Compendium of CWG Water Comments
July 1, 2019

Following is a summary of water quantity and water quality questions, answers and comments captured during Superior Community Working Group (CWG) meetings as well as summaries of presentations made by Resolution Copper Company and various other experts at CWG meetings starting June 2013 through June 2019. Notes are taken from CWG meeting summaries recorded by the group facilitators and implicitly approved by CWG members. Sources of these comments -- complete meeting summaries -- are found at www.SuperiorAZCWG.org. The facilitators have attempted to capture the relevant comments of greatest interest to the CWG, any errors or omissions are unintentional and the sole responsibility of
Godec, Randall & Associates.

July 11, 2013 CWG Meeting

Topic: *Overview of National Environmental Policy Act Requirements & Process*
Speaker: *Vicky Peacey, Resolution Copper*

- Promises were made several years ago about water and well levels, and Resolution said that if there were any water problems they would fix them. But now there are dry wells and nothing's been done about it. This has created mistrust.
- Several members are concerned about water issues in the future; therefore, what's happened in the past has to be considered.
    - Peacey noted that there will be a community forum dedicated to water issues in the next couple of weeks.
- A member noted that there have been dry wells for quite a long time, and in other locations than Queen Valley.
- We should have a meeting of this group on water issues.
- It was suggested that other agencies and experts could be invited, for example, AZ Department of Water Resources. The group wants to make sure Cecil Fendley and Leslie Brian are here for this, as they are locally knowledgeable.

August 29, 2013 CWG Meeting

Topic: *Mining Methods*
Speaker: *Ian Edgar, Resolution Copper*

- How does this (BLOCK CAVE MINING) affect water resources?
    - Rain water will fall into the cave area, not onto the watershed, and so will be diverted from its pre-mining condition. Resolution is running models now to use in the Environmental Impact Statement to evaluate drawdown and effects on surface resources.

October 7, 2013 CWG Meeting

Topic: *Resolution's Water Plan*
Speaker: *Vicky Peacey, Resolution Copper*
Godec introduced Vicky Peacey to provide an overview of Resolution's plans for mine and tailings water management. He noted that we have engaged a representative from the Arizona Department of Water Resources (ADWR) for the next meeting on October 24, so we'd like to hear any questions or information needs that the group may have, and we'll pass them on to the ADWR representative before the next meeting. If there are still water-related topics that need to be addressed after that, we'll plan how to include them in future meetings.

Vicky Peacey apologized that both of Resolution's water experts are out this week, so she'll be doing the presentation but stated that she in fact has quite a bit of experience in hydrological issues. She showed a map that includes the mine site and monitor wells in and around the mine area saying that Resolution has spent several years testing water supply and quality, to determine if the rocks around the mine contain or retain water. She noted that this is especially important in the Queen Creek area, where the soil is alluvial (sandy). Tests have found that these rocks don't release water easily, so can't be used to supply mine water needs.

Because of this, Resolution needs to look for other water supplies. Possibilities include groundwater, both deep and shallow (considered to be largely non-renewable sources) and renewable sources like surface water and the Central Arizona Project (CAP). She explained generally how the Central Arizona Project works and the history of the Project, and noted that Arizona doesn't currently use its entire allocation of Colorado River water.

The Resolution Copper Project needs water for processing, mine cooling, and potable uses. The total consumption is expected to be about 12,000 acre feet per year on average over the life of the project, with a maximum of 17-20,000 acre feet at any one time, most likely in Spring before monsoon season.

Peacey said that the project will get its water from CAP allocations and water "banking". They will also dewater the mine and use the water from this process, but this will not provide enough water for the entire need. Consequently, Resolution is purchasing CAP water on behalf of farmers, who then do not pump groundwater but use the CAP water, leaving the groundwater in place for future use by the Resolution Copper Project. Resolution takes the credit to the groundwater, which is "banked" for future use at the mine. The water is being stored in the New Magma Irrigation District. From this agreement, Resolution has already purchased rights to 275,000 acre feet – enough to operate for about 20 years. Peacey showed a slide that illustrates the impact of water banking over time. There will be a net-zero effect on groundwater depth at the end of the project, since the water used by the mine simply replaces water that would have been used by agriculture. These impacts will be assessed in the project Environmental Impact Statement.

To retrieve the groundwater, wells will be installed and transported in two new pipelines with booster stations.

A third source of possible water is direct withdrawals from the CAP canal, purchased from existing water users if they have water to sell. Resolution has put an application in to ADWR for an allocation of Non-Indian water, but does not know if that right will be granted.

Impacts of Resolution mine and tailings operations include dewatering, subsidence, seepage from tailings, and placement of tailings in drainages. Mitigation measures will be required through federal and state regulatory processes and permitting. These might include surface water diversions, seepage collection and recycling, and reclamation.

Regarding mine groundwater impacts, Resolution has done groundwater testing and modeling to see how it will perform. There are several geologic faults that act as confining units for groundwater flows. The mine is located in a deep groundwater system; surrounding aquifers are confined to other geologic formations. Peacey showed a graphic that illustrates what groundwater monitoring has been showing. She also showed a map illustrating geologic characteristics, showing that formations are mainly “aquatards”, which will prevent widespread regional impacts from the mine.

Impacts on surface water from the tailings disposal area include loss or re-routing of surface drainages. Groundwater monitoring wells will be placed all around the tailings pile, and progressive reclamation should help to manage water resources. “Best available technology” will need to be used to control and manage water.

Comments and questions from the group included the following:

- A member noted that Resolution previously said that the maximum would be 16,000 acre feet.
    - Peacey said these estimates are still being refined based on design progress.
- For comparison, Queen Valley uses about 120 acre feet per year; Superior 160-180 acre feet per year.
- Does Resolution expect to bank enough water for the whole term of the project?
    - Yes
- How far east of the CAP canal will this pipeline be?
    - About one mile.
- Will you use the deep wells that Resolution owns now?
    - No, those are supply wells for Superior.
- Has there been an increase in the depth to groundwater since the farmers have been using CAP water?
    - Yes.
- A member noted that Salt River Project is also pumping groundwater in this area to replenish the canals.
- What is Arizona’s allocation of CAP water?
    - Peacey said she would find out the answer to this question.

- Could Resolution pump water out of the subsided mine and put it back into Queen Creek?
    - Yes. However, that water will likely have higher salt levels (total dissolved solids) than the original creek water. They also need to meet "wet testing" criteria to test quality. They can build treatment plants, e.g. reverse osmosis, to improve discharge water quality.
- Please clarify that Resolution can get 10% of its water needs from dewatering?
    - Yes, about 1,800 acre feet per year can be salvaged from mine dewatering.
- Will operations dry up Devil's Canyon and Pinto Creek?
    - A small part of the subsidence will be located in the upper reaches of Devil's Canyon watershed, so there will be some impacts. These would need to be mitigated, and include either surface water impacts or groundwater impacts in the form of drying up springs and seeps.
- Where will potable water come from?
    - Arizona Water Company
- What do you mean by surface water? Flowing water?
    - Sometimes streams have surface flow, sometimes they're dry, and sometimes they flow beneath the surface. Impacts to all of these would need to be mitigated.
- Will we see the water that's replaced in surface drainages?
    - No, probably not; it will likely go the groundwater.
- Where would replacement water come from?
    - We don't know that yet; could be treated mine water, for example.
- Is it possible that the CAP allocation will be decreased?
    - That's a question that might be appropriate for the Department of Water Resources. It's possible that during a drought water sources could be reduced. If so, agricultural allocations are the first to be reduced.
- What agency is responsible for overseeing this?
    - Multiple agencies: ADWR will review monitoring results and regulate groundwater withdrawals; the Arizona Department of Environmental Quality will require an Aquifer Protection Permit to ensure water quality. Water replacement will be overseen by the Forest Service.
- What constituents could leach from tailings?
    - Salts, sulfates mainly. Resolution will not be allowed to have acid drainage.
- How much water is it possible to bank?
    - Peacey didn't know but said she would find out.
- Have any activities affected the Queen Valley area yet? It's only been monitoring wells so far, correct?
    - Peacey has a report from Montgomery Associates that shows there have not been negative effects. She noted that some members of the group from the Queen Valley area have said they've seen impacts to water recharge, and lower groundwater recharge rates and levels in wells around Queen Creek. We don't know if this attributable to Resolution or the drought.

- A member observed that, in the past, area residents didn't see decreases in wells because the mine was always pumping. It could be that this was during years of high precipitation, so there would have been more pumping and dewatering from the mine.
- What's happening to mine water now?
    - It goes into a lime treatment plant and then is transported 30 miles to the Magma Irrigation District, where farmers use it.
- Several members said that there might be good uses for this water in Superior rather than sending it to the irrigation district.
- A member noted that the Arboretum didn't want the water in the past.
    - The Arboretum representative clarified that is was because of the water quality and unknown effects on wildlife and plants; if a treatment plant had been offered the Arboretum would likely have taken it, but Resolution decided it was cheaper to send the mine water to the irrigation district.
- Peacey noted that a treatment plant is an option, but the challenge is where to put the waste solids/brine from the process; there isn't room for it at the potential plant site, and there is not a commercial market for it.
- Queen Valley representatives said that the community wants to know what happens if water is contaminated, or if wells run dry in the future. This is one of people's foremost concerns, based on historic problems.
    - Resolution understands that. They can confirm that they need to comply with all applicable regulations. Perhaps a joint fact-finding process with the community should have been conducted, and this may be the best approach for the future.
- Shouldn't the tailings have a liner?
    - An artificial/synthetic might not be needed, based on the underlying geology; or it may be required depending on the NEPA analysis and the requirements of ADEQ. Liners are often constructed of existing natural clays and materials.
- This is a complicated issue, and it's hard to present it in a way that everybody can understand. If another water meeting is held in Queen Valley this fall, it should be clearly presented and needs to be kept on topic.
- Can there be monitoring wells closer to Queen Creek?
    - Resolution does monitor some private wells along Queen Creek, and there will be additional wells under the tailings.
- How often are these monitored?
    - About every week to every month. Queen Valley Water Authority is also installing a monitoring well, and once the well is in production, there will be a transducer on it that will provide real-time data.

Public Comments

A visitor said that he's learned something today, both from the presentation and from the group's conversations. Another observed that the issue of what's going on with the Central Arizona Project is of great importance, given the uncertainty of future water availability and resources.

Final CWG Comments and Next Meeting Agenda
Pam Bennett informed the group that there will be a water forum in Queen Valley in November, when there will be many questions about impacts to Queen Creek and local wells; Resolution should be prepared to answer these. Some members noted that there is a lot of misinformation about water uses and impacts, and suggested that it might be a good idea to send information out ahead of time.

October 24, 2013 CWG Meeting

1. Topic: *Recap & Answers to Questions on Resolution's Water Plan*
Speaker: *David Stanley, Resolution Copper*
David Stanley did a brief review of the presentation Vicky Peacey gave at the last meeting. He explained that his focus is on where the company will get the water it needs, and on the regulations that would govern that. He showed a map plotting monitoring wells that have been developed in an effort to understand the impacts of the mining operation on local water supplies. He reviewed the region's water sources, both non-renewable from groundwater and renewable from rivers including the Gila and the Central Arizona Project (CAP).

Major water needs for the mine include refrigeration and cooling of the mine, processing, transportation, and potable use. The total consumption will be 17-20,000 acre feet per year over the life of the project. As much water as possible will be reused.

Resolution plans to obtain its water from mine dewatering, water 'banking' from the New Magma Irrigation District, and has applied for a specific allocation from the CAP of non-Indian agricultural water. Stanley explained that the banking process involves purchasing CAP water for farmers to use instead of using groundwater. The 'un-pumped' groundwater will later be used by Resolution for the mine.

Stanley answered some of the questions from the last meeting, which included:

- Where will the pumping wells be located?
    - He showed a map of the fresh water delivery system.
- How far east of the CAP will you be pumping water from the deep aquifer?
    - We don't know that yet; it will depend to some extent on what has the least impact.
- There have been higher flows underground recently – is this an increase compared to the average between 2009 and 2012?
    - The entire mine is pumping less, but we would expect a 'bathtub effect' as water drains into the mine over time. Resolution has been pumping about 1100 gallons per minute from the shafts, compared to about 400-500 gallons per minute for the old Magma Mine.
- As you sink more shafts and get more water into the mine, will this decrease the amount of outside water needed for the project?
    - Not necessarily; we expect the need to be relatively consistent over time.
- How many monitor wells are there west of the fault?

    - There are 4 wells that monitor the deep aquifer system, and many that monitor the shallow aquifer.
- What is the flow rate through Devil's Canyon?
    - About 95 to 100 gallons per minute, as estimated from direct flow and some modeling
- How much potable water will you use?
    - Approximately 1000 acre feet per year. By comparison, the town of Superior uses about 400 acre feet per year. Of the amount needed for the project, about 200 acre feet is for residential use and the rest is for industrial uses, like refrigeration, that require high quality clean water.
- What is the banking capacity of New Magma Irrigation District?
    - The permitted capacity is 54,000 acre feet per year, which is the maximum that Resolution is allowed to bank and use.
- What percentages of water from each water source would be used?
    - Of the maximum 20,000 acre feet per year, about 10% would be from mine dewatering, and the rest would be from CAP and outside sources.

2. Topic: *Water Resources Overview and Regulations from the State's Perspective*
Speaker: Doug Dunham, Arizona Department of Water Resources
Doug Dunham shared some information about his background in geomorphology and as a special assistant to the director of the Arizona Department of Water Resources (ADWR), legislative liaison, and ombudsman. He explained the critical functions of ADWR, including Colorado River negotiations and the Assured and Adequate Water Supply Program, which set up and regulates the state's Active Management Areas, which are unique among states in water management programs. The department also supports adjudications and Indian water right settlements, and demand and supply planning. The department does this by providing data and technical support.

Dunham showed a chart that outlines the distribution of the state's water sources by type including surface water sources (Colorado River supplies about 39%), groundwater, and reclaimed water. The total water budget for the state is about 7.6 million acre feet per year.

He reviewed the history of the Colorado River Compact dating to 1922, which originally allocated 7.5 million acre feet each to the upper and lower basins. He mentioned some of Arizona's efforts to successfully manage our water supplies, including Salt River Project, Colorado River Compact and Law of the River, the Central Arizona project. Arizona has been a leader in water conservation programs for areas within the five Active Management Areas, and also manages a recharge and recovery water banking program. He showed the relationship between gross domestic income, population, and water use, indicating that water use has remained rather steady because of management programs while population has grown significantly.

Dunham described the concept of water banking, using an underground storage facility either through recharge to a natural channel or constructing infiltration basins such as the CAP Agua Fria recharge facility.

A groundwater saving facility (GSF) uses a renewable water supply as a substitute for groundwater. This is the approach that Resolution is using for this project, which is permitted as a GSW. Most of these facilities have a 5% reserve that goes back to the aquifer, and there is also a benefit from additional water recharge to the aquifer over time, which is not being pumped. Dunham showed a map of the Phoenix Active Management Area, including the three GSFs (New Magma, Tonopah, and Roosevelt irrigation districts).

Questions, comments, and discussion from the group included the following:

- Is there a formula for evaluating how much of this water evaporates versus being recharged?
    - Yes, evaporation rates tend to be higher at certain times of year, and this is calculated in models that the state uses.
- David Stanley clarified that, of the 275,000 acre feet of water Resolution is banking, 219,000 acre feet of storage is permitted in New Magma Irrigation District (which is located in the Phoenix Active Management Area) and the rest is being stored in the Pinal Active Management Area.
- What is an AMA?
    - Established in 1980, these are areas generally near urban centers that are heavily regulated and include conservation requirements. Groundwater rights were assigned at the time, and no new rights have been issued. There are strict requirements for pumping groundwater in these areas, and new users must prove a long-term adequate supply before being permitted. The five AMAs include Prescott, Phoenix, Pinal, Santa Cruz, and Tucson.
- Does Resolution's pumping occur in an AMA?
    - Yes, both in the Phoenix and Pinal AMAs.
- How is the boundary defined?
    - Based on the groundwater basin, which is a distinct hydrologic unit that is separated from adjacent units.
- After paying for the credits in the New Magma Irrigation District, where does Resolution then pump the water from?
    - Under state law, they are allowed to take it from anywhere within the AMA, subject to well spacing criteria and other regulations. The greatest supplies will probably be found near the middle of basins rather than in the foothills and mountains.
- With the drought in the Colorado River basin, will there be cuts in Arizona's allocation of CAP water?
    - After 10 years of drought, the state is doing pretty well. However, the Bureau of Reclamation just issued a report suggesting that there is a 50% chance by 2016 that there will be cuts in the river allocations, increasing slightly by 2018. ADWR

is responsible for managing the CAP water. Unfortunately, CAP is the most junior right on the river, so we'd be the first one to be cut. Within the state's allocation, agriculture has the lowest priority and so would be the first cut by a small percent.

- So, what are the chances that Resolution would not get the amount of water they need for the project if they're relying on agricultural water?
    - The state is now looking at how any reductions would be shared. We currently use every bit of our full allocation, either for use or for banking. There are some municipalities that won't use their full allocation, and we may be able to move some of these supplies to agriculture to 'lessen the pain'. Because of banking, the state has about 8.5 million acre feet in storage in case of emergency – this would last for two to three years at the current usage rates.
- Would these conditions impose restrictions on the recovery of banked water?
    - No, if you've paid for it, you will be able to recover it.
- How will ADWR regulate Resolution's water use for this project?
    - ADWR must approve the banking agreement. They will permit all well sites, which will require a monitoring program to assure that pumping is in accordance with permitted amounts. There will be meters on the wells that will be inspected occasionally; there is only one well inspector for the entire state. Monitoring data is publicly available.
- What about outside of the AMA?
    - There are no groundwater rights or any limitations on groundwater use outside of AMAs in rural areas.
- To get credit for banked water, can dewatering water be released in Queen Creek for credit?
    - Yes, Resolution would need a recharge permit from ADWR and an Aquifer Protection Permit from Arizona Department of Environmental Quality. The state evaluates whether this would cause 'unreasonable harm' to another party.
- Are the recovery wells going to impact our water in Queen Creek and Superior?
    - We don't know that. When Resolution asks for a permit, they need to demonstrate that there will not be greater than a 5-foot decline in water levels over a 10-year modeling period. This would likely be done through pump testing and modeling.
- If the model shows that there wouldn't be a negative impact on Queen Creek wells, what happens if there is, in fact, a negative impact later on?
    - The state has never pulled a permit after the fact. Historically, most declines in well levels that are seen are regional in nature and it's very difficult to attribute that to a specific well or user.
- Does the state have the authority to make a user cut back on pumping if there are negative impacts on other wells?
    - Dunham doesn't know the answer to that. If over-pumping or a violation of the permit occurs, ADWR would have authority to take action.
- Are the shafts considered "wells"?

    - Dunham is not sure about this– We would need to check the statutes. It is an artificial hole in the ground, so it might be logical to define it as a well…
- Is there a public comment period for installing a well?
    - Yes, there will be public notice in the media during the permitting process, and after the permit there is an appeals period if needed.
- Will the location of the 2 wells near the CAP be part of the NEPA process?
    - Yes, they will be included in the plan of operations, and the locations will be further refined through the NEPA process.
- Can Resolution negotiate with landowners to address well impacts, in addition to what's required by law?
    - Yes, Resolution could do things like joint fact-finding, hiring an independent third party to do studies, and similar.
    - Dunham offered that certain 'index wells' are automatically monitored, for example. The state can respond to requests to install transducers on certain wells, and the data from them would then be public data. Bruce Wittig noted that the new well in Queen Valley will have this.

November 14, 2013 CWG Meeting

Topic: *Water Quality*

Speaker: *Nancy Wrona, Arizona Department of Environmental Quality*

Nancy Wrona (ARIZONA DEPARTMENT OF ENNVIRONMENTAL QUALITY) explained how the Aquifer Protection Program (APP) program works in Arizona. It started in the 1980s when water companies had to start sampling for organic and inorganic compounds in groundwater. When chemicals started to be found, there was a high level of public concern. At the time there were no statutory requirements to protect groundwater, but only surface water under the Clean Water Act. While environmental groups called for protection, there were other concerns about the effects of increased regulation on economic development. Under Governor Babbitt, the Environmental Quality Act was enacted in 1986. It established ADEQ and the Aquifer Protection Program. This is a technology-based program, unique among states, that includes a requirement to use Best Available Demonstrated Control Technology, known as BADCT. Demonstrated technologies may include ways of monitoring the quality of effluent, maintenance practices, assessing site-specific conditions, conservation methods, and others. One requirement of the law is that in areas of existing contamination, discharge to groundwater may not cause further degradation. APP applicants must demonstrate that they have the technical capability to implement permit conditions as well as proving financial capability to do so.

Because of the tailings pile, Resolution will need an APP permit because they will be discharging to groundwater. In the application, they must quantify emissions, determine the point of compliance, propose what the discharge limitation will be, how and where they will monitor quality, and also outline contingency provisions if the permit is violated and commit to remediation methods. They will need a closure and post-closure plan as well, and need to post a performance bond or similar guarantee of financial responsibility.

March 12, 2014 CWG Meeting

Field Trip – Tailings Site, Concentrator Site, Mine Site

Greg Ghidotti talked to the group about water impacts. Resolution has a network of 48 monitoring wells, to depths of 1,000 to 7,000 feet, around the region from Mineral Creek to Government Ranch to Dripping Springs Mountain that are being used to perform site characterization. Some of these wells also monitor water quality. What has been learned about subsurface conditions is that there are natural pools in the formation known as Apache Leap Tuft that may be affected by the mine. A group member noted that these are the largest natural pools currently known, and so are of high ecological importance. Below the tuft is the White Tail Conglomerate, which acts as a barrier to water flow and is an unconnected aquifer. Below that is a deep aquifer in "tight" rock. The data collected from the monitoring wells will be used to perform groundwater modeling to be used in the environmental impact statement studies. A seismic monitoring system will also be installed during mining operations.

Resolution has been pumping out water from the mine area over the past five years, producing about three billion gallons (or 6.5 acre feet). This water has been pumped to a treatment plant in Superior, then transported in a pipeline to the Roosevelt Irrigation District where it is injected into the groundwater table in accordance with Resolution's "water banking" agreement. This amount represents about half of the total banking commitment of the company for water that will later be extracted for mining operations.

- How much water per year is needed for mining operations?
    - Resolution is estimating from 15,000 to 20,000 acre feet per year will be needed.
    - A group member commented that this would be about the size of Roosevelt Lake.
- Would the contracted Central Arizona Project (CAP) water be the first to be lost in a case of water emergency?
    - No, mining water rights are protected under the Mining Act of 1872; agricultural water would be most at risk in times of shortage.
- How does water get into the aquifer?
    - Resolution is pumping water into the aquifer in exchange for agricultural users pumping it at this time; farmers are now using Resolution's CAP allocation instead of groundwater, allowing the aquifer to build capacity. In later years, Resolution will use its CAP allocation and agricultural users will pump the "banked" groundwater.

May 7, 2014 CWG Meeting

Topic: *Federal Land Exchanges*

Speaker: *Chris Horyza, Former BLM Manager*

- Will groundwater effects of mining on surrounding areas be analyzed in the EIS?
    - Yes, they should be, by an independent analysis.
- Some members wondered who they should talk to about water and well impacts, and when should it be done?

  - It depends on who has jurisdiction. It could be the State Department of Water Resources.
- There was discussion about previous dewatering methods, disposal methods, and effects.

August 13, 2014 CWG Meeting

Topic: *Housekeeping, CWG discussion*

There are also questions about the water delivery system and the amount of water that will be needed from Arizona Water Company for the mine. There are currently no agreements between Resolution and the water company, according to a company representative who happened to be attending the meeting as an audience member. A CWG member stated that the water system was originally built for the mining operation in Superior, and that the company has purchased water already. It was asked that answers to these questions be addressed at the next meeting.

November 12, 2014 CWG Meeting

Topic: *Tailings Spills, Safety & Resolution's Approach*

Speakers: *Vicky Peacey & Frank Deal, Resolution Copper Company*

- Will Resolution's precautions eliminate the potential for groundwater pollution?
  - That is certainly the objective. To get a permit, Resolution must demonstrate that releases will meet adopted limits, and then the operations must be monitored during production to ensure this continues to be the case.
  - Frank Deal explained that the underlying Schist at the tailings site is not easily susceptible to drainage. The downstream side of the facility will have dams engineered for complete containment of materials. He said that 85% of tailings are, basically, clay. The high sulfide materials would be placed at the inside of the pile to minimize seepage. Grout curtains - trenches filled with concrete – will also be built to control seepage; these will be constructed around the facility. Downward seepage is controlled through very tight bedrock. The seepage collection system contains any releases and pumps it back up for recycling for other mining uses.
  - The relatively small amount of high sulfide tailings are managed so they are not exposed to oxygen and water at the same time. Seepage is controlled by geological conditions. We can't eliminate seepage, but it will be collected and recycled; any releases to the environment will be monitored and addressed if needed.
- Couldn't there be a tailings dam break in a very wet season?
  - This facility will be designed to withstand the 'Probable Maximum Precipitation' (PMP) event, which is larger than a 100-year storm. The existing and historic tailings in Superior were not designed to meet any regulations since these did not exist at the time (1850s) the Magma mine was active. Regulations are different today.
  - A group member noted that the spill in 1993 was the result of a washout in an extreme rain event in which the tailings pond contents were released through the town. The amount of the release was enough to bring the EPA (Environmental Protection Agency) to Superior, and there are still effects of that today.

Frank Deal provided a description of four recent breaches at facilities in North America. These were at Mount Polly, Buena Vista de Cobre, Bingham Canyon, and Pinto Valley. He mentioned

that he, personally, has worked at three of these facilities. In researching these issues, Deal found that only two dams have failed from natural causes; the others have all failed due to poor operating practices and not following design criteria.

Mount Polly is in British Columbia. There was an embankment breach where the dam collapsed, spilling 17 million tons of tailings and water that caused extensive damage to the streambed and surrounding area. This was supposed to be a 'zero-discharge' facility, so mining industry experts are wondering why there was so much water involved. The facility was recently expanded (which the original engineer did not agree with). A team of independent experts was assembled immediately to analyze what happened and monitor water quality. The water supply for 300 people downstream was shut off for several months while tests were being conducted. Peacey speculated that was because the TDS (total dissolved solids) standards were exceeded. Luckily, the pH was very low and there were few metals in the water released. A result of the spill is that the mine has been shut down indefinitely, and it is the major source of employment in the region. Cleanup costs will be about $500 million. There is speculation that the owners may not be able to afford to spend this, while the value of the mine to the area is probably several billion dollars.

The group asked:

- If there is too much water, how does the tailings design address that?
    - Everything above the site needs to be diverted or contained prior to facility operation.
- How many tons were being produced there?
    - 60,000 per day, similar to Pinto Valley
- Do you need a bond for reclamation before you can operate?
    - Yes, in the United States. We don't know about in Canada.
- A group member made the point that if the tailings had been toxic they would have had much higher cleanup costs, and the remaining tailings deposited in the streams would not be able to be reseeded.

The Cananea, Mexico process pond breach occurred just over the border close to Superior, releasing copper sulfate and acid. This occurred because of a failure of an underflow line on a leach pond. Deal suggested that this was a function of poor operating choices. There will be no leachate pond in the Resolution project, so this situation could not occur.

The Resolution Copper Company Bingham Canyon slide in Utah in April 2013 was in the pit, where ground movement caused the slopes to fail. The mine was evacuated and temporarily closed. It was back in operation in about two weeks. In this case, the potential risk was known before mining, and the company was able to predict it. Since the Superior mine will not be an open pit mine, this situation wouldn't happen here.

The BHP Pinto Creek accident occurred in 1997. An old tailings facility had been decommissioned, and BHP decided to use the site for an additional lift when mining resumed. Although the design was for five lifts, the embankment broke down during the second lift, releasing 300,000 cubic yards of tailings into Pinto Creek to travel ½ mile both upstream and

downstream. This also caused concern for water quality in Roosevelt Lake's drinking water supply. Consequently, the mine shut down and 600 people were laid off because there was no affordable alternative site for disposal, and the company spent $35 million to clean up the creek.

Deal summarized a study that looked at tailings dam failures in the last 100 years. Tailings dam failures peaked between the 1960s and 1980s, dropping to about 10 to 20 per decade globally in the last 20 years. The majority of these occur during operation, not after they are closed. Peacey said this is mainly because of water buildups during operations, which are drained off after closure.

Deal said that today we know how to design these facilities, and repeated that most failures happen as a result of operation decisions and errors. Physical design factors considered include adequate capacity, earthquake potential, physical properties of the site, and others. The root causes of tailings failures include static liquefaction, seismic liquefaction, overtopping, slope and foundation instability, seepage and piping, and chemical material modification. Human factors to avoid are lack of a monitoring and review strategy, failure to use the observational method to refine design, reliance on key personnel (personal knowledge) rather than transferrable 'systems', and lack of independent 3rd-party assessment.
Deal emphasized that designs must be followed, and adjusted if conditions or performance warrant it. Operations must be monitored based on conditions, technical advancements, regulation changes, and community and peer review.

Some of the regulatory standards and guidelines that must be followed in Arizona include BADCT (best available demonstrated control technology), aquifer protection permits, and requirements of the federal Clean Air Act and Clean Water Act, and National Environmental Policy Act (NEPA). Requirements apply to tailings chemistry, groundwater quality, risks, stability, mitigation, technical requirements, financial assurances, and others.

In summary, a holistic approach should be taken from design through closure. Consequences of risks must be carefully considered. Review programs should be undertaken by peers and experts. There needs to be regulatory review by agencies, and changes in design if conditions or control requirements change; there can be no compromise about this. Regulatory agencies can shut down operations and facilities at any time for infractions. Peacey suggested that this might be an area where community monitoring could be developed using independent experts, if desired.

Group questions and comments were:

- Is there an agency responsible for monitoring these facilities?
    - Yes, there are several including the federal Environmental Protection Agency, Bureau of Land Management, old Atomic Energy Commission, Mine Safety and Health Administration, and the Arizona State Mine Inspector's Office and others.
    - Peacey offered to provide the group with copies of major significant regulations.
- Are there fines or penalties for non-compliance?

  - Yes; for example, EPA can impose fines for damages to water resources, on top of cleanup costs. Severe penalties can even result in prison penalties.
- A member noted that there have been examples of mining companies choosing to continue to pay penalties rather than fixing problems.
- What minerals are left in the tailings from processing and concentrating the ore? Are they more easily released from tailings than from the ore?
  - Acid mine drainage occurs after the ore has been processed, when minerals are exposed to oxygen as well as water. This needs to be managed in tailings by segregating the sulfides and minimizing contact with oxygen and water. Keeping the tailings saturated prevents exposure to oxygen (oxidation, rusting). There are two separate tailings piles, one inside the other, one containing mainly clay and the other with the higher sulfide content; only the sulfide tailings need intensive management for leaching.
- What is toxic in the tailings, or perceived to be?
  - Arsenic and other metals. They are not concentrated, and do not occur in higher quantities than before being mined. It is the sulfides that are of concern because of exposure to water and oxygen.
- Will there be a mitigation plan? The aquifer is shallow, so small amounts of releases could be harmful.
  - This is what the collection system is designed to prevent. There are alert wells below the dam, before the monitor wells. Compliance is measured at the boundary of the 'discharge impact area', generally at the edge of the collection system. There can still be discharges into groundwater directly below the tailings pile.
- Queen Valley's biggest concern is groundwater quality because this is a shallow aquifer, and it is used as drinking water supply for Queen Valley. In a worst-case scenario, there needs to be a mitigation plan in place – does Resolution have one?
  - Yes, we do contingency and response planning all the time. Additionally, this issue will be extensively explored during the NEPA process, and there will be continuous regulatory oversight during the life of the mine.
- Can the State Land parcel in Superstition Vistas be re-visited for tailings disposal in light of the recent election and different state elected leaders and possible policies?
  - Possibly. Resolution has not discussed this issue yet.
- Bill Vogler described some of the monitoring and assessment measures that are being taken at the Holden Mine, based on his visit. He asked how this compares to what Resolution is planning.
  - Similar measures, as appropriate, will be taken here.
- Mr. Chavez pointed out that this project will be much larger than any of those talked about at this meeting, so impacts will be similar in scale. While the mining companies can create good designs, you can't account for Mother Nature.

February 11, 2015 CWG Meeting

Topic: *Water "101"*

Speaker: *David Brown, Esq.*

David Brown introduced himself, saying that he is a long-time rancher from the St. Johns area in Apache County, where his family has lived since early settlement days. He described some of his legal experience and civic service appointments. He noted that his firm represents various irrigation districts, rural communities, and water districts as well as the Arizona Cattle Growers Association. He has been involved in many water rights adjudications including the three Native American water rights settlements (Zuni, Gila River, White Mountain Apache) in Arizona.

Brown gave a brief overview of Arizona water law. He described four main water laws in Arizona:

- Law of the Colorado River – applies in the western part of the state, mainly. He explained how this law divided up the rights to the river in the upper and lower basin states, which we now know were determined during a particularly wet climate period.
- Arizona Groundwater Code – established the Arizona Department of Water Resources
- Groundwater Management Act - establishes Active Management Areas (AMAs) for groundwater in Pinal, Santa Cruz, Prescott, Phoenix, and Tucson. Generally, there is no governance of groundwater in rural areas of the state, where use is basically unrestricted and one can pump as much as he can reasonably use.
    - There are also Irrigation Non-expansion Areas – there are three of these, which limit future irrigation.
- Surface water law – the first person (before 1919) who used a stream obtained the water rights; after 1919 (State Water Code passed) a permit was needed. When shortages occur, they are implemented according to priority use date.

It was clarified that portions of the Resolution Copper Project lie within the Pinal AMA, and so is subject to state regulatory provisions for those areas. Brown explained that mines can get a permit to pump groundwater in an AMA if there is no reasonable access to surface water. In the case of Resolution, the only surface water might be Roosevelt Lake, which belongs to Salt River Project, so is not a reasonable supply. There is not a local source for approximately 18,000 acre-feet of water annually, which is what Resolution needs.

Freeport McMoRan pays the Apache Tribe for water from the Black River for its Miami mine. This is now done under an exchange for Central Arizona Project (CAP) water. This is similar to what Resolution is doing for this project. Resolution has bought 275,000 acre-feet of CAP water from the New Magma Irrigation District that is being banked in the district. To date, this has increased the water level in the district's groundwater by between 20 feet and 200 feet in various places. When the mine needs the water that has been banked, it will withdraw the banked groundwater, and the district farmers will resume using their CAP allocations. This is allowed under the Water Banking Authority of Arizona. Brown noted that if the Colorado River doesn't have water available for banking in future due to shortages, Resolution would need to find another source of water for purchase if they haven't banked enough by then.

Brown discussed several large water law cases in the state, and their implications, including adjudications in the Gila (1974) and Little Colorado (1978) watersheds. He also talked about the two major power plants in the Four Corners area that use water from the large Coconino Aquifer. Each of these facilities uses a comparable amount of water to what Resolution is proposing to use.

Group members had the following questions and comments:

- How can you tell groundwater from surface water, from a legal perspective?
    - This is a matter of some debate. For example, on the San Pedro there are lawsuits over wells, and whether they use surface water or groundwater. Decisions have indicated that if water is 'tributary' to the river, it is groundwater; if 50% of the yield can be considered to come from the river, it is surface water.
- What are federal reserve water rights?
    - A right granted by the Supreme Court in 1908 to tribes allowing them the water they need, with a priority date of the date of creation of the reservation. Brown characterized this as a 'super priority'.
- Could Resolution buy water from the tribes?
    - They could, but it is unlikely that the Apache have enough water to sell. The Tohono O'odham supply is mostly leased out. Gila River community probably has the most available water.
- What's the status of the dewatering project? There isn't enough water to sustain the needs.
    - According to Resolution managers present at this meeting, about 1000 gallons per minute (gpm) is being pumped, which may go up to about 1500 gpm during production. That is why Resolution is purchasing water.
- Is Resolution working under a permit for this?
    - There's a dewatering permit for what's being pumped out of the mine now. A different permit would be needed to use the water for processing.
- There was discussion about applicable laws and permits in the AMA for various mining uses.
- Heather Gluski of Resolution explained that there are four areas involved in the water scene for this project:
    - Deep water aquifer at shafts near Apache Leap
    - Superior Basin
    - Queen Valley basin
    - Beyond Queen Valley into the East Salt River Valley Basin

  None of these sources are geologically connected, so the deep water aquifer at the mine is not connected to the shallow wells and springs in the Queen Valley/Whitlow Dam area.
- A member noted that the wells in Queen Valley are connected to the surface creek and are considered deep aquifer wells.

- Many in Queen Valley believe that mine activities are dewatering their wells. Please affirm that the mining location and the Queen Valley area are not physically connected, so that is not true?
    - Correct
- A member noted that water that was treated and released from the old mining operation was released to Queen Creek, so there was always a flow there. Since the Nine Shaft was dug, these releases have stopped because there was too much water being extracted to be released to the surface. This may give people the perception that Queen Creek has dried up.
- To clarify, the Queen Valley Water District said that there is a fault line east of Superior, so that the water in Queen Valley is in a separate aquifer from that where the mine is located.
- A member noted that because the groundwater levels in various areas are so high, SRP is pumping some into their canal system.
- Several members discussed how water demand has decreased. For example, Superior uses only about 250 acre feet for residential use today. Queen Valley water use has decreased as population increased.
- Is Coolidge Dam on San Carlos regulated by the tribe or the federal government?
    - The federal Bureau of Indian Affairs and the Bureau of Reclamation operate it for the tribe.
- What's included in the San Carlos Irrigation District?
    - Farmers in Pinal County near Florence and Coolidge
- What's the likelihood of Resolution getting an allocation of Non-Indian Agricultural (NIA) water (2300 acre feet per year requested)?
    - Ian Edgar of Resolution noted that the company has applied for NIA water rights. Resolution feels there's a better than 50% chance of being granted these rights, and a NEPA environmental process is underway for this.
    - Brown said that the state is able to allocate supplies of this. It could be delivered physically, or via an exchange. He noted that 2300 acre-feet is a substantial amount. This water is subject to shortages on the Colorado.
- Has a mine ever been denied water use, through litigation?
    - Yes, Peabody Coal on the Navajo Reservation is no longer in operation. A potash mine in Apache County is on hold, mainly due to the market price of potash. Rosemont Mine is the subject of much controversy but not as a result of litigation.
- Are there restrictions on the use of banked water?
    - No, if you own it you can use it for anything.

September 9, 2015 CWG Meeting

Topic: *Permit Amendments and Updates, Discharges to Queen Creek*
Speaker: *Casey McKeon, Resolution Copper*

Casey McKeon introduced herself as permitting manager for the Resolution Copper Project. She introduced members of her staff who were at the meeting tonight. She will focus on two permits that are being amended at the moment. These are the surface water permit, known as Arizona Pollution Discharge Elimination System (AZPDES), and the groundwater Aquifer

Protection Permit (APP), both issued by the Arizona Department of Environmental Quality. These permits were issued in 2010.

The AZPDES permit protects surface water uses. Of particular interest to this group are discharges to Queen Creek. The current permit allows a discharge of the 100-year/24-hour storm event. Resolution is asking the state to be able to use 2014-15 data to support requested changes. Changes are aimed at reducing storage for stormwater evaporation, reducing reliance on farmers for accepting Resolution's treated water in winter, and developing alternatives for a large rain event.

When Queen Creek is flowing, the water quality is monitored. Total dissolved solids (TDS) are a key indicator of water quality. Between 2009 and 2015 these levels have been dramatically reduced in the influent water into the mine. Effluent TDS levels have been likewise reduced to about 1900 parts per million (ppm). McKeon showed a list of regulated effluent quality standards (for municipal wastewater treatment plants) and results of testing, showing that all parameters are below regulatory standards. Whole effluent toxicity (WET) testing is also required for discharge, measuring toxicity to several species of aquatic life. This water passes all the tests.

McKeon explained how water is treated for various constituents. She showed a process flow diagram of how water is treated, discharged, and delivered to farmers. The discharge point is just upstream of Mary Drive. The treatment plant can treat up to 2500 gallons per minute (gpm), but that much is not needed at this time. She also showed a map of the outfall system.

To satisfy permit conditions, water quality samples will be conducted every day for a month, and reporting requirements will be based on these data.

In summary, aspects of the AZPDES and APP permits that have changed since issuance of the original permits in 2010 include the following:

- Permits will include all treated waters.
- There will be discharge only during the winter rainy season.
- Discharges will occur if farmers don't need the water.
- Flow will be able to increase to 1500 gallons per minute.
- TDS limit will change (be relaxed) based on WET test results.

McKeon reported on the status of the permitting process, which is as follows:

- Resolution submitted amendment applications to ADEQ in July.
- The company has received completeness review letters from the state.
- The state is allowed 294 days to review permit applications.
- Resolution must install a monitoring well to collect ambient data downstream.
- ADEQ will hold a public meeting on the permit application, at some point in its review.

CWG members had a number of questions and comments, including the following:

- Where does the water come from that is being regulated here?

    - It includes water regulated under the reuse APP, which is meant to protect agriculture and groundwater. Sources include all stormwater, blowdown, and vehicle washout that are part of the minewater treatment plan.
    - Water from the mine is also treated. Pumps in the mine were turned off in 1996. After that, the pH dropped and the mine water heated up. Water being treated now includes only water that comes into the mine at the groundwater recharge rate of 600-800 gpm.
- How does treatment with lime and soda ash remove heavy metals?
    - The metals are exchanged with the calcium in the lime, and precipitates out.
- How can the water be used for agriculture, given the remaining pH?
    - A pH between 7 and 9 is suitable for agricultural use; this has a pH of about 8.5.
- When you collect samples, what do you measure it against; e.g. other local waterways?
    - Samples are not compared to other creeks. Queen Creek has its own water quality standards.
- If you were to discharge at higher levels, how far downstream would that carry?
    - Most likely flows would continue past Hewitt Station to near Whitlow Dam. There will be a point-of-compliance well at this location.
- Will that measure surface flows?
    - No, measurements will be for the groundwater aquifer.
- Does Resolution do its own testing?
    - No, the company uses the labs Test America and SVL.
- Does the water go into the Central Arizona Project (CAP) canal?
    - No, it goes into a ditch that farmers use. Farmers call for what water they need on a daily basis.
- Where does 'bankable' water go?
    - It doesn't actually "go" anywhere; it's a 'paper exchange'. These discharge permits are not related to water banking.
- Water coming out of the mine is hot, so what temperature would water going into Queen Creek be?
    - Resolution is still negotiating this with the state. Now it is between 80 and 90 degrees Fahrenheit, generally. It is cooled down as travels through the discharge pipe.
- How do these standards – particularly arsenic - compare to other local water; for example, what Arizona Water Company delivers?
    - We don't know exactly, but know that Arizona Water Company has to treat for arsenic. Queen Creek Water Company levels are much lower than the Resolution measurements shown here. Resolution's measurements are slightly higher than those taken at Central Arizona College Aravaipa campus.
    - McKeon noted that the drinking water standard for arsenic is .01 parts per million, and these levels are about half that.
- What happens if water quality standards are exceeded?
    - Resolution would need to shut the facility down, create an emergency response plan, test again, and create a plan for correcting the problem.

- How often would the company need to check the alert well?
    - Once per month for 8 months, and thereafter quarterly
- How much does Queen Creek normally flow?
    - It has only run three times this summer, and is at the lowest flow point it's ever been. In wet years it can flow quite bit. Discharge from this project is only 1500 gpm which is insignificant, and won't change the riparian ecosystem.
- If discharges lasted for a week, would there be water flowing through the Boyce Thompson Arboretum?
    - Resolution didn't know the answer to this, which would require computer modeling. A CWG member speculated that it would, because of the underlying alluvium.
- There were several questions about recent and historic pumping rates.

McKeon suggested to the group that this might be an opportunity for a community monitoring (third-party) program. Some members thought this would be a good idea. If people are more involved in ongoing monitoring they would be more familiar with the relevant data and constituent levels, and what they mean. Some observed that it may help build trust between the community and the company. Queen Valley said they would be interested in this, and suggested other CWG members who are not here tonight might also be interested.

Godec asked if the group is interested in pursuing this type of program. All agreed that they would be. Those who volunteered to work initially with Resolution on a community monitoring program are Pam Bennett, Cecil Fendley, and Bruce Wittig from Queen Creek, Mark Seigwarth or another representative from Boyce Thompson Arboretum, Lynn and George Martin from Hewitt Station, and Tiffany Rowell, a Superior resident. The group suggested also contacting Roy Chavez to determine his interest.

It was noted that the cost of such a program might be substantial, and the group assumed that Resolution would fund it. A member mentioned the recent Animas River spill in Colorado as an example of the problems that can occur; Godec offered to provide more information about this topic for future discussion.

December 9, 2015 CWG Meeting

Topic: *Update on Queen Creek Monitoring Wells*
Speaker: *Vicky Peacey – Resolution Copper Company*
Casey McKeon is coordinating the efforts for the discharge permit for Queen Creek. In her absence Vicky Peacey provided an update, saying that several locations for monitor wells have been identified. These could be installed in February. One is on Martinez Ranch and one on the Castleberry property, both south of US 60. It would take a few weeks to install the wells, then baseline conditions can be established over the next 8 months to a year. Thereafter, monitoring would likely occur quarterly. Peacey suggested that it would be good to start the community monitoring program for these 2 sites, probably in mid- to late-January. If the CWG wants to select a group to do the sampling, Resolution will pay for it and hire a specialist to perform the sampling with independence from Resolution's sampling and oversight by the group's subcommittee. Typically, different laboratories will have slightly different results. The company

can obtain samples and this subcommittee can also independently get samples, and then compare them. This would be similar to efforts undertaken by Rio Tinto at other mines.

A CWG members asked for clarification on whether there will also be sampling downstream of the tailings site. Peacey confirmed that there will be, noting that this is just a small start on an overall monitoring program. The facilitators will work to pull together the first meeting of this subcommittee in mid to late January 2016.

February 10, 2016 CWG Meeting

Topic: *CWG Subcommittee Status*

The first Community Monitoring Task Force meeting was held on Monday, February 8. Resolution showed some of the tools they use to do sampling. They have decided to also take samples from near the Boyce Thompson Arboretum. The group talked about how they could select an independent sampling company to check what Resolution does. Sampling wells are now installed. The group visited the Arboretum and other sampling sites including Martinez (70-foot-deep well) and Castlebury (25-foot well). Background sampling will be collected for some months to establish baseline conditions before any emissions begin. Releases to Queen Creek will probably begin in Fall 2016. The purpose of this group is to oversee what Resolution will be doing, so that the process is credible and transparent to the community. Independent samples will be sent to a different laboratory than concurrent Resolution samples at any given time. There was discussion of current releases from the Superior sewage treatment plant to Queen Creek and how they might relate to Resolution releases. Godec suggested that Dr. Jeff Bunkelmann might like to look at the list of contaminants that Casey McKeon has developed. Hank Gutierrez asked to be added to this task force.

June 8, 2016 CWG Meeting

Topic: *CWG Subcommittee Status*

For the Community Monitoring Task Force, the facilitators are working with Casey McKeon to develop a scope of work for a third-party hydrogeology contractor to assist with independent water quality testing and sampling. When this is completed, another task force meeting will be set up for the group to discuss hiring the contractor. Several CWG members noted that they think this will be a very important task force.

July 13, 2016 CWG Meeting

Topic: *CWG Subcommittee Status*

For the Community Monitoring Task Force, we hope to have a meeting in late August or early September. The objective is for the group to hire an independent consultant to take samples and test them. The facilitators are working with Casey McKeon to develop a scope of work for a third-party hydrogeology contractor to assist with independent water quality testing and sampling, which the task force will review. On this topic, Jim Schenck told the group that the Arizona Department of Environmental Quality had a public hearing last night on the discharge permit for discharges to Queen Creek.

September 14, 2016 CWG Meeting

Topic: *Housekeeping, CWG Discussion*

Jim Schenck reported that last week the Arizona Department of Environmental Quality (ADEQ) had a public hearing on Resolution's discharge monitoring permit application. Several CWG members attended. One member noted that he was surprised so many people were opposed to discharging to Queen Creek again, since the water can benefit many users. There is a lot of misconception about the water quality, and this may account for it. Some folks think that this discharge will degrade the water quality in Queen Creek, which some people believe is already contaminated. Cecil Fendley of Queen Valley Water District clarified that this is not true; contamination levels are well below regulatory standards. This discharge permit is for water being pumped out of the mine, which is basically clean groundwater and some floodwater. There are discharge points and settling ponds. Those who grew up here see it as a benefit in restoring former riparian and other landscapes. A member said she remembers that ADEQ came to town some years ago and said that the creek was contaminated with copper, but no follow-up information was ever provided.

Schenck noted that at the ADEQ hearing Hank Gutierrez did a good job of explaining the CWG, which many people attending the hearing didn't know about. He also talked with Sierra Club representatives who are interested in groundwater monitoring. It was thought that there might be an opportunity for the CWG to approach Sierra Club about joining the Community Monitoring Task Force.

October 12, 2016 CWG Meeting

Topic: *CWG Subcommittee Status*

A Community Monitoring Task Force meeting will be set up to review a request for proposal (RFP) to hire a consultant to take water samples and arrange for independent laboratory testing. The monitoring and sampling will not likely start until sometime in 2017, a little later than was initially thought. Possible dates for a meeting were discussed, and it was agreed to meet on October 19 at 3:00pm.

April 12, 2017 CWG Meeting

Topic: *Results of Water Quality Sampling*

Speakers: *Kevin Hebert, Southwest Groundwater Consultants & Casey McKeon, Resolution*

John Godec reminded the group that the independent consultant, Southwest Groundwater Consultants (SGC), performed water quality sampling on February 23. Kevin Hebert, the project manager, provided an overview of the sampling day. Three water sources were sampled:

Gallery well at the Arboretum
- Pond at the Arboretum
- Monitor well 002-2 at Castlebury

The approach used was for SGC to take samples of the same water pulled by Resolution staff from these sources to ensure consistency. They then had an independent laboratory test the samples. This lab does not currently do any work with Resolution. The analytes tested were the same as those that Resolution tested for.

Hebert explained the results, as shown on a handout. He discussed the primary and secondary maximum contaminant levels, known as MCLs, against which the results were compared. MCLs are typically used to evaluate drinking water quality, and so represent the most stringent standards. He observed that overall the water quality indicated in these results is quite good.

He showed results for the Gallery well, noting that the nitrate levels are very low (good). Levels of antimony were considered nondetectable. Arsenic is slightly higher than the drinking water standard (.0192 versus .01), but this could be due to natural background levels. We don't currently know what the background levels are for this area. Bill Greenslade of SGC noted that arsenic is usually found in deeper aquifers, and asked Resolution if they find the same thing. They said that finding arsenic in shallow wells in this area is quite common. Sulfate is sometimes an indicator around mine sites and the results are below the secondary MCL. Total dissolved solids are slightly above the secondary MCLs.

Godec asked how these data compared to those obtained at Queen Valley. Queen Valley representatives said these results show surprisingly good quality, particularly for nitrates, and are similar to what they get for drinking water (.005 for arsenic) at Queen Valley.

In response to a question, Hebert said that the depth to water in the Gallery well is 13 feet, which is very shallow. A CWG member suggested that the depth of the wells tested should be included in the reports, which Hebert agreed to do.

Test results for the Arboretum pond show that arsenic is below the quality standard. Other parameters are also well below the standards.

The monitor well 002-2 was at a casing depth of 20.6 feet, and it is screened at 20 feet; the depth to water was 6.9 feet. The water quality is similar overall to the other sources except that the arsenic level is about double what it is at the other locations. A CWG member said he is also surprised at the low nitrate levels.

In describing Resolution Copper's water quality testing results for these same sources, Casey McKeon noted that Resolution uses "aquifer water quality limits", not drinking water standards, for describing and comparing results. These standards are somewhat different from drinking water standards. Greenslade explained that there are only two or three parameters that are different between the two sets of standards. CWG members wondered if SGC reports should continue to use drinking water references, or whether they should be changed to aquifer standards. McKeon noted that Resolution uses this measurement because it is consistent with their Aquifer Protection Permit requirements from the Arizona Department of Environmental Quality. They also collect a minimum of 8 quarterly samples to account for any seasonal variations that might occur.

Godec observed that the public might ask whether you could drink this water; in this case, using MCLs might be a better comparison. There was discussion about the best ways to interpret and

present test results in the future, so that the public can easily and accurately understand them. This will be a topic for further discussion with the consultant and Resolution.

Jeanene Mancha presented the results of sampling collected by Resolution. She explained the sampling protocols used. She said they use two different laboratories to test different constituents.

For the Boyce Thompson Arboretum Gallery well and pond, arsenic was in the non-detectable range (<.025), as was lead. McKeon noted that she's interested in copper levels since Queen Creek is on the watch list for copper compliance.

The pH on the Castlebury well 002-2 is 8.73; Cecil Fendley said it's about 7 in Queen Valley drinking water. This was compared to vinegar at about 4. (Note: a pH of zero is highly acidic and a pH of 14 is highly alkaline.) Resolution's results showed .05 for arsenic, which is very similar to SGC's results. Nitrates were 1.35 compared to a standard of 10 (and 1.48 for SGC results). TDS was also very similar, as was sulfate.

Overall, both Resolution and Southwest Groundwater concluded that both sets of results are very similar.

A CWG member asked whether these results are going to be posted on the CWG web site. The group agreed that we should not do this now, but perhaps could do it once there are more results. All agreed that some explanation will be needed so people can understand the results and the context in which they should be interpreted. A member suggested it needs to be clarified that no biological constituents are included in testing.

Members asked Resolution how long they have been sampling, how often, and whether much variation has been observed. McKeon said they have been sampling for about one year, every month. They are considering reducing this to quarterly. There has been some seasonal fluctuation.

It was suggested that SGC might want to prepare a graph of key constituents that are 'hot buttons', e.g. sulfates, arsenic, that could be plotted at each sampling event.

May 25 at 7:30 AM will be the next sampling date. The Community Monitoring Task Force, SGC, and Resolution agreed to meet at the Chamber of Commerce, since it is easier to park here than at the Resolution office.

Godec mentioned that he has talked with Sierra Club about joining the Community Monitoring Task Force, but they have not committed to doing this.

June 21, 2017 CWG Meeting

Topic: *CWG Subcommittee Status*

CWG members reported on the recent well monitoring conducted in May. It was noted that members were not impressed with the Resolution sampling process, from a safety and protocol perspective. For example, the open well at the Arboretum was not protected and could result in accidents. The sampling bottles were left around haphazardly. The sampling procedures at Castlebury took a long time and it seemed like time was wasted. It was thought that the use of the truck battery was unsafe, as the battery could explode or other accidents could result. It was observed that the CWG is not there not by invitation but to conduct parallel samples, so it was suggested that our group might want to think about our own safety procedures and protections. It was also suggested that we get a commitment in writing from Resolution that the independent monitoring program will be continued, as it also helps them to fulfill their social license. Members wondered whether Resolution would be responsible if there was an accident during this sampling. Godec said that he will let the company know about these concerns. We could ask them to address this before the next sampling session. The group suggested that a solution might be to make the Arboretum well safer. Another could be to use a generator at Castlebury or install electricity for a stand-alone pump.

August 30, 2017 CWG Meeting

Topic: *Update and Recommendations for Well Sampling*

Speaker: *Casey McKeon, Resolution Copper*

Casey McKeon provided an update and response to some concerns that the CWG had expressed about safety at the Boyce Thompson Arboretum well. In light of this, Resolution did not want to expose the CWG to this situation if they did not want to go. If everyone wants to sample this well, Resolution will include it in the itinerary for tomorrow, August 31. The Castleberry well will also be sampled tomorrow. McKeon explained that there is a 70 gallon-per-minute pump at the Hewitt Station well now, but it's proved to be insufficient for pumping this well. Therefore, this well can't be sampled yet. Also, the aquifer test is not yet completed. Therefore, this new well will be sampled next quarter, in November.

Godec asked the group to discuss any concerns they may have with Casey. The manner of opening the Arboretum gallery well was noted, as was the fact that it is an open well. A CWG member observed that, while offsite testing is supposed to comply with MSHA regulations, that may not be a realistic expectation in areas such as the Arboretum. McKeon noted that Resolution does have safety protocols. Loose sample bottles were mentioned, and McKeon said they now have baskets for the water bottles. For the Castleberry well, the use of the truck battery to pump the well was thought to be peculiar. Resolution suggests adding a 12-volt plug to the truck battery, since installing a permanent generator and pump at that site is not practical.

A CWG member asked how long it will be before water is discharged to Queen Creek. McKeon didn't know, as there is a legal challenge to the surface water permit, and the groundwater permit needs to be updated. She could not provide a timeframe for this. A CWG member noted

that the Concerned Citizens and Retired Miners Coalition is a plaintiff in the lawsuit. Their concern is that Queen Creek is already compromised by past years of mine water releases containing heavy metals and other constituents. The discharge water from #10 shaft is now being sent down a pipeline to the farmers around Florence Junction. The method of water flows and retention downstream in Queen Creek is also a question. McKeon offered to discuss this issue in more detail in a future CWG meeting. She said that current blending ratios have significantly lowered the total dissolved solids loading.

December 13, 2017 CWG Meeting

1. Topic: *Subcommittee Reports, CWG Discussion*
The Community Monitoring Task Force and Southwest Groundwater Consultants, along with Resolution, performed the last quarterly sampling for 2017 on November 30. They tested the Arboretum, Castleberry, and new Martin well. Resolution took their samples, then Southwest Groundwater took theirs immediately afterward. The task force is very interested in seeing and comparing test results from both laboratories.

2. Topic: *Southwest Groundwater Consultants Contract, CWG Discussion*
The term of the contract between the CWG and Southwest Groundwater is through this calendar year. Godec asked the group if they would like to extend the contract. They agreed that they want to extend the contract, although they want to see the results of the last two sampling events as soon as possible. Vicky Peacey confirmed that Resolution is willing to continue funding for this contract as it had been previously developed with the understanding that the contractor works for the CWG, not for Resolution.

A member noted that a long-term objective of the monitoring program is to monitor the tailings facility, and wondered if this aspect of the program should be included in the scope of work for next year. Peacey noted that baseline data from wells in the tailings vicinity are available.

January 10, 2018 CWG Meeting

Topic: *Report & Discussion of 2017 Community Monitoring Task Force Well Sampling Program*
Speaker: *Kevin Hebert, Southwest Groundwater Consultants (SGC)*
Godec introduced the discussion, for the benefit of visitors, and provided background to the community monitoring effort. He said the CWG hired its own consultant to take quarterly groundwater samples to establish baseline conditions, along with Resolution Copper, and sends the samples to an independent testing laboratory.

Kevin Hebert said he has all four quarters of data to present tonight. He explained that they have done four samples at the same time as Resolution, in February, May, August, and November. The first samples were from the Gallery well and Ayres Lake at Boyce Thompson Arboretum as well as the Castleberry well; in the following visits the lake was not sampled. For the fourth sampling a new well was added that is downgradient from the other sample locations. Well DSQ-17 was opened in 2017, near Hewitt Station and the proposed tailings site.

He showed the list of water quality parameters that are tested. SGC takes split samples with Resolution, and sends them to a different lab than one that Resolution uses for testing. Hebert explained that what they might look for as "red flags" would be order-of-magnitude differences from time to time; these samples do not show anything like that. Arsenic is the only parameter that would exceed drinking water standards, but it's important to note that these are not drinking water wells. Arsenic is naturally-occurring in Arizona so it's not unusual to find it. These results are not unexpected since these are baseline studies, and nothing is happening at this time that would affect water quality. He observed that the water quality in the new monitor well is even better than that in the other wells. Hebert asked Resolution to confirm that the DSQ-17 well is the one near the tailings; Casey McKeon confirmed that it is near the toe of the tailings pile.

Godec asked the Queen Valley Water District representatives how they deal with arsenic. They said the levels in their wells are very low, and they do not need to treat for it. The only constituent that is occasionally high is nitrates, especially from flooding in wet years. Superior has arsenic in their drinking water wells, and they need to treat for it before delivery. Superior's water is purchased from Arizona Water Company in metropolitan Phoenix.

Janeane Mancha of Resolution reported that these data are very similar to the results they have received from their lab. This is to be expected.

Godec said that some CWG members have questioned why we're doing this testing now when nothing is happening. It's important to have baseline data to compare later on when Resolution starts discharging water to Queen Creek, and even later when mining begins and the tailings facility starts to operate. McKeon noted that about 8-12 sample rounds are optimal for establishing a reliable baseline condition. A member asked Resolution how long it will be until they start discharging to Queen Creek. McKeon said they need to update their existing permits with the State of Arizona first, so it will likely be more than a year.

In response to a question from a CWG member, McKeon explained that as #9 Shaft is developed to a depth of 7000 feet, the amount of discharge water will increase significantly. At this time, about 700-900 gallons per minute (gpm) flow into #10 Shaft, which is connected to #9 Shaft. The water treatment plant can handle 2500 gpm, which should be sufficient for several years. The discharge water is being sent to the farmers near Florence, under an agreement.

Janeane Mancha handed out data tables from Resolution's sampling. A member asked if the two sets of data could be consolidated into a single table for comparison. She showed photos of the Gallery well, noting that Resolution is installing a safety rail around it, which the CWG endorsed. She showed results from the new "Martins well" (DSQ-17) for which they only have one quarter of data. Both Resolution and Southwest Groundwater were surprised that arsenic was essentially not present ("non-detect") in the new well. Mancha showed results for the other wells, which are very similar to those obtained for Southwest Groundwater. Resolution uses the labs SCL, Test America, and ACZ Laboratories to test for various constituents;

Southwest Groundwater uses XENCO in Tempe. All agreed that everything on these samples is below the reporting limit.

There was discussion about scheduling the next sampling event, tentatively for the third Thursday of February (15th).

A CWG member asked what would happen if there was a major discrepancy between the two samples. A re-sample would need to be performed as a first step. Then there may need to be regulatory review and possibly corrective actions. The chances of this happening, however, are very low.

It was pointed out that independent sampling will help foster water quality information credibility and confidence from the community.

A Top of the World resident asked what the water situation is there, since she's been gone for a couple of years. McKeon offered to find more information for her, and they exchanged contact information.

September 12, 2018 CWG Meeting

Topic: *Statewide Drought Issues*
Speaker: *Mike Crimmins, University of Arizona*
Godec introduced Mike Crimmins, a climatologist from the U of A. He noted that Crimmins is not here working for Resolution or as a representative of the company but is an independent researcher. Crimmins said that he is a statewide specialist with the university's Cooperative Extension Service. He clarified that he is not a water expert but deals with climate. In this regard he has been a member of the Governor's Drought Task Force for 10 years, and has worked with the Martins and the Forest Service in the past.

In his presentation, Crimmins provided a definition of drought as an extended period of below-average precipitation. Drought has effects on natural and human systems. Sensitivity to drought can sometimes be mitigated, through planning and other measures.

Drought happens, and is part of normal climate variability; it is not uncommon based on paleo records. Drought is different from aridity in that drought is temporary, whereas aridity is caused by more than temporary increasing temperatures and evapotranspiration. He described the hydrologic cycle, noting that Arizona has a high rate of evapotranspiration. He showed examples of this from Safford data, where water evaporates at a higher rate than it is replaced through precipitation (creating a water deficit), and from Flagstaff where there is a similar situation even though it receives a higher amount of precipitation.

Characteristics of droughts include:

- Meteorological – below average moisture
- Hydrological – impacts on water resources

- Agricultural – insufficient soil moisture
- Socioeconomic – impacts on people and social systems

Some areas of Arizona are rated at a "D4" drought level, which is exceptionally dry, according to the US Drought Monitor. This situation has occurred in about the last year. This is partly due to the fact that last year was a strong La Nina with very little precipitation. This equates to record dries, in the lowest 10% of the scale. The last year also equates to very high temperatures.

Crimmins showed a graph charting precipitation in Superior since the beginning of 2016 that indicates there has been a great deal of climate variability over this period, with some wet monsoons, dry winters, wetter winters, and dryer summers – in other words, a little bit of everything. He showed illustrations of this year's monsoon season, which varied in intensity at various locations around the state. He noted that although the last few months have been wet, we are quite dry when averaged over longer periods. There has not been an extended wet period in Arizona since the early 1990s. To approximate this, we would need to have a wet summer/wet winter/wet summer consecutively. This one wet summer has not ended the drought. In essence, "normal" for us is dry and wet is an anomaly.

Precipitation by year since 1900 was illustrated, showing that the wettest years over the century were 1902, 1941 and 1992/1993, whereas the current period is very dry, representing the worst drought conditions in a hundred years. The 'old school' Palmer Drought Index confirms that this is one of the four worst periods in the reporting timeline, and these conditions would only be expected once or twice per century. In terms of predictions, it would not be unexpected for the current drought to last another 10 years. There is a better than 50% chance of an El Nino this coming year. NOAA seasonal precipitation outlooks predict above-average rainfall throughout the southern US tier. Temperatures, however, are predicted to be above the 1981-2010 seasonal average between now and May 2019. Temperatures have been above average for the past 20 years, with this August/September being the warmest on record. Group comments and questions included the following:

- Intensive summer rains tend to run off and not recharge, while winter rains are longer duration and lower intensity, and recharge aquifers.
- What is going to be done to conserve water in the Valley; is the state doing anything to reduce water use?
    - Crimmins said this is not his area of expertise.
    - The facilitators will try to assemble a meeting that addresses water policy and planning.
- There are many opinions based on politics and money about the state of water resources in Arizona.
- We are in a 20-year drought. This region will take 20 million gallons of water per year out of the groundwater. What can be done about this?
    - This will be a topic for another CWG meeting.
- Is the Southwest getting more arid? Some scientists are now talking about aridification rather than drought.

    - That is a critical question that climatologists are wrestling with.
- Looking back over recorded time, is this situation worse than in the past?
    - Probably not as far as precipitation goes, but temperatures are warmer.
- There is a concern that groundwater levels will continue to drop if Resolution continues to withdraw groundwater, and it is not being replenished through precipitation.
    - Hydrologists from Montgomery Associates were in attendance and offered to come back for another discussion on this topic, which is quite complicated. They are doing work for Resolution.
- Does anyone in Arizona regulate water use and conservation?
    - Local water companies are supposed to monitor their resources and prepare contingency plans, as larger cities and the state do.
    - Areas that receive CAP water dampen the overall effect of drought, which can be very localized, because they receive constant amounts of water from that source. Reservoirs can manage drought better and more than groundwater management programs.
- Godec said that the CAP and the state are preparing drought contingency plans, and they have been invited to discuss their work with the CWG.
- A member noted that banking water doesn't mean that the water will be there when needed; this is a significant issue for the Resolution Copper Project.
- A member suggested that the CWG makes it clear when meeting presentations are about "science" or about "policy", so we don't get sidetracked.
- What is your forecast about how much longer this drought will last?
    - It's not possible to predict with any accuracy. "Plan for the worst, hope for the best." We know that multi-decade droughts occur in Arizona.
- If it's warming, wouldn't this encourage more El Nino activity?
    - This is a current topic of discussion in the climate community; so, we don't know.

December 14, 2018 CWG Meeting

Topic: *Community Monitoring Contract, CWG Discussion*

Godec asked whether the CWG wants to renew the contract for Southwest Groundwater Consultants, and all agreed that they are very happy with them and would like to extend their contract. Resolution will be asked to do this. Vicky Peacey commented that this current effort has been to collect baseline data and to evaluate how the independent sampling process works. She said that other sampling locations can be explored. A CWG member mentioned that some people from the new tailings alternative locations might also be interested in participating or at least knowing that such an independent group exists.

February 13, 2019 CWG Meeting

1. Topic: *Community Monitoring Task Force Report on 2018 Well Sampling*

Speakers: *Kevin Hebert, SGC (now Matrix New World) & Janeane Mancha, Resolution Copper*

Kevin Hebert showed a map of the wells sampled during the final quarter 2018 sampling on December 11. He noted that the Community Monitoring Task Force has sampled the Gallery well at the Arboretum and the Castleberry well every time, the lake at the Arboretum early on

but not now, and the new Martin well once, but it hasn't been possible to test this well recently due to low water levels.

We now have two years of complete sampling data. He showed a table with the cumulative sampling data for the Gallery well. For the most part, constituent levels are similar across time, but some changes have been seen in a few parameters; for example, nitrates have fluctuated but this is not a concern and concentrations are still low. It does, however, indicate that something is going on. The water quality in general is good, and there are no concerns about poor quality. Data for the sampling at the lake was shown, and Kevin confirmed with the group that there is no reason to continue sampling this location. For the Castleberry well, arsenic is above drinking water standards but this is a function of background levels in Arizona and not a health concern. Most other constituent levels are low also compared to Primary and Secondary Maximum Contaminant Levels (MCLs). The Martin well was only sampled effectively in the fourth quarter of 2017, and the next time it took a very long time to purge and obtain a sufficient sample. The Task Force has not been able to sample it since. The water quality looks good here, and hopefully with the wet winter there will be opportunities to sample this well again soon. Casey McKeon clarified that these wells are very shallow even at normal times, but it's important to establish a baseline before permitted discharges begin.

Hebert suggested that it might be helpful to plot all Resolution's and the CWG's data on a hydrograph to see patterns over the past. The group agreed this would be a helpful tool. A member emphasized that it's important to compare Resolution sampling results to Southwest Groundwater's. Casey McKeon reminded the group that Resolution is guided by drinking water standards, whereas the CWG data are compared to non-potable water standards.

In response to a question, it was explained that these wells were selected to be able to monitor future discharges from mining operations, particularly in Queen Creek and downstream. At this time, the data gathered represents background levels. Godec explained that Southwest Groundwater works for the CWG to provide independent review.

It was noted that groundwater levels at some locations in Arizona are going up due to retirement of agricultural withdrawals.

Janeane Mancha of Resolution Copper reviewed things that have changed in the last two years in response to Community Monitoring Task Force suggestions. A guard around the open hole at the Gallery well was added. Power for the sampling pump was changed from using a 12 volt car battery to using a separate portable generator. She showed a graphic illustrating water elevations over the sampling period, and mentioned that Resolution uses SVL Analytical Lab.

2. Topic: *Arizona Drought Contingency Plan 2019*
Speaker: *Mitchell Basefsky, Central Arizona Project*
Mitch Basefsky described his background, saying that he's always been concerned about water in the Southwest. He gave a broad overview of the Colorado River and its uses and allocations, where most of the water is taken off the river before it gets to Mexico. The river is divided into

two basins. There are 7 states in the Upper Basin including Colorado, New Mexico, Wyoming, and Utah, who together receive 7.5 million acre feet (maf) of water per year. The Lower Basin comprises Arizona, California, and Nevada (also 7.5 maf) as well as Mexico's treaty allocation (1.5 maf). Basefsky reviewed the allocations for each state (stemming from the 1922 compact), of which Nevada has by far the smallest allocation of 300,000 af annually.

Arizona's share is 2.8 maf, but until the Central Arizona Project (CAP) system was built, only those directly connected to the Colorado River could use it. The CAP was built to allow Arizona to use the remaining portion of its water by providing a physical connection between the Colorado River and communities in the state. There are 14 pumping stations to lift the water 2800 feet from the river to users. People have asked why the CAP is an open canal rather than a pipeline. Basefsky said it was mainly a matter of cost. The CAP cost $4 billion to build from 1973 to 1993, and a pipeline would have quadrupled the cost. Only about .5% of water is lost to evaporation. Lake Pleasant was built to store and regulate the CAP water.

The CAP service area includes 3 counties cooperating as the Central Arizona Water Conservation District, serving 11 Native American tribes and about 5 million non-Indian people, approximately 80% of the state population. About 33% of CAP water goes to municipal and industrial (M&I) users, 35% to Native American communities, 26% to agriculture, and 6% is recharged for "banking" (as a result of having excess water many years).

In Pinal County, CAP water is used primarily for agriculture. There is a recharge basin near the Superstition Mountains where water is stored on behalf of 9 municipal and agricultural entities. A CWG member asked how much water is lost from reclaiming this stored water. Basefsky said it's about 1.5% plus a 'cut to the aquifer' of 5% that must be left in place.

Basefsky reported on the status of Lake Mead and Lake Powell water levels as of this week:

- Lake Powell sits at only 39% of its capacity, down 44 feet from last year, at elevation 3575
- Lake Mead is 40.6% full (10.5 million af) at elevation 1086. Note that elevation 925 is considered "dead pool", at which electricity cannot be generated or withdrawals made.

He said that the entire Colorado River system is only about 50% full systemwide.

In summary, he said, Arizona is facing a water shortage, since there is not enough water going into the river compared to what's being taken out. Even in 'normal' runoff years, Lake Mead levels have been going down. Historically, the Colorado River allocations were based on unusually wet years, but the reality is that flows have been much less since the original allocations were made decades ago. Today, the mean flow is 10.73 maf per year, compared to 16.5 maf that was estimated in 1922. The structural deficit is about 1.2 maf per year, which is about as much as CAP delivers in total.

In 2007, interim guidelines were agreed among states saying that if Lake Mead goes below 1075 feet elevation, Arizona, Nevada and Mexico take less water. Within CAP, Native American and M&I uses have the highest priority, followed by non-Indian agriculture users who have

negotiated reduction agreements. Excess for banking is the lowest priority. To address this situation, Arizona has taken proactive measures including storage of nearly 4 million af by CAP through the Arizona Water Banking Authority.

The probability of shortage without action is estimated by state water experts to be 57% in 2020, while shortages are not expected in 2019. That is why this Drought Contingency Plan is being developed. This is a collaborative process between the Lower Basin states, key water management agencies, and the U.S. Bureau of Reclamation. All the states and Reclamation will make voluntary reductions. CAP would lose about 1/3 of the water it delivers if the lake elevation goes below 1075. Although California doesn't have to take reductions under the compact agreement, they will do so voluntarily if the water level goes below 1045 feet because of the impact on electric generation from Hoover Dam on which Los Angeles depends.

The Arizona Steering Committee developed the Drought Contingency Plan (DCP) by discussing and recommending how to adopt and implement supply reductions in a way that is acceptable to Arizona water users. This committee included all major users and stakeholders. The Arizona Drought Continency Plan was passed by the Legislature on January 31, 2019. Loss of agricultural water is the biggest issue, so some mitigation measures have been developed including donations from CAP, Salt River Project and Gila River Indian Community during Tier 1 or Tier 2 shortages. Funding for agriculture to reconstruct their groundwater systems in Tier 2 or beyond 2023 would come from CAP and the state and federal governments. Colorado River Indian Tribes and other on-river entities will also leave additional water in Lake Mead, and changes will be made to the groundwater storage regulations to provide added flexibility.

Additional agreements will be needed to implement this plan and develop federal oversight to ensure that water left in Lake Mead is saved for the entities who banked it.

CWG members had the following comments and questions:

- What's the implication for Resolution Copper and the Town of Superior?
    - Hesston Klenk said that all industry would be impacted under significant shortage conditions. But the water that Resolution has banked belongs to them and they won't lose it, and this represents about 70% of the water they will need for the project based on current plans and usage. New technologies in mining are always being developed that may cut Resolution's water demand in future. The water in the aquifer where Resolution is banking has gone up about 300 feet due to changes in agricultural uses.
- Do the discussions include consideration of what kinds of agriculture should be prioritized or cut more or less?
    - Farmers do talk about this because water is their biggest cost, so it's to their advantage to reduce use. This has resulted in conversion to drip irrigation and to less water-intensive crops. There are assistance programs to encourage conversion of irrigation and for municipal conservation assistance.
- Is wastewater viable as an additional water source?

    - There is a lot of discussion about this. Right now, wastewater treatment plants do not treat to the level of drinking water, generally. Yes, you could use it if additional treatment is applied, and it's being done in places now. The biggest public perception problem is the "yuck factor".
- How about desalination?
    - There is an idle desalination plant in Mexico and talks are going on about reopening this. Currently, treating seawater in California costs about $1500/af, which is about 3 times more expensive than traditional water treatment. Israel is building a desalination plant, but details of this were not available.
- Why doesn't California have to take cuts?
    - Because they were "there first", and got water appropriated to them first because of this priority. Arizona agreed to take junior priority in the 1960s as a compromise to get the CAP legislation and funding passed in Congress, which had about 40 California Representatives to Arizona's 3.
- Is Tucson still pumping groundwater?
    - No, now they use CAP delivered water, so groundwater levels have gone up about 70 feet in that aquifer.
- Hesston Klenk said that Kearney will have a very real water crisis this year, since their availability of Gila River water will be reduced from 198 af last year to 50 af this year.
- It was observed that in the current situation, "the Native Americans at long last have the upper hand" in water.

March 13, 2019

Topic: *Discussion and Update of Resolution Copper Project Draft EIS*
Speakers: *Mary Rasmussen, Tonto National Forest & Chris Garrett, SWCA*
Discussion of Impacts: *Water Resources*

Chris Garrett said the Forest Service formed an independent Geology and Subsidence Modeling Workgroup, which found similar data to that prepared by Resolution. Their conclusions are that the subsidence crater at the mine site would be about 1,000 feet deep and 1 mile across, but probably won't result in a lake at the bottom. The fracture zone edge is about 1115 feet from the Apache Leap Special Management Area, so would not result in problems for that feature.

The Forest Service also formed a Groundwater Modeling Workgroup including multiple agencies to examine impacts on key groundwater-dependent ecosystems (GDEs) like springs, Devils Canyon, Queen Creek, Arnett Creek, Telegraph Canyon, and Mineral Creek. They believe that there are at least 5 springs that would be dried up by mine dewatering whether the mine is developed or not, and at least 3 more springs are affected by mining operations.

In relative terms, the Proposed Action would use the most water. The CWG asked:

- Have you modeled just the watershed above Superior? Older folks here say that Queen Creek flowed much more in the past.
    - Because of the subsidence crater capturing some drainage flows, the water in Queen Creek through Superior would be reduced by about 15%.

  - Todd Pryor felt that mitigation for this should be mandatory, as evidence shows that the riparian area through town is much degraded. Perhaps water could be replaced directly back into the creek.
  - The Silver King alternative would cut off some flows in Queen Creek near the Arboretum.
  - There would be no water resources impacts to Queen Valley.
- Will Arizona Water Company's wells be affected, which is what Superior relies on?
  - In the Salt River Valley there would be 90-130 feet of drawdown. These wells are in alluvium and there is plenty of water, so the solution would be to drill deeper. In the New Magma Irrigation District there could be about 40 feet of drawdown. Resolution has stated that they expect to get about half the water they need from here, and would like to figure out how to get it all; this may be more difficult under the state's new Drought Contingency Plan.
- A CWG member suggested that Tonto National Forest hasn't listened to people about the access they want in the Travel Management Plan, so why do they have to listen to Resolution? This is part of the reason the project is taking so long, because the Forest Service has spent much more time than anticipated on alternatives.
- Can the Tonto National Forest 'squash' the project if they don't like it, or do they have a legal responsibility to approve it?
  - It's a lawful proposal and so the Forest Service must consider it under applicable laws.