



OUR WATER SYSTEMS, OUR FUTURE: INCONVENIENT TRUTHS REVEALED IN SNOWBOWL TALKS

BY KYLE BOGGS

The US Forest Service has been accused of not complying with the **National Environmental Policy Act** process when it drafted its Environmental Impact Statement, leading to approval of using the City's reclaimed wastewater to make artificial snow on the San Francisco Peaks, or *Dook'óostlid*, or *Nuva'tukiyaov*; depending on who you ask. It is likely that before this paper blackens the fingertips of any Northern Arizona reader, a US District Court judge has already made a ruling on the case.

On July 20, at the District Court in Phoenix, lawyers representing the Arizona Snowbowl and the Department of Agriculture, as well as other constituents — literally 6 or 7 people — teamed up against attorney **Howard Shanker**, representing the **Save the Peaks Coalition** and nine concerned citizens. According to the Save the Peaks Coalition, in a press release announcing the case in the summer of 2009, "The use of reclaimed sewer water to make snow, however, was not only repulsive to people who hold the San Francisco Peaks sacred, it raised concerns from skiers and the community over the safety of being immersed in, and even eating, snow made from non-potable treated sewage effluent."

While many ski resorts make use of a percentage of reclaimed wastewater to make artificial snow, the Arizona Snowbowl would be the only resort in the world to use 100% of this treated effluent to make snow. It is this kind of exposure that has prompted specific concerns regarding impact to human health.

In oral arguments, lawyers defending the Forest Service's compliance with NEPA — in approving Snowbowl's proposal to use reclaimed water on the Peaks — said that while the filtration process does not test for all compounds, they maintained that because the **Arizona Department of Environmental Quality** graded the water as "A+," that it is safe to be used.

However, as Congress delays amendments to the outdated **Toxic Substances Control Act from 1976**, many scientists are increasingly regarding the standards used to treat and grade reclaimed wastewater as inadequate. "According to ADEQ regulations, treated sewer water can be graded 'A+' even when it contains fecal matter in three out of every ten samples," stated **Dr. Abraham Springer**, Northern Arizona University professor and director of the School of Earth & Environmental Sustainability.

More specifically, there is an increasingly large body of scientific data that suggests there are many compounds in wastewater that are either not tested for regularly, or not tested for at all. Both in Flagstaff and around the world, studies of wastewater have revealed compelling evidence of pharmaceuticals, hormones, endocrine disrupters, industrial pollutants, and narcotics. In these studies, scientists have found oral contraceptives, human and veterinary antibiotics, anti-seizure medication, antihistamines, caffeine, codeine, steroids, fragrances, and bio-accumulating compounds often found in antibacterial products, namely **triclosan** and **triclocarbans**.

When Mr. Shanker pushed defense lawyers to respond to the argument that many potentially dangerous compounds are simply not tested for, they reiterated that there was not only a filtration process, but the water was also exposed to **ultra-violet** rays and chlorine bleach to purify the water further.

Dr. Catherine Propper, professor of Biological Sciences at NAU, is internationally known for her extensive research on the effects of endocrine disrupting chemicals. She explained how the UV treatment can backfire, depending on what compounds are present. "When you spray it and expose it to UV, sometimes those products break down. Sometimes the breakdown products are better than their original

products, sometimes they're worse."

Dr. Paul Torrence, former NAU professor and renowned expert in the field of bio-organic and medicinal chemistry, helped me understand one of these compounds, which is increasingly present in wastewater. Triclosan, and triclocarbans in particular, have received a lot of attention in the media lately. Chances are readers have at least one product that contains this compound. It is found in a score of products ranging from anti-bacterial soaps, toothpaste, deodorants, and face washes.

When triclosan reacts with UV rays, it forms different, mega-carcinogens, in the form of poisonous dioxins. When it reacts with chloride, it becomes chloroform, which is a carcinogen. This means that some compounds have actually been proven to become even more dangerous, not in spite of adequate filtration, but *because of* the filtration process itself.

If exposure to a chemical quickly and directly causes cancer, or tumors, or death, we will hear about it in the news. Effects of these chemicals on the endocrine system, as outlined in the book, *Our Stolen Future: Are we Threatening our Fertility, Intelligence, and Survival?* are, however, more subtle but equally disturbing. "You're not going to see folks dropping dead because of endocrine disruption," says Dr. Propper, "But you do see ... 'quality of life outcomes.'"

As explained in **Nena Baker's** *The Body Toxic: How the Hazardous Chemistry of Everyday Things Threatens Our Health and Well-Being*, the endocrine system refers to the "complex physiology that controls basic systems of the body from fetal development through adulthood," regulate such things as "organ function, sexual development, behavioral cues, intelligence, and reproductive systems." Dr. Propper has demonstrated some troubling effects of endocrine disrupting chemicals in nonhuman animals.

"When we expose animals to individual compounds, we look at genes that are involved in say, how you get testes or ovaries. We see a shift in those genes, which suggests that you're not going to get a properly functioning gonad. But in order to do that study you need to grow the animal up and look at those fertility and fecundity outcomes." Dr. Propper reiterated the importance of healthy gonads, especially in development. "**Your brain function as an adult is a function of how your gonads develop in utero.**"

While those long-term studies yet to be accomplished, her research has illuminated compelling evidence of skewed sex ratios, **whereby 100% or nearly 100% of a given population of animals is female.** She has also observed dramatic increases of newborn species in testing areas born **hermaphroditic** — that is, male fish with evidence of eggs developing in their testicular tissue or male fish that produce female yolk protein. However, because scientists cannot test on humans, there is a reliance on animal data and the correlations in human exposure.

At a recent forum in Prescott titled, "Recharge of Treated Wastewater to Groundwater: What are the Risks?" **Dr. Bruce Blumberg** of the University of California at Irvine recently addressed the **Citizens Water Advocacy Group** and the **Verde Watershed Association** about the human effects of endocrine disrupters in water. He mentioned an increasingly large body of research indicating a lot of correlative human data, where things like higher levels of a certain compound are associated with different potential endocrine disrupting compounds in humans:

"There are now several of those studies out there that show these correlative effects," says Dr. Propper. "The problem is: **correlation doesn't necessarily mean causation.** So

when you go to look for a causative relationship between an exposure and an outcome, there are several steps you have to do. One of them is demonstrate a correlation, but that alone does not give you a causative outcome."

So essentially, while data exists that demonstrates exposure to endocrine disrupting chemicals in nonhuman animals is causing disruption to their hormone systems, Dr. Propper continues, "We cannot do the experiments on humans to demonstrate causation; it's just unethical. All you can do is look at correlative data. When they look at correlative data for several different outcomes, they do see effects. Some of these are **declining sperm counts, increases in development of fat cells, increases in testicular cancers and reproductive anomalies in men.** All of these are correlated with increased exposure to certain compounds."

These concerns have grown so large that the Environmental Protection Agency is currently entrenched in a multi-year study of endocrine-disrupting compounds found in water across the country. The nationwide study, which will not be completed until 2013, will attempt to answer many scientific questions such as: "What effects are occurring in exposed human and wildlife populations?" The comprehensive study will also look at individual compounds, their potencies, dose-levels in different regions, and how can "unreasonable risks be managed?"

When asked what would happen if the courts rule in Mr. Shanker's favor, he responded: "If the Forest Service failed to adequately consider the impacts on people who eat snow made from reclaimed sewer water in their EIS, Snowbowl would either scrap snowmaking using reclaimed sewer water or they would go back and do an adequate analysis of the potential impacts."

If the decision does not go in Mr. Shanker's favor, he is prepared to file an appeal accordingly. If the judge rules in favor of the Forest Service, Snowbowl owner Eric Borowsky is prepared to start construction of the pipeline and retention ponds immediately, regardless of the EPA's conclusions in 2013.

"If you were a reasonable human being," said Mr. Shanker, "And you're a federal agency and the US EPA is saying 'wait a minute, we don't even know what's in this effluent. It may be dangerous. We know it has endocrine disrupters.' If you were reasonable, you'd wait for them to figure out what's in it before you expose large swaths of the population to it directly, especially children, who are going to be eating it and rolling around in it."

"Mr. Borowsky seems to ignore the fact that the science and the facts don't support his position and culturally, it offends the sensibilities of 13 of the tribes in the Southwestern United States. The regulations say that it's not suitable for full body immersion or any kind of activity that would get it into your nose or mouth. If you read the regulations accurately, it says you shouldn't be skiing or falling down in this stuff. ADEQ approved it for snowmaking; they didn't approve it for skiing."

Mr. Borowsky and others have asserted the wastewater is safe enough to drink; that in places like Scottsdale and Orange County, Calif., residents are actually drinking this water. However, this assumes that wastewater treatment and standards are the same everywhere.

"Reclaimed water is not just one homogenous thing," says Mr. Shanker. "It's a state standard. A+ water in Arizona would be completely different from A+ water in another state, generally. And the uses for it would be different. So if you hear that they drink reclaimed water in LA, that really doesn't mean anything."

A quick call to Scottsdale confirmed that in

fact, because people drink this water, however, it goes through reverse osmosis, which is not required by law, and certainly not in Flagstaff's water treatment budget.

The concerns surrounding exposure to endocrine disrupters and other chemical compounds do not just stop at wastewater, however, but call into question the long-term safety of our drinking water. During recent talks with the Flagstaff City Council and the Water Commission regarding the possible sale of potable water to Snowbowl, many were surprised to learn reclaimed wastewater is already percolating into aquifers and mixing with drinking water.

"I think that's an extremely dangerous precedent," said Mr. Shanker. "I think that's going to result, over the long-term, in the degradation of the drinking water quality."

At a **Coconino Plateau Water Advisory** meeting several months ago, **Jim McCarthy** from the Flagstaff Planning and Zoning Commission and a nonvoting member of the Water Commission asked Dr. Propper if any tests have been performed on well water in the vicinity of wastewater. She affirmed that yes, tests were completed on the Continental Well in Flagstaff, and though the numbers were not as high as the tests done on straight reclaimed water, many endocrine-disrupting compounds exist.

Dr. Propper sees exposure to reclaimed water as just one of the many places we are exposed to endocrine disrupters. We also absorb these compounds from the food we eat and the air we breathe.

And physical contact," says Dr. Propper. "Your couches, your carpets, your computers that say, have flame retardants in them. There are a lot of different places people pick up these contaminants. And what most folks are carrying in their body burden, if we look at the animal data, almost certainly has some effect on their endocrine physiology, whether it's always a negative effect remains to be seen."

As a scientist, Dr. Propper is only in a position to present her findings to those who make policy. "This is when policy makers have to come in to play and say, 'when is the body of evidence enough that it suggests the stuff in the environment is nasty?' The EPA is trying to do that at this point, but it becomes a big policy argument in which a lot of stakeholders have a say."

Dr. Propper, instead, is a proponent of reducing our "chemical footprint." "We should be reducing our chemical footprint just as we want to reduce our carbon footprint. We're not going to stop using fossil fuels or chemicals completely any time soon, but we got to at least really start thinking seriously which ones we use and how much of them we use."

"Chemicals have, no doubt, caused an improvement in our quality of life in a number of areas. But there is also a push by market forces to use chemicals when we don't really need them. There might be a place and a rule for triclosan, for example, in hospital settings that could be important."

"Can we build better plastics that don't leech chemicals when they break down? Can we do better green chemistry by making chemicals that aren't going to impact endocrine function? In general, can we reduce our chemical footprint in ways that that still allow chemicals to be effective for the good things they do, but not allow for some of the environmental and human health damage that they're doing?"

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