

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:	<u>Roll Call</u>	<u>Response</u>
	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

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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,

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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

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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

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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

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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 any history 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

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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.

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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

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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 compiled 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 23<sup>rd</sup> 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.

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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]

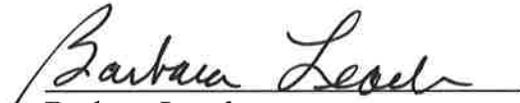
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I, Barbara Leach, declare:

1. I work in the word processing department at Fennemore Craig, P.C.
2. At the request of Sean Hood, I reviewed and transcribed 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 21st 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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