

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

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

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

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.

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

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

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

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.

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

- 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.

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

- 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.

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

[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

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

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?

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

- 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

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

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?

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

- 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.

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

- 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?

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

- 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

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

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.

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

- 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

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

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.

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

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]

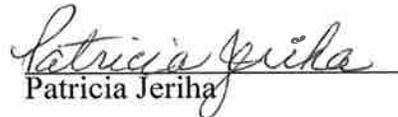
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Transcription of audio tape 3 of 4

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 23rd day of April, 2014


Patricia Jeriha

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