849, so it's not only during Apache unrest in the 49 year, but it's also during harvest when diversion would be low anyway?

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Mr. Burtell: That's correct. If you take a look historically, October is when they harvested in the Tucson area.

The last account – now we're going to go way back, even earlier – this was a fellow named Captain Manje, I'm probably pronouncing his name wrong, this is the second account from the bottom, he described his travels with Father Kino which I'm sure you're all familiar with, he joined Father Kino during one of his trips up the Santa Cruz River. In late November 1697, he just drives the river as follows. Now, I can point out he was travelling from Picacho Peak area down towards Tucson, so he was going from North to South. Okay, and he says, we camped for the night at a settlement which we called Santa Catarina, also spelled Catalina. On November 23rd after mass, travelling nine leagues down the river, we came to a settlement of Valle de Correa, where the Indians obtain their drinking from a well made by hand in the bed of the river. These lands are seasonable. We continued to the south and after going six leagues, we came to the settlement of San Augustin de Ouir – however you pronounce that; that's in the Tucson area. Here, the river runs a full flow of water, though the horses forded it without difficulty. There are good pasture and agricultural lands with a canal for irrigation.

If you take a look, there's a map that's in my figure that actually shows Father Kino's travels, it's Figure 6. And those very diligence that he describes are shown in this figure. You can see where Santa Catalina is, that is up near where Picacho Peak is and then as you follow down you see where this Valle de Correa is where he said at that point that the Native Americans had dug for their water. And then he said a full flow of water down at San Augustin de Ouir, which is in the Tucson area.

The reason that I think that account is important is, again, we're back in 1697 where the very early period of time, we're also there in autumn during the harvest period, and he is describing a river that from the Tucson area up to Picacho Peak he didn't see any water. You can imagine if you're an explorer at this time and you're travelling through this countryside with your horses and other livestock, that having a source of water is critical. So I believe if there was water there he would have said so.

Transcription of audio tape 1 of 4

Mr. Hood: In addition to the table that we just discussed, you addressed sort of a summary account by Bentacourt in your, in the body of your report. Is that right?

Mr. Burtell: Yeah, this is a key document that was entered into evidence I believe during the first round of Santa Cruz hearings. And Bentacourt ....

[recording ends]

Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 1 of 4

I, Barbara Leach, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed the attached pages 1 through 12 of tape 1 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 1 of 4 accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this 22nd day of April, 2014

Barbara Leach

I, Patricia Jeriha, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed the attached pages 13 through 23 of tape 1 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 1 of 4 is accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this 22nd day of April, 2014

Patricia Jeriha

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Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 2 of 4

Wade Noble	Chairman	Rich Burtell	Witness
Jim Henness	Vice Chair	Sean Hood	Attorney representing Freeport-McMoRan Copper and Gold, Inc.
Bill Allen	Commissioner	Joy Herr-Cardillo	Attorney for the Arizona Center for Law in the Public Interest
Jim Horton	Commissioner		
George Mehnert	Director		
Fred Breedlove	Attorney representing the Commission		

Mr. Burtell: … down you see where this Valle de Correa is, where he said that…at that point the Native Americans dug for their water. And then he says they found a full flow of water down in San Augustin de Oiaur which is in the Tucson area. The reason I think that account is important is again we're back in 1697 where a very early period of time, were also there autumn during the harvest period, and he is describing a river that from the Tucson area up to peak, he did not see any water. You can imagine if you are an explorer at this time and your travel through this countryside with your horses and other livestock, that having a source of water is critical. So, I believe if there was water there he would have said so.

Mr. Hood: In addition to the table we just discussed, you address sort of a summary account by Bentacourt in court in the body of your report, is that right?

Mr. Burtell: Yeah, this is a key document that was entered into evidence I believe during the first round of Santa Cruz hearings. And Bentacourt does a nice summary, like me, he became a student of the historical accounts that he could for the area and tried to paint a picture of what stream flow conditions were based on those

Transcription of audio tape 2 of 4

accounts. And on the top of page 6 of my declaration, I quote him directly and I will go ahead and read his quote regarding the occurrence of flow in the Tucson area along the Santa Cruz River. He says, "All accounts agree that the flow of the Santa Cruz first appear not far north of Tubac …"

Mr. Hood: First disappeared.

Mr. Burtell: Right, sorry… "first disappeared not far north of Tubac near the Ford at La Canoa." The flows…" and then he jumps to the next point where he sees flows, which is in the Tucson area by the mission. "The flows from Punta De Aqua and Agua de la Mission springs disappear at San Xavier and the eastern base of Martinez Hill respectively. Permanent water reappeared about 2 miles north of Martinez Hill quitting again in less than 2 kilometers. Another brief stretch of perennial flow existed halfway to Tucson in the northern half of Section 2, Township 15 south, Range 13. The evidence that the water flow disappeared north of Tucson is less clear.

This shows a river that north of the Tubac and the Canoa area is dry and that flow resumes in the Tucson area; but even in the Tucson area it's discontinuous. It's not a long stretch of flow in that area all the way up to Picacho Peak. In fact, these accounts indicate that not far north of the Marana area is where the flow stopped and there simply wasn't flow regularly further north of there.

Mr. Hood: Is that the reason the State Land Commission suggested that the middle region end at Marana's because there was evidence that the flow ended at Marana?

Mr. Burtell: My understanding in looking at their justifications for their segmentation was just that, that the Marana was where regular flow stopped. Since I looked at the segmentation based more on channel characteristics and the fact that they were still a defined channel further north is why I extend it. I guess my beef with the State Land department is that they…and they admit too, that there is this long stretch between Tubac and San Xavier which is dry. And just the occurrence of flow shouldn't necessarily stop where the reach is. To me it is more defined by where there is a definable channel.

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Mr. Hood: Well, let's talk now about the stream flow records that you looked at and let's talk about depths.

Mr. Burtell: Sure. We are, ah…fortunate to have a couple of sets of stream flow records that can be used in my opinion, to evaluate what the both ordinary and natural conditions of flow were and their associated depths. We'll start with the gauge that is near border with Mexico, it is referred to as the Nogales Gauge, and if you look in my declaration you can see on Figure 2, there is a map that shows where that…where the Nogales Gauge is. It moved…originally it was just about a mile north of the border and then it was moved a few miles further down. Data were collected from that gauge starting in the early 1900's and it is still being monitored. I have been to that gauge, I have several photographs of how the stream channel looks over time. At that point, I focused on data that was collected very early prior to 1940 and prior to any ground water pumpage for irrigation in the area, understanding again that if I am going to look at stream flow data that is post statehood, I better try to have a good handle on how much diversions occurred above the gauge so that when we look at the gauge data it can be looked at in light of how much water we need to add back if you will, to…to look at the natural conditions.

Mr. Hood: And indeed, if you are looking at stream gauge data that is even before statehood, you still need to account for any diversions.

Mr. Burtell: Absolutely. You know, regardless of this copy, the ability to quantify diversions upstream of a gauge…um, I think it is important and a critical point that we have to look and as you know, Arizona was diverting water long before statehood. And so, I was cognizant of that and because of that, I looked at the stream flow data in that light. And what I did in Table 3 of my report is I… I'm sorry, Table 4, is I compiled the stream flow data from this Nogales gauge from 1913 to 1922 and from 1930 to 1939. Monthly data, these are median stream flows and as I mentioned, and ah…I discussed at length, it is critical that we have a handle on what are…if any diversions could have affected these data. Based on the U.S. geological survey's description of the gauge site, there was only in their reports a couple hundred acres that were being irrigated upstream of gauge. They also note that there was a stream…that there was an irrigation canal ditch in the United

Transcription of audio tape 2 of 4

States upstream of the gauge site. We are fortunate that USGS actually measured the amount of water diverted into that canal. It ranged from less…or about a 10th of the CFS up to a 1.6 CFS. So less than 2 CFS. I bore you with these details because it is these amounts of diversions that we need to be cognizant of when we look at these stream flow data. So when you look at that amount of diversion into this irrigation canal and the irrigated acreage upstream of the gauge in my opinion, there would only be about 5 CFS that might have been diverted from this stream; 5 cubic feet per second upstream of this gauge that you would affectively need to add back to these numbers. Again, with our task being to look at natural and ordinary conditions and in this case, naturally what was the water without any diversions. If you add that 5 CFS back to these numbers, what does it do? Well, it does not make the numbers that much bigger, um…and what I did was try to evaluate what that affect that would have on the stream depths, um…similar to the Lochiel gauge, if you go to my Figure 4, and this again is following the approach that is similar to what Fuller did for the San Pedro, I plotted a series of discharge measurements that the USGS collected at the gauge site from 1975 through 2011. So we are talking over 30 years of field measurements, over 200 measurements I think almost 250 measurements of how stream discharge varies with the average depth and these are not as Mr. Hjalmarson does...did hypothetical descriptions of the channel being a nice smooth parabola. This is physically what is out in the field of what USGS actually saw.

Mr. Hjalmarson took great issue with this…this figure from my report and if you look at his report towards I think it is the end of the appendices, he really lets me have it regarding this. I was surprised by his criticisms I guess first of all, in that he was very critical of this analysis even though the same analysis of using multiple field measurements of discharge and depth was used by the State's expert, Fuller, in the San Pedro. So, I do not understand why he thought what I was doing was so inappropriate in that regard. He was also very taken by the fact that I plotted discharge on the Y-axis versus the X-axis. I think he thought that by doing that I was presuming some causation between variables, that the Y is the independent variable and the X is the dependent or vice versa. In no way was I doing that. I was simply plotting the data to show that there was a relationship between the two factors,

average depth in discharge. So I certainly was not concerned with the causation. And I would also point that, in the very report for the Santa Cruz River that Fuller put together on behalf of the State Land Department, they plot in the same way as me. They plot discharge on the Y-axis like I do and stage or depth of the stream on the X-axis. So the very thing that Mr. Hjalmarson, the Center's expert criticized me for doing which he thought was very inappropriate, um…the State's expert, Fuller, does that for the Santa Cruz River.

Mr. Hood: Can you identify the page in this specific document, please?

Mr. Burtell: Yes, this is the 2004 navigability report, ah…study that Fuller put together. It is um…I think Exhibit 19 and starting on Page 76 through 79 they have a series of rating curves where again, they fought discharge of the Y-axis, which is what I do and stage or depth on the X-axis, which is what I do, so…

The other thing ah, Mr. Hjalmarson the Center's expert took great issue with me and I was very confused by this was my analysis of or use of average stream depth to evaluate navigability. You might recall the from the San Pedro hearings and Mr. Hjalmarson, who unfortunately is not here to speak for himself, but based on my reading of his report, he assumes for purposes of evaluating navigability and stream depth the stream is a smooth parabola. But what's most importantly is that, his analysis, his findings are all based on the maximum depth of such an artificial channel, that is, at its deepest point, and that is what his analysis is based on. So, all of his conclusions are based on that maximum depth. And when you he then compares that maximum depth to boating standards, it is all based on the maximum depth, not the average depth.

Mr. Hood: He's using the maximum depth or the standard is using maximum depth, that's an important distinction.

Mr. Burtell: He is using the maximum depth and what I found unusual, he takes great…he is quite concerned with the fact that I am using averages and said that is inappropriate, that you need to use the maximum depth. That surprised me and it surprised me in a couple of ways because I will start with the Utah case. The Supreme court case related to the navigability of streams in Utah.

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They looked at the Green River, the Grand River and the Colorado River and a Special Master in that case and I have his report here. He does exactly what I did. He looks at mean stream…mean or average stream flow depth in his evaluation of the navigability of those streams. Nowhere in the Special Master's report for the Utah case, does he look at the maximum depth for these streams. He looks at the mean or average stream depth, which is what I did. I would also point out that Fuller, in his study of the San Pedro which we have already gone through, but I looked back at it again, and when Fuller evaluates – and again this is Exhibit 16 from the San Pedro evidence – Fuller did the same thing. He looked at average stream flow depths in his evaluation of the navigability of those rivers.

Mr. Hood: That makes perfect sense if your navi…if you are attempting to navigate a stream and your relying upon the maximum depth, then unless you know right where that maximum depth is that does not matter much.

Mr. Burtell: Yeah he draw the…he draws the example of the Mississippi River where they…they go down, they dredge channels through the Mississippi River which, ah…my understanding is barges will follow those dredge channels. That is a very different thing than an Arizona stream which after a storm event, ah, could have changed its channel quite a bit. And when I checked last, there are not many barges that I have seen on the Santa Cruz River dredging the channel. Its just…it just does not make a lot of sense.

As a further example of the use average or mean stream flow depth to evaluating navigability, we have the State of Washington, which has developed criteria that they are using to evaluate navigability of their streams. One of their criteria: mean depth of the stream. There is nothing about maximum depth, which is what Mr. Hjalmarson uses. But I thought what got me most about Mr. Hjalmarson's criticism is the very method that he uses to evaluate boating criteria, that is, the depth is required for recreational boats, um…is based on average or mean depths, not maximum depths and I draw…we'll submit these into evidence I believe

Chairman Noble: We hope.

Mr. Burtell: Excuse me?

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Chairman Noble: We hope.

Mr. Burtell: This is…if you look at Mr. Hjalmarson's report, he…he takes his modeling analysis and looks at it in light of these boating criteria. Okay, this is the methods of assessing in-stream flows for recreation. This is his main tool to evaluate whether his stream flow results…his model results indicate that the stream is navigable or not.

Mr. Hood: And these are…we discussed this as some length on the San Pedro proceedings, these are the recreational…modern recreational boating standards that indicate that a modern canoe needs a foot to navigate.

Mr. Burtell: That is correct. He used these not only in San Pedro, but he is also using these in the Santa Cruz. He presents these…he references these, we are talking about the same thing. And when you take a look at these methods and you go to page…when he talks about his methodology as he is using what is called the single cross section method, I won't bore the Commission with the details. But I would draw the Commission to the fact that in this…in these criteria, it talks about using a computer program, the IFG Model to calculate what parameters you need to use for the single cross section method, okay. So this IFG Model is referenced in the methodology that has these boating standards. Well, what I did then is I went to the very document that was published about the same year by the same group, this is Hydraulic simulation of in stream flow studies, is the same group U.S. Fish & Wild Life and they have further detail about this model, the so-called IFG Model, which they say that you use to figure out what your depths are for boating criteria. So then when you go to that report, which we'll also submitted into evidence, they talked about this model IFG and what is the output from the model? Not maximum stream flow depths. The output is average depth.

And just this one final indication that I wasn't just imaging things, I spent a few minutes online and found a study where Wyoming Game & Fish used that same model, the IFG model, which again, is what references to the method you can use to calculate the depth to figure out your boating criteria for recreational purposes. And what is the output from the IFG model that the Wyoming…that the state of Wyoming presents? Average depth. So, I apologize if I

beat the drum a little bit loud here, but Mr. Hjalmarson took great pains to attack my report for looking at average stream flow depths, when it appears from these records average stream flow depths is, in fact, what people use, including the only methodology he uses to evaluate boating criteria.

Mr. Hood: So even in the context of modern recreational boating criteria which I think we have addressed at length why that is not applicable here. Even in that context you want to look average depth, not maximum depth?

Mr. Burtell: That is correct. And I will just point out again, that all of Mr. Hjalmarson's findings are based on maximum depth, not average depth.

Mr. Hood: Okay. Just in brief summary because you touched upon it in your table, what kind of depths did we have during the stretch…at this stretch, the middle, in ordinary natural conditions?

Mr. Burtell: If you take a look at my table, I outlined…and there is well over…I think it is almost 150 different months and you an even probably see it from a distance; these are median stream flows for all these years and…

Mr. Hood: And, again, we are back to Table 4 now?

Mr. Burtell: We are at Table 4 and I highlighted in bold red those months where based on the median stream flows and that stage relationship that rating grade might have between average depth and discharge. There is only four months in over 150 months where the average depth was greater than a foot. Those average depths were greater than a foot during a winter storm in January and February and also during August during the monsoon floods.

The point to take home here and I go on longwinded is that, for a period of time when there was no ground water pumpage, when there was very minor diversions using actual data from the stream. This is not a simulation, this is not a hypothetical of what a channel looks like, this is the actual channel conditions. You only have a couple of months out of over 150 months where the flow was greater than a foot. Obviously … even I think Mr. Hjalmarson

would admit that flow less than a foot would not be conducive as a highway of commerce.

Mr. Hood: He did admit that on the San Pedro.

Mr. Burtell: And in the San Pedro I do believe he did admit that.

Mr. Hood: Okay. Um, let's…now I just want to be clear, have you accounted for those minor diversions in the canal system?

Mr. Burtell: Yes, and I…I encouraged the Commission to go back to my Figure 4. And again, Mr. Hjalmarson took it issue with the fact…well I should point this out. He took issue with the fact that I plotted multiple years of field measurements on the same plot, understanding that this is a sand channel that changes its grade over time. Well, when I read his criticism I was very surprised because that's exactly what I was trying to do with this graft is to show the variability. I did not want the Commission to get locked in with one rating curve which represents the channel that could change over time. I have over 30 years of field measurements thatr show how that channel changes over time and how the width of, or I should say, the depth of the channel changes with its discharge. And I did not use the equation on this graft. I just used…I put these…the line in the equation, I simply showed there was a relationship.

Getting back to Mr. Hood's comment: if you take the actual median flows that were measured at that gauge and add back in the 5 CFS, and quite frankly add 10 CFS, it really doesn't matter, and you then take that flow 50, 60, 70, 100 CFS, and you walk across and see what the associated depths are with over 30 years of field measurements, they are all still less than a foot. So, my point is Mr. Hjalmarson was very critical that I was using multiple data points…that is exactly what I wanted to show. I wanted to show the full range of possible variability of stream discharge with depth. Even when you look at that full range you still get less than a foot of flow.

Mr. Hood: Adding 200 CFS, you are still talking about a stream that pales in comparison to the San Juan which was deemed non-navigable, is that right?

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Mr. Burtell: In fact if you put in 200 CFS in my figure 4 and you walk across and look all the field measurements that the USGS took when there was 200 CFS is fairly more than 1.2, 1.3 average depth in a stream. So, it just simply…it just simply would not be conducive to be a highway of commerce, even if you put the diversions back in.

Mr. Hood: In terms of depth…a depth comparison, the San Juan was over 2-1/2 feet in terms of average depth and here we are talking about a stream on the middle that is clearly under foot.

Mr. Burtell: When you look at the Special Master's findings in the Utah case, he actually compiled the number of days that the average depth of the San Juan River was in different categories. And as I recall, I believe over 150 days out of the year, it was greater than 2 feet.

Mr. Hood: And the typical CFS was 1000 or greater, is that right?

Mr. Burtell: Yes. A couple of 1000 as I recall. And again, we are talking a stream here where you've got 10's of CFS versus a stream with 1000's of CFS's, and the San Juan is deemed nonnavigable. So, we are talking a stream of orders of magnitude difference of flow.

Mr. Hood: Let's talk…um…let's move now to history and navigation. You have already said that there is none. Okay, I think there is a couple of examples of people paddling around behind a manmade lake and people floating in effluent. But during this period of time you talked about Father Kino's explorations, we know the 49ers came through, we had military encampments, including Fort Buchanan. We had mine operations, silver mines in the Patagonia mountain area: what explains the fact that there was no history of navigation. We obviously had a need…and we had people here who would have used it.

Mr. Burtell: You know, I think what…one thing I took out of the Utah case that I think is critical that subsequent reports in and Commissions have acknowledged and had to take into account was just because there was not boating in an area, you can't necessarily assume that the stream was not navigable just due to lack of boating. However, the court was clear in that is…that might be explained because there was a lack of need, that there wasn't any settlement to the area. The area was largely unsettled and the reason there was not a lot of boating was there simply was no one there.

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That argument cannot be made for the Santa Cruz River, it just cannot be made. At the time when there was…even Apache unest, a fellow named Malory, who the Center's expert spends a lot of time talking about, he has…I believe it was a silver mine up in the Patagonia mountains. There are records. He has written about having to transport supplies from the Port at Guaymas by wagon train up to that mine site. Supplies were also being brought in to Yuma at that time. Supplies from Yuma and Guaymas were all brought either to Tucson or to the Tubac area by wagon train. There was a military base…we all know about the Tucson Presidio, it was here in Tucson. There was also a military base in the Tubac area. There was a U.S. military base, Fort Buchanan, up Sonoita the creek and it was operating before the civil war. They got its supplies from Guaymas; there was…by wagon train. There were people in the area. There was a need for a highway for commerce. If there was ever a need to bring in supplies, either equipment for the mines, supplies for the troops, there was a need. That need was talked about. But the river was not used to meet that need, at any time of the year. Even if one could make the argument, which I do not believe the Center and their expert have that for some way irrigation dried up the river in the times of year when there was not irrigation going on, during the harvest and in the winter time, and in years when the Apache unrest had largely caused the area to be abandoned, they still didn't use the river. So you have to start to ask yourself the question, you had a need for supplies being brought in, you had a need for a highway for commerce, but the river was not used. I think that is strong evidence to say that the river was not suitable as a means for navigation. Except…

Mr. Hood: Please proceed.

Mr. Burtell: The Center in their brief, talks about more recent use of the river. They talk about boating on two lakes that were in the Tucson area; Silver Lake and Warner Lake. When one looked at those lakes it does not take very long for one to figure out that those are artificial lakes. They were formed by dams being placed across the Santa Cruz River. I think the best evidence…and I thought about it last night of why it is unreasonable to consider those lakes from a navigability prospective. If there was any ponding of water, why didn't any of the historic accounts before that time mention those

lakes? Nobody did. That is because the lakes were not there, they were formed by dams. Those dams that I think the proponents of navigability are very quick to point out the effects of diversions having an effect on navigability. Well in this case, they can't have it both ways. You cannot put an artificial structure across a stream that dams off water that causes a pond to form, that thus is used by boats and all of a sudden it is navigable. That's just unreasonable.

Mr. Hood: It is not ordinary and natural.

Mr. Burtell: It is not natural. So, their artificial lakes and in my opinion, any boating accounts described to the Commission as evidence of navigation on Warner and Silver Lakes, those are not natural water bodies and they shouldn't be considered. They have taken more recent…they present more recent evidence of boating, um, and that is during summer monsoons and they present…and I have in my declaration, some newspaper articles that describe folks that have boated along the Santa Cruz River during storm events in wintertime and monsoonal floods in the summer and also along effluent reaches.

And I would like to point out to the Commission, I do not think this has been entered into evidence up to this point, but when I was with the Department of Water Resources I had an opportunity to work on the Arizona water atlas, among other duties, and in the tables to water atlas we at that time, actually tabulated the amount of water discharged from the treatment plants along the Santa Cruz River. And the Nogales International Waste Water Treatment Plant, which is down by the Rio Rico area, it discharges some 16,000 acre feet a year, which when you convert it into CFS's about 22 CFS. So, folks that talk about boating the Santa Cruz River in the Nogales area, they are floating on the effluent, the 20 or so CFS of effluent. At least when they're there not during a storm event. Then you move up to the Tucson area where we are at now and the Roger Road Treatment Plan, the records we have indicated it was discharging about 32,000 acre feet a year in discharge and you convert that into CFS and that is almost 50 CFS. So, the Center has discussions of some people that live here that float down the Santa Cruz River in a rubber raft. In 50 CFS you can float down…you can float down the Santa Cruz River on that effluent dominated reach. And during flood events if you have got

the will you could do the same thing. Neither one of those – effluent reaches or flood events – in my opinion, or I don't think anyone's opinion, would be a natural stream flow condition as defined by the Arizona Court of Appeals.

Mr. Hood: I want to back up a little bit the stream flow data. I jumped ahead to the history of boating, the absence thereof. Where there some other data that you looked at on the middle reach?

Mr. Burtell: We are…again I feel fortunate that we have some measurements that were taken by the Tucson City Engineer between 1880 I believe and 1883. Tucson was starting to grow quite a bit at this time, and he was very concerned, understandably, with a growing population and a limited water supply. So what the Tucson City Engineer did, I believe his last name is Culver, is he went out and looked at the main areas where stream flow starts in the Tucson area. And if you take a look, it is one of my tables, I tabulated his findings. And it is Table 5, entitled Early 1880 Santa Cruz River Discharge Measurements in the San Xavier, Tucson area. And what you find is that it is a very modest quantity of flow that he measured, and he these above where the diversions occured. The springs that fed the agricultural lands of the San Xavier Mission area, he looked at the springs above the mission. There was as I mentioned, Warner Lake, Silver Lake. Those lakes were formed downstream of mills along the Santa Cruz River. He actually looked at the flow of the water either going in or leaving these mills along the mill _____. I encourage the Commission in Table 5 to once again look at the quantities of flow we are talking about here. When he added these up because he did not want to do…he did not want a double count, he came up with on the order of 25 CFS, um…and depending on…he was being conservative, so he originally said it could be up to 35 CFS. But so 25-35CFS of flow in the Tucson area along the Santa Cruz River, I will just ask the Commission again, to consider: we are talking about streams like the San Juan with several thousand of CFS being deemed unnavigable, and we are talking here about streams with less than 50 CFS on the order of 20 or 30 CFS its…we are talking orders of magnitude difference of flow, um, it just does not seem reasonable to me based on these very minor amounts of flow that the Santa Cruz River could have been used for a highway for commerce, it is just hard for me to imagine.

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Mr. Hood: And by comparison it is not restricted to the San Juan. The Commission can take a look at the submission that Mr. McGinnis made that SRP has prepared and used over the course of time that shows a number of other streams that have been deemed navigable, non-navigable. And, again we are talking about thousands of CFS, in comparison to the stream here where we are talking about 10s.

Mr. Burtell: Yeah…it's just a…again it's the orders of magnitude that we are talking about. Um…and I would draw the Commission's attention even to the Colorado River, which I do not think any folks argue at least the lower portion along our border was historically navigated. Once again, we are talking 6, 7, 8, 10,000…10,000 CFS not 10 to 20 or 30 CFS.

Mr. Hood: Have we covered the general basis for your opinion regarding the middle of reach at this point?

Mr. Burtell: I think the last point that I really would draw the Commission's attention to is that, I agree that there were portions of the middle Santa Cruz River from the Mexican border down Santa Cruz Flats that had regular flow. I believe, and hopefully the evidence I have presented indicate that that flow was very shallow. But the Commission cannot…I do not think can ignore the fact that, that whole stretch, unlike what Mr. Hjalmarson concludes, based on the historic accounts, the whole stretch didn't regularly have flow. North of Tubac, based on the evidence I looked at, it appears that the stream went intermittent. But north of Canoa it was ephemeral all the way up until you got to the commiss…ur…up, up to San Xavier. From a boating perspective, what we are saying is…and I am largely agreeing with the um…with the State Land Department. That's one segment. Within that one segment you would not have over a 20 mile portage from the Canoa area all the way up until you hit San Xavier. You would have to have portage of the river. There was no water regardless of whether there was enough water that you could float a boat in.

Mr. Hood: And indeed it was intermittent up to…between north of Tubac to Canoa, so even during that stretch you would often times have to portage.

Mr. Burtell: And again, that is assuming there was enough depth which I do not believe there was. And there would be one other account I want to

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draw to…the Commission's attention to before I leave the middle. Continuing along with this idea of portages though; so now you are in San Xavier and you encounter these springs. Well, it is not a steady flow from those springs all the way down to Marana, as described by Bentacourt, as described by these historic accounts. The flow occurred and then it just disappeared. Well, every time it disappears you need another portage. So within the segment from the…from the Mexican border all the way down to Marana or in my case, all the way down to Santa Cruz flats, it is not a steady flow all the way along there. You'd have to portage, and that portage would in those areas defeat the navigation.

Mr. Hood: So, even if there were sufficient depth, which your analysis suggest there is not, demonstrates there is not, um…the spatial discontinuity of the river during the middle reach also defeats navigability.

Mr. Burtell: That is correct. In one historic quote that I really would also like to remind the Commission of was one that was made at a time of year where again, arguably there was little or no diversion…this was made way back in 1857 by a fellow named Reed and he made this in the Calabasas area. Calabasas is where the Sonoita River joins the Santa Cruz River. And he talks about his observations, ah, again in February of 1857. And this is what he says: he says if you will portray in your imagination, a bottom covered with tall golden colored grass, hedged by mountain who sand wither like metal, divided by a meandering stream, Santa Cruz River, a dozen yards wide – so 36 feet wide – and is made many inches deep…

Mr. Hood: Twelve inches deep?

Mr. Burtell: Twelve inches deep. This shaded by Cotton Woods, Willows and Mesquites. And a few hundred yards higher up another stream Samoa Creek, a creek with less volume pouring in from the right. And in the fork an elevated rolling surface you will have a view of Calabasas.

A dozen yards wide and as many inches deep. So he was saying in February of 1857, he was seeing 12 inches of water, a foot of water at Calabasas. Well, that's not that far away from my analysis of how much stream flow was in the river based on the gauge data. I draw the comparison to Mr. Hjalmarson's report where he says

that the Santa Cruz River from the international border all the way down to Picacho Peak in his opinion, over 75% of the time had greater than 2 feet of water. It just does not…it is just not supported by the historic evidence. And again, I think that's partially due to the fact of how he did his model.

Mr. Hood: Okay. Well, maybe talk a little bit about that at the end. Let's move on now…I think you made your opinion clear as it relates to the navigability or non-navigability of the middle reach. The lower reach we could probably go through a little bit quicker.

Mr. Burtell: Sure.

Mr. Hood: Because I do not think we have anybody contending that the lower reach is navigable. Is that your understanding?

Mr. Burtell: Um, when I looked at the Center's September 2012 brief, they urged the Commission to consider portions of the middle reach as navigable. They did mention either the upper or the lower being navigable. In fact, I believe the Commission…and I included the quote in my report, they even talk about it. They say, this is their words not mine, the Center states, "the lower Santa Cruz River in Pinal County, never support perennial flows. It is only during flood times that the river flows continuously to the Gila River. There are no reported instances of boating at any times on the lower Santa Cruz. Although during one high flood event Tucsonan Sam Hughes opined that the river was big enough to float a steamboat all the way to the sea." I don't believe based on that, that the Center is making much of an argument that the lower Santa Cruz River was navigable. Their expert did not address it.

I would say the best evidence is when you look at the historic accounts. I mentioned and I draw the Commission's attention to Figure 5…6 of my Declaration. And this is a map that was put together based on all Kino's travels up and down…up along the Santa Cruz River. You will notice that just north of Picacho Peak, Kino and his associate left of the river. They left the river. Now, this was a stretch that was very difficult to go…you know, there was no water. So, obviously these folks wanted to stay where there was water. If there was water at Santa Cruz flats and in Santa Cruz wash, you would imagine that Kino would have stayed on that course where there was water. Notice there is no missions

that were established in that stretch. He left the river at the point where he called Santa Catalina and then followed a kind of a northwesterly direction up the Gila River which was the closest source of water. He needed water as he is…with all of his troops as he…or his associates as they are working their way up, he was accompanied by military people. I think this is the best evidence we have that there wasn't water in this stretch, or there would be any reason why Kino would not follow a river that has water, either to establish missions or to have water for his horses as he moves his way up and down the river. This course that Kino took was then followed by all the subsequent folks all the way through the 49ers, and in fact, pretty much all I think where I-10 goes. This is the path that subsequent explorers, including Captain Anza who went up through the area in 1775, he followed the same course. Captain Anza talked about how difficult this passing was because there wasn't any water. Certainly if the Santa Cruz flats and the Santa Cruz wash area have water. They wouldn't have the river they _____.

There is no historic accounts of boating obviously in this area. The talk about taking a steamboat up there in the flood time, I think that speaks for itself.

Mr. Hood: Not an ordinary time.

Mr. Burtell: Certainly a flood event is not ordinary and when that water hits Santa Cruz flats it spreads out. It is very dispersed in that area. It is not a single, defined channel. So, Mr. Hjalmarson's idea of a nice uniform channel, I think he would even agree that, that area…that breaks down.

Mr. Hood: Let's talk now…I want to be as brief as we can, just to talk…make a few more observations regarding Mr. Hjalmarson's analysis.

Mr. Burtell: Sure.

Mr. Hood: You have touched on a lot of it as we've gone…but just in general strokes, did his analysis of the Santa Cruz compare to what he did on the San Pedro?

Mr. Burtell: It did. And he took three general steps in my understanding… and again, I got a week to look at his report, but in the time that I did

have and also preparing for this. It seemed like there was a similar approach followed in the…as he used for the San Pedro and that is this: his first step is to try and figure out what the predevelopment stream flow was. That is, stream flow absent any diversions. In this case, unlike the San Pedro, I looked at his predevelopment stream flows and they do not seem that unreasonable to me. I did not have a lot time to study them, but the quantities of average predevelopment flow that he looks at along the stream – now that is average, not median flow, so his averages incorporated include those big flood events – range from I believe from 20 cubic feet per second all the way up to like 60 CFS, 60 CFS being in the Tucson area. Maybe absent the ones in the Tucson area, those do not seem that unusual to me, again that is average flow. And again, we are talking less than 100 CFS in water, um…where I then take great issue with what Mr. Hjalmarson did is the next thing he did similar to the Santa Cruz River, is that he then has to relate those average stream flows to the frequency of flow and he talked about the flow duration curve, which again, is just a fancy way of saying is how often as a percentage is the flow in the river equal to or greater than a certain amount. And the 50% flow in a flow duration curve is its median flow. Half the flows are less than, half the flows are higher. Where I take great issue with Mr. Hjalmarson is Mr. Hjalmarson used the flow duration curve for the Nogales gauge, the very gauge that he attacked how I used the data from it. He used that flow duration curve to represent the occurrence and the frequency of flow at all the other stations along the Santa Cruz River. So, let me bring an example to mind. He is saying the frequency of flow at the Nogales gauge where flow is much more regular down there, I would admit that, is the same as frequency of flow in the Continental area, which is the area between the San Xavier Mission and the Tubac area. Now, those historic accounts that I talked about all were in agreement that there was no flow in that area. It was ephemeral. Mr. Hjalmarson takes a reach, which is a femoral and superimposes on it a flow duration curve from an area which was perennial or maybe intermittent, which was the Nogales gauge. And when you do that you end up with these very unusual findings which Mr. Hjalmarson has in his report. And…I do not know what the…Commissioners…if you do not have a copy of this in front of you, but Mr. Hjalmarson's flow duration curves have what he concludes based on this, and…he referenced the page of his

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report…this is Page 23…actually I may need to get back a few pages. This is Page 15 of Mr. Hjalmarson's report and the figure I am referring to is titled *Flow Duration Relationship for the Middle Santa Cruz River*. In the Continental area, which is right in the middle where if you look at my historic accounts, these travelers realized they were going through a dry stretch, and they all say it, this is a dry stretch. If you believe Mr. Hjalmarson's report, 50% of the time in that area in Continental, you would have 20 CFS. Mr. Hjalmarson in fact says that the river only goes dry 10% of the time at that Continental reach, 10% of the time. So he is saying 90% of the year there is flow in that Continental reach, which is between San Xavier and Tubac and Canoa.

Mr. Hood: In all of the empirical evidence demonstrates that that stretch is not perennial, it is not intermittent, it's ephemeral.

Mr. Burtell: It's ephemeral. I will just again, encourage the Commissioners to go back in my historic accounts that were made in the winter time, that were made during the harvest period, no one says that there is water in that stretch. Mr. Hjalmarson on the other hand with his flow duration curve. He says there

[recording ends]

Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 2 of 4

I, Carolyn Turner, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed tape 2 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 2 of 4 accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this 21st day of April, 2014

Carolyn Turner

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Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

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Wade Noble	Chairman	Rich Burtell	Witness
Jim Henness	Vice Chair	Sean Hood	Attorney representing Freeport-McMoRan Copper and Gold, Inc.
Bill Allen	Commissioner	Joy Herr-Cardillo	Attorney for the Arizona Center for Law in the Public Interest
Jim Horton	Commissioner		
George Mehnert	Director		
Fred Breedlove	Attorney representing the Commission		

Mr. Burtell: What he concludes based on this, and let me reference the page of his report. This is page 23. Actually, I may even go back a few pages. This is page 15 of Mr. Hjalmarson's report and the figure I'm referring to is titled "Flow duration relationship for the Middle Santa Cruz River." In the Continental area, which is right in the middle of where – if you look my historic account – these travelers realized they were going through a dry stretch, and they all say it, this is a dry stretch. If you believe Mr. Hjalmarson's report, 50 percent of the time, in that area, in Continental, you would have 20 CFS. Mr. Hjalmarson in fact says that the river only goes dry 10 percent of the time at that Continental reach. Ten percent of the time. So he's saying that 90 percent of the year there is flow in that Continental reach, which is between San Javier and Tubac in Canelo.

Mr. Hood: And all of the empirical evidence demonstrates that that stretch is not perennial, it's not intermittent, it's ephemeral.

Mr. Burtell: It's ephemeral. And I'll just again encourage the Commissioners to go back in the historic account that were made in the winter time or made during the harvest period, no one says that there was water in that stretch. Mr. Hjalmarson on the other hand with his

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flow duration curve, he says there's not just flow there, there's flow there 90 percent of the time. So that's why I think that he erred by facing flow duration curve from an area which was perennial, if not intermittent, and superimposed that flow duration curve on other areas of the stream.

I should also point out that that same relationship of 90 percent of the time that there's flow, he says it's also occurring at Picacho Peak. I encourage the commissioners again look back at the historic account taken in the fall or made by Spanish officials or Mexican officials. Certainly, if 90 percent of the time when people travelled north of Tucson up to Picacho Peach, 90 percent of the time they would see flow, let's say in the Winter time when the trees were transpiring, don't you think they would say something about that? But they don't. But that's what Mr. Hjalmarson's model suggests. So that's an area where I have great disagreement with Mr. Hjalmarson.

The other area is, and it's treading old ground, is the same I think problem that Mr. Hjalmarson runs into with assuming that for purposes of determining stream depth that the stream is a smooth parabolic channel. And as I spent, as I'm sure in your mind, an excruciating amount of time here this morning describing, Mr. Hjalmarson uses that model to come up with the maximum stream flow depth. Maximum stream flow depth is simply not how people have looked at, look at navigation don't look at maximum stream flow depth. They look at mean or average stream flow depth. So right off the bat, any of his conclusions regarding, his conclusions are based on maximum stream flow depths, and I'm not sure how you even use those with his own criteria which are based on mean or average stream flow depths.

Mr. Hood: That's his recreational modern boating standards.

Mr. Burtell: Boating standards.

Mr. Hood: And I apologize. Just for the record, that was referenced as the Hyra method?

Mr. Burtell: That is the Hyra method. Hyra was the author to the U.S. Fish and Wildlife Service document.

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The other area that was discussed in the San Pedro is let's assume that everything that Mr. Hjalmarson did was correct. Did he calibrate his model? Was there any check to see whether his results are reasonable? I would say right off the bat, assuming that there was only 90, only ten percent of the time was there not flow at Continental or Picacho Peak, right off the bat, that seems to me unreasonable and shows that his model doesn't calibrate. But let's take a look at maybe some of his own data. And what you find is he used a relationship between stream width, I'm sorry, yes, stream width and discharge. That was one of his what he refers to – let me turn your attention to page 22, 21 and 22 of his report and he has equations that relate the width of the stream to its discharge.

Mr. Hood: This has at various times including in the San Pedro proceedings been referred to as the width equation.

Mr. Burtell: The width equation. When you take a look at that width equation, you end up with some unusual findings related to it, and let me explain what I mean. Mr. Hjalmarson indicates that based on his analysis about 50 percent of the time the medium flow at the Nogales gauge where I did my analysis was about 18 cfs. Okay. 18 cfs. Mr. Hjalmarson on page 23 of his report also provides a graph that shows how often width occurred, how often the stream is a certain width. So that same 50 percent of the time, Mr. Hjalmarson shows in his figure 11 that the width of the stream is less than 20 feet. Looking at his graph at about 18 feet. So he's saying 50 percent of the time the flow is about 18 cfs and so is the width of the stream in feet. Well, as a check, I fall back on the actual measurement that the USGS made of stream width versus flow. Now, I talked to you folks about the use of these field measurements by the GS as a means of relating discharge to average depth. Well, the USGS when they were out there taking these 200 plus measurements, they also looked at the width of the stream. When you put Mr. Hjalmarson's 18 or 20 cfs of flow into the actual measured width of the stream, at that cfs, you don't get 17 or 18 feet. You get more on the order of 30 to 40 feet. So what that indicates is that the actual stream width – assuming his pre-development flows are correct – that flow as it actually passes through the Nogales area is much wider, almost twice as wide as what his model says. The reason why that's important is that if the stream is actually wider – if he's saying, if the stream is wider than

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he says it actually says it is, you're forcing more water into a more narrow cross section. It's got to be deeper.

I have several figures for the Commission's benefit that show, and I think you can even see them from here, just how wide and broad, these are low flow so you can actually look to see I think from that distance, this is the Santa Cruz River at Nogales. This is how wide, and I've been there. It is a very wide, broad sandy channel and you can walk through time – this is 1930, another with some water in 1930, this is 19- let me see, 1947, it's dry, you can see how broad the channel is. Certainly, not a parabola. This is a very broad channel. This is in January 1964, you can see what the channel is. This is not the picture that Mr. Hjalmarson paints of a narrow, deep, a narrow channel with a parabola. In reality, what is actually seen in the field, which again to me is important with a model, you got to be able to calibrate it to something. This is a stream that is very broad, and when it does flow, the water is very shallow. When I've been out there stream gauging actually, when I worked with the Department of Water Resources and it literally, ankle deep water pretty much all the way across this stretch, there's not a nice clean deep channel which Mr. Hjalmarson then picks the deepest part of. It's actually almost like sheet flow in the channel. It's very, a very shallow broad expanse of flow.

There's one other example, which I think is, will be interesting for the Commission, is …

Mr. Breedlove: Hey Rich.

Mr. Burtell: Yes.

Mr. Breedlove: I'm sorry, just a second, do we have those in evidence?

Mr. Hood: No. He brought them with him today. I will submit them within the next couple weeks.

Mr. Breedlove: Thanks.

Mr. Breedlove: Sorry to interrupt.

Mr. Burtell: If it would be a benefit to the Commission, you guys can take a look at these now.

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Chairman Noble: And indexed Mr. Hood?

Mr. Hood: That would be fine, yeah, I was going to get with Mr. Mehnert after this and see. I was planning to do Freeport One, Freeport Two, Freeport Three.

Unknown: Thank you.

Unknown: Okay.

Unknown: We don't need them right now.

Mr. Burtell The last thing I would draw the Commission's attention to related to the calibration if you will of Mr. Hjalmarson's model, is that on page two of his Appendix B, he talks about the ditch that was going to be constructed north of Tubac, two miles north of Tubac, south of Canoa, back in 1887, and he references a newspaper article from this time, and he talks about this newspaper article and he quotes from it. He says that at this point where they were going to build this diversion ditch, and he says, and this is Mr. Hjalmarson's quote from the newspaper article, he says the river was about 60 feet wide with a stony bottom and firm banks where the head gate was located. All right, you said well okay 60 feet wide, all right. Well, we got our guy Reed back in 1857 saying it was 36 feet wide. Here they are saying it's 60 feet wide. Okay, this is in the Tubac area. I draw the Commission's attention then back to Mr. Hjalmarson who has a width duration curve, as I say, based on his flow duration curve. And if you take a look at page at page 23 of his report, you will see that a width of 60 feet, which is what he says, that newspaper article says the width of the Santa Cruz River was 60 feet. He said at the Tubac area that would have occurred only about five percent of the time, a width of 60 feet. Unfortunately for Mr. Hjalmarson, that's what was written up as probably based on the newspaper article a more typical width of the river. Mr. Hjalmarson suggests that the river was much more narrow than it actually was and the end result of that is you have a very narrow river, you got to put a lot more flow into its cross section and that gives you greater depths.

Mr. Hood: So just in summary: the width equation understates width and forces the same amount of water through a narrower channel thus inflating artificially the depth, you get an inaccurate depth reading.

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Mr. Burtell: That is correct. And then on top of that the fact that the depth that he ultimately calculates in his model is not an average depth, which is what the Utah court did or anybody else seems to do. But it is a maximum depth. Not an average depth.

Mr. Hood: Is that all we have, Mr. Burtell? Being mindful of the Commission's desire that we not take all of their time?

Mr. Burtell: I'm sure I've gone longer than the Commission wanted or anticipated, so.

Chairman Noble: Thank you. Is there anyone who wants to ask Mr. Burtell some questions now? Go right ahead.

[inaudible]

Chairman Noble: Yes, can you come up and sit where the colored pens are?

[background talking]

Mr. Burtell: Could I take just a minute break to just get some water. My throat is a little dry.

Chairman Noble: Shall we take a short break? Okay. Let's be back in ten minutes.

[background talking during 10 minute break]

Chairman Noble: Mr. Burtell, are you ready?

Mr. Burtell: I am.

Chairman Noble: Joy?

Ms. Herr-Cardillo: Yeah.

Chairman Noble: Mr. Hood?

Mr. Hood: I am ready, Mr. Chairman.

Chairman Noble: We'll wait a moment for Mr. Allen. Do you know how to start this tape?

Mr. Breedlove: I think we need to wait for George.

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[inaudible]

Chairman Noble: It doesn't appear that obvious?

Mr. Breedlove: No, there is one tape that appears to be recording.

Chairman Noble: Oh it is?

Mr. Breedlove: But I don't know if it's correct.

Chairman Noble: If it's on, it must be recording.

Mr. Breedlove: There's a second tape that is not recording.

Chairman Noble: Go ahead, shall we test it? Can you hear anything?

Mr. Breedlove: I can hear you. I don't know if that means that it's recording though.

Ms. Herr-Cardillo: That just means the mics are picking up I think.

Mr. Breedlove: It appears to be but I don't know (inaudible)

[background talking]

Chairman Noble: Are we on Mr. Mehnert? If he pushes some buttons I wouldn't be surprised. We are on. Joy proceed.

Ms. Herr-Cardillo: Okay.

Mr. Hood: Mr. Chairman, can I make one point very quickly.

Chairman Noble: Yes.

Mr. Hood: I apologize for the interruption. But very briefly. Some questions were asked of me on the break why we're showing new exhibits here that weren't submitted before and I want to make it a point – Mr. Burtell prepared his report, we submitted it in October. Mr. Hjalmarson's report was dropped on us one week ago. Mr. Burtell had one week to evaluate that report and come up with documents that refuted what Mr. Hjalmarson had to say. So, I just want to object to the notion that there was any sandbagging by us. We put our report in in a timely fashion, and if we receive _____ reports

in a timely fashion we have rebuttal documents, we'll certainly have an opportunity to submit them. Mr. Burtell brought those documents with him today. This will be our first opportunity to submit them and we will do them in a timely fashion, moving forward. Thank you.

Ms. Herr-Cardillo: Just so the record is clear, that objection didn't come from me. So it's the tit-for-tat aspect of that statement escapes me. But, at any rate, my understanding is the laws allow for submission of evidence up through the time of the hearing. So.

Chairman Noble: And we will, and the Commission will allow for further examination on anything that's submitted. This hearing will not close for a while.

Ms. Herr-Cardillo: Great, your Honor, I guess not your Honor, Mr. Chairman. Okay, Mr. Burtell. I have just actually very few questions for you today, but if you could refer to your declaration I'm assuming it's handy there.

Mr. Burtell: It is.

Unknown: Ma'am, excuse me. Mr. Chairman. I would appreciate it if you would speak up the best you can.

Ms. Herr-Cardillo: Oh I'll try, sure. Sure. [background discussion] It's just a recording microphone so I will try to crank it up. In paragraph 29 of your declaration, you make the statement that the historical account in table 2 indicate that in its natural and ordinary condition, the middle Santa Cruz River had regular flow, and I won't continue. What I'm trying to understand is, when in your opinion was the middle Santa Cruz River in its ordinary and natural condition? What time period are you referring to there?

Mr. Burtell: Well, I believe that with the historic accounts that we have that you can indicate when ordinary and natural conditions were even at times when there was settlements in the area. Again, if one looks carefully at the time of year that the accounts were made, and also years when the area was largely abandoned due to Apache unrest.

Ms. Herr-Cardillo: So, when specifically, can you specify what timeframe it is that you are contending it was in its ordinary and natural condition?

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Mr. Burtell: No, what I'm saying is that the historic accounts that we have can be looked at and covering a wide range of years, you can find periods of time when the river was in its ordinary and natural conditions due to, again, lack of diversions and/or lack of settlement in the area. So, I can't put a particular, as I indicate, in fact, I state it, and if you look back at my paragraph 26 I say it is well documented that irrigation has been practiced along the middle reach of the Santa Cruz River for centuries if not millennia. So, Ms. Cardillo I am in no way saying that there wasn't occupation of the river for thousands of years, and, in fact, I am familiar with recent archeological evidence in the Tucson area that suggests that irrigation has gone back three to four thousand years. So, never during that period of time was there no occupation in the area and that's not what I'm inferring. What I'm saying is that using the data that we have you can identify periods when the diversions were minor and/or the area was largely unoccupied and you can determine what the natural and ordinary conditions are.

Ms. Herr-Cardillo: And is it your position that the river had not been impacted historically by prior diversion?

Mr. Burtell: I'll just go on, I'll continue to read paragraph 26 of my declaration, if it would help. Depending on the extent of irrigation and variations in climate, it is likely that diversions have at times impacted river flows. In fact, during the Spanish and Mexican occupation, water shortages were reported during the irrigation season at both Tubac and Tucson…

Ms. Herr-Cardillo: You don't need to keep reading. What I'm trying to understand is, are you suggesting that once the diversions are discontinued, that the river reverts to its ordinary natural condition?

Mr. Burtell: I am suggesting that during periods of time when there are not diversions in the Fall harvest period, when both you're not diverting, as well as the plants aren't transpiring, that the river returns to its natural and ordinary condition.

Ms. Herr-Cardillo: And is it your understanding…

Mr. Burtell: Oh, sorry, and if I could also add, also during years which is not a year, but multiple years when, particularly the reach from the Mexican border up through the Canoa and Tubac area were largely

abandoned. Not just a month or a year of no diversions, but these were years when the area was large abandoned due to Apache unrest. So, yes, after years of the area being largely abandoned I would say yes, the river also in that state was representative of ordinary and natural conditions.

Ms. Herr-Cardillo: Is it your understanding that diversions have an impact on the river's channel?

Mr. Burtell: I would say in this situation unlikely. I have been down on the Santa Cruz River during extreme flood events. In fact, I almost got swept away doing stream flow gauging on the Santa Cruz River in this area. Every time you have a summer monsoon event, you scour that channel and change it. The very comment that your own expert said about these are sand channels that are quite variable. So whether or not diversions … I would say no. I would say that the diversions had little or minimal impact. At least at this period prior to groundwater pumpage. Because every year and often during the Winter time, you get large flood events that scour and change that channel.

Ms. Herr-Cardillo: You mentioned groundwater pumpage. Let me follow up on that.

Mr. Burtell: Sure.

Ms. Herr-Cardillo: To what extent in your analysis have you accounted for the impact of groundwater pumping?

Mr. Burtell: Well, if you take a look at my historic accounts, they all pre-date 1860. So, there wasn't any groundwater pumpage at that time. The gauge data that I looked at for both Lochiel and for the Nogales area. For Lochiel, they actually talked about the fact that were some 200 acres upstream of the gauge that largely were being supplied by groundwater pumpage. I focused on the irrigated acreage. The Nogales gauge, I looked at data prior to 1940 and my understanding and studying irrigation across Arizona is agricultural pumping typically started in the 1940s when power became available to these more rural areas. So I specifically looked at stream flow records in times when there wasn't pumpage or I could quantify what the irrigated acreage was.

Ms. Herr-Cardillo: What about groundwater pumping for other uses?

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Mr. Burtell: Well, the only other groundwater pumpage that I'm aware of is in the Tucson area. They put infiltration galleries in along the river to get additional flow. I'm cognizant of those and those occurred after Culver took his measurements in the 1880s. That's one of the fortunate things we have with Culver's measurements is we have, we have areas in the Tucson Basin where we have stream flows upstream of diversions or any infiltration galleries or groundwater pumping. So that's a longwinded way of saying yes, I did look at the occurrence of pumpage, and tried to pick accounts where there either wasn't any pumpage going on or the pumpage was downstream.

Ms. Herr-Cardillo: Turning to the paragraph 38 regarding Culver, the very end of that paragraph you state that even if all the streams discharged to the same point along the Santa Cruz River, which they did not, the combined flow would have been insufficient for commercial navigation – what amount would you consider sufficient for commercial navigation?

Mr. Burtell: Well, there would have to be enough amount of water to at least get on the order of three feet of flow in the river. There is no evidence that I found nor did your expert enter into the record of actual relationship between stream flow and average depth along the river to indicate where there was flow. I will, based on the Utah decision where streams have been deemed navigable, those had three feet of flow.

Ms. Herr-Cardillo: So, is that what you consider the minimum depth of flow?

Mr. Burtell: I would say that several factors are taken into account. But certainly when stream depth is taken by itself, I would say on the order of three feet is – those streams that have been navigated or they are navigated, that is the type of depths that I have seen recorded.

Ms. Herr-Cardillo: Is that, is that the basis of your opinion? That three feet is the minimum depth?

Mr. Burtell: I would say that based on the Utah decision that is certainly guidance that can be used. The San Juan River was deemed non-navigable and its flows were typically less than three feet. They were more on the order of two to two and a half feet deep.

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Ms. Herr-Cardillo: And, what do you mean by when you use the term commercial navigation?

Mr. Burtell: When I, my understanding of the Daniel Ball test is that, that is navigation for trade and travel for commercial purposes. I think that the distinction needs to be made, or at least in my opinion, and I'm not a lawyer, but the distinction is that simply putting a recreational boat into a stream and floating around does not constitute a commercial enterprise where you are using that vessel for trade or travel for a meaningful purpose.

Ms. Herr-Cardillo: What meaningful purpose? Where does that definition come from?

Mr. Burtell: When I looked at the PPL Montana test, they indicated that the navigation needs to be, if one is going to look at recreational boats as a measure of navigability, then that use of boats must be meaningfully similar to the boats used at or before statehood for trade or travel for commercial enterprises. So, my understanding is that were a lot of people using recreational rafts and kayaks to try to conduct a commercial business for trade and travel at the time.

Ms. Herr-Cardillo: What's your understanding of the boats that were typical for trade or travel at the time of statehood?

Mr. Burtell: Well, probably the best example is the Colorado River and the steamboats that were used going up and down the Colorado River. My understanding those were vessels that were used for commercial purposes.

Ms. Herr-Cardillo: So steamboats. Anything smaller than a steamboat?

Mr. Burtell: I'm sure there were smaller vessels that were used but I think those vessels need to be distinguished from a one or two person boat that is used for recreational purposes. My understanding is that that would not constitute a commercial use of a boat for trade or travel.

Ms. Herr-Cardillo: What about use of a canoe by James O'Paddy to transport beaver furs?

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Mr. Burtell: Well, my understanding of James O'Paddy's use of canoes is that the only place where he used canoes was far down on the Gila River and on the Colorado River.

Ms. Herr-Cardillo: I realize that, but irrespective of where he used that, would you consider that a commercial navigation? Using a canoe to transport furs?

Mr. Burtell: Well, if he was simply, and I think PPL Montana talked about it, that if you were simply using the boat and not dragging the boat along the stream, which is not clear to me Paddy was doing anything more than that, PPL Montana actually talks about the fact that if you are simply using the boat to drag your supplies along the river that that would not constitute a use of the boat for commercial purposes.

Ms. Herr-Cardillo: What if you're not dragging it? What if you're in it and you're riding in it and you're transporting furs?

Mr. Burtell: If that's that case, then maybe under those circumstances, maybe that is considered a commercial enterprise.

Ms. Herr-Cardillo: On figure 4 of your declaration.

Mr. Burtell: Yes.

Ms. Herr-Cardillo: Just to clarify. The measurements that you plotted there were all, I can't seem to find it – I don't know that I need to – were all taken from 1975 through 2011, correct?

Mr. Burtell: That's right.

Ms. Herr-Cardillo: And the river was not, in your opinion, in its ordinary natural condition at that time, correct?

Mr. Burtell: No, you're asking two different things. The flow in the river might not have been in its ordinary and natural condition but the channel conditions, your expert has provided no evidence to indicate that the channel conditions were any different in that time than they were previously. What I'm focusing on is the flows. So what I'm doing is I'm taking a channel that your expert indicates hasn't provided any evidence that the channel geomorphology has

changed, and I'm inputting into that flow conditions that have been accounted for diversions. Or, you could use your own expert's pre-development flows and put that into this graph and come up with the average depths. I mean unless I'm mistaken Ms. Cardillo I did not see in your expert's report anything about how the channel geomorphology has changed historically along the river.

Ms. Herr-Cardillo: Again, referring to figure 4…

Mr. Burtell: I am.

Ms. Herr-Cardillo: …where you've taken gauge measurements, correct?

Mr. Burtell: Yes.

Ms. Herr-Cardillo: And those gauge measurements were taken from 1975 to 2011, correct?

Mr. Burtell: What these are, are gauge measurements of flow and channel characteristics.

Ms. Herr-Cardillo: Okay. Would you agree with me that from 1975 to 2011 the Santa Cruz River was not in its ordinary and natural condition.

Mr. Burtell: The river was not, but the channel…

Ms. Herr-Cardillo: Thank you, that's all.

Mr. Burtell: Well, you're not letting me answer the question.

Ms. Herr-Cardillo: You answered the question.

Mr. Burtell: Okay.

Ms. Herr-Cardillo: You indicated that with respect to modern accounts of boating on the Santa Cruz that that was an effluent dominant river at that point in time. I think that was the term you used. The middle Santa Cruz.

Mr. Burtell: But at what time? What are you referring to?

Ms. Herr-Cardillo: I'm referring to the account of boating in more recent years on Santa Cruz.

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Mr. Burtell: The accounts that you put in your declaration?

Ms. Herr-Cardillo: I didn't have a declaration.

Mr. Burtell: Or, I'm sorry, in your September 20, 12 brief?

Ms. Herr-Cardillo: Yes. I believe that they were, you referred to …

Mr. Burtell: I think you have to…

Ms. Herr-Cardillo: People have canoed on the Santa Cruz River in recent years,

Mr. Burtell: Sure.

Ms. Herr-Cardillo: …and your response to that was not in its ordinary natural condition because it's an effluent dominant stream.

Mr. Burtell: Well, I said two things as I recall. I said that the occurrence of boating events has occurred at two periods of time, either during Winter or Summer flood events, or when it was low water during or along stretches that were effluent dominated. That is, the flow in the river was effluent.

Ms. Herr-Cardillo: That's what I'm referring to. What I'd like to know is what is the source of that effluent? I mean not the power plant, but I mean the natural source. Where does that effluent ultimately come from?

Mr. Burtell: Well, the effluent that the referring to the Tucson effluent reach or the Nogales reach?

Ms. Herr-Cardillo: Either one.

Mr. Burtell: Oh okay. Well.

Ms. Herr-Cardillo: You can do them separately.

Mr. Burtell: Okay, well then I'll do them separately. The Nogales reach, it gets its water both from Sonora, Mexico and Well Fields in Sonora, Mexico as well as Well Fields in the Nogales area. And both of those sources of water come into the inter--, that's why they call it the International Waste Water Treatment Plant. So the water that's being discharged into the Santa Cruz River in the Rio Rico area is both coming from aquifer water in Mexico and aquifer water in the

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United States. As to the Roger Road Treatment Plant, my understanding – I don't live in Tucson area anymore, but the water that ultimately is discharged is since most of Tucson gets its water from the CAP now and that's the Colorado River. Then a lot of that water that's being discharged is probably Colorado River water. Does that help?

Ms. Herr-Cardillo: Yes. A couple times in your testimony you referred to a highway of commerce. What did you mean by that?

Mr. Burtell: My understanding of the Daniel Ball test as well as the definition of the state for navigability is highway for commerces, the definition or the phrase used as part of the definition of what's a navigable stream.

Ms. Herr-Cardillo: What in your interpretation of that, what in your mind would a highway for commerce look like?

Mr. Burtell: I would say the best example of that would be the lower Colorado River prior to all the dams and diversions being put in along the river where you actually had the transport of supplies and goods if not people along the river.

Ms. Herr-Cardillo: Regarding some of your criticisms of Mr. Hjalmarson's report, you took issue with the fact that he had based a flow duration curve that he used on just the Nogales gauge data, um, just to be clear, you're not suggesting that he used Nogales gauge measurements on various parts of the river. Just the shape of the curve.

Mr. Burtell: Well, I agree, but what's critical is the shape of the curve is related to the frequency of flow events. So what he's saying then by taking the flow duration curve from Nogales, he's inferring that the frequency of flow, how often flow occurs 50 percent of the time, or 80 percent of the time, or whatever, is the same at every single point along the river. Whether it's Continental or the Picacho Peak area. And when you do that you end up with my opinion at least, the very unreasonable conclusion that a portion of the river like the stream at Continental had flow 90 percent of the time, but only ten percent of the time it was dry. That seems inconsistent with all of the historic accounts that I looked at. Mr. Hjalmarson didn't seem to address those historic accounts or in any way compare his model results to any of that old data.

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Ms. Herr-Cardillo: What's your understanding of what a flow duration curve tells you? What are they used for?

Mr. Burtell: It's used for a lot of different things but my understanding first how its generated as you take all of the data – it's usually daily stream flow data from a gauge and you put it all into one box, if you will. And the flow duration curve is simply an ordering of all that data. Because flows differ throughout the year, you are capturing for the period of record that you have where that flow was measured you are ordering the smallest flows in or all the way up to the biggest flows. And then when you're done with that, you're able to, because it's all ordered, you can say for this flow data set for half of the time when this gauge was monitored, the flow was either greater than this amount or less than it.

Ms. Herr-Cardillo: And you showed the Commissioners several pictures of the Santa Cruz River channel, which I haven't seen because I was behind you.

Mr. Burtell: Sure.

Ms. Herr-Cardillo: But …

[recording ends]

Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 3 of 4

I, Patricia Jeriha, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed tape 3 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 3 of 4 is accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this 22nd day of April, 2014

Patricia Jeriha
Patricia Jeriha

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Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 4 of 4

Wade Noble	Chairman	Rich Burtell	Witness
Jim Henness	Vice Chair	Sean Hood	Attorney representing Freeport-McMoRan Copper and Gold, Inc.
Bill Allen	Commissioner	Joy Herr-Cardillo	Attorney for the Arizona Center for Law in the Public Interest
Jim Horton	Commissioner		
George Mehnert	Director		
Fred Breedlove	Attorney representing the Commission		

Ms. Herr-Cardillo: What are they used for?

Mr. Burtell: They are used for a lot of different things, but my understanding first – how it's generated is you take all of the data. It's usually daily stream flow data from the gauge, and you put it all into one box, if you will; and, the furtheration curve is simply an ordering of all that data. Because flows differ throughout the year, you are capturing for the period record that you had when that flow as measured. You are ordering the smallest flows in order all the way up to the biggest flow. And then when you are done with that, you are able, because it's all ordered, you can say for this flow data set, for half of the time when this gauge was monitored the flow was either greater than this amount or less than.

Ms. Herr-Cardillo: And you showed the Commissioners several pictures of the Santa Cruz River channel, which I haven't seen because I was behind you.

Mr. Burtell: Sure.

Ms. Herr-Cardillo: But you described them and I think – well do you want to review, what were the dates?

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Mr. Burtell: Yes.

Ms. Herr-Cardillo: That those pictures were taken.

Mr. Burtell: Yes, I have those here. As you recall, the data that I used from the Nogales gauge was in the 1910s in through the 1930s and I have a figure that shows what the gauge looked like on November 24, 1930; I have a picture of what the gauge looked like on May 21, 2001; I contacted the USGS office and they gave me a series of photographs of the gauge site. I will give you these dates. Quite frankly this supports Mr. Hjalmarson's criticism of the use of the gauge. He repeatedly talked about the fact that the Nogales – the Santa Cruz River in the Nogales area was a broad sandy channel whose rating curve changed over time. And so what we fortunately have is a series of photographs. This one is June 5, 1930; another one that is dated 1930 but I don't know the month and the day that shows shallow flow across the channel. This is a picture in 1947 of the channel and a fellow is standing there for scale. This line here is where they had a cable car that they would use when they went out to measure the flow during high flow events when it was dangerous to be in the channel. And then a couple of upstream/downstream views. This is January 30, 1964, again this one is looking upstream and this one is looking downstream.

And the point to me of these is I fully agree with Mr. Hjalmarson, your expert, that the channel is variable, it's a sandy channel, and it changes after flood events. And that is the reason why when I created my rating curve, I didn't just look at a few years of data. I looked at over 30 years of data to see how this channel changes after storm events, and used that rating curve then to evaluate what his pre-development flows, let alone my flow data, would look in terms of average depths.

Ms. Herr-Cardillo: For those years that you have pictures for, 1930 I think was the earliest one I heard you say to, there was one in 1954, one in 2001.

Mr. Burtell: That's most recent is in 2001.

Ms. Herr-Cardillo: 2001. The river was not in its natural condition at any point. Of those years.

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Mr. Burtell: Okay, I will again. I guess we will have to go through this again. I have tried to explain myself. I agree that the flow in the stream, the quantity of flow, was affected by diversions. And I've addressed that. But,

Ms. Herr-Cardillo: That's all I wanted to establish.

Mr. Burtell: But if I could talk to the commission,

Chairman Noble: Mr. Hood might want to rehabilitate that.

Mr. Burtell: Okay. Thanks.

Chairman Noble: Next year.

Ms. Herr-Cardillo: Okay, Appendix B, you mentioned.

Mr. Burtell: Appendix B –

Ms. Herr-Cardillo: I will get there. Mr. Hjalmarson's report you testified regarding Appendix B, Item 3, page 2 of Appendix B and you talk about the river was 60' wide with a stony bottom and firm banks. Earlier in that description of Item 3, it talks about land at this location had been farmed for about a century where flow was perennial. Correct?

Mr. Burtell: Yes.

Ms. Herr-Cardillo: Do you have much experience yourself, personally, boating?

Mr. Burtell: I had boated down the Green and Colorado Rivers through Canyonlands National Park and I've also taken a recreational river rafting trip on the Arkansas River when I lived in Colorado.

Ms. Herr-Cardillo: So that's two separate boating trips or multiple trips on Green.

Mr. Burtell: Multiple trips along the Green and the Colorado.

Ms. Herr-Cardillo: In your experience, that when you are traveling down those rivers, you are able to determine what the deepest part of the river is.

Mr. Burtell: No, actually. My experience has been that I would, even on the Green River; now I would do it in the springtime, as well as in

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autumn, usually it's the best time to be out there. But, I am embarrassed to say that more times than not I would run myself onto shallow areas, which was surprising to me.

Ms. Herr-Cardillo: Okay, that's all I have.

Chairman Noble: Is there anyone else who wishes to ask Mr. Burtell questions?

[inaudible]

Chairman Noble: Well, okay, let's wait a second here.

Mr. Hood: I have one follow up question is all, Mr. Chairman.

Chairman Noble: Mr. Hood.

Mr. Hood: My lone follow up question for you, Mr. Burtell, is you were starting to explain the difference between flow and the geomorphology as is it relates to ordinary and natural conditions. Can you complete that please?

Mr. Burtell: Yes, I think Ms. Herr-Cardillo was trying to make me state, if you will, that we can't use recent measurements of the relationship between stream flow data and flow because these are recent measurements when there have been diversions and the river is no longer in its natural and ordinary condition. I strongly disagree with that statement. What one needs to be cautious about, obviously, is looking at the flow measurements by themselves recently that could have been affected by diversions. But, there's been no evidence that has been entered by the Center or anyone else that I can remember, including the State Land Department's expert, Fuller, which talked about the channel. The geomorphology of the channel changing in the Nogales area.

What I mean by that is the shape and the configuration of the channel. In having been down there, both during low flow events and high flow events, diversions in my opinion are not effecting the geomorphology of that river. What effects the geomorphology of that river is storm events. Monsoonal flood events and the occasional winter event. I have been down there after those events and I talked to the USGS. It changes the configuration of the channel. It's a sand channel. You got high flows, that channel is

going to change its configuration. So it's – it's a variable channel. In fact, Mr. Hjalmarson mentions that. That's a variable channel that's going to change after every large storm event. So the geomorphology is always changing and will continue to change. I took a 30-year period of time where I tried to capture all that change. I didn't see any evidence that would suggest that that 30 years of changes that I looked at in channel geomorphology would have been any different than the changes that channel geomorphology before that.

Mr. Hood: And again, the changes of flow in convergence, any of the records you looked at you accounted for those versions.

Mr. Burtell: Yeah, maybe Ms. Herr-Cardillo didn't hear my testimony, but I did fully look at the flow data from the teens and the 1930s but I was also very cognizant of the amount of irrigated acres and diversions that occurred above those gauges, and even mentioned, I think in my direct testimony that if you take those diversions and add it on to the flow data that was gauged, it still does not result in conclusion that the flow depths were typically greater than a foot. Even when those diversions are accounted for.

Mr. Hood: May I ask one more question that occurred to me, Mr. Chairman? I apologize I promised one and I have two.

Chairman Noble: I'm glad something's occurred to you.

[laughter]

Mr. Hood: Mr. Burtell, Ms. Herr-Cardillo asked some questions about certain crafts and whether they qualified as commercial vessels, etc. Do you recall having reviewed in the special master's report in the Utah case, the discussion of the vessels that were typical of trade and travel during that general time period?

Mr. Burtell: Yes, the boats that he considered for trade and travel were not, certainly in my reading of his reports were not recreational vehicles. Or recreational crafts. In fact, he had discounted the occasional use by prospectors of rafts going down because in his mind they would use them for short stretches, but weren't able to even pull – they'd have to pull the rafts back upstream. There was a discussion where his – as I read his case – he did not use the

occasional recreational use by a canoeist as a measure or a fact in his findings of navigability. He focused on larger boats, motor driven boats. Either steam or by that time, when he wrote his decision, there was actually gasoline powered boats. Those boats that he considered and looked at from a navigability perspective –

Mr. Hood: He looked at the drafts required by a variety of commercial vessels.

Mr. Burtell: That's correct.

Mr. Hood: That's all I have. Thank you.

Chairman Noble: Thank you. Anyone else have any questions?

Comm. Horton: Mr. Chairman Just a comment. I was at San Xavier six months ago, and you pronounced it correctly.

Mr. Burtell: Okay. My counsel had me worried that I had been pronouncing it wrong, and I assume you pronounced it like the basketball team. Which I think is Xavier.

Comm. Horton: Yeah. Down there they say San Xavier.

Mr. Burtell: I thought that was the case. I still get Prescott versus Prescott wrong.

Chairman Noble: Okay. No one else has any questions then we'll open it up the Commission. Commissioner Allen.

Comm. Allen: Could you define the difference between average and median flow just for the Commission's benefit please?

Mr. Burtell: Sure. What I look at in my report as median flows. I happened to look at median flows on a monthly basis, but, obviously you could look at a median flows on an annual basis. The median flows is the middle of the distribution. If you had a whole bunch of measurements, and you wind them up from the smallest of those measurements all the way to the largest, the median flow was that measurement that occurs right smack dab in the middle. That is to be contrasted with the average flow where all the flow data are taken in its entirety. And average flows for streams in Arizona as described by Fuller, both in the San Pedro and in the Santa Cruz,

as a measure of typical stream flow conditions, averages are usually not considered as appropriate because Arizona streams are known and for those of us that have been out there, it's a scary time, but when you do have flood flows, they are unusually high events. And those events have a disproportionate effect on all those other values, resulting in an average value that for most Arizona streams and those streams in the Southwest, the average flows are higher than the median flows. Median flows seem to be used more commonly for things like navigability determinations because it's a better measure of typical flow conditions that are less effected by those extreme high events.

Comm. Allen: Can you tell me when the infiltration gallery was installed in Nogales.

Mr. Burtell: Yes, in fact, in my report, I specifically made sure not to include a few years of data, when the gauge site was downstream of that infiltration gallery. And so, if you would let me refer to my table – it's in one of my footnotes, Commissioners, so if I could turn to that – it will take me a second. I know you just asked me for the year, and I apologize, I should know that off the top of my head, but – okay. And, I say it in my text. I say from March 13 to December 4, 1915 and from April 28, 1921 through 1922. The gauge was located half mile downstream at the Nogales pumping plant. Due to potential impacts from the plant on stream flows, data collected during these months are not included. So the plant was installed some time before 1915.

Comm. Allen: Prior to 1915.

Mr. Burtell: At least on or before March of 1915. The –

Comm. Allen: I'm sorry I can't hear. Fifty or 15?

Mr. Burtell: Fifteen, excuse me.

Comm. Allen: Okay.

Mr. Burtell: And the USGS when they would record these stream flow records, they would talk about any diversions that occurred above the gauge. And they mentioned when the gauge was temporarily located downstream of that pumping plant, I didn't include those

data for obvious reasons. I didn't know what the pumpage was from the Nogales Plant – that infiltration gallery.

Comm. Allen: It was significant.

Mr. Burtell: I believe so.

Comm. Allen: There was a change in stream channel morphology that occurred in the late 1800s, when the arroyo formations occurred throughout the state. So, as we recognize did occur on the San Pedro. And, at what point in time do you see that occurring and was it – I'll end with that.

Mr. Burtell: Sure. No, it's an excellent question and it's another document that I will suggest to counsel that I enter into evidence. It is a study that was done of how the channel in the Tucson area has changed over time. They've done a lot of archeological work in the Tucson area and what it shows is they go back several thousand – two, three thousand years. It shows how the channel has naturally changed. There has been erosion, and then infilling, and erosion and infilling, they encountered these changes in the channel geomorphology there as part of their archeological studies. Anyone who has spent any time in the Tucson area will see that it's an entrenched channel here. I think when you look at the photographs – and there's also entrenchment and a long history of entrenchment, Commissioner Allen, in the San Pedro area as well as in the Tucson area.

When you look at these photographs of the Nogales gauge, as well as if you've been to the Lochiel gauge, the entrenchment that was noted in the San Pedro and in the Tucson area was not noted or I have not seen in the Nogales area. And, in fact, the figures from the 1930s through the 60s all the way to now, shows little, if any entrenchment in the channel in the Nogales area. So what that leads me to believe is that there are different levels of entrenchment. I am certainly very familiar and you unfortunately weren't with us at the time, but we spent a lot of time discussing the changes in the geomorphology of the San Pedro River.

Comm. Allen: I was there.

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Mr. Burtell: You might have been, that's right, maybe you were in the audience.

Comm. Allen: Right.

Mr. Burtell: And, there's a lot of evidence of that entrenchment. When you look at the records for the upper Santa Cruz, in that portion where the Nogales gauge is, I simply have not found any studies that showed that area suffered that type of entrenchment. Certainly, within the Tucson area, there is a long, long, long history of entrenchment in many studies that have been done, which I am sure you are familiar with, including the USGS. Were they'd look back in time, starting as you said in the 1880s and certainly some of that entrenchment may have been effected or not by man's activities in the Tucson area. I think what we concluded, or I certainly concluded in the San Pedro, and I would also conclude in the Santa Cruz, or at least in the Tucson area, is it's not clear to me that those entrenchment events were simply caused by man. When you look archeologically…

Comm. Allen: I would agree.

Mr. Burtell: I think archeologically, when you go back three or four thousand years and you see that those same events, have been mapped in the Tucson area shows that it's a natural event. I don't know why the area in the Nogales range has not become more entrenched. I don't know why.

Comm. Allen: So you're assuming, then, that the channel changed very, very little between the late 1800s and the current conditions that exist there.

Mr. Burtell: In the Nogales area, I have not seen any evidence to say otherwise. In the Nogales area. Certainly in the Tucson area, I agree.

Comm. Allen: That'd be true of Lochiel?

Mr. Burtell: I would say the same thing at Lochiel. That I have not seen any evidence of substantial entrenchment of the channel in the Lochiel area.

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Comm. Allen: Okay, but if you look upstream from Lochiel, there has been head cutting occur. Is that correct?

Mr. Burtell: I have noticed it, yes. There is some head cutting.

Comm. Allen: So, undoubtedly, there has been some change in the channel geometry at that spot.

Mr. Burtell: There could be then, in the Lochiel area. I would then also offer to the Commission's consideration that in that area, there has been little if any development.

Comm. Allen: That's true.

Mr. Burtell: And so aside from …

Comm. Allen: Aside from the mining that's occurred in that area.

Mr. Burtell: In the Patagonia mountains adjacent. But I was thinking in the actual Lochiel –

Comm. Allen: Bed of the channel?

Mr. Burtell: In the Lochiel Valley, per se, there has been minimal agriculture, which leads me to conclude that this might be another indication of channel entrenchment where it does occur, can occur under natural conditions.

Comm. Allen: And then I would assume that both you and Hjalmarson would contend that there's been a little change in the precipitation that's occurred over the past 200 years.

Mr. Burtell: When I look at tree grain records, I think they show what most people have concluded and that is there are dry periods and wet periods. But there hasn't been a wholesale change.

Comm. Allen: Yep, not only has there been a wholesale change in the amount of precipitation, but during the time of the year when the precipitation has occurred.

Mr. Burtell: Some have argue that the entrenchment that occurred in the Tucson area is, and the USGS has reported that more than once that their opinion is a major factor in the entrenchment that

occurred in the Tucson area was caused by the change in frequency of flood events. Frequency of high precipitation events in the area. I think they also recognize that man's engineering project in the river in the Tucson area may have had some effect, but the ultimate driver of those events was precipitation and how that precipitation has changed.

Comm. Allen: When we go back to your Table 4.

Mr. Burtell: Okay.

Comm. Allen: And look at the depth versus discharge, what would be the point where it would be the amount of water that was discharged, now I believe you've given it in acre feet in Table 4, correct?

Mr. Burtell: What I did in Table 4 is I show the median flows.

Comm. Allen: Okay, median flow.

Mr. Burtell: Month by month. And it's kind of a shorthand. I highlighted in bold red, those median flows where, when you compare those flows to the measurements of the relationship between average stream flow depth and flow as the USGS measured those flows would result in average depth of great event flow. They would still be less than two feet, but they would be greater than a foot. The foot was kind of a bench mark that Mr. Hjalmarson even admitted to that in his opinion recreational watercraft would have difficult times perhaps navigating if it was less than a foot.

Comm. Allen: So at what point would it exceed one foot?

Mr. Burtell: Well, to answer that question, you have to go to my figure. And I apologize for having to just go back and forth here. If you look at my Figure 4, and this again is my relationship between measured discharge in the stream and average stream depth. And, if you look along the x axis, Mr. Hjalmarson indicated I shouldn't have put stream depth on the x axis, but it doesn't make any difference if you plot it on the y axis, you can still do the exercise. But if you go across the x axis and go over the one foot, and then work your way up the graph, you can see those field measurements of discharge where the average stream depth is greater than a foot.

So to answer your question, to get greater than a foot of water in the stream, you typically have to get greater than 100 CFS of flow.

Comm. Allen: It says ten.

Mr. Burtell: I'm sorry, it says ten?

Comm. Allen: It says ten, on the table on Figure 4. Are you talking about figure 3?

Comm. Allen: Oh, I'm Figure 4 of the Nogales case.

Mr. Burtell: Okay, just a second. Oh, I'm sorry, I thought you were referring to the Nogales case. You're on the Lochiel ---

Comm. Allen: No, let's stay with Nogales.

Mr. Burtell: Okay. So there was one measurement that you can see that the discharge was – looks like it's about 15 CFS, which was about 1.2 feet. But that looked like an outlier. All the other measurements, if you come over to 1 feet, an average stream depth of 1 and work your way up, you'll see that you start to get stream flow depth greater than 1 when the discharge exceeds 100.

Comm. Allen: Or 150.

Mr. Burtell: Or 150. That's correct. Mr. Hjalmarson's pre-development stream flows for that area was on the order of 20 to 30 CFS. So, as I said during my direct testimony, I don't necessarily disagree with his average stream flows during pre-development time are unreasonable. But when you look at those average flows in relationship to what type of associated depths that they would have of flow, it would be less than a foot in my opinion.

Comm. Allen: I have a little trouble understanding that 10 times different between Lochiel and Nogales. And, I'm assuming that that's based solely on the width of the channel.

Mr. Burtell: I'm sorry, I didn't quite understand your comments about Lochiel.

Comm. Allen: The depth at Lochiel is 10 CFS where it reaches one foot.

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Mr. Burtell: Yeah, when, and that probably gets back to your point about there being more entrenchment there and that the channel is actually in more of a confined channel where it's more concentrated, and thus, it results in greater depths.

Comm. Allen: The only point that I would make in that regard is that there is a – if it were entrenched at Lochiel, and it had to have been entrenched to a certain degree at Nogales, you can't get upward erosion occurring unless you've got some physical thing happening in Lochiel, in the valley above Lochiel, where we do know entrenchment occurred, if you didn't have it down at the Nogales, because Nogales is downstream.

Mr. Burtell: Unless the, my understanding – the entrenchment works its way upstream,

Comm. Allen: That's correct. That's my point.

Mr. Burtell: And I guess my point would be is that unless there is some cause geological or otherwise for entrenchment to occur upstream of Nogales, but downstream of the Lochiel gauge and it worked its way up the channel up to the headwaters.

Comm. Allen: Okay. I've got no further questions.

Chairman Noble: Mr. Henness?

Comm. Henness: Nothing.

Chairman Noble: Mr. Horton?

Chairman Noble: Anyone else out there want to prolong this?

Mr. Breedlove: I do.

Chairman Noble: Mr. Breedlove does.

Mr. Breedlove: It's all right, I just have a couple of questions for clarification. Ms. Herr-Cardillo was asking you some questions that I've actually written down myself, and I just wanted a few clarifications.

Mr. Burtell: Please.

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Mr. Breedlove: So, actually, let's get back to the Utah Special Master Report.

Mr. Burtell: Okay.

Mr. Breedlove: Did it list a flat bottom canoe as a boat that was used in the timeframe that Arizona became a state?

Mr. Burtell: It certainly listed lots of different boats, including those that were used. That's correct.

Mr. Breedlove: And, do you know what the draft is on – I think it was talked about during the San Pedro hearing. Do you remember what the draft is on a flat bottom canoe or, I'm sure it's dependent on how much weight is in the canoe and that sort of thing.

Mr. Burtell: Yeah, it depends. I am not a boating expert as I think Ms. Herr-Cardillo was asking me, I am in no way a boating expert, but having canoed on rivers myself, certainly the size of the boat, the type of the boat, and the load of the boat is going to effect that draft. And so, I guess I bring to the Commission's attention when the Colorado River was being used for navigation purposes, prior to the dams being constructed, and prior to the railroad, that many times those boats that had very shallow drafts on waters, my understanding of less than a foot, would run aground. And they would run aground because those channels shifted, number one; and also, if they were loaded coming up from San Francisco that would have a bearing. So it's hard to give "a" answer – it depends on the boat and it depends on the load. I think the point though to contrast that being used for commercial purposes, is someone either by themselves or in a two person kayak, which would have a very minimal load, that would have a very shallow draft. Those type of boats in my mind are not meaningfully similar to those that were being used at statehood for commercial purposes.

Mr. Breedlove: Keeping in mind, I know that the record shows that there was little or no commercial boat travel on the river at the time of statehood. I know that, I just going into the question I am having – I'm going to ask you.

Mr. Burtell: I'm sorry, Mr. Breedlove, which river are you referring to the Santa Cruz or the ...

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Mr. Breedlove: Yes.

Mr. Burtell: Okay.

Mr. Breedlove: Just hypothetically speaking, Ms. Herr-Cardillo talked about James O'Patty and whether a canoe – whether that was actually a commercial use transporting beaver hydes or what have you. And I think you said that you didn't think so according to what you understood of the definition in existing jurisprudence, is that correct?

Mr. Burtell: No. I think I said I tried to explain my knowledge of what Patty actually did and she said, I don't want to put words in her mouth, or anyone's mouth, but I think she said, "Well, let's not worry about whether he was dragging his canoe along the stream with furs in it." If he was actually in the canoe on some river, floating down, loaded with furs, would that constitute a commercial use? And I would say, that probably would be. I would counter if his canoe, depending on the size of it, was loaded with furs, then it's going to have some draft to it, depending on how many furs he's got in there. And it's also going to have to be a pretty large canoe.

Mr. Breedlove: Just, hypothetically speaking, if somebody had a canoe, a flat bottom canoe and was transporting mail, I mean just hypothetically.

Mr. Burtell: Sure.

Mr. Breedlove: You know, down the San – do you remember which river we are on? The Santa Cruz.

Mr. Burtell: Sure.

Mr. Breedlove: Would that be a commercial use?

Mr. Burtell: If, yes. I think if somebody was using the river to transport mail up and down the river, I would say that would be a use of the river for trade or travel and that is a type of commerce.

Mr. Breedlove: Taxi service, hypothetically speaking.

Mr. Burtell: Yes, a taxi service, yes.

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Mr. Breedlove: Just a second, I just want to look at my notes.

Mr. Burtell: And, Mr. Breedlove, as you are looking at your notes, if I could add a point; in light of the time when there was occupation along the river, and during those months, because there was irrigation going on during the fall harvest period, or during the years, not just a month or two, but whole years when the area was largely abandoned, there were people in the area, but there's no accounts. Like for example, mail and supplies, would need to get to these people, but they didn't use the river, and I guess that's the point I tried to make in my report. For example, Mowry, who ran those mines in the Patagonia area that Commissioner Allen and I were discussing, he got his supplies from the Port of Guaymas and brought them up to Patagonia. He makes no mention of using the river, even during the period when it was all he could do to keep himself from being killed by the Apaches when he was operating those mines. And so, there was a need. There was a need for commercial use. I don't know how much mail was being transported at that time, but certainly supplies for his, he had a smelter there for gosh sakes. They had to get all those supplies. All those supplies got brought in by wagon.

Mr. Breedlove: So you were – just confirming. Your analysis really is that – you know that the test isn't whether it actually was used for commercial use, but it was susceptible to commercial use at the time. And so your argument then is that because there wasn't enough flow, in the stream channel at the time or that, you know, that it wasn't then susceptible to commercial use.

Mr. Burtell: No. I'm saying, I'm saying two things. I think both there – there wasn't enough flow, number one; but, in times when there was no diversions there was a need – but it simply wasn't being used. So, unlike the Utah case where the Utah case, I think, and I'm not a lawyer, but as I read it, the court wanted the point to be made that just because there wasn't evidence of historic navigation, by itself doesn't mean that there wasn't susceptible to navigation, with the understanding that maybe there wasn't anyone in the area at the time, so there was no need to bring supplies in or to transport people, etc. My argument in the Santa Cruz, is that there was a need. There was a military base. There were mines. And, even at times of year when there weren't any diversions, during several

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years when the area was largely abandoned, but there's still a mine down there and there was still a military base, they still didn't use the river. So,

Mr. Breedlove: Thanks, Rich, Mr. Burtell.

Chairman Noble: Thank you Mr. Burtell. Is there anyone here that foresees a need or wants to have further oral testimony on the Santa Cruz?

The record will remain open until April 15, at noon for any further evidence that anyone wishes to submit or any response to evidence that has been submitted.

Now, let's see what we have coming up.

On April 25 we have a scheduling conference, 9 a.m., Phoenix, and I think – do we have other things on the calendar that we want to talk about?

Mr. Mehnert: April 24 in Globe for the Upper Salt.

Chairman Noble: April 24 in the Upper Salt in Globe.

Mr. Mehnert: [inaudible]

Chairman Noble: [inaudible]

Mr. Mehnert: [inaudible]

Chairman Noble: 'til noon.

Unknown: Yeah.

Unknown: Added April 15 is also when the Verde evidence is due, that's the initial due date.

Chairman Noble: The initial due date for the Verde evidence is also April 15 at noon.

Unknown: Correct.

Chairman Noble: Any questions about any of those things? Well then, we appreciate you being here, it's been fun to be here. Yes, Joy.

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Ms. Herr-Cardillo: Do we know when the briefing schedule is going to be on Santa Cruz, do you want to set that today?

Chairman Noble: Since the evidence isn't closing until the 15th and we're having a schedule conference on the 25th, let's just set it up at the scheduling conference. Okay.

Ms. Herr-Cardillo: Okay.

Chairman Noble: Let's just set it the briefing schedule, and the briefing schedule for everything at the scheduling conference.

Ms. Herr-Cardillo: I'm down for that.

Chairman Noble: If there is nothing else, this hearing is over. Thank you Mr. Allen.

[recording ends]

Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

Transcription of audio tape 4 of 4

I, Barbara Leach, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed tape 4 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 4 of 4 accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this _____ day of April, 2014

_____
Barbara Leach

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Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

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Wade Noble	Chairman	Rich Burtell	Witness
Jim Henness	Vice Chair	Sean Hood	Attorney representing Freeport-McMoRan Copper and Gold, Inc.
Bill Allen	Commissioner	Joy Herr-Cardillo	Attorney for the Arizona Center for Law in the Public Interest
Jim Horton	Commissioner		
George Mehnert	Director		
Fred Breedlove	Attorney representing the Commission		

Ms. Herr-Cardillo: What are they used for?

Mr. Burtell: They are used for a lot of different things, but my understanding first – how it's generated is you take all of the data. It's usually daily stream flow data from the gauge, and you put it all into one box, if you will; and, the furtheration curve is simply an ordering of all that data. Because flows differ throughout the year, you are capturing for the period record that you had when that flow as measured. You are ordering the smallest flows in order all the way up to the biggest flow. And then when you are done with that, you are able, because it's all ordered, you can say for this flow data set, for half of the time when this gauge was monitored the flow was either greater than this amount or less than.

Ms. Herr-Cardillo: And you showed the Commissioners several pictures of the Santa Cruz River channel, which I haven't seen because I was behind you.

Mr. Burtell: Sure.

Ms. Herr-Cardillo: But you described them and I think – well do you want to review, what were the dates?

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Mr. Burtell: Yes.

Ms. Herr-Cardillo: That those pictures were taken.

Mr. Burtell: Yes, I have those here. As you recall, the data that I used from the Nogales gauge was in the 1910s in through the 1930s and I have a figure that shows what the gauge looked like on November 24, 1930; I have a picture of what the gauge looked like on May 21, 2001; I contacted the USGS office and they gave me a series of photographs of the gauge site. I will give you these dates. Quite frankly this supports Mr. Hjalmarson's criticism of the use of the gauge. He repeatedly talked about the fact that the Nogales – the Santa Cruz River in the Nogales area was a broad sandy channel whose rating curve changed over time. And so what we fortunately have is a series of photographs. This one is June 5, 1930; another one that is dated 1930 but I don't know the month and the day that shows shallow flow across the channel. This is a picture in 1947 of the channel and a fellow is standing there for scale. This line here is where they had a cable car that they would use when they went out to measure the flow during high flow events when it was dangerous to be in the channel. And then a couple of upstream/downstream views. This is January 30, 1964, again this one is looking upstream and this one is looking downstream.

And the point to me of these is I fully agree with Mr. Hjalmarson, your expert, that the channel is variable, it's a sandy channel, and it changes after flood events. And that is the reason why when I created my rating curve, I didn't just look at a few years of data. I looked at over 30 years of data to see how this channel changes after storm events, and used that rating curve then to evaluate what his pre-development flows, let alone my flow data, would look in terms of average depths.

Ms. Herr-Cardillo: For those years that you have pictures for, 1930 I think was the earliest one I heard you say to, there was one in 1954, one in 2001.

Mr. Burtell: That's most recent is in 2001.

Ms. Herr-Cardillo: 2001. The river was not in its natural condition at any point. Of those years.

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Mr. Burtell: Okay, I will again. I guess we will have to go through this again. I have tried to explain myself. I agree that the flow in the stream, the quantity of flow, was affected by diversions. And I've addressed that. But,

Ms. Herr-Cardillo: That's all I wanted to establish.

Mr. Burtell: But if I could talk to the commission,

Chairman Noble: Mr. Hood might want to rehabilitate that.

Mr. Burtell: Okay. Thanks.

Chairman Noble: Next year.

Ms. Herr-Cardillo: Okay, Appendix B, you mentioned.

Mr. Burtell: Appendix B –

Ms. Herr-Cardillo: I will get there. Mr. Hjalmarson's report you testified regarding Appendix B, Item 3, page 2 of Appendix B and you talk about the river was 60' wide with a stony bottom and firm banks. Earlier in that description of Item 3, it talks about land at this location had been farmed for about a century where flow was perennial. Correct?

Mr. Burtell: Yes.

Ms. Herr-Cardillo: Do you have much experience yourself, personally, boating?

Mr. Burtell: I had boated down the Green and Colorado Rivers through Canyonlands National Park and I've also taken a recreational river rafting trip on the Arkansas River when I lived in Colorado.

Ms. Herr-Cardillo: So that's two separate boating trips or multiple trips on Green.

Mr. Burtell: Multiple trips along the Green and the Colorado.

Ms. Herr-Cardillo: In your experience, that when you are traveling down those rivers, you are able to determine what the deepest part of the river is.

Mr. Burtell: No, actually. My experience has been that I would, even on the Green River; now I would do it in the springtime, as well as in

autumn, usually it's the best time to be out there. But, I am embarrassed to say that more times than not I would run myself onto shallow areas, which was surprising to me.

Ms. Herr-Cardillo: Okay, that's all I have.

Chairman Noble: Is there anyone else who wishes to ask Mr. Burtell questions?

[inaudible]

Chairman Noble: Well, okay, let's wait a second here.

Mr. Hood: I have one follow up question is all, Mr. Chairman.

Chairman Noble: Mr. Hood.

Mr. Hood: My lone follow up question for you, Mr. Burtell, is you were starting to explain the difference between flow and the geomorphology as is it relates to ordinary and natural conditions. Can you complete that please?

Mr. Burtell: Yes, I think Ms. Herr-Cardillo was trying to make me state, if you will, that we can't use recent measurements of the relationship between stream flow data and flow because these are recent measurements when there have been diversions and the river is no longer in its natural and ordinary condition. I strongly disagree with that statement. What one needs to be cautious about, obviously, is looking at the flow measurements by themselves recently that could have been affected by diversions. But, there's been no evidence that has been entered by the Center or anyone else that I can remember, including the State Land Department's expert, Fuller, which talked about the channel. The geomorphology of the channel changing in the Nogales area.

What I mean by that is the shape and the configuration of the channel. In having been down there, both during low flow events and high flow events, diversions in my opinion are not effecting the geomorphology of that river. What effects the geomorphology of that river is storm events. Monsoonal flood events and the occasional winter event. I have been down there after those events and I talked to the USGS. It changes the configuration of the channel. It's a sand channel. You got high flows, that channel is

going to change its configuration. So it's – it's a variable channel. In fact, Mr. Hjalmarson mentions that. That's a variable channel that's going to change after every large storm event. So the geomorphology is always changing and will continue to change. I took a 30-year period of time where I tried to capture all that change. I didn't see any evidence that would suggest that that 30 years of changes that I looked at in channel geomorphology would have been any different than the changes that channel geomorphology before that.

Mr. Hood: And again, the changes of flow in convergence, any of the records you looked at you accounted for those versions.

Mr. Burtell: Yeah, maybe Ms. Herr-Cardillo didn't hear my testimony, but I did fully look at the flow data from the teens and the 1930s but I was also very cognizant of the amount of irrigated acres and diversions that occurred above those gauges, and even mentioned, I think in my direct testimony that if you take those diversions and add it on to the flow data that was gauged, it still does not result in conclusion that the flow depths were typically greater than a foot. Even when those diversions are accounted for.

Mr. Hood: May I ask one more question that occurred to me, Mr. Chairman? I apologize I promised one and I have two.

Chairman Noble: I'm glad something's occurred to you.

[laughter]

Mr. Hood: Mr. Burtell, Ms. Herr-Cardillo asked some questions about certain crafts and whether they qualified as commercial vessels, etc. Do you recall having reviewed in the special master's report in the Utah case, the discussion of the vessels that were typical of trade and travel during that general time period?

Mr. Burtell: Yes, the boats that he considered for trade and travel were not, certainly in my reading of his reports were not recreational vehicles. Or recreational crafts. In fact, he had discounted the occasional use by prospectors of rafts going down because in his mind they would use them for short stretches, but weren't able to even pull – they'd have to pull the rafts back upstream. There was a discussion where his – as I read his case – he did not use the

occasional recreational use by a canoeist as a measure or a fact in his findings of navigability. He focused on larger boats, motor driven boats. Either steam or by that time, when he wrote his decision, there was actually gasoline powered boats. Those boats that he considered and looked at from a navigability perspective –

Mr. Hood: He looked at the drafts required by a variety of commercial vessels.

Mr. Burtell: That's correct.

Mr. Hood: That's all I have. Thank you.

Chairman Noble: Thank you. Anyone else have any questions?

Comm. Horton: Mr. Chairman Just a comment. I was at San Xavier six months ago, and you pronounced it correctly.

Mr. Burtell: Okay. My counsel had me worried that I had been pronouncing it wrong, and I assume you pronounced it like the basketball team. Which I think is Xavier.

Comm. Horton: Yeah. Down there they say San Xavier.

Mr. Burtell: I thought that was the case. I still get Prescott versus Prescott wrong.

Chairman Noble: Okay. No one else has any questions then we'll open it up the Commission. Commissioner Allen.

Comm. Allen: Could you define the difference between average and median flow just for the Commission's benefit please?

Mr. Burtell: Sure. What I look at in my report as median flows. I happened to look at median flows on a monthly basis, but, obviously you could look at a median flows on an annual basis. The median flows is the middle of the distribution. If you had a whole bunch of measurements, and you wind them up from the smallest of those measurements all the way to the largest, the median flow was that measurement that occurs right smack dab in the middle. That is to be contrasted with the average flow where all the flow data are taken in its entirety. And average flows for streams in Arizona as described by Fuller, both in the San Pedro and in the Santa Cruz,

as a measure of typical stream flow conditions, averages are usually not considered as appropriate because Arizona streams are known and for those of us that have been out there, it's a scary time, but when you do have flood flows, they are unusually high events. And those events have a disproportionate effect on all those other values, resulting in an average value that for most Arizona streams and those streams in the Southwest, the average flows are higher than the median flows. Median flows seem to be used more commonly for things like navigability determinations because it's a better measure of typical flow conditions that are less effected by those extreme high events.

Comm. Allen: Can you tell me when the infiltration gallery was installed in Nogales.

Mr. Burtell: Yes, in fact, in my report, I specifically made sure not to include a few years of data, when the gauge site was downstream of that infiltration gallery. And so, if you would let me refer to my table – it's in one of my footnotes, Commissioners, so if I could turn to that – it will take me a second. I know you just asked me for the year, and I apologize, I should know that off the top of my head, but – okay. And, I say it in my text. I say from March 13 to December 4, 1915 and from April 28, 1921 through 1922. The gauge was located half mile downstream at the Nogales pumping plant. Due to potential impacts from the plant on stream flows, data collected during these months are not included. So the plant was installed some time before 1915.

Comm. Allen: Prior to 1915.

Mr. Burtell: At least on or before March of 1915. The –

Comm. Allen: I'm sorry I can't hear. Fifty or 15?

Mr. Burtell: Fifteen, excuse me.

Comm. Allen: Okay.

Mr. Burtell: And the USGS when they would record these stream flow records, they would talk about any diversions that occurred above the gauge. And they mentioned when the gauge was temporarily located downstream of that pumping plant, I didn't include those

data for obvious reasons. I didn't know what the pumpage was from the Nogales Plant – that infiltration gallery.

Comm. Allen: It was significant.

Mr. Burtell: I believe so.

Comm. Allen: There was a change in stream channel morphology that occurred in the late 1800s, when the arroyo formations occurred throughout the state. So, as we recognize did occur on the San Pedro. And, at what point in time do you see that occurring and was it – I'll end with that.

Mr. Burtell: Sure. No, it's an excellent question and it's another document that I will suggest to counsel that I enter into evidence. It is a study that was done of how the channel in the Tucson area has changed over time. They've done a lot of archeological work in the Tucson area and what it shows is they go back several thousand – two, three thousand years. It shows how the channel has naturally changed. There has been erosion, and then infilling, and erosion and infilling, they encountered these changes in the channel geomorphology there as part of their archeological studies. Anyone who has spent any time in the Tucson area will see that it's an entrenched channel here. I think when you look at the photographs – and there's also entrenchment and a long history of entrenchment, Commissioner Allen, in the San Pedro area as well as in the Tucson area.

When you look at these photographs of the Nogales gauge, as well as if you've been to the Lochiel gauge, the entrenchment that was noted in the San Pedro and in the Tucson area was not noted or I have not seen in the Nogales area. And, in fact, the figures from the 1930s through the 60s all the way to now, shows little, if any entrenchment in the channel in the Nogales area. So what that leads me to believe is that there are different levels of entrenchment. I am certainly very familiar and you unfortunately weren't with us at the time, but we spent a lot of time discussing the changes in the geomorphology of the San Pedro River.

Comm. Allen: I was there.

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Mr. Burtell: You might have been, that's right, maybe you were in the audience.

Comm. Allen: Right.

Mr. Burtell: And, there's a lot of evidence of that entrenchment. When you look at the records for the upper Santa Cruz, in that portion where the Nogales gauge is, I simply have not found any studies that showed that area suffered that type of entrenchment. Certainly, within the Tucson area, there is a long, long, long history of entrenchment in many studies that have been done, which I am sure you are familiar with, including the USGS. Were they'd look back in time, starting as you said in the 1880s and certainly some of that entrenchment may have been effected or not by man's activities in the Tucson area. I think what we concluded, or I certainly concluded in the San Pedro, and I would also conclude in the Santa Cruz, or at least in the Tucson area, is it's not clear to me that those entrenchment events were simply caused by man. When you look archeologically…

Comm. Allen: I would agree.

Mr. Burtell: I think archeologically, when you go back three or four thousand years and you see that those same events, have been mapped in the Tucson area shows that it's a natural event. I don't know why the area in the Nogales range has not become more entrenched. I don't know why.

Comm. Allen: So you're assuming, then, that the channel changed very, very little between the late 1800s and the current conditions that exist there.

Mr. Burtell: In the Nogales area, I have not seen any evidence to say otherwise. In the Nogales area. Certainly in the Tucson area, I agree.

Comm. Allen: That'd be true of Lochiel?

Mr. Burtell: I would say the same thing at Lochiel. That I have not seen any evidence of substantial entrenchment of the channel in the Lochiel area.

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Comm. Allen: Okay, but if you look upstream from Lochiel, there has been head cutting occur. Is that correct?

Mr. Burtell: I have noticed it, yes. There is some head cutting.

Comm. Allen: So, undoubtedly, there has been some change in the channel geometry at that spot.

Mr. Burtell: There could be then, in the Lochiel area. I would then also offer to the Commission's consideration that in that area, there has been little if any development.

Comm. Allen: That's true.

Mr. Burtell: And so aside from …

Comm. Allen: Aside from the mining that's occurred in that area.

Mr. Burtell: In the Patagonia mountains adjacent. But I was thinking in the actual Lochiel –

Comm. Allen: Bed of the channel?

Mr. Burtell: In the Lochiel Valley, per se, there has been minimal agriculture, which leads me to conclude that this might be another indication of channel entrenchment where it does occur, can occur under natural conditions.

Comm. Allen: And then I would assume that both you and Hjalmarson would contend that there's been a little change in the precipitation that's occurred over the past 200 years.

Mr. Burtell: When I look at tree grain records, I think they show what most people have concluded and that is there are dry periods and wet periods. But there hasn't been a wholesale change.

Comm. Allen: Yep, not only has there been a wholesale change in the amount of precipitation, but during the time of the year when the precipitation has occurred.

Mr. Burtell: Some have argue that the entrenchment that occurred in the Tucson area is, and the USGS has reported that more than once that their opinion is a major factor in the entrenchment that

occurred in the Tucson area was caused by the change in frequency of flood events. Frequency of high precipitation events in the area. I think they also recognize that man's engineering project in the river in the Tucson area may have had some effect, but the ultimate driver of those events was precipitation and how that precipitation has changed.

Comm. Allen: When we go back to your Table 4.

Mr. Burtell: Okay.

Comm. Allen: And look at the depth versus discharge, what would be the point where it would be the amount of water that was discharged, now I believe you've given it in acre feet in Table 4, correct?

Mr. Burtell: What I did in Table 4 is I show the median flows.

Comm. Allen: Okay, median flow.

Mr. Burtell: Month by month. And it's kind of a shorthand. I highlighted in bold red, those median flows where, when you compare those flows to the measurements of the relationship between average stream flow depth and flow as the USGS measured those flows would result in average depth of great event flow. They would still be less than two feet, but they would be greater than a foot. The foot was kind of a bench mark that Mr. Hjalmarson even admitted to that in his opinion recreational watercraft would have difficult times perhaps navigating if it was less than a foot.

Comm. Allen: So at what point would it exceed one foot?

Mr. Burtell: Well, to answer that question, you have to go to my figure. And I apologize for having to just go back and forth here. If you look at my Figure 4, and this again is my relationship between measured discharge in the stream and average stream depth. And, if you look along the x axis, Mr. Hjalmarson indicated I shouldn't have put stream depth on the x axis, but it doesn't make any difference if you plot it on the y axis, you can still do the exercise. But if you go across the x axis and go over the one foot, and then work your way up the graph, you can see those field measurements of discharge where the average stream depth is greater than a foot.

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So to answer your question, to get greater than a foot of water in the stream, you typically have to get greater than 100 CFS of flow.

Comm. Allen: It says ten.

Mr. Burtell: I'm sorry, it says ten?

Comm. Allen: It says ten, on the table on Figure 4. Are you talking about figure 3?

Comm. Allen: Oh, I'm Figure 4 of the Nogales case.

Mr. Burtell: Okay, just a second. Oh, I'm sorry, I thought you were referring to the Nogales case. You're on the Lochiel ---

Comm. Allen: No, let's stay with Nogales.

Mr. Burtell: Okay. So there was one measurement that you can see that the discharge was – looks like it's about 15 CFS, which was about 1.2 feet. But that looked like an outlier. All the other measurements, if you come over to 1 feet, an average stream depth of 1 and work your way up, you'll see that you start to get stream flow depth greater than 1 when the discharge exceeds 100.

Comm. Allen: Or 150.

Mr. Burtell: Or 150. That's correct. Mr. Hjalmarson's pre-development stream flows for that area was on the order of 20 to 30 CFS. So, as I said during my direct testimony, I don't necessarily disagree with his average stream flows during pre-development time are unreasonable. But when you look at those average flows in relationship to what type of associated depths that they would have of flow, it would be less than a foot in my opinion.

Comm. Allen: I have a little trouble understanding that 10 times different between Lochiel and Nogales. And, I'm assuming that that's based solely on the width of the channel.

Mr. Burtell: I'm sorry, I didn't quite understand your comments about Lochiel.

Comm. Allen: The depth at Lochiel is 10 CFS where it reaches one foot.

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Mr. Burtell: Yeah, when, and that probably gets back to your point about there being more entrenchment there and that the channel is actually in more of a confined channel where it's more concentrated, and thus, it results in greater depths.

Comm. Allen: The only point that I would make in that regard is that there is a – if it were entrenched at Lochiel, and it had to have been entrenched to a certain degree at Nogales, you can't get upward erosion occurring unless you've got some physical thing happening in Lochiel, in the valley above Lochiel, where we do know entrenchment occurred, if you didn't have it down at the Nogales, because Nogales is downstream.

Mr. Burtell: Unless the, my understanding – the entrenchment works its way upstream,

Comm. Allen: That's correct. That's my point.

Mr. Burtell: And I guess my point would be is that unless there is some cause geological or otherwise for entrenchment to occur upstream of Nogales, but downstream of the Lochiel gauge and it worked its way up the channel up to the headwaters.

Comm. Allen: Okay. I've got no further questions.

Chairman Noble: Mr. Henness?

Comm. Henness: Nothing.

Chairman Noble: Mr. Horton?

Chairman Noble: Anyone else out there want to prolong this?

Mr. Breedlove: I do.

Chairman Noble: Mr. Breedlove does.

Mr. Breedlove: It's all right, I just have a couple of questions for clarification. Ms. Herr-Cardillo was asking you some questions that I've actually written down myself, and I just wanted a few clarifications.

Mr. Burtell: Please.

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Mr. Breedlove: So, actually, let's get back to the Utah Special Master Report.

Mr. Burtell: Okay.

Mr. Breedlove: Did it list a flat bottom canoe as a boat that was used in the timeframe that Arizona became a state?

Mr. Burtell: It certainly listed lots of different boats, including those that were used. That's correct.

Mr. Breedlove: And, do you know what the draft is on – I think it was talked about during the San Pedro hearing. Do you remember what the draft is on a flat bottom canoe or, I'm sure it's dependent on how much weight is in the canoe and that sort of thing.

Mr. Burtell: Yeah, it depends. I am not a boating expert as I think Ms. Herr-Cardillo was asking me, I am in no way a boating expert, but having canoed on rivers myself, certainly the size of the boat, the type of the boat, and the load of the boat is going to effect that draft. And so, I guess I bring to the Commission's attention when the Colorado River was being used for navigation purposes, prior to the dams being constructed, and prior to the railroad, that many times those boats that had very shallow drafts on waters, my understanding of less than a foot, would run aground. And they would run aground because those channels shifted, number one; and also, if they were loaded coming up from San Francisco that would have a bearing. So it's hard to give "a" answer – it depends on the boat and it depends on the load. I think the point though to contrast that being used for commercial purposes, is someone either by themselves or in a two person kayak, which would have a very minimal load, that would have a very shallow draft. Those type of boats in my mind are not meaningfully similar to those that were being used at statehood for commercial purposes.

Mr. Breedlove: Keeping in mind, I know that the record shows that there was little or no commercial boat travel on the river at the time of statehood. I know that, I just going into the question I am having – I'm going to ask you.

Mr. Burtell: I'm sorry, Mr. Breedlove, which river are you referring to the Santa Cruz or the ...

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Mr. Breedlove: Yes.

Mr. Burtell: Okay.

Mr. Breedlove: Just hypothetically speaking, Ms. Herr-Cardillo talked about James O'Patty and whether a canoe – whether that was actually a commercial use transporting beaver hydes or what have you. And I think you said that you didn't think so according to what you understood of the definition in existing jurisprudence, is that correct?

Mr. Burtell: No. I think I said I tried to explain my knowledge of what Patty actually did and she said, I don't want to put words in her mouth, or anyone's mouth, but I think she said, "Well, let's not worry about whether he was dragging his canoe along the stream with furs in it." If he was actually in the canoe on some river, floating down, loaded with furs, would that constitute a commercial use? And I would say, that probably would be. I would counter if his canoe, depending on the size of it, was loaded with furs, then it's going to have some draft to it, depending on how many furs he's got in there. And it's also going to have to be a pretty large canoe.

Mr. Breedlove: Just, hypothetically speaking, if somebody had a canoe, a flat bottom canoe and was transporting mail, I mean just hypothetically.

Mr. Burtell: Sure.

Mr. Breedlove: You know, down the San – do you remember which river we are on? The Santa Cruz.

Mr. Burtell: Sure.

Mr. Breedlove: Would that be a commercial use?

Mr. Burtell: If, yes. I think if somebody was using the river to transport mail up and down the river, I would say that would be a use of the river for trade or travel and that is a type of commerce.

Mr. Breedlove: Taxi service, hypothetically speaking.

Mr. Burtell: Yes, a taxi service, yes.

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Mr. Breedlove: Just a second, I just want to look at my notes.

Mr. Burtell: And, Mr. Breedlove, as you are looking at your notes, if I could add a point; in light of the time when there was occupation along the river, and during those months, because there was irrigation going on during the fall harvest period, or during the years, not just a month or two, but whole years when the area was largely abandoned, there were people in the area, but there's no accounts. Like for example, mail and supplies, would need to get to these people, but they didn't use the river, and I guess that's the point I tried to make in my report. For example, Mowry, who ran those mines in the Patagonia area that Commissioner Allen and I were discussing, he got his supplies from the Port of Guaymas and brought them up to Patagonia. He makes no mention of using the river, even during the period when it was all he could do to keep himself from being killed by the Apaches when he was operating those mines. And so, there was a need. There was a need for commercial use. I don't know how much mail was being transported at that time, but certainly supplies for his, he had a smelter there for gosh sakes. They had to get all those supplies. All those supplies got brought in by wagon.

Mr. Breedlove: So you were – just confirming. Your analysis really is that – you know that the test isn't whether it actually was used for commercial use, but it was susceptible to commercial use at the time. And so your argument then is that because there wasn't enough flow, in the stream channel at the time or that, you know, that it wasn't then susceptible to commercial use.

Mr. Burtell: No. I'm saying, I'm saying two things. I think both there – there wasn't enough flow, number one; but, in times when there was no diversions there was a need – but it simply wasn't being used. So, unlike the Utah case where the Utah case, I think, and I'm not a lawyer, but as I read it, the court wanted the point to be made that just because there wasn't evidence of historic navigation, by itself doesn't mean that there wasn't susceptible to navigation, with the understanding that maybe there wasn't anyone in the area at the time, so there was no need to bring supplies in or to transport people, etc. My argument in the Santa Cruz, is that there was a need. There was a military base. There were mines. And, even at times of year when there weren't any diversions, during several

years when the area was largely abandoned, but there's still a mine down there and there was still a military base, they still didn't use the river. So,

Mr. Breedlove: Thanks, Rich, Mr. Burtell.

Chairman Noble: Thank you Mr. Burtell. Is there anyone here that foresees a need or wants to have further oral testimony on the Santa Cruz?

The record will remain open until April 15, at noon for any further evidence that anyone wishes to submit or any response to evidence that has been submitted.

Now, let's see what we have coming up.

On April 25 we have a scheduling conference, 9 a.m., Phoenix, and I think – do we have other things on the calendar that we want to talk about?

Mr. Mehnert: April 24 in Globe for the Upper Salt.

Chairman Noble: April 24 in the Upper Salt in Globe.

Mr. Mehnert: [inaudible]

Chairman Noble: [inaudible]

Mr. Mehnert: [inaudible]

Chairman Noble: 'til noon.

Unknown: Yeah.

Unknown: Added April 15 is also when the Verde evidence is due, that's the initial due date.

Chairman Noble: The initial due date for the Verde evidence is also April 15 at noon.

Unknown: Correct.

Chairman Noble: Any questions about any of those things? Well then, we appreciate you being here, it's been fun to be here. Yes, Joy.

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Ms. Herr-Cardillo: Do we know when the briefing schedule is going to be on Santa Cruz, do you want to set that today?

Chairman Noble: Since the evidence isn't closing until the 15th and we're having a schedule conference on the 25th, let's just set it up at the scheduling conference. Okay.

Ms. Herr-Cardillo: Okay.

Chairman Noble: Let's just set it the briefing schedule, and the briefing schedule for everything at the scheduling conference.

Ms. Herr-Cardillo: I'm down for that.

Chairman Noble: If there is nothing else, this hearing is over. Thank you Mr. Allen.

[recording ends]

Arizona Navigable Stream Adjudication Commission
In re Determination of Navigability of the Santa Cruz River
(Case No. 03-002-NAV)
Tucson, Arizona, March 28, 2014

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I, Barbara Leach, declare:

1. I work in the word processing department at Fennemore Craig, P.C.

2. At the request of Sean Hood, I reviewed and transcribed tape 4 of 4 of the March 28, 2014 hearing held in Tucson, Arizona in *In re In re Determination of Navigability of the Santa Cruz River* (Case No. 03-002-NAV). Mr. Hood provided assistance to identify certain speakers, words, and spellings that I was unsure about.

3. The foregoing transcription of tape 4 of 4 accurate to the best of my ability to hear and discern the questions, testimony, and other statements captured on the tape.

Executed on this 21st day of April, 2014

Barbara Leach

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