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HAND DELIVERED

April 30, 2014

New Mexico Interstate Stream Commission
Santa Fe, New Mexico

SUBJECT: Gila River Diversion Planning—Process and Facts

Dear Mr. Chairman, Mr. Secretary, and Members of the NMISC:

Thank you for the opportunity to appear before you today at your meeting in Tucumcari to present this letter report.

INTRODUCTION

The ISC's planning and decision-making process has been flawed. This letter report describes fundamentally important facts and issues that the flawed process has not yet considered. I have had trouble getting reliable, factual information, and believe that the information available to you is inadequate to properly inform your forthcoming decision. I am very concerned after reviewing the facts that I have been able to extract from the process. Therefore, I have prepared this report to present important information that I don't think you know and to identify extremely important questions for which you should have answers.

I believe this will be the first time you have had a presentation regarding what it means for you to say yes. What outcome can be expected if the New Mexico Unit of the Central Arizona Project were to be built?

- The average net yield will be much less than half of the 14,000 acre-foot per year junior water right,
- The safe yield will be very small or perhaps zero,
- The project will be hugely expensive to build,
- Operations will be inordinately costly due to energy and exchange costs alone, and
- Existing water rates for project beneficiaries would more than double <u>and</u> $100s of millions of state funding would be required for construction.

Ultimately, if the project were to be built, the consequences would be a failed project that would produce little or no water but with major waste of money, time, and effort. A portion of the wild Gila River would be destroyed. More likely, many years, substantial human effort, and millions of dollars would be wasted on the federal decision-making process that ultimately would reach the same rational conclusion that the ISC should make before the end of 2014. More likely, the ISC would find neither the New Mexico Legislature nor the counties and communities in southwest New Mexico willing and able to pay. Because funding must be secured prior to the beginning of construction, construction would not start.

Perhaps worse, the opportunity will be gone or delayed for a decade or more to use the federal AWSA dollars that ISC has in hand to build cost-effective, functional improvements to existing infrastructure and to fund other measures that in combination would provide a sustainable water supply for the citizens and communities of southwest New Mexico.

I recommend that the ISC direct its staff to make public for review its best version of its secret model. The process should be modified to include discussion of the ISC's best calculations of expected legally available water supply, its variability, the risk that this supply will diminish in the future, and the expected net and safe yields. The process has presented none of this essential information to date.

The ISC's planning and decision-making process has been flawed. Therefore, I urge you to immediately commit to an open, transparent public process so that you can make an informed, well-considered, rational, and legitimate decision. The single most important action that the ISC should take to support the public process is to immediately make available the legally available water model, i.e., the CUFA model.

Thank you for allowing me to point out many pertinent facts that the process has ignored or hidden and to try to persuade you to make the necessary changes to the process.

THREE ESSENTIAL ELEMENTS OF A NEW WATER SUPPLY

The metaphor of a water supply being the seat of a three-legged stool is useful to organize thinking about and evaluation of the essential elements of a water supply. The three legs that support and are essential for a water supply are:

- The water rights,
- The water supply available pursuant to the water rights, and
- The infrastructure to develop and deliver usable water to its users.

Junior Water Rights. The Arizona Water Settlement Act (AWSA) of 2004 reaffirmed and further limited New Mexico's junior water rights to develop water from the Gila River. These 1968 river water rights are so junior that every bit of additional consumptive use from development of Gila River water in New Mexico must be replaced by exchange so the senior downstream users in Arizona are not harmed.

The New Mexico Consumptive Use and Forbearance Agreement (CUFA), which is an inseparable part of the AWSA, codifies with harsh terms the fact that New Mexico's proposed diversions would be the most junior on the river. Development of a reliable water supply under these exceedingly junior water rights is very difficult, very expensive, and very risky.

The process refers to these junior water rights as if they were water. The process speaks of New Mexico's obligation to not let 14,000 acre-feet per year continue to flow to Arizona. As is the very nature of junior surface water rights, the legally available water supply on average is much less than 14,000 acre-feet. If diverted, the storage losses will be excessive. Your obligation is to understand whether or not these exceedingly junior water rights are essentially worthless because they will produce only a small but exceeding expensive net yield.

<u>Limited Available Wet Water Supply.</u> Perhaps the most glaring fundamental omission of the flawed process is the total absence of any public quantification and discussion of the net yield available pursuant to the junior water rights and the absence of good reservoir sites. The single most important questions you, as decision-makers, should ask your staff and consultants are: what is the net yield? What is the safe yield? What are the risks of failure to produce that yield? How often will be the yield be zero or very small? If you and the public that you serve don't have reliable answers to these questions at the end of your process and if you don't find those answers satisfactory, you will be derelict in your duty if you say yes.

The ISC has a secret model, called the CUFA model, which calculates the Gila River daily water supply legally available for diversion by New Mexico. It applies the numerous and complex CUFA constraints on New Mexico diversions to the historical record of Gila River flows at the diversion site.

The ISC has three times since December 2013 denied my requests for a copy of its CUFA spreadsheet model.[1] However, the ISC determined I was entitled pursuant to my Inspection of Public Records Act (IPRA) request to receive the model results; that is, the model calculation results of the legally available water supply each day from October 1, 1936, to March 31, 2013. I used these data to prepare Figure 1, which shows the annual quantity of water available for diversion under the CUFA for the most recent 20 calendar years. The mean is only 8,000 acre-feet.

The process has received expert advice that future Gila River streamflow will be 8% less than the historical water supply during historical dry periods.[2] For purposes of

[1] Oral request to Craig Roepke on December 12, 2013, an Inspection of Public Records Act request made to the ISC on February 3, 2014, and an oral appeal made February 18, 2014 to Estevan Lopez to reconsider ISC's denial of the IPRA request.

[2] <u>Streamflow Projections for the Upper Gila River,</u> report prepared for the New Mexico Interstate Stream Commission, David S. Gutzler, December 10, 2013

illustration I reduced the model calculations by 8%, leaving 7,400 acre-feet per year. This amount likely overestimates future legally available supply for reasons I will explain below. If half of this legally available supply were lost to evaporation and seepage from the shallow, off-channel reservoirs that the process is contemplating, the mean annual net yield over the last 20 years would be only 3,700 acre-feet per year. Figure 1 also illustrates that the legally available water supply during a critical extended low flow period from 1999 through 2003 averages only 1,600 acre-feet per year. Similarly, diversions during the low yield 10 years starting in 1999 would be only 4,900 acre-feet per year. These low water supply amounts would yield much less due to storage losses. Even though the limits to water supply illustrated by Figure 1 are crucially important to sound decision-making, the process has pretended the annual yield is 14,000 acre-feet, graphic evidence that this process is flawed and is misleading the public and decision-makers.

I have obtained two prior versions of the ISC CUFA model spreadsheet. I compared these model results to the model results the ISC produced to me on February 18, 2014, pursuant to my IPRA request. These three sets of model results are markedly different, as illustrated in Figure 2. Further, I have found errors in the 2013 CUFA model. These marked differences between different versions of the model is a problem. The errors and the processes' false reliance on the quantity of junior water rights as a surrogate for the legally available wet water supply mean that you, the decision-makers, are misinformed. The information informing your decision should be clear and reliable, but it currently is neither.

The modified process should consider whether or not diversions will be possible during large floods because of extreme amounts of bed load, suspended sediment, large trees, and debris.[3] At flood, the Gila River water surface literally is covered with uprooted large trees, branches, and debris.

While that is a necessary step for sound and informed decision-making regarding whether or not the ISC will say yes, that step is not sufficient. Water supplies are not based on the legally available water supply. Rather, they are based on the net yield and are characterized by the safe yield, which is also called the firm yield or the minimum annual yield. The net yield and safe yield of the proposed diversion project are dependent on storage of diverted water in reservoirs. The process has proposed multiple shallow reservoirs constructed by placing earthen dams across

[3] Daily sediment concentrations and sediment loads were measured by the USGS at the Gila near Gila gage site, which is the Hooker Dam site, from July 1959 through July 1967. These data, which are available on-line, show very high sediment loads. Daily sediment loads regularly exceed 10,000 tons per day and higher, have a maximum of 130,000 tons per day, and have exceeded 1,000 tons per day on 99 dates when the secret CUFA model shows maximum New Mexico diversions from flood flows during these eight years. These high sediment loads will present very difficult and expensive diversion operations and maintenance challenges, regardless of the diversion configuration, and undoubtedly will limit diversions of flood flows.

arroyos that flow into the Gila River downstream from the diversion. The volume of the reservoirs is limited by the topography of the arroyos and the ability to convey diverted flows into the reservoirs by gravity, without pumping.

The yield of the project must consider the evaporation and seepage losses from these reservoirs. How much of the legally available water supply, after storage in these reservoirs, will remain for beneficial use? The Sandia National Laboratory model[4] can be verified and updated to include physical characteristics of the proposed reservoirs, the best available information on expected current and future reservoir evaporation rates, and the likely range of values for reservoir seepage. The Sandia model can then be operated to estimate the likely range of the average net yield and the safe yield. Sufficient time remains before your decision to do this. If the process chooses to continue to ignore this excellent tool, it should publicly justify that exclusion.

Although the process commissioned Dr. Gutzler's study and conclusions of future Gila River streamflow, the process has ignored the fact that the downstream CUFA constraints are likely to become more stringent and will further reduce the legally available supply. One example is the San Carlos Reservoir minimum annual storage of 30,000 acre feet each year before New Mexico's annual diversions can commence. The CUFA model shows this constraint has frequent effect. To what extent will extended drought worsen the impact on New Mexico of this downstream constraint? What protections does New Mexico have against San Carlos Reservoir operations being manipulated in the future to deliberately keep reservoir levels below the threshold for New Mexico's diversions? How will extended drought impact the other CUFA constraints? These questions are fundamental to the ISC's informed decision, but the flawed public process has not addressed them.

Why has the process kept the CUFA model a secret? The highly variable results from different versions of the secret model as illustrated in Figure 2 and the absence of any process discussion of the threshold feasibility questions of project yield and reliability of yield in conjunction with the information in Figure 1 suggest the flawed process is intended to avoid public knowledge or discussion of the certainty that the Gila River diversion project can yield only a fraction of the junior water right or the likelihood that the safe yield might be very small or even zero. Why are New Mexicans being subjected to the misleading hard sell? I urge you to direct the necessary changes to the current flawed process so that it is forthcoming and will publicly provide, for review, the ISC's best estimate of the water that the ISC calculates will flow to the water users. How does the ISC proposed to allocate the limited yield? The process has implied that all needs can be met with this project. The river will be kept wetter during dry periods. The irrigators will have a supplemental supply of stored water for use in dry times. Large amounts of water

[4] Modeling the Gila-San Francisco Basin using System Dynamics in Support of the 2004 Arizona Water Settlement Act, Sandia National Laboratories report SAND2012-3220, approved for public release, further dissemination unlimited, April 2012

will be available for the Silver City area and Deming. The flawed process has misinformed them. The flawed process has misinformed you.

Infrastructure. Infrastructure to divert, store, and deliver usable water is the third essential leg of a water supply. The process has created two parallel efforts to define the necessary infrastructure and estimate its costs. Bohannon-Huston, Inc. (BHI) prepared a draft Preliminary Engineering Report (draft PER) that was released by the ISC in January 2014.[5] BOR's draft evaluation will be released this spring and will be available for public comment for 30 days, prior to BOR's submittal of the final report to the ISC by July 31, 2014.[6]

The draft PER recommends the fatally flawed concept of using a tunnel and very large diameter pipeline system to convey water to reservoirs on both sides of the Gila River as its selected "Preferred Alternative." Its cost estimate is low.[7] Please refer to the attachment for a summary of my reasons for these conclusions.

Documents that I obtained in February from the ISC in response to my IPRA request show BHI engineers conclude open canals are infeasible to convey the diverted water from the diversion site to the head of the Cliff-Gila Valley. I agree. The sinuous river channel flows directly against and is repeatedly deflected off massive, steep bedrock walls on both sides of the river. Construction would require huge costs and destruction of the river and riparian corridor to blast bedrock to provide space for the gravity-flow open conveyance and placement of protective concrete walls to separate and protect the canals from damage or destruction by floods. Alternately, open channel conveyance could be accomplished by constructing three canals, including one in the center for the river in order to make room for conveyance canals on both sides of the river to reach the storage reservoirs on both sides. Both these options are infeasible.

History has rejected the main stem dam and reservoir alternative for reasons that are beyond the scope of this letter report but which are well documented in a book about the history of the New Mexico Unit of the Central Arizona Project.[8]

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[5] Preliminary Engineering Report – Gila River Diversion, Conveyance, and Storage Alternatives – Draft Final, Bohannon-Huston, January 2014

[6] "New Mexico Unit – Central Arizona Project, Questions Reclamation is Frequently Asked Regarding Technical Support for New Mexico", April 14, 2014.

[7] The January 2014 draft PER provides an obviously low-ball cost estimate of $350 million with a 20% contingency on construction costs. The "Tour Book" produced for the ISC's April 12-13, 2014, Gila River tour includes BHI's revised but still very incomplete cost estimate of $438 million for the fatally flawed tunnel and buried pipeline preferred alternative, a 25% increase.

[8] Water Politics – Continuity and Change, Helen Ingram, University of New Mexico Press, 1990

Pumped diversions are infeasible due to both the cost of the massive infrastructure required to pump 350 cfs and the fact that no pump can survive pumping the sediment that exists in the Gila River at flood flows.

There are no other alternatives for conveyance from diversion locations upstream sufficiently far to provide stored water to the Cliff-Gila valley.

Storage reservoirs are necessary because water will be legally available for diversion less than 10% of the time and will be diverted at rates that far exceed water demand. The attachment contains additional discussion of the likelihood of high losses from the proposed off-channel reservoirs.

UNIT COSTS OF ELECTRICITY AND EXCHANGE ALONE EXCEED DEMING DRINKING WATER RATES

To date, the flawed process has omitted any discussion of the energy cost of pumping water from the Gila River over the continental divide, an elevation difference of about 1,700 feet. I calculated the electric energy cost for pumping to be about $890 per acre-foot.[9] This energy cost plus the exchange cost of $146 per acre-foot for delivery of Central Arizona Project water to the senior water right owners downstream totals about $1,035 per acre-foot of raw water pumped to the continental divide, or $3.19 per 1000 gallons. This cost does not include any of the capital costs of project construction or any of the other operations and maintenance costs, which radically increase the additional amount that you will expect Deming and Silver City rate payers to pay, yet won't produce any drinking water.

Compare this energy and exchange cost to Deming's 2010 residential water rate of $1.98 per 1000 gallons of drinking water. Residential water rates for all the communities in the region as published in the most recent statistical abstract of the Southwest New Mexico Council of Governments average $4.13 per 1000 gallons.[10] I recommend the ISC identify, as part of its revised public process, whom it expects to pay these large costs for a raw water supply that won't be used anywhere as a drinking water supply. The process should provide publicly, in advance of the ISC's decision, a calculation of all the project costs, expressed in units of dollars per thousand gallons. The process should compare the costs and benefits against the equivalent unit costs of non-diversion alternatives. This comparison should be publicly accessible, not buried in dense technical reports.

[9] My assumptions for this calculation are 1,700 feet of vertical lift, 4 pump stations in series, electric motors with 92% efficiency, pumps with 80% efficiency, friction losses equal to half of the static head, and electrical costs at $0.10 per kWh.

[10] Statistical Abstract—Selected Tables, Southwest New Mexico Council of Governments, June 2011, page 17. This table contains nine communities' residential water costs for 6,000 gallons.

PURSUING THE GILA RIVER DIVERSION WILL FORECLOSE FUNDING FOR FUNCTIONAL AND EFFECTIVE NON-DIVERSION ALTERNATIVES THAT ARE NEEDED NOW

I have familiarized myself with the Grant County Regional Water Supply Project, a non-diversion water supply project that will provide a safe, sustainable drinking water supply to 26,000 people in Silver City, Santa Clara, Bayard, Hurley, and the adjacent colonias at an estimated cost of $18 million. Even at twice the price, this project could be fully funded from the federal money provided to New Mexico under the AWSA. The advantages include that it could be built now, that it would continue to provide affordable drinking water rather than provide a hugely expensive and unreliable raw water supply, and would meet immediate needs for safe drinking water in the mining district for New Mexicans that have a poor water supply or are currently under notice that in the future they will have none. It is my professional opinion that it would be irresponsible for the ISC to decide to not fund this project forthwith. Please inform the public of your position on this matter and the reasons therefore.

CLOSING

The ISC's decision-making process will be informed by additional reports (such as BOR report and other information). As part of this process, I request an opportunity to speak to you at your August 2014 open public meeting after these reports are available. I also hope to review the missing diversion project yield information that is essential to your informed decision and that I urge you to direct your staff to produce. Finally, I will provide my expert opinion and recommendations, at no public cost, regarding the functionality of the entire set of non-diversion alternatives.

Regardless, you must direct your staff to release the model and all assumptions and to provide you and the public with their calculations of expected net yield and safe yield.

Respectfully and professionally yours,

/s/

Norman Gaume, P.E. (ret)

Acknowledgements. I would like to thank Peter Coha and Jim Brainard for helping me analyze data, prepare graphics, verify calculations, and review the functionality of the Sandia National Laboratories dynamic simulation model. I also acknowledge and thank the New Mexico Wildlife Federation for providing financial support for my work regarding the proposed Gila River diversion starting April 2, 2014. All of my prior work on this matter was pro bono.

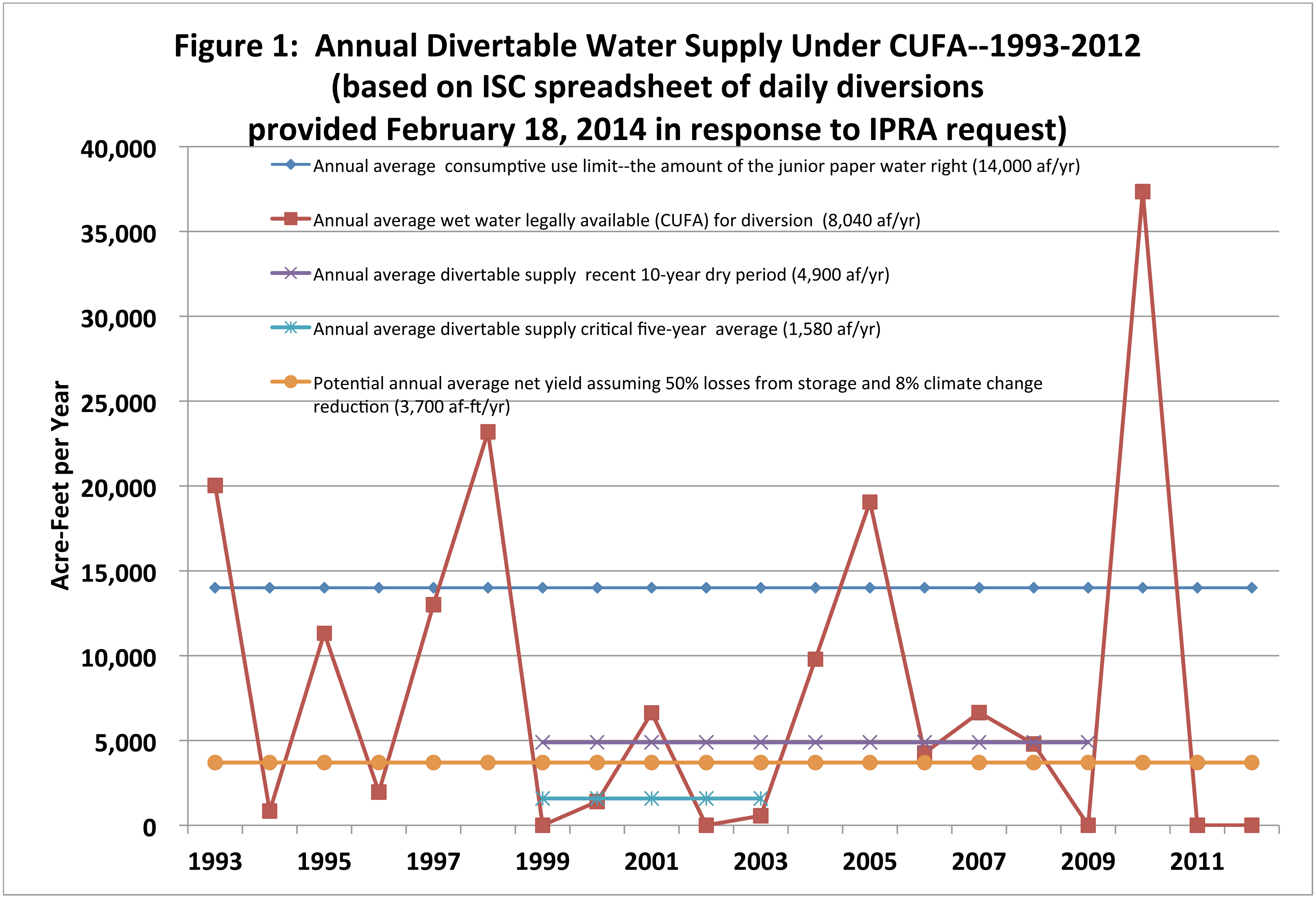
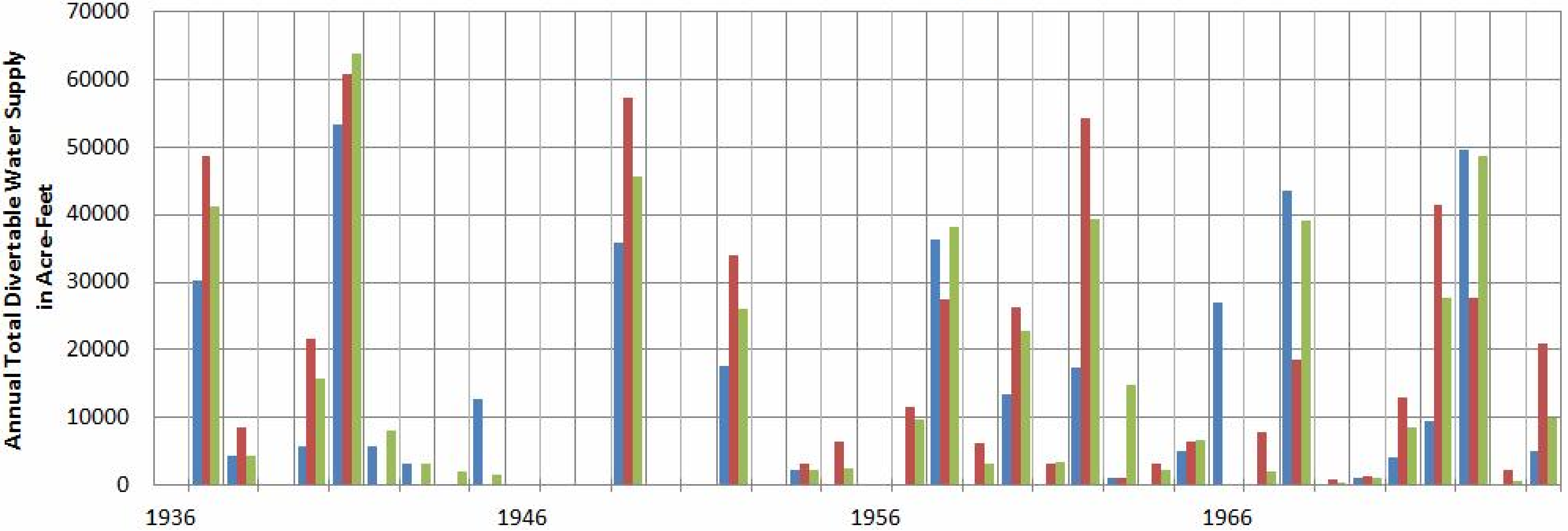
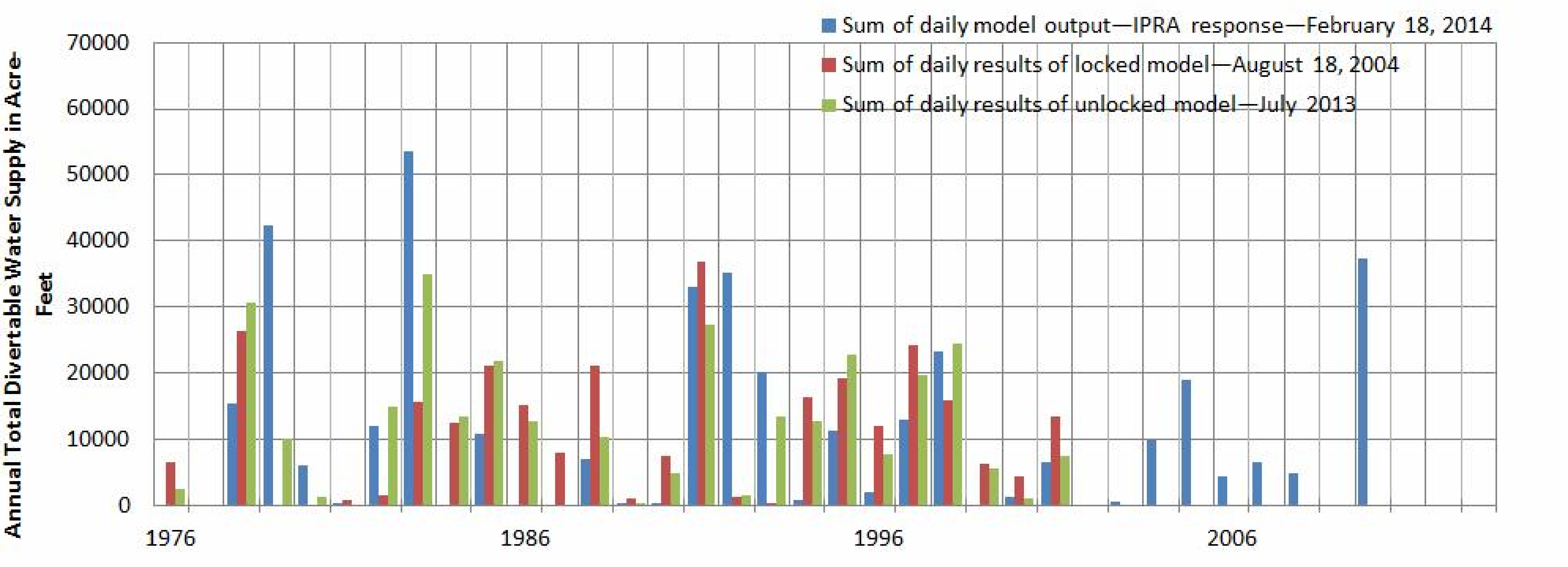


Figure 1: Annual Divertable Water Supply Under CUFA--1993-2012
(based on ISC spreadsheet of daily diversions
provided February 18, 2014 in response to IPRA request)
Annual average consumptive use limit--the amount of the junior paper water right (14,000 af/yr)
Annual average wet water legally available (CUFA) for diversion (8,040 af/yr)
Annual average divertable supply recent 10-year dry period (4,900 af/yr)
Annual average divertable supply critical five-year average (1,580 af/yr)
Potential annual average net yield assuming 50% losses from storage and 8% climate change reduction (3,700 af-ft/yr)
Acre-Feet per Year
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011

Figure 2: Conflicting ISC Information Regarding Gila River Annual Divertable Water Supply 1936 through 2012





ATTACHMENT TO APRIL 30, 2014 LETTER REPORT

REASONS THE BOHANNON-HUSTON DRAFT FINAL PRELIMINARY ENGINEERING REPORT'S PREFERRED ALTERNATIVE IS FATALLY FLAWED AND THE COST ESTIMATE IS AN INDEFENSIBLE LOW-BALL

The draft PER preferred alternative relies on gravity diversion and conveyance via pressure flow in a closed tunnel and pipeline system with a small difference in elevation between the diversion site and the reservoirs (little maximum available head). All upstream and downstream ends of the pipeline and tunnel system are higher than the buried sections in the Cliff-Gila valley and especially those that are routed under the river to reach arroyo storage reservoirs on the north side of the river. The closed pipelines are huge in order to convey the maximum diversion rate of 350 cfs of water. If they were smaller, friction losses would not allow diversion at 350 cfs, and the project yield would suffer. The pipeline system will always be full of water and the velocity of the water will almost always be zero or too low to keep sediment in suspension. It's a water engineering principle that once sediment settles, it is very difficult to resuspend. If sediment enters the gravity-flow, pressurized pipeline system, it will plug it.

The draft PER concept illustrates a diversion dam incorporating an unprotected, fragile screen. The dam is dramatically hydraulically and structurally inadequate. The screen is wildly inappropriate for its designed application in the main channel of the Gila River. Neither will survive the first large flood. As noted in my February 13 testimony to the Senate Conservation Commission, the only question in my mind is whether the river would destroy the diversion structure and its fragile screen before the river buried the structure in sediment and cobbles or would bury it first. Actually, if the diversion dam were built as it was illustrated in the draft PER, the river would probably first bypass the dam, leaving it high and dry until a big flood occurred.

The inadequate dam is not a fatal flaw; a properly designed one would divert water but would cost 20 or 30 times more. However, the screen concept is fatally flawed. Even if it could be made to survive erosion and destruction by coarse suspended sediment, bed load cobbles and boulders, and huge trees with large branches and root balls moving at high velocity, which I think is impossible; the screen has a practical minimum spacing of 0.5 millimeters. Most of the particles comprising the sediment mass have a grain size of less than 0.5 millimeters. All but the coarse sand and gravel and larger particles will flow with the water through the screen and into the closed pipeline system. The medium and fine sand will settle at the upper end of the pipeline system. Almost all particles, except the very finest colloidal particles, including the silt and ash and much of the clay, will settle under the prevailing perfectly quiescent conditions and will plug the large diameter tunnel and pipeline system. The sediment will be essentially impossible to remove.

It's impossible using gravity as the only energy source to remove sediment prior to conveyance and convey the diverted water to storage in a pressurized buried pipeline with the limited difference in elevation that exists between the diversion site and the planned full off-channel reservoirs downstream.

The BHI cost estimate clearly does not capture very significant elements of this project's cost, even though it has increased by 25% from January to April (see letter report for additional discussion). The capital cost has obvious omissions of costly components such as an adequate diversion dam that would survive the highly energetic and destructive Gila River at flood stage, instrument and control systems, the owner's share of the electric utility's construction of adequate electric energy transmission lines and substations for the pump stations, pressure relief stations for the Deming pipeline, capital facilities required to make beneficial use of the raw water pumped over the continental divide other than those uses provided by constructing the recreational reservoir, adjacent to Silver City, with no uses of the water other than the in situ reservoir uses, and interest during construction. The contingency amount at this stage of extremely limited detail, and with these omissions, should be 50% to 100%.

The draft PER total annual operations and maintenance (O&M) cost estimate is based on a total O&M workforce consisting of one quarter-time employee within a total O&M budget of $338,250.[1] Both the labor estimate and the total annual O&M budget estimate are absurdly low. The O&M cost estimate omits the exchange cost, currently at $146 per acre-foot, which of course must also be paid on each acre-foot of water that is evaporated from the off-channel reservoirs.

The draft PER total annual O&M cost estimate is less than 4% of my estimate of the annual electricity cost to pump the 10,000 acre-feet per year from the arroyo storage reservoirs adjacent to the Gila River the 1,700 vertical feet or so to the continental divide.[2] Perhaps the most useful illustration of likely O&M costs is the fact that energy costs plus the exchange cost of the proposed project's water is over $1,000 per acre-foot. For the layperson that might question the huge energy cost, note that one acre-foot of water weighs over 1300 tons. Lifting 1,300 tons 1,700 vertical feet requires 4.6 billion foot-pounds of work plus the work required to overcome friction and other losses.

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[1] Draft PER, Appendix G, page 17, Alternative 2b

[2] The draft PER on page 41 indicates the cost estimate is based on exporting 10,000 acre-feet per year from the Gila River over the continental divide, 1,700 feet of vertical lift. This would require more than 2,600 horsepower continuously before adjusting for machine efficiency and pipeline friction losses. The draft PER assumes 4 pump stations in series. Assuming electric motors with 92% efficiency, pumps with 80% efficiency, friction losses equal to half of the static head, and electrical costs at $0.10 per kWh, the annual electric energy bill would be about $8.9 million, or about $890 per acre-foot. The current exchange rate applicable to the New Mexico Unit is $146 per acre-foot. The electricity bill and the water exchange alone would cost over $10 million per year.

An additional likely infeasible feature of the Gila River Diversion infrastructure is the storage of diverted flows in off-channel reservoirs constructed adjacent to the Gila River. Most of the water would be lost to evaporation and infiltration because the proposed storage reservoirs are located in the sandy bottoms of multiple arroyos. These arroyos run through coarse, unconsolidated sand and gravel hills next to the river. The draft PER indicates that evaporation from Winn, Pope, Sycamore, and Dix reservoirs would be 6,140 acre feet of year, based on their surface area when full and on an annual evaporation rate from a 1972 report that the process has chosen to use, of 60 inches per year. The evaporation rate is not at all conservative and likely underestimates both current and future evaporation rates. The annual volume of evaporation should be based on a simulation of the reservoirs surface area with the Sandia National Laboratories dynamic simulation model, or another appropriate simulation tool.

The draft PER includes a geological and geotechnical report prepared, signed and stamped by a professional geotechnical engineer. This report is contained in Appendix B of the draft PER. The geological and geotechnical report says on the second page of the executive summary with respect to the reservoir sites:

> "The second biggest concern is the very granular (non-cohesive) characteristics of the Gila Conglomerate….
>
> > *There is a distinct lack of clayey fines in this formation that is shared by all the Gila River valley sites. This translates as a moderate to high potential for infiltration that should apply a greater criteria weight than evaporation rate; for concerns of slope stability including landslides; and for lack of available material for the clay core." (Emphasis in the original)*

The draft PER says, " seepage losses will need to be evaluated during future geotechnical investigations by means of a comprehensive program of in-situ permeability (well infiltration) tests."[3] There is no discussion within the draft PER of the potential for reservoir evaporation and seepage losses to be of a magnitude to render the arroyo-bottom reservoirs infeasible or capable of producing a net yield that is greater than a small fraction of the legally available water supply, despite the language quoted above, which I interpret as a strong, professional warning from the geotechnical engineer that seepage losses from the reservoirs could be very significant. I have visited the proposed arroyo bottom reservoir sites and it is my opinion that will prove to be the case.

[3] Draft PER, page 34.