Utilities, Inc.®

August 5, 2016

Legislative Commission's Subcommittee to Study Water
c/o Alysa Keller, Subcommittee Policy Analyst
Research Division
Legislative Counsel Bureau
401 South Carson Street
Carson City, NV 89701-4747

Re: Water Quality

Dear Chairman Goicoechea,

At the Legislative Commission's Subcommittee to Study Water session in Pahrump, Nevada on July 11, 2016, several citizens voiced concerns over water quality in Hydrographic Basin 162 and suggested Rapid Infiltration Basins (RIBs) could be the source of Nitrates in the groundwater. There was also a concern of pharmaceuticals in the groundwater. While all concerns should be respected, it is important to understand the facts. Understanding the facts should alleviate the concerns about RIBs and their effect on the groundwater. The facts regarding RIBs and their effect on groundwater prove that these concerns are misplaced.

Nitrate, Nitrite and Total Nitrogen

Nitrates are a concern in water and the sources should be understood and recognized. Nitrogen (N) is an organic compound which is necessary for all life for all organisms. The inorganic forms of Nitrogen are Nitrate (NO_2), Nitrite (NO_3) and Ammonia (NH_3). Nitrite are short-lived in water as the bacteria and other microscopic organisms strip oxygen (O) from the NO_3 to create NO_2 (nitrate). Excessive amounts of nitrate can harm human beings.

Nitrate can come from many sources: fertilizers, septic systems, and domestic animals in residential areas, dairies, etc., and can be naturally occurring. A study performed in 2005 by Thomas Buqo on behalf of Pahrump Utilities Company, Inc. reported:

> *The groundwater down gradient of the [Artesia Sewage Treatment] facility is brackish with total dissolved solids concentrations of more than 2,000 ppm, sulfate concentrations of more than 1,000 ppm, and nitrate concentrations of more than 200 ppm, all well above the respective drinking water standards for these parameters.*

It further reports:

> *Nitrates [in the southern portion of the Pahrump valley] are probably related to the Pleistocene lake in Pahrump Valley, specifically the decay of vegetation in bog and marsh deposits adjacent to the shoreline.*[1]

[1] Groundwater Conditions at the Artesia Sewage Treatment Facility, Pahrump, Nevada, Thomas S. Buqo, Consulting Hydrogeologist, Inc., June, 2005. (*Attachment A*)

As human waste contains nitrogen, the Clean Water Act in 1972 (a half century ago) addressed the needs to improve wastewater treatment through controls and Best Available Technologies (BAT). The primary drinking water standard for nitrate is 10 parts per million (ppm). The wastewater treatment plants in Pahrump treat the recycled water to less than the MCL for drinking water for nitrate and total nitrogen and are significantly more effective than the almost 11,000 septic systems[2] in Pahrump. Using 290 gpd discharge per single family residence, the volume of discharge is significantly greater from septic tanks which are 50% less effective than wastewater treatment facilities (and have no disinfection process).

Description	UICN WWTP 3	Septic System
Total Nitrogen	~ 95% - 98% Effective	~ 50% Effective
CBOD (carbonaceous biochemical oxygen demand)	~ 95% - 98% Effective	~ 50% Effective
TSS (total suspended solids)	~ 95% - 98% Effective	~ 50% Effective
E-Coli	~ 95% - 98% Effective	0% Effective
Discharge Volume	~650,000 gpd	~3,190,000 gpd

In 2012, the USGS performed a Pilot Study with the "*Objective . . . to identify the distribution and concentrations of nitrate in groundwater from domestic wells in Pahrump Valley.*"[3] The Pilot Study was followed up with a Phase 2 Study in 2014-2015. The results of these studies were presented to the Nye County Water District Governing Board on March 28, 2016. "*Out of the 47 wells tested for nitrate, 6.4% had nitrate concentrations above the drinking water MCL, with another 2 wells very close to the MCL (>9 ppm <10 ppm). In 42% of the wells, the nitrogen isotopes indicate septic system waste and manure are the sources. Furthermore, the isotope signal indicates nitrate source is* ***not*** *from: fertilizers, precipitation, natural desert deposits.*"[4] The presenter, a Supervisory Hydrologist with the USGS, suggested that the USGS could further support the valley with additional study including sampling around RIBs. However, sampling around RIBs (and wastewater treatment plants) is already required by the USEPA and NDEP so the scientific facts are already available in great quantity about whether the utilities contribute to nitrate in the groundwater; and, they do not.

There has been undue concern regarding Rapid Infiltration Basins (RIB) in Basin 162. Two of three utilities in Pahrump, Nevada discharge into RIBs (as do six other utilities in Nye County[5]) with a Nye County approval pending for RIBs for the third utility. Each utility wastewater facility in the State of Nevada must submit Discharge Monitoring Reports (DMR) to the NDEP and are public record. (Depending on reporting requirements, these DMRs may have to be submitted monthly or quarterly.) In reviewing the DMRs for over a year from the three wastewater treatment plants in Pahrump which have RIBs, or plan to have RIBs, there have been no exceedances since the beginning of 2015 for Nitrate or Total Nitrogen. The fact is that RIBS only enhance the filtration process. RIBs are secondary earthen filters which enhance the cleansing of the treated discharge through slow downward percolation before it enters the aquifer. Not only do the utilities provide high quality recycled water to the basin, NDEP concluded that Pahrump Utilities Company, Inc.'s "*monitoring results from a down-gradient monitoring well, MW-2, exhibit lower concentrations of the same constituents; TDS (1780 mg/L[6]), total*

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[2] There are over 11,000 domestic wells in Pahrump. Additionally, some central water customers have septic systems, some central sewer customers have domestic wells and there are many commercial septic systems in the valley. The estimate of 11,000 septic systems is a low estimate for illustrative purposes.

[3] Presentation by Michal Moran, Supervisory Hydrologist with the USGS, Henderson, NV, to the Nye County Water District Governing Board, March 28, 2016. *(Attachment B)*
(http://nyecounty.granicus.com/MediaPlayer.php?view_id=4&clip_id=937 at 1:26:30.)

[4] Ibid.

[5] Gabbs, Nevada; Tonopah, Nevada (two RIBS, one located in Nye County and one Esmeralda County); Round Mountain, Nevada; Beatty, Nevada; Tonopah Test Site; and Mercury, Nevada.

[6] mg/L (milligrams per liter) is the equivalent of ppm (parts per million). (For these measurements to be perfectly equal, they must be taken with pure water at standard temperature and pressure. Most testing instruments include an automatic temperature compensation feature (ATC) which corrects for this difference.)

nitrogen (9.4 mg/L), and chlorides (250 mg/L), indicating that discharges from the RIBs to groundwater may be diluting and improving the groundwater quality."[7]

The regulations for recycled water are listed in Nevada Administrative Code (NAC) 445A.275 to .280

NAC 445A.276 Reuse categories: Requirements for bacteriological quality of effluent. (NRS 445A.425)

1. Treated effluent being used for an activity approved for a reuse category must meet the following requirements for bacteriological quality for that category:

	Total Coliform	Fecal Coliform			
	c.f.u. or mpn/100ml	c.f.u. or mpn/100ml			
Reuse Category	A	B	C	D	E
30-day geometric mean	2.2	2.2	23	200	No Limit
Maximum daily number	23	23	240	400	No Limit

2. As used in this section, "c.f.u. or mpn/100ml" means colony forming units or most probable number per 100 milliliters of the treated effluent.

(Added to NAC by Environmental Comm'n, eff. 9-13-91; A by R063-04, 10-6-2004)

The difference between Category B and Category A reuse, is simply the measure between fecal coliform c.f.u. and Total Coliforms. As it has never been so much as mentioned by NDEP that there is a need to take these wastewater treatment plants to from Category B to Category A reuse, no engineering study has been done to quantify the (unnecessary) cost.

In conclusion about nitrates in Basin 162: they exist and should be monitored in the Valley. Research and official State and Federal monitoring results strongly indicate septic system and manure sources. Further research may be necessary; however, the facts prove that utility wastewater recycling does not contribute to the nitrate risk to Basin 162 and, in fact, may be beneficial to decreasing the nitrate risk in the Basin.

Pharmaceuticals

Pharmaceuticals in the water are not a current threat to our source water in the basin. On July 13, 2016 you received an email from Wendy Barnett, which included the United States Geological Survey (USGS) findings on pharmaceuticals in the water from testing two of Utilities, Inc. of Central Nevada's (UICN) wells. (Attached for your convenience as *Attachment C.*) The USGS study was focused on a nitrate study and the purpose of the pharmaceutical testing was to determine whether nitrate in the valley are from human sources. At the end of the study, the USGS did not have concerns about the levels of pharmaceuticals in Basin 162.

Pharmaceuticals which are discharged into a water source are diminished through natural process (e.g. adsorption onto sediment, solar photo degradation and biological degradation) and are further degraded by wastewater treatment processes (if used), and the chlorination of drinking water. Sewage treatment plants are not currently designed to remove pharmaceuticals from water; nor are the facilities that treat water to make it drinkable. Yet a certain amount of pharmaceutical residual is removed when water gets treated for other purposes. For example, some research shows that

[7] Nevada Division of Environmental Protection September 2011 Fact Sheet; Prepared by: Arthur Marr, P.E.

conventional treatment methods result in a 90% decrease in the amount of ibuprofen and naproxen in the water discharged from sewage treatment plants.

Drinking-water treatment may also get rid of some pharmaceutical residual. Chlorine is used to kill bacteria and other pathogens, but it also seems to degrade or remove acetaminophen, codeine, and the antibiotic sulfathiazole. A 2007 study of one drinking-water plant found that conventional treatment methods reduced the concentrations of several important medications (acetaminophen, carbamazepine) by 75%.

Most importantly is that the likelihood of risk to human health is minimal. There is no proof that pharmaceuticals in the water have ever impacted human health. The World Health Organization (WHO) reports, "*Current observations suggest that it is very unlikely that exposure to very low levels of pharmaceuticals in drinking-water would result in appreciable adverse risks to human health, as concentrations of pharmaceuticals detected in drinking-water (typically in the nanogram per litre range) are several orders of magnitude (typically more, and often much more, than 1000-fold) lower than the minimum therapeutic dose.*"[8]

The Nye County Board of County Commissioners Planning Department Staff Report to the Pahrump Regional Planning Commission stated:

> *The concerns about pharmaceutical contamination are overblown. Discussions with NDEP, PUC and USGS have concluded that there are typically very low concentrations of some pharmaceuticals which are partially removed by water treatment systems and the filtration of the waste water through the soil removes the majority of anything remaining. . . Trace levels of these chemicals do not necessarily mean any health risk. The EPA and NDEP safe drinking water sample and testing requirements are designed to manage things that are a known health risk.* [9]

Additionally, water quality is within the jurisprudence of the United States Environmental Protection Act (USEPA). The USEPA has no mandated maximum contaminant levels (MCL) for pharmaceuticals. In fact, they have not even set benchmarks for pharmaceuticals. The USEPA does have contaminants of concern lists that have some pharmaceuticals on them but all that means is that they intend to study the detrimental effects and determine if there should be a regulatory limit promulgated for that contaminant.

We urge the Subcommittee to position water quality oversight where it is now, with the USEPA who sets the MCL for contaminants in drinking water and provides enforcement authority to the Nevada Division of Environmental Projection (NDEP). This is a beneficial chain of authority for our State and its citizens. And, there are very real barriers with creating any mandate for monitoring without the USEPA. "*Practical difficulties associated with implementing monitoring programs for pharmaceuticals include the lack of standardized sampling and analysis protocols, high costs and the limited availability of the analytical instruments required to measure the diverse range of pharmaceuticals that may be present.*"[10]

Conversely, should the Subcommittee decide that it is best to establish a pharmaceutical monitoring program, there is always the question of funding. Who should pay for the monitoring? What pharmaceuticals should be monitored? And, who should monitor? USGS? NDEP? Utilities? Local Government? Well Owners? USEPA? As we work towards a solution for water in the State of Nevada, we should use care not to put burdens on only certain sectors of the population. More importantly, it is important as we work towards solutions for water in the State of Nevada that we focus on issues which really need to be addressed based on facts rather than the vocalization from those that don't have the facts on which to base their outcries.

A public education program regarding the protection of the groundwater source from future residual of pharmaceuticals may be appropriate. The Harvard School of Medicine recommends four ways to limit pharmaceuticals in drinking water:

1. **Limit bulk purchases**. Volume discounts make the price attractive, but big bottles of unused pills create an opportunity for medications to end up in the water.

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[8] WHO, Information sheet: Pharmaceuticals in drinking-water. (*Attachment D*)

[9] Nye County Board of County Commissioners Planning Department Staff Report to the Pahrump Regional Planning Commission, March 15, 2016.

[10] WHO, Information sheet: Pharmaceuticals in drinking-water. (*Attachment D*)

2. **Use drug take-back programs**. A federal law went into effect in 2010 that makes it easier for those programs to be organized at a local level, so you may see one in your community. The federal Drug Enforcement Agency has held two national drug take-back days and is likely to organize some more.
3. **Do not flush unused medicines or pour them down the drain**. This is the very least you can do. But the FDA advises that certain powerful narcotic pain medications should be flushed because of concerns about accidental overdose or illicit use unless you can find a drug take-back program that will accept them. We've posted a list of the narcotics on our Web site at www.health.harvard.edu/healthextra.
4. **Be careful about how you throw medications into the trash**. Medications thrown into the trash end up being incinerated or buried in landfills, which is preferable to flushing them or pouring them down the drain. If you put them in the trash, remove them from the packaging, crush them, and seal them in a plastic bag with some water. You're supposed to add sawdust, cat litter, coffee grounds, or some other unappealing material to the bag. That isn't for environmental reasons, but to cut down on the chances that a child or animal might eat the contents. You should also be careful to peel off any identifying information from containers of prescription medicine.

In conclusion about pharmaceuticals in Basin 162, citizens who have been unnecessarily alarmed about pharmaceutical contamination in Basin 162 can be assured through facts from the USGS, the USEPA, WHO and Nye County that their drinking water is safe today from pharmaceuticals. There is no evidence of human health issues or even adverse risk to humans from low level exposure to pharmaceuticals.

Sincerely,

Wendy S.W. Barnett, President
Utilities, Inc. of Central Nevada
Utilities, Inc. of Nevada
Sky Ranch Water Services Corp.
Spring Creek Utilities Co.

Encl: Attachment A - Groundwater Conditions at the Artesia Sewage Treatment Facility, Pahrump, Nevada, Thomas S. Buqo, Consulting Hydrogeologist, Inc., June, 2005
Attachment B - Presentation by Michal Moran, Supervisory Hydrologist with the USGS, Henderson, NV, to the Nye County Water District Governing Board, March 28, 2016
Attachment C - USGS Results Letter UICN
Attachment D - WHO, Information sheet: Pharmaceuticals in drinking-water