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Thomas Buschatzke, Director  
Arizona Department of Water Resources  
1110 W. Washington St., Suite 310  
Phoenix, Arizona 85007

Dear Director Buschatzke:

SRP appreciates the Arizona Department of Water Resources (ADWR) efforts to facilitate stakeholder discussions within the Safe-Yield Technical Subgroup. We are pleased to see a continued emphasis on improving ADWR's analysis of how to define and assess safe-yield, while maintaining regulatory flexibility. As 2025 approaches, one of the major issues discussed by the Safe-Yield Technical Subgroup is how best to refine the safe-yield definition. As noted in the Fourth Management Plan, the goal of the Phoenix AMA is to achieve and maintain a "long-term balance" between the annual amount of groundwater withdrawals and natural and artificial recharge in an active management area. How exactly to define "long-term" and how to incorporate it into the assessment of safe-yield remains an open question. SRP has previously provided comments regarding the long-term aspect of safe-yield in letters to ADWR on August 2, 2019, October 30, 2019 and most recently via ADWR's survey in response to the Safe-Yield Technical Subgroup Meeting held on September 30<sup>th</sup>, 2020. In this letter we wish to summarize SRP's perspective on how safe-yield should be evaluated.

There are three key components of our view of safe-yield:

1. ADWR should take into account the cyclical nature of hydrology when considering its assessment of safe-yield by using a 40-year rolling average of the natural components of safe-yield as the data becomes available.
2. ADWR should take into account the temporary fluctuations in groundwater use by using a 5-year <sup>1</sup>rolling average of the artificial components of safe-yield.
3. ADWR should take into account the inherent inaccuracies associated with water measurement devices and calculated estimates of natural components by measuring safe-

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<sup>1</sup> SRP had previously submitted comments after the September 30<sup>th</sup>, 2020 Safe-Yield Technical Subgroup meeting supporting the use of a three-year rolling average of the artificial components of safe-yield. After further evaluation, SRP believes that a 5-year rolling average of artificial components would better account for variability in the economy of the region which would then affect the region's overall water use.

yield against a band of acceptable levels of overdraft or groundwater surplus, suggested to be +/- 5% of total AMA water use.

#### 40-Year Rolling Average of Natural Components vs. 5-Year Rolling Average of Artificial Components

We support the concept of tracking safe-yield using a metric where a 40-year average of the natural components are compared to a 5-year rolling average of the artificial components. While ADWR's safe-yield dashboard has only provided a 20-year average of the natural components, over time more data will become available so that by 2025 we will have 40 years of data comprising the natural components which will provide an assessment of safe-yield that properly accounts for natural hydrologic variability. The benefit of a long-term average approach is that it captures the natural variability in available surface water supplies and its effect on groundwater use and natural recharge, and more accurately shows the long-term impact of both wet and dry cycles. Using a shorter period than the natural variability of surface water supplies could give a false assessment of safe-yield, depending on whether the shorter period is during a wet or dry cycle. We believe that this approach will avoid premature relaxation of conservation requirements during wet periods and over-zealous regulation during temporary dry periods.

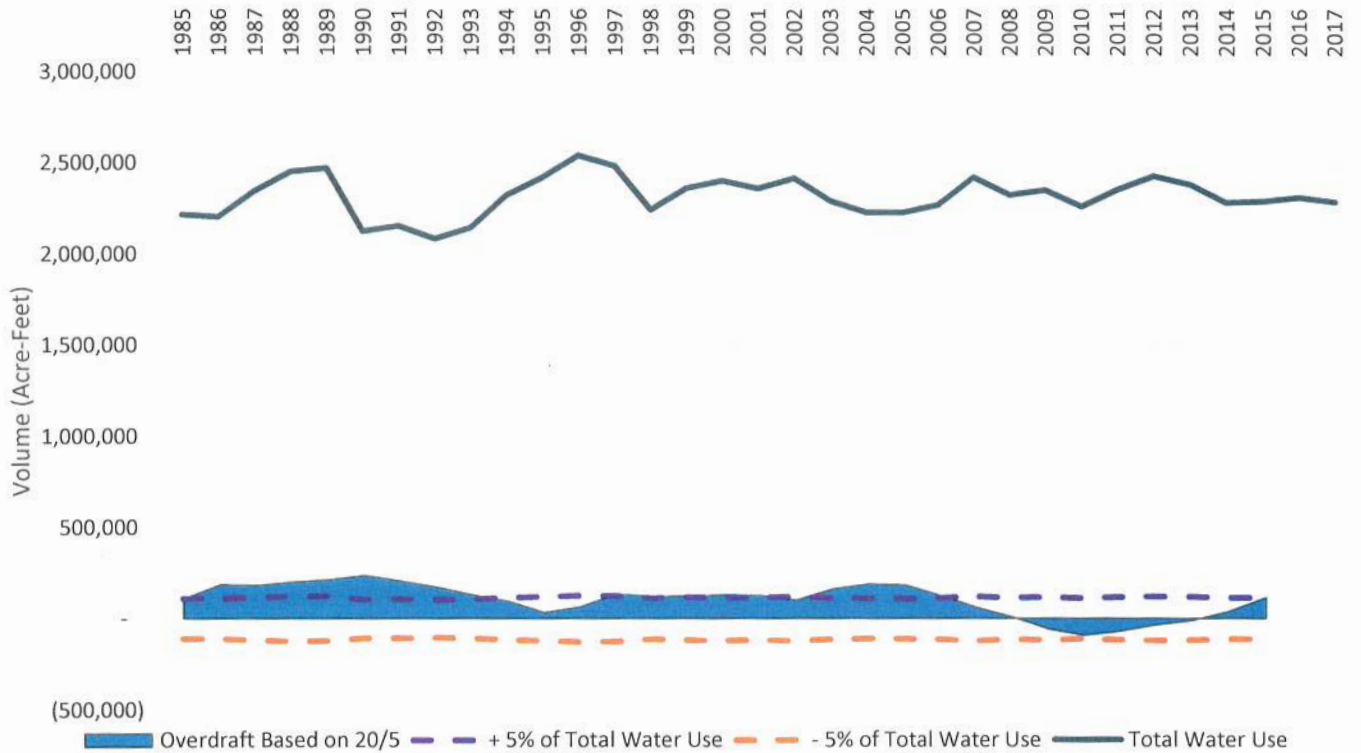
#### +/- 5% Safe-Yield Band

Since the GMA was enacted, water management has become much more sophisticated and we benefit from extensive water use measurement and reporting. We have the capability to examine our progress in great detail, but we shouldn't mistake availability of data for accuracy of data. For example, in the First Management Plan, natural recharge in the Phoenix AMA was estimated to be 10,000 acre-feet per year, but extensive water level data collection and detailed groundwater modeling have combined to form a clearer hydrologic picture that there is much more natural recharge than originally thought. However, model-based estimates of components such as natural recharge or incidental recharge, are still estimates. Likewise there is inherent uncertainty in measured data as well. Even when properly calibrated and in working order, most measurement devices have an expected deviation of +/- 5 percent.

Whether it is the degree of uncertainty in the model-based estimates of natural inflows and outflows or the expected variation in accuracy of water measurement devices, it seems unreasonable for the success of achieving a state of safe-yield to rely upon hitting an exact target. We believe there is a better approach.

We propose that achievement of safe-yield should be defined as net overdraft or surplus within a certain bandwidth that accounts for the uncertainty in model derived estimates and measurement device deviation. Since we do not know the degree of uncertainty in model derived estimates, we are proposing that safe-yield be measured within a bandwidth of 5% of total AMA water use. Figure 1 shows how this range approach would work.

**Figure 1. Overdraft Based on 20 Year Rolling Average of Natural Components and 5 Year Rolling Average of Artificial Components with +/- 5% Band of Total AMA Water Use**



As long as the rolling average overdraft (based on 40-year average of natural components and a 5-year average of the artificial components) is within 5% plus or minus of total AMA water use, the AMA would be determined to be in safe-yield.

## Summary

Safe-yield is a complex metric to define. As 2025 rapidly approaches, it is more important than ever for safe-yield over the long-term to have an operating definition broadly supported by stakeholders. The most significant challenge with addressing safe-yield is deciding on an appropriate time scale and level of accuracy to use when evaluating the condition of the Phoenix AMA. SRP recommends the following principles:

1. ADWR should take into account the cyclical nature of hydrology when considering its assessment of safe-yield by using a 40-year rolling average of the natural components of safe-yield (when the data becomes available).

2. ADWR should take into account the temporary fluctuations in groundwater use by using a 5-year rolling average of the artificial components of safe-yield.
3. ADWR should take into account the inherent inaccuracies associated with water measurement devices and calculated estimates of natural water sources by measuring safe-yield against a band of acceptable levels of overdraft or groundwater surplus, suggested to be +/- 5% of total AMA water use.

We believe that these principles will work together to give an accurate picture of the Phoenix AMA's safe-yield status.

It is important to note that under safe-yield conditions, there are still other water management challenges to address, such as the disconnect between recharge and recovery. Safe-yield may be achieved at an AMA scale, but there could be localized groundwater level concerns that may arise from years of groundwater depletion. Conversely, there are areas of the AMA that continue to experience the water quality consequences of waterlogging. Furthermore, most of the water that has been recharged by various entities across the Phoenix AMA has not had to be recovered at scale. Some of the water that was stored at one location may have physically been pumped by entities with groundwater rights in those same locations. Additional protections for stored water are needed to ensure it can be relied upon in the future.

In short, the achievement of safe-yield is not the end to water management challenges within the Phoenix AMA. While it is important to understand long-term water use patterns and changes in short term demand trends, the identification and adoption of a metric for safe-yield is merely one measure of water management success. Now more than ever it is important for ADWR and Phoenix AMA water users to work together to ensure reliable, resilient, and sustainable water supplies are available to meet our needs today and in the future. We appreciate the opportunity to comment on this important issue and would be happy to meet with you or your staff to discuss our proposal further. Please let us know if you have any questions.

Sincerely,



David C. Roberts  
Associate General Manager  
Water Resources