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BEFORE THE ARIZONA NAVIGABLE STREAM ADJUDICATION COMMISSION

In re Determination of Navigability of the Lower Salt River, from Granite Reef Dam to the Gila River Confluence; Upper Salt River; Verde River; Gila River; San Pedro River; Santa Cruz River	No. 03-005-NAV (Lower Salt) No. 03-007-NAV (Gila) No. 04-008-NAV (Upper Salt) No. 04-009-NAV (Verde) No. 03-004-NAV (San Pedro) No. 03-002-NAV (Santa Cruz) **SALT RIVER PROJECT'S AND FREEPORT-McMORAN'S JOINT SUPPLEMENTAL MEMORANDUM REGARDING SEGMENTATION ISSUES**

On March 23, 2012, the Salt River Project Agricultural Improvement and Power District and Salt River Valley Water Users' Association (collectively, "SRP") submitted two memoranda regarding the opinion of the United States Supreme Court in the case of *PPL Montana LLC v. Montana,* Supreme Court Case No. 10-218 ("*PPL Montana*").[1] At that time, SRP submitted one memorandum regarding the impact of the *PPL Montana* decision on the

[1] SRP submitted a copy of the United States Supreme Court's slip opinion with its Notice of Decision in Related Case and Request for Supplemental Briefing filed with the Commission on February 23, 2012. The citations to two of the case reporters are now available, 132 S.Ct. 1215, 182 L.Ed.2d 77.

Lower Salt River case and another memorandum regarding the impact of that decision on the Upper Salt, Verde, Gila, San Pedro, and Santa Cruz River cases.[2] Similarly, on March 23, 2012, Freeport-McMoRan Corporation ("Freeport") filed a consolidated memorandum regarding the impact of *PPL Montana* on each of the watercourses currently before the Commission. At its meeting on April 6, 2012, the Commission requested additional briefing on the *PPL Montana* decision, specifically with respect to the "segmentation" issues discussed in that decision. *See also* ANSAC Correspondence (April 17, 2012). Pursuant to that request, SRP and Freeport hereby jointly submit this Supplemental Memorandum addressing segmentation.

I. The Proponents of Navigability Bear the Burden of Proving Which Segments of a Watercourse They Contend are Navigable.

In prior decisions, the Arizona courts have held the proponents of navigability bear the burden of proving that a river is navigable. *See Arizona Ctr. for Law in the Public Interest v. Hassell*, 172 Ariz. 356, 363 n.10, 837 P.2d 158, 165 n.10 (App. 1991); *Land Dep't v. O'Toole*, 154 Ariz. 43, 46 n.2, 739 P.2d 1360, 1363 n.2 (App. 1987); *Defenders of Wildlife v. Hull*, 199 Ariz. 411, 420, 18 P.2d 722, 731 (App. 2001). The Arizona statutes further support this allocation of the burden. In order for the Commission to determine that a particular watercourse is "navigable," the proponents of navigability must establish that fact by a "preponderance of the evidence." *See* A.R.S. § 37-1128(A). If sufficient evidence is not presented to show navigability for a particular watercourse, the Commission must find the watercourse non-navigable. *Id.*

The United States Supreme Court in *PPL Montana* found that this proof must be made on a "segment-by-segment" basis: "To determine title to a riverbed under the equal-footing doctrine, this Court considers the river on a segment-by-segment basis to assess whether the

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[2] *See* Salt River Project's Memorandum Regarding Effect of Supreme Court's Opinion in *PPL Montana* on Lower Salt River Case (March 23, 2012); Salt River Project's Memorandum Regarding Effect of Supreme Court's Opinion in *PPL Montana* on Remanded Cases Other Than Lower Salt River (March 23, 2012).

segment of the river, under which the riverbed in dispute lies, is navigable or not." 132 S.Ct. at 1229. Thus, the proponents of navigability must demonstrate, by a preponderance of the evidence, that specific segments of a watercourse are navigable.

The *PPL Montana* ruling on segmentation is consistent with the process set up in the Arizona statutes and with what the Commission has done in the past. The relevant statute defines "watercourse" as "the main body or a portion or reach of any lake, river, creek, stream, wash, arroyo, channel or other body of water. . . ." *See* A.R.S. § 37-1101(11). Thus, the Commission always has been empowered to address watercourses in segments (or "portions" or "reaches," as used in the Arizona statute) rather than in their entirety. *See id.* That is, in fact, what the Commission has done in its analysis. Although only the Salt River was divided for administrative and hearing purposes, the Commission's final reports on each of the watercourses has dealt with the segmentation issue and analyzed each watercourse by reach. *See* Sections II-VIII, *infra*. With respect to each of the six remanded watercourses currently before the Commission, the proponents of navigability have proven no segments navigable. Therefore, the Commission should find all segments of each watercourse non-navigable.

II. Process for Future Proceedings

At the Commission's meeting on April 6, some discussion occurred regarding whether the segmentation rulings in *PPL Montana* would require the Commission to realign and segregate the six remanded watercourses for administrative and hearing purposes, such that separate and individual hearings would be held on specific "segments" of each watercourse. SRP submits that such an approach would be unnecessary, is not required by the *PPL Montana* decision, and would constitute an unnecessary waste of limited State resources.

Although the Supreme Court's opinion in *PPL Montana* supports the Commission's ability and duty to continue to consider each watercourse on a "segment-by-segment" basis, this does not require the Commission to break out the reaches separately for administrative and hearing purposes. In fact, the various segments addressed in *PPL Montana*, which were

parts of three different watercourses, were all litigated in the same case, in the same hearings, and on the same appeal.

Rather than separating the watercourses into various segments and holding separate hearings on each segment, the Commission should continue with the same cases that it currently has before it. *PPL Montana* requires nothing different. What *PPL Montana* does support is that the Commission should continue to consider the evidence submitted with respect to each particular segment of each watercourse and should continue to require the proponents of navigability to establish, by a preponderance of the evidence, that any particular segment is navigable. No change is necessary in the case administration or hearing process.

III. No Segment of the Lower Salt River is Navigable.

As stated above, it is the burden of the proponents of navigability to show, by a preponderance of the evidence, that any specific segment of a watercourse is navigable. *See* Section I, *supra*. For the Lower Salt River, the proponents have failed to meet that burden.

The Commission divided the Lower Salt River from the Upper Salt River at Granite Reef Diversion Dam and conducted separate proceedings on the Upper Salt and Lower Salt. This division, although not required by *PPL Montana*, is generally consistent with the segmentation approach adopted by the Supreme Court in that decision. In *PPL Montana*, the Court stated that "practical considerations" can support segmentation:

> Physical conditions that affect navigability often vary significantly over the length of the river. This is particularly true with longer rivers, which can traverse vastly different terrain and the flow can be affected by varying local climates. . . . These shifts in physical conditions provide a means to determine appropriate start points and end points for the segment in question. Topographical and geographical indicators may assist.

132 S.Ct. at 1230.

The Upper Salt and Lower Salt Rivers are both non-navigable, but largely for different reasons. Although the overall flow regimes of the two portions of the river are similar, the

physical and topographical characteristics are significantly different. The Lower Salt (below Granite Reef) has a wide, braided channel that occupies most or all of the valley floor.[3] In his report prepared for the State Land Department, Jon Fuller stated: "The Lower Salt River was considered a single stream reach for the analysis of stream geology."[4] According to Mr. Fuller, "[a]lthough a natural dividing point exists at Tempe Butte, the river is an alluvial stream throughout, with similar geomorphic, hydrologic, and hydraulic characteristics." *Id.* In this area below Granite Reef, the river historically spread into at least two distinct channels, which ran "through sandy soil" and were "constantly changing position and size."[5]

The proponents of navigability have not established a preponderance of the evidence that this wide, sandy, constantly changing reach of the Salt River is or ever was navigable.[6] No portion of the Lower Salt is or ever has been used or susceptible to being used as a "highway for commerce." *See* A.R.S. § 37-1101(3), (5). At and before statehood, the Lower Salt River was a braided stream, consisting of multiple channels interspersed with boulders, sandbars, beaver dams, and other natural impediments to navigation. *See* SRP Opening Memo/Lower Salt, § III(B). Prior to the construction of Roosevelt Dam and other dams on the Upper Salt and Verde Rivers, the Lower Salt River was particularly subject to alternating periods of floods and droughts. *Id.* § III(A). Since the construction of Roosevelt Dam was completed in 1911, the Lower Salt has been dry or virtually dry for almost every period of

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[3] *See* Schumm, *Geomorphic Character of the Upper Salt River*, at 12 (January 2005) [Case No. 04-008-NAV, EI 28] ("Schumm/Upper Salt"). "EI" refers to "Evidence Items" in the existing record before the Commission.

[4] *See* JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the Salt River from Granite Reef Dam to the Gila River Confluence*, at 5-1 (revised April 2003) [Case No. 03-005-NAV, EI 30] ("Fuller/Lower Salt").

[5] *See* Littlefield, *Assessment of the Salt River's Navigability Prior to and on the Date of Arizona's Statehood, February 14, 1912*, at 31-33, 35-37, 39-40, 48 (December 5, 1996) [Case No. 03-005-NAV, EI 16] ("Littlefield/Lower Salt") (quoting, among others, federal surveyor Wilfred Ingalls from 1868 and federal surveyor Robert Farmer from 1910-11).

[6] *See, e.g.*, Salt River Project's Opening Post-Hearing Memorandum, Case No. 03-005-NAV (June 9, 2003) ("SRP Opening Memo/Lower Salt"); Salt River Project's Responsive Post-Hearing Memorandum, Case No. 03-005-NAV (August 11, 2003).

every year. *Id.* On the few occasions when there has been water in the river, it has come in the form of huge floods that destroy lives and property. *Id.* The Lower Salt is not navigable.

IV. No Segment of the Upper Salt River is Navigable.

Like the Lower Salt River, the Upper Salt River is non-navigable, but largely for different reasons. Whereas the Lower Salt is generally a wide, sandy, braided channel, the majority of the Upper Salt (above Granite Reef Dam) is bounded by steep-walled bedrock canyons that lack a significant geologic floodplain.[7] Between Roosevelt and the Highway 60 bridge, for instance, there are many bedrock controls, plus eighteen rapids and steep gradients ranging from seventeen to thirty-one feet per mile. *See* Schumm/Upper Salt, at 2.[8] The bedrock controls continue through the Upper Salt, including significant bedrock at the confluence of the Salt and Verde Rivers (just upstream from Granite Reef Dam). *Id.* at 1. Even the stretch at the lowest extreme of what the Commission has classified as the Upper Salt (from the Verde River confluence to Granite Reef Dam) is confined by bedrock and terraces.[9]

The evidence in the record before the Commission shows that the Upper Salt is not navigable, and that evidence certainly is not sufficient to establish a preponderance in favor of navigability.[10] Surveys conducted by the United States Government before statehood indicate

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[7] *See* JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the Salt River: Granite Reef Dam to the Confluence with the Black and White Rivers*, at 4-9, 5-3 (revised June 2003) [Case No. 04-008-NAV, EI 27] ("Fuller/Upper Salt"); ANSAC, *Report, Findings and Determination Regarding the Navigability of the Upper Salt River from the Confluence of the White and Black Rivers to Granite Reef Dam*, at 5 (December 13, 2007) ("ANSAC/Upper Salt").

[8] *See also* Fuller/Upper Salt, at 4-11 (stating that the stretch of the Upper salt from the Black and White Rivers to Roosevelt Lake has a slope of 0.2 feet per foot and the stretch from Roosevelt Lake to Stewart Mountain Dam has a slope of 0.4 feet per foot).

[9] *See* Schumm, *Geomorphic Character of the Lower Salt River*, at 3 (March 2003) [Case No. 03-005-NAV, EI 26].

[10] *See* Salt River Project's Opening Post-Hearing Memorandum, Case No. 04-008-NAV (December 9, 2005) ("SRP Opening Memo/Upper Salt"); Salt River Project's Responsive Post-Hearing Memorandum, Case No. 04-008-NAV (January 1, 2006).

that the Upper Salt is non-navigable.[11] Land patents and grants in this reach also reflect that the river is non-navigable. *Id.* Charles Hayden, in 1873, attempted to boat the river in an effort to determine whether it was susceptible to the flotation of logs from the mountain forests to the central deserts. His party "pronounced the scheme a failure." *See* Fuller/Upper Salt, at 2-1. If the reach from Granite Reef Dam to Roosevelt Dam had been navigable, transportation along the river certainly would have been an easier way to move supplies upriver for dam construction rather than to build the Apache Trail or to take the circuitous route through Globe. *See* SRP Opening Memo/Upper Salt, at 5-7. Commercial operations existed near the Upper Salt in the 1800s, mostly in the Globe area, and water-borne transportation would have been a much more efficient means of traveling between those locations and Phoenix if the Upper Salt had been navigable. *Id.* at 10. Accounts of any pre-statehood attempts to boat this reach of the river, however, are spotty and almost wholly unsuccessful. *Id.* at 7-9.

Another example of the geomorphologic and topographical obstructions to any type of navigation on the Upper Salt is shown by the 1993 conviction of eight men who used explosives to alter the rapids at Quartzsite Falls, located above the mouth of Cherry Creek. *See* Fuller/Upper Salt, at 3-40. The obvious purpose of this action was to attempt to clear the river of rocks, rapids, and other obstructions that made the Upper Salt not susceptible to even the most basic and risky boating efforts. *Id.* Prior to this destruction, "[e]ven with modern technology, boaters routinely portaged around this rapid. Such portages took two to four hours, even when traveling light."[12]

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[11] *See* Littlefield, *Assessment of the Navigability of the Parts of the Upper Salt River and Tonto Creek between Granite Reef Dam and the Inundation Lines of Roosevelt Lake Prior to and on the date of Arizona's Statehood, February 14, 1912*, at 36-44, 61-73 (October 5, 2005) [Case No. 04-008-NAV, EI 29].

[12] *See* U.S. Forest Service, *Evaluation of Navigability at the Time of Statehood: Salt River*, at 3-4 (January 1998) [Case No. 04-008-NAV, EI 8]. "Even though Quartzsite Falls would have been the most dangerous rapid encountered in 1912, there are many others which would have been extremely dangerous to someone attempting sustained trade and travel." *Id.* at 4.

In his report for the State Land Department, Mr. Fuller summarized his conclusions on the Upper Salt as follows:

> Review of the geology of the Upper Salt River indicates that the channel geomorphology is substantially unchanged from its condition at or before statehood, except where the river has been inundated by reservoir impoundments. Most of the Upper Salt River is formed in bedrock canyons. Bedrock along the channel margins in these canyons precludes significant movement of the river channel or other channel changes. In addition, the bedrock geology of the Upper Salt River made access to the river difficult during the period around statehood, prevented development of extensive irrigation systems, and prevented the development of large population centers near the river. Bedrock outcrops in the channel created waterfalls, rapids, and narrow canyons which may have been potential impediments to navigation for some types of boats such as keel boats, steamboats and powered barges.

Fuller/Upper Salt, at 4-15.[13]

The Commission properly divided the Salt River for administrative and hearing purposes at Granite Reef Diversion Dam, due to the difference in physical, topographical, and geographical characteristics between the reaches upstream and downstream of Granite Reef. *See PPL Montana*, 132 S.Ct. at 1230. The proponents of navigability have not established a preponderance of the evidence necessary to show that any segment of the Lower Salt or Upper Salt is navigable.

V. No Segment of the Verde River is Navigable.

In their 1993 report, the State Land Department's consultants divided the Verde River into three reaches: (1) the Upper Verde from Sullivan Lake to Sycamore Canyon, southeast of Perkinsville; (2) the Middle Verde from Sycamore Creek to Fossil Creek, and (3) the Lower Verde from Fossil Creek to the Salt River confluence.[14]

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[13] *See also* Fuller/Upper Salt, at 4-10 ("Historical accounts of boating the Upper Salt River describe the waterfalls and rapids, and sheer canyon reaches that lacked beaches or bars on which to land."); *id.* at 5-6 ("Within the Upper Salt River study reach, the river is located almost entirely within steep bedrock canyons.").

[14] *See* CH2M Hill, *Arizona Stream Navigability Study for the Verde River: Salt River Confluence to Sullivan Lake*, at 13-15 (November 1993) [Case No. 04-009-NAV, EI 7] ("Fuller/Verde").

Although the Commission treated the entire Verde as one watercourse for administrative and hearing purposes, the Commission considered the evidence with respect to each segment. In effect, the Commission's report shows a division into four reaches: (1) an upper reach above the Verde Valley; (2) the Verde Valley; (3) from the lower end of the Verde Valley to Bartlett Dam; and (4) the stretch below Bartlett Dam.[15]

The Commission's four-reach segmentation is similar to the consultants' division into three reaches, with the exception that the Commission divided the consultants' Lower Verde reach into two reaches (one reach from the lower end of the Verde Valley to Bartlett Dam and another reach from Bartlett Dam to the Salt River confluence). SRP and Freeport submit that the Commission's four-reach division is more appropriate, given that the evidence shows that the river just above the Bartlett Dam area is significantly different from the river below the dam. For purposes of this memorandum, SRP and Freeport will refer to four reaches:

1. "Upper Verde" from the headwaters to Sycamore Canyon, which is near the upper end of the Verde Valley;

2. "Middle Verde" from Sycamore Canyon to Fossil Creek, which primarily encompasses what is commonly known as the "Verde Valley," including the towns of Cottonwood, Clarkdale, and Camp Verde;

3. "Lower Verde" from Fossil Creek (lower end of Verde Valley) to Bartlett Dam; and

4. "Confluence Reach," which includes the stretch between Bartlett Dam and the Salt River confluence.

Most of the Upper Verde floodplain is narrow, and topographic relief along the river is moderate. *See* Fuller/Verde, at 13; ANSAC/Verde, at 5. The reach is characterized by steep,

[15] *See* ANSAC, *Report, Findings and Determination Regarding the Navigability of the Verde River from Its Headwaters to the Confluence with the Salt River*, at 52 (March 24, 2008) ("ANSAC/Verde").

narrow canyons formed in bedrock, a narrow floodplain corridor, and springs that provide ephemeral baseflow. *See* Fuller/Verde, at 73; ANSAC/Verde, at 5.[16]

The Middle Verde (Verde Valley) includes the most densely populated portion of the river, the richest historical record, and the broadest floodplain area. *See* Fuller/Verde, at 73. The floodplain of the Middle Verde is generally broader than the Upper Verde, with a diversity of land forms such as mesas, ridges, and canyons. *See* ANSAC/Verde, at 6. In the mid-1800s, the Middle Verde was swampy, and the residents had problems with malaria. *See* Fuller/Verde, at 34-35; ANSAC/Verde, at 29. Historical accounts of the Middle Verde generally show a river only a few feet deep.[17] In the Middle Verde (as well as in the Confluence Reach), "the river spreads out over a larger flood plain and had braided characteristics with shifting sand bars and sand islands, which would make it impossible to be considered as navigable or susceptible to navigation." ANSAC/Verde, at 52.

The Lower Verde is characterized by a cobble- and gravel-bedded channel formed over shallow or exposed bedrock.[18] The floodplain of this reach generally broadens and the topography decreases from mountainous to sloping bajadas as the river flows from north to south. *See* ANSAC/Verde, at 6. The river widens as it flows through the Lower Verde and the Confluence Reach, with widths of approximately 600 feet upstream of Horseshoe Dam; 2,000 feet downstream of Horseshoe Dam; and 4,000 feet downstream of Bartlett Dam. *See* Schumm/Verde, at 14. Among other things, the United States Geological Survey ("USGS") in 1911 noted that the bed of the river in its lower portions was "sandy and shifting." *See*

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[16] *See also* ANSAC/Verde, at 52 (in the Upper Verde, "the steep narrow, bedrock canyons, lack of accessibility to the river, and the steep gradient of the river" make navigation as a highway for commerce not possible).

[17] *See* Littlefield, *Assessment of the Verde River's Navigability Prior to and on the Date of Arizona's Statehood, February 14, 1912*, at 61, 69 (revised July 7, 2005) [Case No. 04-009-NAV, EI 32] ("Littlefield/Verde") (recounting, among other things, statement by federal surveyor Burton Foster in 1863 that river was about 3 feet deep and statement by federal surveyor Robert Farmer in 1911 that the river was between 2 ½ and 4 feet deep).

[18] *See* Fuller/Verde, at 73; ANSAC/Verde, at 6; Schumm, *Geomorphic Character of the Verde River*, at 8 (December 2004) [Case No. 04-009-NAV, EI 30] ("Schumm/Verde").

Littlefield/Verde, at 118. Reports from the Bureau of Indian Affairs between 1905 and 1910 describe the channel in the Confluence Reach as frequently changing course, eroding, and depositing alluvium. *Id.* at 126-28.

The proponents of navigability have not shown that any of these four reaches (or any other reach of the Verde River) is navigable.[19] The geomorphic evidence in the record shows that the Lower Verde is particularly unsuitable for navigation. This reach includes fourteen rapids in sixty-one miles, with a river gradient varying from sixteen to twenty-two feet per mile. *See* Schumm/Verde, at 14. In its report and findings, the Commission noted that the forest supervisor for the Tonto National Forest had submitted a study for the portion of the Verde that flows through National Forest lands. *See* ANSAC/Verde, at 43. The forest supervisor "opined that the river was not navigable in these areas due to the steep gradient of the river, trees, rapids and waterfalls, and other obstacles that blocked the river." *Id.* The Commission further noted that, in the Lower Verde (Verde Valley to Bartlett Dam), the river flows through "some of the most rugged country in Arizona." *Id.* In this reach in particular, "the river flows fast and contains rapids, waterfalls and other obstacles." *Id.* at 52. No segment of the Verde River is navigable.

VI. No Segment of the Gila River is Navigable.

For study purposes, the State Land Department's consultants broke the Gila River into two reports: One report dealing with the portion of the river from the New Mexico border to the Town of Safford, and another report dealing with the portion from Safford to the Gila River confluence.[20] The Commission treated the entire river as one watercourse for

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[19] *See* Salt River Project's Opening Post-Hearing Memorandum, Case No. 04-009-NAV (March 16, 2006); Salt River Project's Responsive Post-Hearing Memorandum, Case No. 04-009-NAV (April 7, 2006).

[20] *See* JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the Upper Gila River (Safford to State Boundary) and San Francisco River (Gila Confluence to the State Boundary)* (revised June 2003) [Case No. 03-007-NAV, EI 2] ("Fuller/Upper Gila"); JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the Gila River; Colorado River Confluence to the Town of Safford* (revised June 2003) [Case No. 03-007-NAV, EI 4] ("Fuller/Lower Gila").

administrative and hearing purposes, but discussed the river in three reaches: (1) Upper Gila from the New Mexico border to Florence; (2) Middle Gila from Florence to the Salt River confluence; and (3) Lower Gila from the Salt River confluence to the Gila River confluence.[21]

The evidence currently before the Commission supports a conclusion that the division between the Upper Gila and Middle Gila is somewhere near the Town of Florence and that the division between the Middle Gila and the Lower Gila is somewhere near the Salt River confluence. *See* Fuller/Lower Gila, at III-1, IV-52. In the archaeology section of their Lower Gila report, the State Land Department's consultants placed the Upper/Middle Gila boundary just east of Florence and the Middle/Lower Gila boundary just west of the Agua Fria River confluence. *Id.* at III-1. That report also noted that, in the early 1890s, the USGS had divided the Gila River Basin into various reaches. *Id.* at IV-52. The USGS placed the Upper/Middle Gila boundary at the Buttes just above Florence and the Middle/Lower Gila boundary at the Salt River confluence. *Id.* at IV-52. For purposes of this memorandum, SRP and Freeport adopt the dividing lines used by the Commission: The Upper Gila extends to Florence, and the Middle Gila goes to the Salt River confluence.

The Upper Gila is located mostly in relatively narrow canyons controlled by bedrock outcroppings in between broad alluvial plains. *See* ANSAC/Gila, at 53.[22] The Gila Box is an exception to this rule, and the State Land Department's consultants divided the Upper Gila into three sub-reaches: (1) the New Mexico border to the Gila Box; (2) the Gila Box; and (3) from the Gila Box to Safford. *See* Fuller/Upper Gila, at 4-1. In the area above the Gila Box, the canyons are about 2,000 feet wide, with floodplains that alternate from side to side as the main channel meanders across the canyon bottom. *Id.* at 4-6. The stream itself in this reach is about 100-500 feet wide. *Id.* at 4-10.

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[21] *See* ANSAC, *Report, Findings and Determination Regarding the Navigability of the Gila River from the New Mexico Border to the Confluence with the Gila River* (January 27, 2009) ("ANSAC/Gila").

[22] The channel slope in the Upper Gila is 0.002 feet per mile (0.2 percent). *See* Fuller/Upper Gila, at 4-8.

The Gila Box is unique within this reach (and throughout the Gila River). *See generally* Fuller/Upper Gila, at 4-6. The geomorphology in the Gila Box is controlled by bedrock cropping out in the bed or at the margins of the canyons. *Id.* The average width of the canyons in the Gila Box is about 500 feet, with very narrow floodplain terraces. *Id.* The stream width within the canyons varies from 100 to 500 feet. *Id.* at 4-10. The bed material is alluvial (sand and gravel), with some bedrock outcrop and control. The channel slope is moderately steep. *Id.*

The portion of the Upper Gila below the Gila Box is located within a deep alluvial valley. *See* Fuller/Upper Gila, at 4-6. The river flows in a broad valley more than a mile wide and is subject to rapid shifting of the channel and floodplain geometry in response to floods. *Id.* The stream width in this reach is about 500 feet. The bed material is alluvium (sand and gravel). *Id.* at 4-9.

For the entire Upper Gila, the State Land Department's consultant concluded that the bedrock geology made access to the river difficult, prevented development of extensive irrigation systems, and prevented development of large population centers near the river. *See* Fuller/Upper Gila, at 6.

The Middle Gila runs from Florence to the Salt River confluence. In this reach, the Commission determined that there is abundant evidence of the river being partly an underground stream, rising and sinking according to local formations. *See* ANSAC/Gila, at 51. In each of the valleys of the Middle Gila, the river is dry for a few days each year. *Id.* The river flows through a broad, flat valley and a broad, sandy channel. *Id.* The channel through at least most of this reach is braided. *Id.* at 9, 63, 68-69.

The Lower Gila starts at the Salt River confluence southwest of Phoenix and runs to the Gila River confluence near Yuma. In this reach, the river flows mostly over deep alluvium. *See* ANSAC/Gila, at 9. Except at places near Arlington and Painted Rock Dam, the river flows over a wide, unconfined floodplain. *Id.* The river's normal or low flow is greatly reduced by infiltration in these alluvial basins, and the river tends to move laterally

during high water or flood periods. *Id.* The flow of the river is braided, and it has many sandbars, sand islands, and other obstructions in the river bed. *Id.*

The Lower Gila is characterized by inherent instability and frequent and destructive channel migration.[23] The river is typical of braided streams, variable in channel configuration and dimensions. *Id.* at 7-8. The State Land Department's consultants acknowledged that the floodplain of the Lower Gila is comprised mostly of sand and salt, so the bank material can be easily mobilized by floods of significant magnitude and duration. *See* Fuller/Lower Gila, at VII-6.

In pre-statehood conditions, the Lower Gila ranged in width from 240 to 1,300 feet, with 450 feet being the most common estimate. *See* Schumm/Gila, at 8. Depths ranged from almost zero to four feet. *Id.* A federal surveyor in 1868, for example, noted that the Lower Gila "is a wide but shallow water course." *See* Fuller/Lower Gila, at IV-36. Another surveyor in 1871 reported that the river had a fall of about 20 feet per mile and that it was "not too deep to cross on a line."[24] A third surveyor in 1907 stated that the river was eighteen inches to two feet deep. *See* Littlefield/Gila, at 33.

The proponents of navigability failed to show that any segment of the Gila River is navigable. In its 2009 report, the Commission determined that the reaches that go through deep bedrock canyons between the New Mexico border and Safford and below Coolidge Dam have rapids, waterfalls, and other obstacles that prevent them from being navigable. *See* ANSAC/Gila, at 87. The reaches of the river that lie within the broad alluvial plains (particularly between Safford and Coolidge Dam, from near Florence to the Salt River confluence, and downstream from there) are generally braided and have two or more channels

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[23] *See* Schumm, *Geomorphic Character of the Gila River*, at 3 (June 2004) [Case No. 03-007-NAV, EI 6] ("Schumm/Gila").

[24] *See* Littlefield, *Assessment of the Navigability of the Gila River from Its Confluence with the Salt River to Its Mouth on the Colorado River Prior to and on the Date of Arizona's Statehood, February 14, 1912*, at 52-53 (November 3, 2005) [Case No. 03-007-NAV, EI 12] ("Littlefield/Gila").

that are interspersed with sandbars, sand islands, and other obstacles that make them non-navigable. *Id.* at 87-88.

These findings were consistent with the evidence presented to the Commission for each reach of the Gila River. In 1854, for example, John R. Bartlett of the United States Army Corps of Topographical Engineers who worked on surveying the boundary between the United States and Mexico from 1850 to 1853 and subsequently "prepared a two-volume report that was essentially a travel book," stated: "It is doubtful whether [the Gila River] can ever be navigated, except at its floods, and these are by no means regular. At such times [i.e., during irregular floods,] flat-bottomed boats might pass to the mouth of the Salinas [Salt River], near the Pima villages." *See* Fuller/Upper Gila, at 5, 3-14, and 8-4.

Another example is the testimony by Dr. Gary Huckleberry of the Arizona Geological Survey, who prepared the "Historical Geomorphology" section of the State Land Department's consultants' report on the Lower Gila:

> The Gila River is a classic example of a dryland river that seldom seeks equilibrium form. Unlike rivers in humid regions that have more stable channels adjusted for more continuous streamflow with less variance in discharge, the dryland rivers are inherently more unstable and more prone to changes in channel configuration. . . . [A] basic premise of this study is that the Gila River responds to secular climatic variability by radical changes in channel configuration, and that periods of increased, large flood frequency correlate with unstable, braided channel conditions.

Fuller/Lower Gila, at VII-10.

These conclusions that large parts of the Gila River consist of a braided channel are also supported by early anecdotal descriptions of the river. In 1899, for instance, the bed of the river was described as "sandy and shifting." *See* Fuller/Lower Gila, at IV-9. That same 1899 account stated that "[t]he channel of the (Gila) river at the buttes is composed of

quicksand and likely to change daily with any considerable amount of water in the river." *Id.* at IV-10.[25] No segment of the Gila River is navigable.

VII. No Segment of the Santa Cruz River is Navigable.

In their study of the Santa Cruz River, the State Land Department's consultants divided the river into three reaches: (1) the Upper Santa Cruz River reach from its headwaters in the San Rafael Valley to Pima County; (2) the Middle Santa Cruz River reach from the Pima County line to Marana; and (3) the Lower Santa Cruz River reach downstream of Marana to the confluence with the Gila River.[26]

Although the Commission treated the Santa Cruz River as one watercourse for administrative and hearing purposes, the Commission considered the evidence presented to it with respect to two separate segments: (1) the Upper Santa Cruz River from the Mexican border near Nogales to Marana; and (2) the Lower Santa Cruz River from Marana to the confluence with the Gila River.[27] The Commission's two-reach segmentation is similar to the Fuller/Santa Cruz report's division into three reaches, with the exception that the Commission combined the consultant's upper and middle reaches into a single upper reach. For purposes of this memorandum, the Commission's two-segment analysis will be used.

The Upper Santa Cruz River historically consisted of shallow perennial or intermittent flows, similar to present conditions. *See* Fuller/Santa Cruz, at Section 6, 4. Perennial flow existed in many places, but the river frequently went subsurface near the Pima County line. *See* Fuller/Santa Cruz, at Executive Summary, at 7. This portion of the Upper Santa Cruz

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[25] *See also, e.g.,* Fuller/Lower Gila, at IV-12 (1904: "The bed of the stream is composed of sand and gravel, free from vegetation, and shifting."); *id.* (1905: "At every flood the channel shifts."); *id.* at IV-13 (1908: "the constantly shifting channel"); *id.* at IV-14 (1910: "The bed of the stream is composed of shifting sand and silt."); *id.* (1910: "The bed of the stream is wide and composed of shifting sand.").

[26] *See* JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the Santa Cruz River: Gila River Confluence to the Headwaters*, at Final Report, 7-8 (revised January 2004) [Case No. 03-002-NAV] ("Fuller/Santa Cruz").

[27] *See* ANSAC, *Report, Findings and Determination Regarding the Navigability of the San Pedro River from the Mexican Border to the Confluence with the Gila River*, at 4-5 (October 18, 2006) ("ANSAC/Santa Cruz").

River was dry most of the year as a result of a geological change from high bedrock in Santa Cruz County to a deep alluvial system in Pima County. ANSAC/Santa Cruz, at 23-24. The Upper Santa Cruz is a well-defined, often entrenched channel in its upper reaches and an ill-defined system of braided channels in its lower reaches. *See* Fuller/Santa Cruz, at Sec. 6, 4.

In contrast to portions of the Upper Santa Cruz, the Lower Santa Cruz never supported perennial flow. *See* Fuller/Santa Cruz, at Executive Summary, 7 and at Section 6, p. 7; ANSAC/Santa Cruz, at 5. It is ephemeral, flowing only in response to "significant" precipitation events. *See* Fuller/Santa Cruz, at Executive Summary, 7; ANSAC/Santa Cruz, at 5. The Lower Santa Cruz River is a broad plain of non-continuous channels where floodwaters spread over a wide area. *See* ANSAC/Santa Cruz, at 5. Distinct channels exist on the Lower Santa Cruz only near its confluence with the Gila River. *See id.*

Whether considered as two or three segments, the proponents of navigability have not shown that any segment of the Santa Cruz River is navigable. Historically, the Santa Cruz River Valley was an important transportation route in southern Arizona. *See* Fuller/Santa Cruz, at Executive Summary, 3 and at Section 6, p. 4. Yet there is no evidence to suggest that early inhabitants used boats on the river. *See* Fuller/Santa Cruz, at Section 6, 4. This is likely due to the river being "much too shallow most of the time for small boats, even in the perennial stretches." *See* Fuller/Santa Cruz, at Executive Summary, 12. Similarly, there are no stories of boating on the Lower Santa Cruz, no records of ferry service anywhere on the river, no evidence of the river being used to transport goods, and no reports of commercial fishing. *See* Fuller/Santa Cruz, at Executive Summary, 4; ANSAC/Santa Cruz, at 24. Although there are a few reported instances of boating attempts on the Upper Santa Cruz, there are no reports of successful navigation attempts over any significant portion of the river. *See* ANSAC/Santa Cruz, at 24. The Lower Santa Cruz River was never perennial, and the perennial flow that existed on the Upper Santa Cruz historically was such that it could not be "regularly navigated." *See* Fuller/Santa Cruz, at Executive Summary, 12. Therefore, no segment of the Santa Cruz River is navigable.

VIII. No Segment of the San Pedro River is Navigable.

Similar to the other rivers, the State Land Department's consultants divided the San Pedro River into separate reaches due to the San Pedro's "somewhat distinct" hydrologic conditions: (1) the Upper San Pedro from the Mexican border to the "Narrows," a bedrock constriction located between the foothills of the Rincon Mountains and the Little Dragoon Mountains; and (2) the Lower San Pedro from the Narrows to the confluence with the Gila River.[28]

Similarly, although the Commission considered the San Pedro as "one entire watercourse" for administrative and hearing purposes, it also evaluated the two distinct reaches of the San Pedro "based on environmental, archaeological and geomorphic characteristics."[29] Like the Fuller/San Pedro report, the Commission separated the Upper and Lower San Pedro reaches at the Narrows. *See* ANSAC/San Pedro, at 5.

The Upper San Pedro is generally perennial from about Hereford to Fairbank and intermittent downstream of Fairbank. ANSAC/San Pedro, at 4. It is characterized as a small braided stream with steep banks and "coarse-grained point bars" that impede navigation and result in meandering and channel widening. *See id.*, at 4-5; Fuller/San Pedro, at 9-2. The Upper San Pedro historically had a baseflow of less than 10 cubic feet per second between vertical banks that are 130 to 260 feet wide. Fuller/San Pedro, at 9-2.

The Lower San Pedro is characterized by an entrenched, broad, braided channel with only isolated reaches of perennial flow. *See* Fuller/San Pedro, at 7-1; ANSAC/San Pedro, at 5. Like the Upper San Pedro, the Lower San Pedro channel contains point bars that "deflect the water and contribute to its sinuosity and impede navigation." *See* ANSAC/San Pedro, at 5. The Lower San Pedro contains only "isolated" reaches of perennial flow near areas of

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[28] *See* JE Fuller/Hydrology & Geomorphology, Inc., *Arizona Stream Navigability Study for the San Pedro River: Gila River Confluence to the Mexican Border*, at 7-1 (revised January 2004) [Case No. 03-004-NAV, EI 16] ("Fuller/San Pedro").

[29] *See* ANSAC, *Report, Findings and Determination Regarding the Navigability of the San Pedro River from the Mexican Border to the Confluence with the Gila River*, at 4 (October 18, 2008) ("ANSAC/San Pedro").

shallow bedrock and is generally intermittent. *See* Fuller/San Pedro, at 7-1, 7-22, 9-22; ANSAC/San Pedro, at 5.

Despite the San Pedro River being one of the most studied rivers in the Southwest, the proponents of navigability have not shown that either of the two segments of the river is navigable. *See* Fuller/San Pedro, at 9-2; ANSAC/San Pedro, at 3. There are no published accounts of boating on the San Pedro River and no reports that there was ever "enough water" to conduct any type of navigation on the river. *See* Fuller/San Pedro, at 9-2; ANSAC/San Pedro, at 23. Thus, despite San Pedro River Valley historically being a "significant" transportation route through southern Arizona, "travel was alongside the river rather than through it." *See* Fuller/San Pedro, at 9-2, ANSAC/San Pedro, at 23. For all of these reasons, no segment of the San Pedro River is navigable.

IX. Summary and Requested Action

With regard to segmentation, the Commission has done what it is required to do. Although it has generally handled each river as one watercourse for administrative and hearing purposes, it has considered the evidence introduced with respect to whether any segment/reach of the watercourse is navigable. The proponents of navigability have not submitted sufficient evidence to establish a preponderance that any segment of the Salt, Verde, Gila, Santa Cruz, or San Pedro Rivers is navigable.

DATED this 8th day of June, 2012.

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