



Water Pipeling Comments <nsepipelinecomments@gmail.com>

# Consolidated Fwd: Addendum Fwd: Comments on the proposed Las Vegas Water pipeline

1 message

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Water Pipeling Comments <nsepipelinecomments@gmail.com>

Wed, Nov 30, 2011 at 3:08 PM

To: nsepipelinecomments@gmail.com

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To: Mr Jason King  
Nevada State Engineer

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In previously submitted comments UPHE has cited two studies that offer an estimation of the amount of Colorado River run off lost because of early snow melt in the Rocky Mountains secondary to dust originating from the Southwest. The estimation was 5% of the water within the snow pack, or 250 billion gallons a year. Compare this figure to the water amount that SNWA wishes to pump from this proposed pipeline--65 billion gallons a year.

This leads to the conclusion that there is a very high likelihood that the dust created from this project will cause a loss of Colorado River water far in excess of the amount pumped from Nevada and Utah aquifers. Therefore this project will not just "steal" water from rural Nevada and Utah communities, but from the metropolitan water districts dependent on Colorado River water in all Western states, including Las Vegas. In other words not only will everyone in the Western United States be harmed, but it will also be counterproductive for Las Vegas and the SNWA itself.

Brian Moench, MD  
President, Utah Physicians for a Healthy Environment

To the Nevada State Water Engineer:

The Utah Physicians for a Healthy Environment (UPHE) is a volunteer organization of over 200 physicians and consultants from other scientific fields like toxicology, biology, engineering and ecology. Our mission is to protect public health from the consequences of environmental degradation in Utah. UPHE thanks the Engineer for the opportunity to comment on SNWA's proposed water pumping project.

Numerous individuals and organizations will make comments on the impact this project will have on the economies and the livelihoods of people living in rural Nevada and Utah.

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including the Goshute Native Americans. Others will make comments on the negative impact on native vegetation and wildlife in the affected area and the Great Basin National Park, the cost to residents in the domain of the SNWA.

Hopefully others will point out that if this project is approved, a few decades from now, the SNWA will have exhausted this one time source of water, and Las Vegas will have ended up placing an expanded population at even greater risk of outgrowing any sustainable water resources, essentially making the future disparity between their water needs and availability even worse than exists today. To put it simply, once this water has been used up, what does an even larger Las Vegas do for water then?

While UPHE agrees with others who object to this project because of the above mention considerations we choose to focus our objection on the public health consequences of the almost certain dust and air pollution consequences to residents of Utah from loss of existing desert vegetation.

In their draft environmental impact statement, the BLM estimates that between 24,122 and 34,742 tons per year of newly generated PM10 dust pollution would be created.

However, making use of comparisons to the history and the current state of Owens Valley, California UPHE considers the BLM figure a gross underestimation. And the comparison is appropriate even if the soils in the Great Basin are not identical to the Owens Valley dry lake bed. The Owens Valley lake bed is 280 km<sup>2</sup> and has been estimated to be the source of between 900,000 and 8,000,000 metric tons of PM10 per year (1). The area in the Great Basin that would be dewatered by the proposed SNWA pipeline is approximately 24,000 km<sup>2</sup>, 857 times larger than the dry Owens Lake. Using the median estimate of Owens Valley based PM10 (4,450,000 tons) yields a value of 15,893 tons of PM10 per km<sup>2</sup>. By contrast the BLM is estimating a value of one ton of PM10 per km<sup>2</sup> from the 24,000 km<sup>2</sup> affected by the pipeline. This is, in effect, 16,000 times less dust per sq. km than what has been historically observed by dewatering the Owens Valley. This kind of discrepancy is inexplicable.

Furthermore, loss of Great Basin native vegetation will make the Basin even hotter, creating a positive feedback mechanism that will lead to even greater stress on remaining vegetation, further accelerating vegetation die off and increasing the ensuing dust. We see no evidence that this phenomenon has been considered or factored into the BLM's EIS.

Even the BLM's absurdly low estimates are alarming enough. To place those figures in

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context: The entire PM10 annual emissions in Salt Lake County is approximately 18,000 tons. Salt Lake County is the most urbanized and industrialized county in Utah, home to more than one million people and heavy industrial activity like the Rio Tinto's open pit copper mine, numerous gravel pits, power plants and next door to five oil refineries. The BLM's estimation of PM10 emissions from the desertification consequences of this pipeline are 30-100% greater than the entire emissions of Salt Lake County, which have substantial health impacts.

Over 2,200 research publications in the main stream medical literature in just the last ten years, contribute to this conclusion: there is no safe level of particulate pollution that humans can be exposed to. There is no threshold below which there is no health effect. Even levels that were once thought to be benign, including natural background levels, have been proven to have health consequences. In fact studies have proven that when the signature health outcome of particulate air pollution, sudden cardiac death, is plotted against particulate concentrations, the steepest part of the curve is at the lowest concentrations. In other words, per unit dose of exposure, particulate pollution well below the NAAQS has the greatest health impact.

Attached to these comments is a summary prepared by UPHE of the health impacts of air pollution, organized by organ systems. Bullet points of these impacts on the heart, lungs, brain, chromosomes, fetal and chromosomal development and birth outcomes are given followed by the references supporting these bullet points. There are over 205 studies referenced in total, all from well respected national and international medical journals, many of which establish that this broad array of health impacts are evident at particulate concentrations well below the NAAQS.

Despite the provisions of the Clean Air Act, the history of the EPA's establishment and periodic revisions of the National Ambient Air Quality Standards (NAAQS) demonstrate a strong, indisputable political influence over that process. Throughout the last ten years there have been numerous examples where the recommendations of the EPA's Clean Air Scientific Advisory Committee (CASAC), the scientific experts on the health affects of air pollution, have not been adopted or have been "watered down" by the EPA itself, or other officials in the executive branch. This history alone contradicts any assumption by federal or state (Nevada or Utah) agencies that pollution below federal standards does not have health impacts.

The evidence of desert dust being transported literally thousands of miles is extensive. Satellite images show wind-borne dust originating from the Sahara and Gobi deserts of Africa and Asia drifting to South America, the Caribbean and the southern United

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States (2).

PM10 can be transported more than 1,000 km even in light storms (3). Researchers from the University of Washington found that dust from the Gobi and Taklimakan deserts in China is routinely present in the air over the western United States (4). The National Weather Service has stated that dust generated in the Gobi Desert affects the air quality and sunsets visible in Utah (5). Researchers from the University of Calif. at Davis using a monitoring station at the top of Donner Summit concluded that most of the particulate pollution measurable over Lake Tahoe originates in China and that one third of it is dust from drought and deforestation (6). NASA has proven that forest fires in Russia and Canada have created a poisonous ring of particulate pollution around the entire planet (7). The pollution plume from forest fires in Alaska have been shown to significantly increase ozone concentrations in Europe (8).

Dust from the southwest has already been shown to hasten the melting of snow in the Rocky Mountains, reducing the amount of runoff into the upper Colorado River by 5%, ultimately causing a loss of 250 billion gallons of water a year (9,10).

Dust from the Sahara Desert is regularly transported to Europe. In fact, a recent study demonstrated that Sahara Desert dust frequently induces exceedances of the European Union's standard for PM10. Furthermore, a study of over 80,000 residents in Rome, Italy revealed increased rates of death from cardiac, respiratory, cerebrovascular and natural causes related to increases in PM10 from Saharan dust outbreaks. The relationship was present even at levels that would have been below the EPA's standards in the United States (11).

The World Health Organization published a 100 page document titled, *The Health Risks of Particulate Matter From Long-Range Transboundary Air Pollution*. The following are excerpts from that document.

"PM in the size between 0.1  $\mu\text{m}$  and 1  $\mu\text{m}$  can stay in the atmosphere for days or weeks and thus can be transported over long distances in the atmosphere (up to thousands of kilometres). The coarse particles are more easily deposited and typically travel less than 10 km from their place of generation. However, dust storms may transport coarse mineral dust for over 1000 km."

Medical research of the last ten years has identified ultrafine particle pollution (<.1  $\mu\text{m}$ ) as the most dangerous because it travels deeper into body membranes when inhaled, can invade virtually any cell in the body, penetrating cell membranes and creating a

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chemical toxicity within organelles and the nucleus of the cell (12).

The WHO report goes on to state, "Health effects are observed at all levels of exposure, indicating that within any large population there is a wide range of susceptibility and that some people are at risk even at the lowest end of the observed concentration range." Medical research since this report of 2006 has served to significantly strengthen that contention.

In his book, "The Worst Hard Time", pulitzer prize winner Timothy Egan chronicles the nightmare of the 1930s Dust Bowl, arguably the world's worst environmental disaster. For nine years tsunamis of dust pounded the Great Plains. Sometimes they lasted for weeks at a time, reached 10,000 feet high and blew as far east as the middle of the Atlantic Ocean. Day after day people had to crawl out their windows to scrape the dirt away from their doors. Abandoned homes disappeared beneath drifts of dirt. Dirt coated every indoor surface. House cleaning literally required a shovel.

People and animals trapped outside in the storms risked blindness or suffocating to death. Woody Guthrie wrote a song about the chronic "dust pneumonia", a lung disease that sickened or killed thousands of Midwesterners, especially children. In some counties one third of all deaths were due to "dust pneumonia."

Heat waves led to plagues of insects. For mile after mile not a single green leaf survived as waves of grasshoppers devoured any plants that survived the weather.

The Dust Bowl had three ingredients: unusual heat, drought and most importantly, land use mismanagement. With roots 18 ft. deep native prairie grasses had kept the soil in place for centuries. But encouraged by ignorant government agencies and greedy real estate speculators, settlers were duped into plowing under native grasses to plant winter wheat that had no chance to survive extreme conditions.

Those same three dust bowl ingredients are now gathering on the horizon of the Great Basin. Scientists say climate change will bring us the heat and drought, worse than 1930s. If the SNWA's piping plan is approved, that will bring to the West the third ingredient of the Dust Bowl, land use mismanagement and consequent loss of critical native vegetation.

In the 1930s the ecological disaster of the Dust Bowl got very little attention in Washington, DC until the dust started affecting the skies and air quality in the Eastern United States. But despite eventual changes in federal land use policies the great Dust



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Bowl did not end until rain finally returned to the Great Plains. The Great Basin is not likely to see rain undo the damage wrought by draining its aquifers.

The history of Owens Valley and the Aral Sea cannot be ignored when examining the unintended but predictable collateral damage of water diversion. The dessicated Owens Lake has become the largest source of particulate air pollution in the United States and has set the record for particulate air pollution measured in the US (13). Keeler, Calif. the nearest town, 60 miles away, experiences particulate pollution that violates the NAAQS about 25 days per year. Dr. Bruce Parker, one of the emergency room physicians at Ridgcrest Community Hospital made this statement: "When we see the white cloud headed down through the pass, the ER and doctors' offices fill up with people who suddenly got worse. It's a pretty straightforward cause and effect."(13) Additional health considerations consequent to particulate pollution at Owens Valley is high concentrations of arsenic and other trace metals in the dust, as high as 400 ng/m<sup>3</sup>.(13)

The history of the diversion of inlet waters to the Aral Sea must also be considered when examining the consequences of the SNWA's proposal. Called one of the world's worst environmental disasters by the UN's Secretary General Ban Ki-Moon, the Aral Sea is now 10% of its original size. Due to increased dust storms generated in the now dry lake bed, respiratory illnesses, including drug resistant tuberculosis, brucellosis, cancer, digestive disorders, anemia, and infectious diseases are now common ailments in the region. Liver, kidney and eye problems can also be attributed to the toxic dust storms. There is an unusually high fatality rate amongst vulnerable parts of the population. There is a high child mortality rate of 75 in every 1,000 newborns and maternity death of 12 in every 1,000 women.

In 2002 the UN estimated that winds carried an average of 200,000 tons of salt and toxic dust every day throughout the Aral Sea region and thousands of miles beyond, as far as Russia's arctic north. The dust is heavily polluted with herbicides, heavy metals, and salt (14,15).

Average life expectancy in the Aral Sea region of Kazakhstan has declined from 64 to 51 years. Reproductive pathologies and adverse pregnancy outcomes are much higher than the rest of the former USSR and present-day Russia. 87% of newborn babies are anemic and 5% have birth defects (16). Health authorities in the area are largely in agreement that the newly formed dust bowl and the toxic chemicals contained in the dust is the primary cause of these disturbing public health trends.

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In their EIS the BLM makes this assertion: "Erionite has not been identified in the project area and is not expected to be an air contaminant resulting from project activities."

The Great Basin is uniquely suited to the formation of zeolites such as erionite in that a great deal of volcanic ash has accumulated in the valley basins. The permanent saline, alkaline lakes and playas provided the necessary circumstances for the volcanic ash to eventually produce zeolites. For the BLM to state that erionite "has not been identified in the project area" reveals virtually nothing about how much investigation has been conducted and offers no reassurance that this is not a potentially serious health issue.

Erionite was first recognized as a serious health hazard in the 1980s and found to cause the same types of cancer and interstitial fibrosis as asbestos. However, animal experiments suggest that erionite is 300 to 800 times more carcinogenic than asbestos (Cartew et al. 1992). In villages in Turkey contaminated with naturally occurring erionite the rate of cancer is about 1000 times the normal rate. Erionite contaminated gravel in North Dakota has resulted in levels of exposure similar to what was found in Turkish villages ravaged by mesothelioma cancer (17,18,19).

Given the toxicity of erionite, and its known presence in the Great Basin, the residents of the Western US have a right to know the details of the investigation that allows the BLM to conclude that erionite "is not expected to be an air contaminant resulting from project activities." The Nevada State Engineer should not approve any project where the risk of erionite contamination for local and downwind populations has not been thoroughly evaluated for the entire affected area.

The BLM's EIS makes this statement: "There is not anticipated to be re-suspension and transport of radionuclides from past nuclear testing at levels considered to be harmful to human health." Similar to our statement on erionite, UPHE considers this statement unsubstantiated at best and grossly inaccurate at worst.

In 2006 considerable controversy was raised and eventually wide spread public opposition was mounted in Utah against a federal government planned, non-nuclear bomb test in Nevada dubbed "Divine Strake". 10,000 letters of protest were written to the federal government, most expressing opposition to the likelihood of radioactive contaminated dust drifting into Utah. Divine Strake was cancelled due to public opposition and pressure from Utah's Governor Jon Huntsman. SNWA's pumping project represents a much greater radioactive threat.

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Over 900 nuclear bomb tests occurred at the Nevada test site in the mid 20th century. The DOE also conducted numerous "safety" experiments that did not produce nuclear explosions but did create significant "surface contamination" with plutonium. Nuclear "rocket tests" added additional radioactive contamination. In terms of cumulative effects, the contamination from above ground testing along with the safety shots and cratering events left an estimated 27,000 acres (42 square miles) of surface soils contaminated at levels in excess of 40 pico curies per gram (20).

Underground tests did not stop until 1992 and the US Dept. of Energy (DOE) admits that of the 723 underground tests that were detonated, at least 114 of them released significant radioactivity into the atmosphere. Other scientists think that number is much higher and in fact think that it is rare that underground testing does not release atmospheric radioactivity. Surface soil contamination from underground tests only added to the radioactivity levels mentioned above.

The DOE has stated that it is not possible to fully define the level of residual contamination that remains from the atmospheric testing program, but admits that radioactive isotopes that are still in Great Basin soil include americium, plutonium, uranium, cobalt, cesium, strontium, and europium (20). Some of these radioactive elements are alpha-emitters, some of the most carcinogenic substances known. Illustrating this point: since 1943 the military has been aware of the extreme toxicity of uranium as a gas. In a document dated October 30, 1943 and declassified June 5, 1974, three major scientists from the Manhattan Project, Drs. James Conant, A. H. Compton, and H. C. Urey wrote to Brigadier General Leslie R. Groves, who was the head of the atom bomb project, concerning "Radioactive materials as a military weapon." In that document they stated:

"As a gas warfare instrument the material (uranium) would be ground into particles of microscopic size to form dust and smoke and distributed by a ground-fired projectile, land vehicles, or aerial bombs. In this form it would be inhaled by personnel. The amount necessary to cause death to a person inhaling the material is extremely small. It has been estimated that one millionth of a gram accumulating in a person's body would be fatal. There are no known methods of treatment for such a casualty."

Uranium was also recommended as a permanent terrain contaminant which could be used to destroy populations by contaminating water supplies and agricultural land with radioactive dust (21). One millionth of a gram of uranium yields 1,000 alpha particles per day, each alpha particle carries over 4 million electron volts, and it takes only 6-10 electron volts to break a DNA strand. Because of its mass and energy alpha particles

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are 20 to 1000 times more dangerous to living tissue than beta or gamma radiation (22).

Some of these radioactive elements also bioconcentrate as they rise up the food chain, reaching concentrations as much as thousands of times higher in meat and milk, including human breast milk. Humans reside at the top of the food chain, especially human embryos.

Once inside the human body these radioactive elements continue to bioconcentrate, accounting for their distinctive carcinogenic patterns and enhancing the toxicity of low dose exposures. Strontium concentrates in bone, bone marrow and teeth, resulting in bone cancers and leukemia. Cesium resembles potassium, which is ubiquitous in every cell. It concentrates in brain, muscle, ovary and testicles, leading to brain cancer, muscle cancers (rhabdomyosarcomas), ovarian and testicular cancer and, most importantly, can mutate genes in the eggs and sperm causing genetic diseases in future generations.

Plutonium is the most deadly of an alpha emitters. If inhaled into the lung it is transported from the lung to thoracic lymph nodes where it can induce Hodgkins disease or lymphoma. Because it is an iron analogue it combines with the iron transporting protein and concentrates in the liver, causing liver cancer, and the bone marrow causing bone cancer, leukemia, or multiple myeloma. It also concentrates in the testicles and ovaries where it can induce testicular or ovarian cancer, and/or mutate genes to induce genetic disease in future generations. Plutonium can cross the placental barrier which protects the embryo. Once lodged within the embryo, one alpha particle could kill a cell that would form the left side of the brain, or the right arm, like thalidomide did years ago. The half-life of plutonium is 24,400 years, so it can cause harm for 500,000 years; inducing cancers, congenital deformities, and genetic diseases for the rest of time, not only in humans, but in all life forms.

There is little doubt that current dust storms from the Great Basin already continue to deliver radioactive isotopes to the environment where millions of Utah residents live. A 2009 masters thesis study was conducted using soil samples from the Washington County area to determine if Cesium 137 still exists in the area in detectable amounts. 102 soil samples were collected and analyzed. Only one of the 102 soil samples did not have detectable amounts of Cesium. The author stated, "Several of the samples contained levels substantially higher than earlier estimates would have predicted. This leads us to conclude that doses to the public from the testing could also have been higher than earlier thought." (23)



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If Cesium 137 is that prevalent in soil in Washington County, Utah, one can assume that it and other long lived radioactive isotopes would be all the more prevalent in soil in the area affected by this project, which is closer to the Nevada Nuclear Testing Site. Therefore the dust generated by the newly dewatered landscape is almost certainly still radioactive.

As with particulate air pollution, science has established that there is no safe level of radioactivity exposure. The National Academy of Sciences Biological Effects of Ionizing Radiation (BEIR) Report VII from 2005 states, "A comprehensive review of available biological and biophysical data supports a "linear-no-threshold" (LNT) risk model, that the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase in risk to humans."

Radiation damage is cumulative and each successive dose builds upon the cellular mutation caused by the last. One mutation, in one gene, in a single cell, if unrepaired, can result in a fatal cancer. Many cancers, especially solid tumors, and other genetic diseases have a latency period of many decades. Utah residents are still showing up with new cancers from the original nuclear testing program decades ago.

Even small increases in risk per person become significant public health hazards in the aggregate, when large numbers of people are exposed. In other words, when millions of people are exposed to slightly increased risks, there will be thousands of new victims.

It should be emphasized that cancer is not the only health risk of radiation exposure. Cardiovascular disease causing heart attacks, strokes and diseases consequent to immunosuppression are all correlated to radiation exposure, as are any diseases related to chromosomal dysfunction, such as birth defects. Children are much more susceptible to radiation caused health affects and human embryos, especially during early gestation, are perhaps thousands of times more at risk for genetic mutations from radiation exposure than are adults. There are over 2,600 diseases described in the medical literature caused by genetic mutations. Mutated genes are passed down from generation to generation in perpetuity, impacting the health of future generations.

This type of detailed radio-biological assessment may be beyond the expertise of the Nevada State Water Engineer but it is a very real factor in determining the health impacts of the SNWA's project. The residents of Utah certainly deserve a complete analysis of the radioactive risks of this project to downwind populations in Utah before

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it is approved by the Engineer.

To summarize: the radioactive contamination from nuclear testing still present in Great Basin soil and dust has medical ramifications that will never cease. It will affect the health and viability of future generations forever; inducing epidemics of cancer, leukemia and genetic disease. If any state or federal agency has made an actual assessment of concentrations of residual radioactive isotopes in the surface soil of the pipeline's anticipated affected landscape and/or if modeling has been done to assess public exposure to radioactivity from the ensuing dust, this information should be shared with the public. Unless both of these assessments have been done, the Engineer cannot offer any credible opinion about possible health impacts from radioactive isotopes.

On a per weight basis mercury is considered the most toxic substance on earth after plutonium and the most toxic natural heavy metal. Mercury has become a ubiquitous contaminant of the global environment primarily because of industrial emissions from coal power plants and cement production plants. Even higher concentrations of mercury are also likely to be in surface soils in the affected area because it is released during the smelting phase of the numerous gold mine operations in Nevada. Utah already has a severe problem with mercury contamination of its waterways. The Great Salt Lake has one of the highest concentrations of mercury of any inland body of water in the United States (24).

Given the toxicity of mercury, the Engineer should have made an assessment of mercury and other heavy metal levels in the soils that will be turned into dust by the project. The Aral Sea history proves the health consequences of dust borne heavy metal exposure. We see no evidence any state or federal agency has made any attempt to assess concentrations of non-radioactive heavy metals in the affected area.

Soils in the Western United States also harbor significant concentrations of microorganisms like the fungal spores that cause Valley Fever (coccidioidomycosis). Valley Fever is a difficult to diagnose, occasionally fatal disease caused by inhalation of these spores. The disease has quadrupled in occurrence in the last ten years in the Southwest. The American Academy of Microbiology estimates that 200,000 people per year contract the disease which is fatal in about one in 1,000 cases. People who are immunosuppressed, women who are pregnant and diabetics are particularly susceptible to serious courses of this disease.

Hotter temperatures allow the cocci a survival advantage over other microorganisms and

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more frequent and intense dust storms are the perfect delivery system for increasing this infectious disease among residents of the Western US. Dale Griffin, the USGS microbiologist, says one gram of desert soil can contain as many as one billion microorganisms. Fungi can travel long distances because the spore "housing" acts like a cocoon, protecting the fungus from environmental stresses. More than 140 different organisms have been identified as "hitchhiking on to dust particulates (25). SARS, meningitis, influenza and foot and mouth disease are other infectious diseases that can be transmitted by dust.

To summarize: UPHE considers the public health impacts of SNWA's project, especially regarding Utah residents, to be largely if not entirely unaddressed by state and federal agencies. What must be done in order to properly make that assessment is:

1. Thorough soil sampling of the entire landscape anticipated to be dewatered, including assessment of the concentrations of all the primary heavy metals, especially mercury, radionuclides, zeolites in general, erionite in particular, and microorganisms, especially coccidiomycosis.
2. Depending on the results of the above soil sampling, independent third parties should be employed to make a comprehensive study of the what those concentrations will translate into regarding public health impacts.
3. The methodology used to determine the amount of PM10 dust created by the dewatering of the landscape should be offered to the public and an explanation of why the BLM's estimate is in such sharp contrast to what has been observed in the Owen's Valley and the Aral Sea.
4. Extensive air quality modeling must be done to make a determination of how much of an increase in atmospheric PM2.5 can be expected in various locations in Utah, especially the Wasatch Front.

UPHE wishes to remind the Engineer that the nature of this project means that mistakes made by underestimating public health impacts are likely irreversible, because once the native vegetation has been killed by the drop in ground water levels, there is no reason to believe, and multiple historical examples contradict, SNWA's assurances that more drought tolerant vegetation will take their place. The Engineer's findings must be thorough, impartial, and most importantly error on the side protecting public health.

Sincerely,

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----- Forwarded message -----

From: **Jane Feldman** <[feldman.jane@gmail.com](mailto:feldman.jane@gmail.com)>

Date: Wed, Nov 30, 2011 at 2:56 PM

Subject: Addendum Fwd: Comments on the proposed Las Vegas Water pipeline

To: [nsepipelinecomments@gmail.com](mailto:nsepipelinecomments@gmail.com)

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From: **brian moench** <[drmoench@yahoo.com](mailto:drmoench@yahoo.com)>

Date: Wed, Nov 30, 2011 at 10:39 AM

Subject: Re: Comments on the proposed Las Vegas Water pipeline

To: Jane Feldman <[feldman.jane@gmail.com](mailto:feldman.jane@gmail.com)>

Cc: Steve Erickson <[erickson.steve1@comcast.net](mailto:erickson.steve1@comcast.net)>, Terry Marasco <[tmarasconrm@natural-resource-mgt.com](mailto:tmarasconrm@natural-resource-mgt.com)>

Jane:

Can you add an addendum below to the comments I submitted on behalf of the Utah Physicians for a Healthy Environment (UPHE)?

In previously submitted comments UPHE has cited two studies that offer an estimation of the amount of Colorado River run off lost because of early snow melt in the Rocky Mountains secondary to dust originating from the Southwest. The estimation was 5% of the water within the snow pack, or 250 billion gallons a year. Compare this figure to the water amount that SNWA wishes to pump from this proposed pipeline--65 billion gallons a year.

This leads to the conclusion that there is a very high likelihood that the dust created from this project will cause a loss of Colorado River water far in excess of the amount pumped from Nevada and Utah aquifers. Therefore this project will not just "steal" water from rural

Nevada and Utah communities, but from the metropolitan water districts dependent on Colorado River water in all Western states, including Las Vegas. In other words not only will everyone in the Western United States be harmed, but it will also be counterproductive for Las Vegas and the SNWA itself.

Brian Moench, MD  
President, Utah Physicians for a Healthy Environment

-- On **Wed, 11/30/11**, **brian moench** <[drmoench@yahoo.com](mailto:drmoench@yahoo.com)> wrote:

From: brian moench <[drmoench@yahoo.com](mailto:drmoench@yahoo.com)>

Subject: Comments on the proposed Las Vegas Water pipeline

To: "Jane Feldman" <[feldman.jane@gmail.com](mailto:feldman.jane@gmail.com)>

Date: Wednesday, November 30, 2011, 1:40 AM

Jane:

Can you deliver the comments below to the Nevada State Water Engineer?

Sincerely,

Dr. Brian Moench  
President, Utah Physicians for a Healthy Environment

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To the Nevada State Water Engineer:

The Utah Physicians for a Healthy Environment (UPHE) is a volunteer organization of over 200 physicians and consultants from other scientific fields like toxicology, biology, engineering and ecology. Our mission is to protect public health from the consequences of environmental degradation in Utah. UPHE thanks the Engineer for the opportunity to comment on SNWA's proposed water pumping project.

Numerous individuals and organizations will make comments on the impact this project will have on the economies and the livelihoods of people living in rural Nevada and Utah.

including the Goshute Native Americans. Others will make comments on the negative impact on native vegetation and wildlife in the affected area and the Great Basin National Park, the cost to residents in the domain of the SNWA.

Hopefully others will point out that if this project is approved, a few decades from now, the SNWA will have exhausted this one time source of water, and Las Vegas will have ended up placing an expanded population at even greater risk of outgrowing any sustainable water resources, essentially making the future disparity between their water needs and availability even worse than exists today. To put it simply, once this water has been used up, what does an even larger Las Vegas do for water then?

While UPHE agrees with others who object to this project because of the above mention considerations we choose to focus our objection on the public health consequences of the almost certain dust and air pollution consequences to residents of Utah from loss of existing desert vegetation.

In their draft environmental impact statement, the BLM estimates that between 24,122 and 34,742 tons per year of newly generated PM10 dust pollution would be created.

However, making use of comparisons to the history and the current state of Owens Valley, California UPHE considers the BLM figure a gross underestimation. And the comparison is appropriate even if the soils in the Great Basin are not identical to the Owens Valley dry lake bed. The Owens Valley lake bed is 280 km<sup>2</sup> and has been estimated to be the source of between 900,000 and 8,000,000 metric tons of PM10 per year (1). The area in the Great Basin that would be dewatered by the proposed SNWA pipeline is approximately 24,000 km<sup>2</sup>, 857 times larger than the dry Owens Lake. Using the median estimate of Owens Valley based PM10 (4,450,000 tons) yields a value of 15,893 tons of PM10 per km<sup>2</sup>. By contrast the BLM is estimating a value of one ton of PM10 per km<sup>2</sup> from the 24,000 km<sup>2</sup> affected by the pipeline. This is, in effect, 16,000 times less dust per sq. km than what has been historically observed by dewatering the Owens Valley. This kind of discrepancy is inexplicable.

Furthermore, loss of Great Basin native vegetation will make the Basin even hotter, creating a positive feedback mechanism that will lead to even greater stress on remaining vegetation, further accelerating vegetation die off and increasing the ensuing dust. We see no evidence that this phenomenon has been considered or factored into the BLM's EIS.

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Even the BLM's absurdly low estimates are alarming enough. To place those figures in context: The entire PM10 annual emissions in Salt Lake County is approximately 18,000 tons. Salt Lake County is the most urbanized and industrialized county in Utah, home to more than one million people and heavy industrial activity like the Rio Tinto's open pit copper mine, numerous gravel pits, power plants and next door to five oil refineries. The BLM's estimation of PM10 emissions from the desertification consequences of this pipeline are 30-100% greater than the entire emissions of Salt Lake County, which have substantial health impacts.

Over 2,200 research publications in the main stream medical literature in just the last ten years, contribute to this conclusion: there is no safe level of particulate pollution that humans can be exposed to. There is no threshold below which there is no health effect. Even levels that were once thought to be benign, including natural background levels, have been proven to have health consequences. In fact studies have proven that when the signature health outcome of particulate air pollution, sudden cardiac death, is plotted against particulate concentrations, the steepest part of the curve is at the lowest concentrations. In other words, per unit dose of exposure, particulate pollution well below the NAAQS has the greatest health impact.

Attached to these comments is a summary prepared by UPHE of the health impacts of air pollution, organized by organ systems. Bullet points of these impacts on the heart, lungs, brain, chromosomes, fetal and chromosomal development and birth outcomes are given followed by the references supporting these bullet points. There are over 205 studies referenced in total, all from well respected national and international medical journals, many of which establish that this broad array of health impacts are evident at particulate concentrations well below the NAAQS.

Despite the provisions of the Clean Air Act, the history of the EPA's establishment and periodic revisions of the National Ambient Air Quality Standards (NAAQS) demonstrate a strong, indisputable political influence over that process. Throughout the last ten years there have been numerous examples where the recommendations of the EPA's Clean Air Scientific Advisory Committee (CASAC), the scientific experts on the health affects of air pollution, have not been adopted or have been "watered down" by the EPA itself, or other officials in the executive branch. This history alone contradicts any assumption by federal or state (Nevada or Utah) agencies that pollution below

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federal standards does not have health impacts.

The evidence of desert dust being transported literally thousands of miles is extensive. Satellite images show wind-borne dust originating from the Sahara and Gobi deserts of Africa and Asia drifting to South America, the Caribbean and the southern United States (2).

PM10 can be transported more than 1,000 km even in light storms (3).

Researchers from the University of Washington found that dust from the Gobi and Taklimakan deserts in China is routinely present in the air over the western United States (4). The National Weather Service has stated that dust generated in the Gobi Desert affects the air quality and sunsets visible in Utah (5).

Researchers from the University of Calif. at Davis using a monitoring station at the top of Donner Summit concluded that most of the particulate pollution measurable over Lake Tahoe originates in China and that one third of it is dust from drought and deforestation (6). NASA has proven that forest fires in Russia and Canada have created a poisonous ring of particulate pollution around the entire planet (7). The pollution plume from forest fires in Alaska have been shown to significantly increase ozone concentrations in Europe (8).

Dust from the southwest has already been shown to hasten the melting of snow in the Rocky Mountains, reducing the amount of runoff into the upper Colorado River by 5%, ultimately causing a loss of 250 billion gallons of water a year (9,10).

Dust from the Sahara Desert is regularly transported to Europe. In fact, a recent study demonstrated that Sahara Desert dust frequently induces exceedances of the European Union's standard for PM10. Furthermore, a study of over 80,000 residents in Rome, Italy revealed increased rates of death from cardiac, respiratory, cerebrovascular and natural causes related to increases in PM10 from Saharan dust outbreaks. The relationship was present even at levels that would have been below the EPA's standards in the United States (11).

The World Health Organization published a 100 page document titled, *The Health Risks of Particulate Matter From Long-Range Transboundary Air Pollution*. The following are excerpts from that document.

"PM in the size between 0.1  $\mu\text{m}$  and 1  $\mu\text{m}$  can stay in the atmosphere for days or weeks and thus can be transported over long distances in the atmosphere (up to

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thousands of kilometres). The coarse particles are more easily deposited and typically travel less than 10 km from their place of generation. However, dust storms may transport coarse mineral dust for over 1000 km."

Medical research of the last ten years has identified ultrafine particle pollution (<.1 um) as the most dangerous because it travels deeper into body membranes when inhaled, can invade virtually any cell in the body, penetrating cell membranes and creating a chemical toxicity within organelles and the nucleus of the cell (12).

The WHO report goes on to state, "Health effects are observed at all levels of exposure, indicating that within any large population there is a wide range of susceptibility and that some people are at risk even at the lowest end of the observed concentration range." Medical research since this report of 2006 has served to significantly strengthen that contention.

In his book, "The Worst Hard Time", Pulitzer prize winner Timothy Egan chronicles the nightmare of the 1930s Dust Bowl, arguably the world's worst environmental disaster. For nine years tsunamis of dust pounded the Great Plains. Sometimes they lasted for weeks at a time, reached 10,000 feet high and blew as far east as the middle of the Atlantic Ocean. Day after day people had to crawl out their windows to scrape the dirt away from their doors. Abandoned homes disappeared beneath drifts of dirt. Dirt coated every indoor surface. House cleaning literally required a shovel.

People and animals trapped outside in the storms risked blindness or suffocating to death. Woody Guthrie wrote a song about the chronic "dust pneumonia", a lung disease that sickened or killed thousands of Midwesterners, especially children. In some counties one third of all deaths were due to "dust pneumonia."

Heat waves led to plagues of insects. For mile after mile not a single green leaf survived as waves of grasshoppers devoured any plants that survived the weather.

The Dust Bowl had three ingredients: unusual heat, drought and most importantly, land use mismanagement. With roots 18 ft. deep native prairie grasses had kept the soil in place for centuries. But encouraged by ignorant government agencies and greedy real estate speculators, settlers were duped into

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plowing under native grasses to plant winter wheat that had no chance to survive extreme conditions.

Those same three dust bowl ingredients are now gathering on the horizon of the Great Basin. Scientists say climate change will bring us the heat and drought, worse than 1930s. If the SNWA's piping plan is approved, that will bring to the West the third ingredient of the Dust Bowl, land use mismanagement and consequent loss of critical native vegetation.

In the 1930s the ecological disaster of the Dust Bowl got very little attention in Washington, DC until the dust started affecting the skies and air quality in the Eastern United States. But despite eventual changes in federal land use policies the great Dust Bowl did not end until rain finally returned to the Great Plains. The Great Basin is not likely to see rain undo the damage wrought by draining its aquifers.

The history of Owens Valley and the Aral Sea cannot be ignored when examining the unintended but predictable collateral damage of water diversion. The dessicated Owens Lake has become the largest source of particulate air pollution in the United States and has set the record for particulate air pollution measured in the US (13). Keeler, Calif. the nearest town, 60 miles away, experiences particulate pollution that violates the NAAQS about 25 days per year. Dr. Bruce Parker, one of the emergency room physicians at Ridgrecrest Community Hospital made this statement: "When we see the white cloud headed down through the pass, the ER and doctors' offices fill up with people who suddenly got worse. It's a pretty straightforward cause and effect."(13) Additional health considerations consequent to particulate pollution at Owens Valley is high concentrations of arsenic and other trace metals in the dust, as high as 400 ng/m<sup>3</sup>.(13)

The history of the diversion of inlet waters to the Aral Sea must also be considered when examining the consequences of the SNWA's proposal. Called one of the world's worst environmental disasters by the UN's Secretary General Ban Ki-Moon, the Aral Sea is now 10% of its original size. Due to increased dust storms generated in the now dry lake bed, respiratory illnesses, including drug resistant tuberculosis, brucellosis, cancer, digestive disorders, anemia, and infectious diseases are now common ailments in the region. Liver, kidney and eye problems can also be attributed to the toxic dust storms. There is an unusually high fatality rate amongst vulnerable parts of the population. There is

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a high child mortality rate of 75 in every 1,000 newborns and maternity death of 12 in every 1,000 women.

In 2002 the UN estimated that winds carried an average of 200,000 tons of salt and toxic dust every day throughout the Aral Sea region and thousands of miles beyond, as far as Russia's arctic north. The dust is heavily polluted with herbicides, heavy metals, and salt (14,15).

Average life expectancy in the Aral Sea region of Kazakhstan has declined from 64 to 51 years. Reproductive pathologies and adverse pregnancy outcomes are much higher than the rest of the former USSR and present-day Russia. 87% of newborn babies are anemic and 5% have birth defects (16). Health authorities in the area are largely in agreement that the newly formed dust bowl and the toxic chemicals contained in the dust is the primary cause of these disturbing public health trends.

In their EIS the BLM makes this assertion: "Erionite has not been identified in the project area and is not expected to be an air contaminant resulting from project activities."

The Great Basin is uniquely suited to the formation of zeolites such as erionite in that a great deal of volcanic ash has accumulated in the valley basins. The permanent saline, alkaline lakes and playas provided the necessary circumstances for the volcanic ash to eventually produce zeolites. For the BLM to state that erionite "has not been identified in the project area" reveals virtually nothing about how much investigation has been conducted and offers no reassurance that this is not a potentially serious health issue.

Erionite was first recognized as a serious health hazard in the 1980s and found to cause the same types of cancer and interstitial fibrosis as asbestos. However, animal experiments suggest that erionite is 300 to 800 times more carcinogenic than asbestos (Cartew et al. 1992). In villages in Turkey contaminated with naturally occurring erionite the rate of cancer is about 1000 times the normal rate. Erionite contaminated gravel in North Dakota has resulted in levels of exposure similar to what was found in Turkish villages ravaged by mesothelioma cancer (17,18,19).

Given the toxicity of erionite, and its known presence in the Great Basin, the residents of the Western US have a right to know the details of the investigation

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that allows the BLM to conclude that erionite "is not expected to be an air contaminant resulting from project activities." The Nevada State Engineer should not approve any project where the risk of erionite contamination for local and downwind populations has not been thoroughly evaluated for the entire affected area.

The BLM's EIS makes this statement: "There is not anticipated to be re-suspension and transport of radionuclides from past nuclear testing at levels considered to be harmful to human health." Similar to our statement on erionite, UPHE considers this statement unsubstantiated at best and grossly inaccurate at worst.

In 2006 considerable controversy was raised and eventually wide spread public opposition was mounted in Utah against a federal government planned, non-nuclear bomb test in Nevada dubbed "Divine Strake". 10,000 letters of protest were written to the federal government, most expressing opposition to the likelihood of radioactive contaminated dust drifting into Utah. Divine Strake was cancelled due to public opposition and pressure from Utah's Governor Jon Huntsman. SNWA's pumping project represents a much greater radioactive threat.

Over 900 nuclear bomb tests occurred at the Nevada test site in the mid 20th century. The DOE also conducted numerous "safety" experiments that did not produce nuclear explosions but did create significant "surface contamination" with plutonium. Nuclear "rocket tests" added additional radioactive contamination. In terms of cumulative effects, the contamination from above ground testing along with the safety shots and cratering events left an estimated 27,000 acres (42 square miles) of surface soils contaminated at levels in excess of 40 pico curies per gram (20).

Underground tests did not stop until 1992 and the US Dept. of Energy (DOE) admits that of the 723 underground tests that were detonated, at least 114 of them released significant radioactivity into the atmosphere. Other scientists think that number is much higher and in fact think that it is rare that underground testing does not release atmospheric radioactivity. Surface soil contamination from underground tests only added to the radioactivity levels mentioned above.

The DOE has stated that it is not possible to fully define the level of residual

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contamination that remains from the atmospheric testing program, but admits that radioactive isotopes that are still in Great Basin soil include americium, plutonium, uranium, cobalt, cesium, strontium, and europium (20). Some of these radioactive elements are alpha-emitters, some of the most carcinogenic substances known. Illustrating this point: since 1943 the military has been aware of the extreme toxicity of uranium as a gas. In a document dated October 30, 1943 and declassified June 5, 1974, three major scientists from the Manhattan Project, Drs. James Conant, A. H. Compton, and H. C. Urey wrote to Brigadier General Leslie R. Groves, who was the head of the atom bomb project, concerning "Radioactive materials as a military weapon." In that document they stated:

"As a gas warfare instrument the material (uranium) would be ground into particles of microscopic size to form dust and smoke and distributed by a ground-fired projectile, land vehicles, or aerial bombs. In this form it would be inhaled by personnel. The amount necessary to cause death to a person inhaling the material is extremely small. It has been estimated that one millionth of a gram accumulating in a person's body would be fatal. There are no known methods of treatment for such a casualty."

Uranium was also recommended as a permanent terrain contaminant which could be used to destroy populations by contaminating water supplies and agricultural land with radioactive dust (21). One millionth of a gram of uranium yields 1,000 alpha particles per day, each alpha particle carries over 4 million electron volts, and it takes only 6-10 electron volts to break a DNA strand. Because of its mass and energy alpha particles are 20 to 1000 times more dangerous to living tissue than beta or gamma radiation (22).

Some of these radioactive elements also bioconcentrate as they rise up the food chain, reaching concentrations as much as thousands of times higher in meat and milk, including human breast milk. Humans reside at the top of the food chain, especially human embryos.

Once inside the human body these radioactive elements continue to bioconcentrate, accounting for their distinctive carcinogenic patterns and enhancing the toxicity of low dose exposures. Strontium concentrates in bone, bone marrow and teeth, resulting in bone cancers and leukemia. Cesium resembles potassium, which is ubiquitous in every cell. It concentrates in brain, muscle, ovary and testicles, leading to brain cancer, muscle cancers

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(rhabdomyosarcomas), ovarian and testicular cancer and, most importantly, can mutate genes in the eggs and sperm causing genetic diseases in future generations.

Plutonium is the most deadly of an alpha emitters. If inhaled into the lung it is transported from the lung to thoracic lymph nodes where it can induce Hodgkins disease or lymphoma. Because it is an iron analogue it combines with the iron transporting protein and concentrates in the liver, causing liver cancer, and the bone marrow causing bone cancer, leukemia, or multiple myeloma. It also concentrates in the testicles and ovaries where it can induce testicular or ovarian cancer, and/or mutate genes to induce genetic disease in future generations. Plutonium can cross the placental barrier which protects the embryo. Once lodged within the embryo, one alpha particle could kill a cell that would form the left side of the brain, or the right arm, like thalidomide did years ago. The half-life of plutonium is 24,400 years, so it can cause harm for 500,000 years; inducing cancers, congenital deformities, and genetic diseases for the rest of time, not only in humans, but in all life forms.

There is little doubt that current dust storms from the Great Basin already continue to deliver radioactive isotopes to the environment where millions of Utah residents live. A 2009 masters thesis study was conducted using soil samples from the Washington County area to determine if Cesium 137 still exists in the area in detectable amounts. 102 soil samples were collected and analyzed. Only one of the 102 soil samples did not have detectable amounts of Cesium. The author stated, "Several of the samples contained levels substantially higher than earlier estimates would have predicted. This leads us to conclude that doses to the public from the testing could also have been higher than earlier thought." (23)

If Cesium 137 is that prevalent in soil in Washington County, Utah, one can assume that it and other long lived radioactive isotopes would be all the more prevalent in soil in the area affected by this project, which is closer to the Nevada Nuclear Testing Site. Therefore the dust generated by the newly dewatered landscape is almost certainly still radioactive.

As with particulate air pollution, science has established that there is no safe level of radioactivity exposure. The National Academy of Sciences Biological Effects of Ionizing Radiation (BEIR) Report VII from 2005 states, "A comprehensive review of available biological and biophysical data supports a

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"linear-no-threshold" (LNT) risk model, that the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase in risk to humans."

Radiation damage is cumulative and each successive dose builds upon the cellular mutation caused by the last. One mutation, in one gene, in a single cell, if unrepaired, can result in a fatal cancer. Many cancers, especially solid tumors, and other genetic diseases have a latency period of many decades. Utah residents are still showing up with new cancers from the original nuclear testing program decades ago.

Even small increases in risk per person become significant public health hazards in the aggregate, when large numbers of people are exposed. In other words, when millions of people are exposed to slightly increased risks, there will be thousands of new victims.

It should be emphasized that cancer is not the only health risk of radiation exposure. Cardiovascular disease causing heart attacks, strokes and diseases consequent to immunosuppression are all correlated to radiation exposure, as are any diseases related to chromosomal dysfunction, such as birth defects. Children are much more susceptible to radiation caused health affects and human embryos, especially during early gestation, are perhaps thousands of times more at risk for genetic mutations from radiation exposure than are adults. There are over 2,600 diseases described in the medical literature caused by genetic mutations. Mutated genes are passed down from generation to generation in perpetuity, impacting the health of future generations.

This type of detailed radio-biological assessment may be beyond the expertise of the Nevada State Water Engineer but it is a very real factor in determining the health impacts of the SNWA's project. The residents of Utah certainly deserve a complete analysis of the radioactive risks of this project to downwind populations in Utah before it is approved by the Engineer.

To summarize: the radioactive contamination from nuclear testing still present in Great Basin soil and dust has medical ramifications that will never cease. It will affect the health and viability of future generations forever; inducing epidemics of cancer, leukemia and genetic disease. If any state or federal agency has made an actual assessment of concentrations of residual radioactive isotopes in the surface soil of the pipeline's anticipated affected landscape and/or if

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modeling has been done to assess public exposure to radioactivity from the ensuing dust, this information should be shared with the public. Unless both of these assessments have been done, the Engineer cannot offer any credible opinion about possible health impacts from radioactive isotopes.

On a per weight basis mercury is considered the most toxic substance on earth after plutonium and the most toxic natural heavy metal. Mercury has become a ubiquitous contaminant of the global environment primarily because of industrial emissions from coal power plants and cement production plants. Even higher concentrations of mercury are also likely to be in surface soils in the affected area because it is released during the smelting phase of the numerous gold mine operations in Nevada. Utah already has a severe problem with mercury contamination of its waterways. The Great Salt Lake has one of the highest concentrations of mercury of any inland body of water in the United States (24).

Given the toxicity of mercury, the Engineer should have made an assessment of mercury and other heavy metal levels in the soils that will be turned into dust by the project. The Aral Sea history proves the health consequences of dust borne heavy metal exposure. We see no evidence any state or federal agency has made any attempt to assess concentrations of non-radioactive heavy metals in the affected area.

Soils in the Western United States also harbor significant concentrations of microorganisms like the fungal spores that cause Valley Fever (coccidioidomycosis). Valley Fever is a difficult to diagnose, occasionally fatal disease caused by inhalation of these spores. The disease has quadrupled in occurrence in the last ten years in the Southwest. The American Academy of Microbiology estimates that 200,000 people per year contract the disease which is fatal in about one in 1,000 cases. People who are immunosuppressed, women who are pregnant and diabetics are particularly susceptible to serious courses of this disease.

Hotter temperatures allow the cocci a survival advantage over other microorganisms and more frequent and intense dust storms are the perfect delivery system for increasing this infectious disease among residents of the Western US. Dale Griffin, the USGS microbiologist, says one gram of desert soil can contain as many as one billion microorganisms. Fungi can travel long distances because the spore "housing" acts like a cocoon, protecting the fungus

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from environmental stresses. More than 140 different organisms have been identified as "hitchhiking on to dust particulates (25). SARS, meningitis, influenza and foot and mouth disease are other infectious diseases that can be transmitted by dust.

To summarize: UPHE considers the public health impacts of SNWA's project, especially regarding Utah residents, to be largely if not entirely unaddressed by state and federal agencies. What must be done in order to properly make that assessment is:

1. Thorough soil sampling of the entire landscape anticipated to be dewatered, including assessment of the concentrations of all the primary heavy metals, especially mercury, radionuclides, zeolites in general, erionite in particular, and microorganisms, especially coccidiomycosis.
2. Depending on the results of the above soil sampling, independent third parties should be employed to make a comprehensive study of the what those concentrations will translate into regarding public health impacts.
3. The methodology used to determine the amount of PM10 dust created by the dewatering of the landscape should be offered to the public and an explanation of why the BLM's estimate is in such sharp contrast to what has been observed in the Owen's Valley and the Aral Sea.
4. Extensive air quality modeling must be done to make a determination of how much of an increase in atmospheric PM2.5 can be expected in various locations in Utah, especially the Wasatch Front.

UPHE wishes to remind the Engineer that the nature of this project means that mistakes made by underestimating public health impacts are likely irreversible, because once the native vegetation has been killed by the drop in ground water levels, there is no reason to believe, and multiple historical examples contradict, SNWA's assurances that more drought tolerant vegetation will take their place. The Engineer's findings must be thorough, impartial, and most importantly error on the side protecting public health.

Sincerely,

Brian Moench, MD

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President, Utah Physicians for a Healthy Environment  
Honors College Faculty, U. of Utah  
course instructor, Public Health and the Environment

Cris Cowley, MD  
Vice President, Utah Physicians for a Healthy Environment  
Chair, Division of Cardiothoracic Anesthesia. Intermountain Medical Center.

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Conservation Chair, Southern Nevada Group of the Sierra Club  
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Every gun that is made, every warship launched, every rocket fired, signifies in the final sense a theft from those who hunger and are not fed, those who are cold and are not clothed. Dwight D Eisenhower

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