SUPPLEMENTAL TESTIMONY OF DR. DAMON CLARKE,

CHAIRMAN, HUALAPAI TRIBE

BEFORE THE SUBCOMMITTEE ON WATER, OCEANS AND WILDLIFE

OF THE HOUSE COMMITTEE ON NATURAL RESOURCES

IN SUPPORT OF H.R. 2459

THE HUALAPAI TRIBE WATER RIGHTS SETTLEMENT ACT OF 2019

JULY 3, 2019

Chairman Huffman and members of the Subcommittee, my name is Dr. Damon Clarke, Chairman of the Hualapai Tribe. I would like to supplement my testimony regarding H.R. 2459, the Hualapai Tribe Water Rights Settlement Act of 2019, which I presented at the Subcommittee's hearing on June 26, 2019. This supplemental testimony is primarily in response to several objections to the legislation set forth in the written and oral testimony of Alan Mikkelsen, Senior Adviser to the Secretary of Interior and Chair of the Department's Working Group on Indian Water Settlements.

The Hualapai Tribe remains disappointed that the Department of Interior continues to withhold its support for a water rights settlement that has the strong support not just of the Tribe, but also of all of the major State and local stakeholders—the Governor of Arizona, the Arizona Department of Water Resources, the Central Arizona Water Conservation District, the Salt River Project and Freeport Minerals Corp. Each of those stakeholders has testified or submitted a statement for the record in support of H.R. 2459. The settlement also has the strong support of Mohave County, the local jurisdiction in which most of the Reservation is located.

Disputes between Indian tribes and non-Indians over rights to the Colorado River are particularly contentious and divisive matters in Arizona. When, as here, the Hualapai Tribe and

the State parties have worked hard over a period of eight years to resolve one of those disputes and to craft a compromise that will strengthen both the Tribe and the non-Indian stakeholders, the Department should respect that effort by giving its support to that settlement.

For the reasons set forth below, I believe that the criticisms of the settlement legislation set forth in Mr. Mikkelsen's testimony are misguided:

1. The Department's call for additional groundwater studies on the Reservation.

Mr. Mikkelsen said in response to a question from Chairman Huffman that the Department is unable to support the settlement until the Department completes additional studies of the groundwater on the Reservation.

Mr. Mikkelsen's statement is, for the Tribe, particularly frustrating because the Department's position has already led to years of unnecessary delay in moving this settlement forward, and could lead to years more of delay. The groundwater on the Hualapai Reservation has been studied for decades, and none of the many prior studies has shown that there is a supply of groundwater sufficient to meet the long-term domestic and municipal needs of the Hualapai Tribe. Nor have any of the prior studies shown that the groundwater is sufficient to permit the Tribe to realize the significant opportunities for economic development that exist on the Reservation, but which the Tribe cannot pursue because of the lack of water.

We attach a summary of past Reservation groundwater studies that has been compiled by Natural Resources Consulting Engineers (NRCE), the Tribe's expert hydrologist. The summary is divided into two categories: studies done of the "Deep Regional Aquifer" that extends under most of the Reservation, including the Grand Canyon West area, and studies done of the "Alluvial-Volcanic Aquifers" that include the Truxton aquifer which serves Peach Springs.

The NRCE summary references seven studies of the Deep Aquifer, done in 1962, 1977, 1987, 1992, 1999, 2005 and 2013. These studies were done by, among others, the United States Geological Survey (USGS), the Bureau of Land Management (BLM), the Bureau of Indian Affairs (BIA), the Bureau of Reclamation (BOR), NRCE and DOWL-HKM. None of these studies has shown that there is a significant, accessible source of groundwater. The only well that has been successfully completed in the area near Grand Canyon West (GCW-1) suffers from both low water quality and low yield. It is currently not used for this reason.

Even more studies—nine in all—over an even longer period of time, have been done of the alluvial aquifer. The NRCE summary lists studies of this aquifer that were done in 1942, 1973, 1975, 1987, 1991, 1992, 2007, 2009 and 2011, by USGS, the Indian Health Service, BOR and the Tribe. Again, none of these studies suggests that the alluvial aquifer can serve as the source of water for the Tribe's long-term needs.

The Tribe's experience with regard to the Department's most recent groundwater study of the Truxton aquifer is a good illustration of why the Department's insistence on additional groundwater studies just serves as an excuse for further delay.

In February 2015, four years after the Tribe and the State parties began negotiating this settlement with the active participation of a Federal team, the Department—for the first time—told the Tribe that it wanted to conduct new groundwater studies on the Reservation. The Department said that it first would commission the USGS to again study the Truxton aquifer, which underlies part of the Reservation near Peach Springs. The Department said that the study would be completed in six months.

The Tribe received the results of that study in January 2017—almost two years later. And the USGS report was, in the opinion of our hydrogeological experts, so flawed as to be

neither credible nor useful because it grossly overstated the amount of groundwater-in-storage in the Truxton aquifer. We promptly provided the Department with our experts' comments on the study and almost a year later, in December 2018, USGS issued its revised report which, although modified, continued to significantly overstate the amount of groundwater in the aquifer.

But there was one point of agreement between our experts and the USGS experts—that there is only minimal recharge of the Truxton aquifer. The USGS report estimates the recharge at about 295 acre-ft per year, which is substantially below the Tribe's annual water needs. So reliance on the Truxton aquifer as its long-term water supply would put the Tribe in the position of mining an ever-depleting amount of groundwater—a practice which is, by definition, unsustainable. And as I said in my opening testimony, our experts estimate that the groundwater in the Truxton aquifer would be sufficient to serve the Tribe's needs only for a period of about 30-40 years. In the words of our experts, "This does not represent a permanent water supply solution." This groundwater source is plainly not the answer to the Tribe's long-term water needs.

And in any event, even if the groundwater supply was adequate, it would still not address the Department's principal objection to the legislation, which is cost. NRCE has advised the Tribe and the Department that the construction costs of an infrastructure project to produce and deliver 3,400 acre-feet-a-year of groundwater on the Reservation would <u>not</u> be appreciably lower than the cost of the infrastructure project authorized by H.R. 2459 to deliver water from the Colorado River. Thus, little money would be saved by a project to produce and deliver groundwater instead of Colorado River water, even if sufficient groundwater was available.

Nonetheless, in his testimony, Mr. Mikkelsen informed that Subcommittee that the Department is conducting additional groundwater studies on the Reservation. Although he stated

that "preliminary" results of one study may soon be ready to share with the Tribe, we do not know when final results of that study will be done, nor do we know how long it will take the Department to complete any other studies it may wish to conduct in the future. From our experience with the Department on this matter, the time required may well be measured in years.

This delay is unfair, unjustified and unacceptable. It is unfair to the Tribe and the State parties, who have worked diligently and cooperatively for years to resolve the Tribe's claims to the Colorado River, and whose work is being undermined by the Department's call for years of additional groundwater studies. It is unjustified because multiple studies of groundwater on the Reservation have already been done, most of them by the Department itself, and none of the prior studies suggest that there is adequate groundwater to satisfy the Tribe's long-term needs. And it is unacceptable because the lack of water on the Reservation is causing tribal members to suffer ongoing hardship, as I previously explained in my opening testimony.

2. The Department's position re off-Reservation groundwater pumping.

Mr. Mikkelsen testified that the Department opposes a provision in the settlement agreement in which the Tribe waives its right to object to off-Reservation groundwater pumping. Testimony at 5.

This concern ignores the reciprocal provisions of the settlement agreement that give the Tribe the exclusive right to use all groundwater on the Reservation, and that prohibit any off-Reservation groundwater user from objecting to tribal use of groundwater on the Reservation. This concern also ignores context: the Tribe's agreement to forego our right to object to off-Reservation pumping is reasonable because the point of the settlement is to provide the Tribe with sufficient water from the Colorado River to meet our future domestic, commercial and

municipal needs, so that we will not have to be solely reliant on groundwater in the future, as we are at present.

To the extent the Department is saying that the settlement should have included an off-Reservation groundwater protection zone, it knows full well that the State parties advised the Tribe that any such protection zone would require changes to State law that would be impossible to enact. Thus, insisting on such a protection zone simply would have led to a failure of the settlement process.

To the extent the Department is now saying that the Tribe should have retained its right to litigate against off-Reservation groundwater users in order to protect the Tribe's on-Reservation groundwater, then the Department is just encouraging the ongoing potential for litigation and conflict between the Tribe and its neighbors. This undermines the whole purpose of a water rights settlement, which is to foster resolution of disputes, finality, certainty and harmony instead of the ongoing conflict, risk and expense that is the inevitable product of litigation (or even of the threat of litigation). The Department's position on this is neither practical nor wise.

3. The "scope, size and phasing" of the project.

Mr. Mikkelsen's testimony states that the Department is "concerned about the scope, size and phasing of the project given current and projected water uses on the Reservation." Testimony at 5. He further states that project facilities "may not be used for 40-50 years." *Id.*

I can assure the Subcommittee that the Project was designed to deliver the amount of water that is necessary to satisfy the Tribe's water needs in the foreseeable future for an economically self-sufficient homeland. This is the standard established by the Arizona Supreme Court for quantifying tribal reserved water rights. *See In re General Adjudication of All Rights to Use Water in the Gila River System and Source,* 35 P.2d 68 (Ariz. 2011) (*Gila V*).

A settlement of the Tribe's water rights claims cannot be based only on satisfying the Tribe's water needs today. A settlement is forever, in the important sense that the Tribe is settling and waiving our legal claims—forever. For that reason, the benefits that the Tribe receives in return for settling our claims must be sufficient to address the Tribe's water needs, if not forever, then at least into the reasonably foreseeable future.

The infrastructure project authorized in this legislation to deliver that water to the Reservation is designed to be at a size and scope to provide water security to the Tribe into the future, and to stimulate and expand our on-Reservation economy. We have an immediate need for water to serve our residential population in Peach Springs, because as I previously testified, our well levels in the Truxton aquifer are declining. That need will grow in the future as our population expands. We have an immediate need for water at Grand Canyon West in order to expand our facilities there and to take advantage of the opportunities for further economic development that will bring more jobs and revenues to the Reservation. That need also will grow in the future as our economy expands. We have an immediate need to develop a residential community at Grand Canyon West so that tribal employees there can live near their jobs, and avoid the daily four-hour round-trip commutes that impose such a hardship on our employees and their families. That need too will grow in the future as our on-Reservation economy and population both grow.

The size and scope of the project supported by this legislation are based upon expert projections of future population growth on the Reservation over a 100-year period (the same period that State law requires non-Indian communities in Arizona to use in permitting new residential areas). The Tribe's calculation of needs also takes account of all future needs on the Reservation, municipal, domestic, and commercial.

Surely the Department is not saying that the "scope and size" of the infrastructure project should be designed only to satisfy the Tribe's current needs, as important as those needs are, without any capacity for meeting our needs into the future. If we settle and waive our claims now in exchange for a project that is smaller in "scope and size," we can hardly expect to return to the Department and to the Congress in 25 years to seek funding for the larger project we will need then. This settlement is our one-time opportunity to provide security for our water needs into the foreseeable future. It's "scope and size" need to be sufficient to meet that task.

Let me make two other points in this regard. First, it is my understanding that municipal and regional water projects are regularly built with significant initial over-capacity, precisely in order to have the size and scope to serve the growing needs of the project well into the future. Indeed, I have been told that the Central Arizona Project was built with substantial over-capacity which, many decades later, has still not been fully utilized. The proposed infrastructure project here is no different. Second, it is my understanding that building a smaller capacity pipeline project does not result in significant cost savings, since the major capital costs are in laying the pipeline, not in the size of the pipe itself. So the Department's objections about the "scope and size" of the project are not likely to lead to a significant reduction of costs in any event.

4. <u>The threat of cost overruns for the infrastructure project</u>.

The legislation authorizes funding of $134.5 million for construction of an infrastructure project to deliver water from the Colorado River to the Reservation, and an additional $39 to fund OM&R and training costs related to that project.

Mr. Mikkelsen's written testimony raises "questions about the accuracy of the cost estimates" for the infrastructure project, and he further states that "the cost to construct the project will greatly exceed the costs currently contemplated in H.R. 2459." Testimony at 5.

Indeed, in response to a question from Rep. McClintock, Mr. Mikkelsen stated that the Bureau of Reclamation has estimated that the cost of the project "could be as high at $350 million."

The cost of the project set forth in the legislation is based on a thorough, two-year study conducted by one of the Nation's preeminent engineering firms, DOWL, of Tucson, Arizona. The DOWL study, which itself cost $1.5 million, included significant field investigations and was conducted at above the appraisal-level standard commonly used in Indian water settlements. Further, DOWL designed and completed its study in consultation with the Bureau of Reclamation, and based its cost estimates on BOR cost-estimating methods. Another nationally recognized water resources specialty contractor, ASI Contractors, independently developed cost estimates for the project which were used by DOWL as a check on its own estimates. The final 235-page DOWL report was supported by five volumes of appendices consisting of an additional 442 pages of tables, charts and drawings. All of this material has, of course, been provided to the Department.

By contrast, Mr. Mikkelsen's testimony to the Subcommittee is apparently based on a BOR cost estimate, dated February 2, 2018. That estimate, as it was provided to the Tribe, is presented in a two-and-a-half-page memo, with no supporting documentation, and is described as at "a preliminary cost estimate level which does not meet the criteria for appraisal or feasibility cost estimates." Indeed, the BOR memo states that it's cost estimate "correlates" with the Association of Advancement of Cost Engineering (AACE) "Class 5" or "ballpark" estimate. AACE standards describe a "Class 5" estimate as one "based on very limited information" and prepared "within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare." AACE lists "alternative names" for this type of estimate as "blue sky," "seat-of-pants" and "guesstimate." AACE, "Cost Estimate Classification

System," Practice No. 18R-97 (2005). We have asked the Department to provide the Tribe with additional information to explain, document or support the BOR cost estimate, and to allow the Tribe's experts to engage with the BOR estimators on the issue, but those requests have not been granted.

Without specific information about which costs the Department believes DOWL has underestimated, by how much, and why, it is simply impossible for the Tribe (or for DOWL) to compare DOWL's thorough and extensively documented "appraisal-plus" estimate with BOR's skimpy "guesstimate." We do not think it is fair or responsible for the Department to continue to criticize the DOWL cost estimate without substantiating its criticisms, without providing specific information to the Tribe, and without allowing us the opportunity to address the merits of the specific cost estimates that concern BOR. Nor do we think it is fair or responsible for the Department to continue to use an unsubstantiated "guesstimate" to taint the much more thorough DOWL study, or to raise the unwarranted specter that there will be, in the words of Rep. McClintock, "huge cost overruns" associated with this project.

5. The non-federal cost share.

Mr. Mikkelsen criticizes H.R. 2459 because, he says, the State contribution in this case "is not commensurate with the benefit to the State of Arizona for a final settlement of all Hualapai water claims." Testimony at 5.

As pointed out by Rep. Gosar at the hearing, the Department's position on this point is contrary to law. In 2014, the Tribe, the United States and Freeport Minerals Co. entered into a settlement agreement to resolve their mutual water rights in the Bill Williams Basin, where the Tribe has a small reservation parcel. As part of that "phase 1" settlement, and in anticipation of this comprehensive "phase 2" settlement, Freeport made a $10 million contribution to a Tribal

economic development fund which was specifically earmarked to be used by the Tribe to acquire Colorado River water rights and otherwise to increase the security of the Tribe's water rights. The 2014 Bill Williams Settlement Act, Pub. L. 113-223, which ratified that settlement, specifically provided that this Freeport contribution "shall be considered to be a non-Federal contribution that counts toward any non-Federal contribution associated with a settlement of the claims of the Tribe for rights to Colorado River water." Sec. 5(d)(1)(B) (emphasis added).

Mr. Mikkelsen's stated at the hearing that the Department "does not believe that the contribution of a private corporation is the same as a contribution by the State." This "belief," however, is foreclosed by the law, which requires the Department to "count" the Freeport contribution in the Bill Williams settlement as a non-Federal cost-share to this settlement of the Tribe's Colorado River water rights.

And when the Freeport contribution is properly counted, the Department's complaint about an inadequate non-federal cost-share becomes frivolous. This $10 million Freeport contribution to the Hualapai settlement is, by itself, larger than the $8 million contribution by the State of Utah that is part of H.R. 644, the Navajo Utah settlement, which the Department supports. The Department does not object to the fact that the non-federal contribution to the Navajo Utah settlement is smaller than the non-federal contribution to the Hualapai settlement, even though the amount of federal funding in H.R. 644 is greater than the amount of federal funding in the Hualapai settlement bill.

There is in the Hualapai settlement, in addition, a $1 million contribution that Freeport made to substantially fund the costs of the DOWL infrastructure study for this settlement. And as Mr. Mikkelsen does recognize, there is a contribution by the State of Arizona, valued at $3.25 million, to "firm" a portion of the CAP water that the Tribe will receive in the settlement. And

finally, the Tribe itself has committed to pay for construction of the electric transmission line to supply power to the infrastructure project, a contribution to the cost of the settlement that is estimated to be $40 million.

Altogether, the non-federal parties to the Hualapai settlement collectively contribute approximately $55 million to the settlement, which is over 30 percent of the size of the federal cost. This is more than six times greater in absolute terms than the non-federal cost share in the Navajo Utah settlement (approximately $55 million v. $8 million), and more than seven times greater relative to the federal cost of each settlement (approximately 30 percent v. 4 percent). Yet the Department supports the Navajo Utah settlement while complaining that the much larger non-federal contribution to the Hualapai settlement is not "commensurate" with the federal benefits provided.

The Department's differential treatment of the non-federal cost share in these two settlements is stark, unexplained, unfair and also, at least in significant part, contrary to law.

6. The NPCA statement.

Finally, I want to respond briefly to a letter dated June 25, 2019 submitted to Committee members by the National Parks Conservation Association (NPCA). NPCA objects to the settlement principally because, in its view, "the authorized pipeline construction skirts full NEPA compliance by not considering the project as a major federal action."

This objection is based on a misreading of the legislation. Section 4(c)(1) requires the Secretary to "carry out all Federal compliance activities necessary to implement the Hualapai Tribe water right settlement agreement … including activities necessary to comply with all applicable provisions of [NEPA]." (emphasis added). Thus, all aspects of the implementation of

the settlement, certainly including the construction of the pipeline project, are expressly subject to "all applicable provisions" of NEPA.

NPCA's error is apparently based on its misunderstanding of section 4(c)(2) of the bill, which states that the Secretary's "execution" of the settlement agreement does not constitute a "major federal action." But this standard language in Indian water rights settlements applies only to the action of executing—signing—the settlement agreement, not to implementing the agreement, *i.e.,* building the pipeline that is part of the settlement. The implementation of the settlement, as noted above, is subject to full NEPA review.

The language in H.R. 2459 regarding "execution" of the settlement is identical to language in the Navajo Utah settlement, *see* H.R. 644, sec. 4(c)(2). And indeed, the same provision is standard language in past Arizona water rights settlements. *E.g.* sec. 203(c)(2), Gila River Indian Community Water Rights Settlement Act of 2004, P.L. 108-451, 118 Stat. 3500 (108th Cong.), ("Execution of the Gila River agreement by the Secretary under this section shall not constitute a major Federal action under the National Environmental Policy Act (42 U.S.C. 4321 et. seq.)"); sec. 309(h)(3)(B), Southern Arizona Water Rights Settlement Act of 2004, P.L. 108-451, 118 Stat. 3500 (108th Cong.) ("Execution of an agreement described in paragraph (2) by the Secretary under this section shall not constitute a major Federal action under the National Environmental Policy Act (42 U.S.C. 4321 et seq.)"). Accordingly, the NEPA language in H.R. 2459 has long been accepted as appropriate for water rights settlements and ensures that for this settlement, as for past settlements, there will be full environmental compliance for the proposed pipeline project.

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I would like to invite the members of the Subcommittee to come to the Hualapai Reservation so you can see for yourself the conditions on our Reservation, the water problems that we are dealing with every day, and the need we have for a reliable, long-term source of water for our people and for our future.

I appreciate the opportunity to submit this supplemental testimony to the Committee.

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3927 Martin Luther King Jr. Way
Oakland, CA 94609
Phone: (510) 547-0750, Fax: (510) 547-0793

MEMORANDUM

Date: December 4, 2015

To: Hualapai Project Files

From: NRCE, Inc.

Cc:

RE: Previous Groundwater Studies

This memorandum presents a list and brief description of previous groundwater studies on the Hualapai Reservation. The list of studies is separated between the deep regional aquifer and the alluvial-volcanic aquifers.

Deep Regional Aquifer

Description: The deep regional aquifer on the Hualapai Reservation includes the Redwall-Muav Aquifer (R-Aquifer) and the Tapeats Sandstone lying at the bottom of the Paleozoic section in contact with crystalline basement rocks.

- Representative well yields from the R-Aquifer range from 5 to 40 gallons per minute, with 150 gallons per minute the highest reported in the region (Twenter, 1962; Myers, 1987; and others).
- There is some evidence indicating that faults, fractures, and folds may enhance aquifer properties that can localize potential for larger well yields; however targeting these features using surface geophysics is speculative and drilling costs are very high.
- The USGS conducted a hydrogeological study of the Reservation between 1957 and 1962 (Twenter, 1962). The R-Aquifer was identified as the most promising aquifer, but drilling depths were prohibitive.
- Several wells were drilled to various depths (mostly shallow) in the late '60's and '70's by the BLM and the BIA loosely based on Twenter's recommendations but most were unsuccessful (Huntoon, 1977).
- Several deeper wells were completed on the Hualapai Plateau in 1992 by the Bureau of Reclamation. One well drilled near the GCW resort in 1992 targeted the deep regional R-Aquifer. The well was deepened in 1999 (Watt, 2000). That well (GCW-1) encountered groundwater only in the Tapeats Sandstone. The

EXHIBIT A

shallower Redwall and Muav Formations were unsaturated. The well is equipped with an oilfield-type pumping unit but is currently unused due to low water quality and low yield (15-26 gpm).

- NRCE was contracted in 2005 to investigate and evaluate all possible water supply options for the resort. The preferred alternative recommended diversion from the Colorado River. Groundwater development options were judged to be infeasible for a variety of reasons, but primarily because of their inability to supply the sustainable yield required by the Grand Canyon West resort at a reasonable overall project cost.
- DOWL (2013) further assessed a few Colorado River alternatives considered in the NRCE study. Groundwater development alternatives were judged to be infeasible in this study for the same reasons as the 2005 study by NRCE.

Alluvial-Volcanic Aquifers

Description: The main alluvial-volcanic aquifers are in the northern Aubrey Valley around Frazier Wells (eastern part of the Reservation), Westwater Canyon, Peach Springs-Truxton Wash Valley, and elsewhere along the southwest flank of the Hualapai Plateau (e.g. Horse Flat area and the upper Milkweed Canyon). The alluvial-volcanic aquifers have areal extents that are limited by the valleys and washes that contain them. The volume of stored groundwater is similarly limited. Depth to water is generally shallow, typically less than 500 feet below ground level, and well yields of up to 170 gallons per minute have been reported. Water from these aquifers is generally acceptable for domestic use.

- The Santa Fe Railroad drilled 6 fairly shallow wells within Peach Springs between 1903 and 1922. The Hualapai Tribe acquired use of water from the railroad spring-fed water system between 1931 and 1954. One well near the town is currently used.
- The USGS conducted a study in 1942 to assist location of prospective sites for development of stock water supply on the Hualapai Reservation (Peterson, 1942). In addition to a hydrogeological characterization of the region, the study inventoried numerous existing wells and stock ponds. Peterson recommended 18 sites across the Reservation for drill-testing.
- N. J. Devlin evaluated the Peach Springs water system in 1973 and considered possibilities for development of additional water supplies for the town. Devlin recommended further development of the aquifer contained in the lake beds of Truxton Valley. Development of other springs and other exploration areas were judged to have low potential.
- The Indian Health Service drilled two wells in Truxton Valley in 1972 to provide additional water supply for Peach Springs. A third well was drilled in 1976 by the

IHS in Truxton Valley near the wells drilled in 1972. These wells currently supply all of the water needs for the town of Peach Springs.

- The Bureau of Reclamation drilled an unsuccessful hole into Cenozoic volcanics near the head of Milkweed Canyon in 1975. A second successful well in Westwater Canyon alluvium and volcanics was completed in 1975. This well currently provides most of the water to Grand Canyon West via a 30-mile pipeline.
- A well drilled in the Frazier Wells area in the eastern part of the Reservation serves a fish-rearing facility. An additional two boreholes were completed in the shallow alluvial aquifer in the Frazer Wells area in an effort by the Tribe to develop additional groundwater supply. Both wells were dry and were abandoned.
- Regional hydrogeological mapping by Richard Young (State University of New York at Geneseo) focused on the Tertiary volcano-sedimentary aquifer in the area of Westwater Canyon near the well drilled by the Bureau of Reclamation (Young, R. A., 1987, 1991, 1992, 2007). Stantec (2009) estimated the safe yield of this aquifer to be approximately 600 afy. Further development of this aquifer is prohibited by tribal policy as it would likely reduce spring flow (considered to be a cultural resource) in its discharge area.
- NRCE conducted an evaluation of the groundwater supply for the town of Peach Springs in 2011. That study included an inventory of wells in the sub-regional area, a comprehensive review of the regional geology, an evaluation of hydrologically attractive areas for development of additional groundwater supplies in the southern part of the Reservation, and made some specific recommendations for exploratory evaluation of both the R-Aquifer and alluvial-volcanic aquifers. The adequacy of natural aquifer recharge to support existing and future water needs was also assessed.