



Hot Air from EEOP – A Newsletter

Environmental Education Outreach Program (EEOP)
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Web version @
<http://www.nau.edu/eeop/newsletter>

The Newsletter

This newsletter is a service of the Institute for Tribal Environmental Professionals (ITEP) Environmental Education Outreach Program (EEOP). The EEOP staff created this newsletter for K-16 students, educators, and tribal professionals that are interested in learning more about environmental issues with an emphasis on air quality. This issue of the newsletter will provide more information on two topics introduced in the last issue – mercury and uranium. Articles will consider how mercury from power-plants impacts on many tribal communities and explore the issues associated with uranium mining. Another article will provide information about Summer Programs on the Northern Arizona University (NAU) campus.

Mercury – Tribal Impacts

Last month's newsletter had an article about a federal court ruling that the US Environmental Protection Agency (EPA) violated the Clean Air Act (CAA) when it removed oil and coal fired power plants from the list of sources that are subject to the CAA's most stringent air pollution controls. Mercury emissions from power plants are deposited in watersheds and water bodies, where it is converted to its most toxic form, methyl mercury. The methyl mercury gets into the ecosystem food web and through the processes of bioaccumulation and biomagnifications the aquatic predator fish accumulate high concentrations of mercury.

The EPA works with the U.S. Food and Drug Administration (FDA) and with states and tribes to issue advice to women who may become pregnant, pregnant women, nursing mothers and parents of young children about how often they should eat certain types of commercially-caught fish and shellfish. In addition, EPA releases an annual summary of information on locally-issued fish advisories and safe-eating guidelines to the public. Fish is a beneficial part of the diet, so EPA & FDA encourage people to continue to eat fish that are low in methyl mercury.

Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. Research shows that most people's fish consumption does not cause a health concern. However, tribal communities may be at especially high risk for environmentally-caused diseases because of their subsistence lifestyles, occupations and customs and/or environmental releases impacting tribal lands. For many tribes, fish is more than just food. It's a link with past generations, a symbol of cultural identity. That makes mercury contamination a particularly touchy matter. Tribal leaders walk a fine line between encouraging their citizens to retain ancient traditions and cautioning them against the modern threat of tainted fish, the leading cause of human mercury poisoning.

Excessive mercury from power plants threatens both the health of individual tribal members from mercury poisoning and the health of tribal communities from the disruption of cultural practices. Reductions of mercury releases are vital for protecting human health and preserving tribal traditions.

In addition to encouraging your elected officials to support the Clean Air Act (CAA), you can help by conserving energy. If we can reduce energy consumption, we can focus on cleaning up old power plants, rather than building new ones. For more ideas on conserving energy, contact the EEOP staff.

Nuclear Power – Clean Energy with a Dirty Side

With increasing concerns about Global Warming and Climate Change, many people previously opposed to nuclear power have been reconsidering their position. Since nuclear power production does not release carbon dioxide, it is considered a “green” energy source by some. However, most people considering nuclear power do not understand the “dirty side” of nuclear power. The “dirty side” of the nuclear energy cycle is not the storage of spent nuclear fuel. While the storage of spent nuclear fuel is a political “hot potato”, the storage issues are more political than technical. There is another side of the nuclear energy cycle, rarely acknowledged by the nuclear industry – the extraction of raw materials from the earth.

Uranium ore usually contains only a small percentage of pure uranium. As long as it remains outside the body, lower grades of this ore pose little health risk. However, if uranium is inhaled or ingested, its radioactivity can trigger the development of lung cancer and bone cancer. Uranium at low concentrations is also chemically toxic and can cause damage to internal organs, notably the kidneys. Extraction of the uranium from the ore can lead to increased health risks from several activities.

Uranium ore is either dug out of the ground or the uranium is leached from the ore in the mine. Uranium is generally found in low concentration ores; therefore, huge amounts of rock must be mined. For every ton of high grade uranium ore produced, there are 55 tons of tailings produced; low grade uranium ores result in even more tailings. Before the uranium metal is extracted, the ore must be crushed into finer and finer fragments. Large amounts of water and chemicals are added to the pulverized ore in order to extract the uranium.

The product of the milling process is called yellowcake, which is a yellow powder that contains 90 percent uranium oxide (U₃O₈). Yellowcake (U₃O₈) is further processed to produce enriched uranium, which is required for nuclear power plants. The fuel pellets, enriched uranium dioxide (UO₂), are assembled into fuel rods for power production.

Tailings are the left-over sludge after the uranium metal is extracted from the uranium ore. The half-lives of the principal radioactive components of mill tailings, Thorium-230 and Radium-226 are long, 75,000 and 1,600 years respectively. Therefore these tailings require long-term storage to ensure protection of the environment and human health.

In addition to the tailings, the mines themselves become sources of contamination because of the development of “acid mine drainage”. The disturbance of the soil and exposure to the atmosphere causes changes in the soil, which can lead to mobilizing metals in the soil, resulting in contamination plumes in ground water or acid contamination of streams and lakes.

Another major threat to the environment and human health is Radon. During uranium exploration and mining, huge quantities of Radon gas are released into the air. Radon and its decay products can get into the lungs and cause lung cancer. (This is a significant part of the health impacts experienced by Navajo communities during mining operations in the 50s, 60s and 70s.) When Radon-222 gas is released from a uranium mine, it deposits solid radioactive dust on the ground for hundreds of miles downwind from the mine site. The Radon-222 and all of its radioactive decay chain products release twelve times as much radiation as is in the Uranium-238 itself. These solid particles that form when Radon-222 decays quickly become Lead-210, which has a half-life of 22.3 years. Uranium waste rock and tailings storage sites have also been identified as significant sources of Radon gas released into the environment.

Mining operations in the 50s, 60s, and 70s ignored the environmental and health consequences of uranium mining. Many tribal communities are still dealing with legacy issues resulting from the poor mining practices of the past. Research continues on ways to mitigate the negative consequences of mining, however, uranium mining is still the “dirty” side of the nuclear energy cycle. When comparing different sources of energy, the entire energy production cycle must be carefully considered. This is true of even the alternative energy sources like wind and solar power.

As we understand the consequences of any energy production cycle, we develop a better understanding of the importance of energy conservation. If we need less energy, the consequences of energy production can be reduced. The Native American Cancer Partnership at Northern Arizona University (NAU) is investigating the health impacts of uranium on Navajo communities in Arizona. For more information about uranium mining and health impacts contact the EEOP staff.

Summer Programs at Northern Arizona University (NAU)

There are several departments at Northern Arizona University (NAU) that provide summer experiences for Middle School and High School students. We encourage all students to consider participating in a summer program to enrich and enhance your academic preparation.

Northern Arizona University's (NAU) **Multicultural Engineering Program (MEP)** is hosting two engineering camps for high school students on the NAU Mountain Campus this July. This will be the fourth year for the popular STEP UP engineering camp for young women (July 6-12) and the first for its male equivalent: TEC UP (July 21-25) These residential summer camps are dedicated to introducing high school students to engineering through a variety of hands-on engineering and science activities. Students from across the country learn from NAU engineering faculty, students and professional engineers from a wide range of engineering and science disciplines. Past and future activities include water quality testing and the construction of solar stoves, working robots, mousetrap cars, and a hydraulics system. The camps also include exciting design challenges, which encourage the students to produce innovative team designs and learn the value of teamwork in engineering design. The MEP engineering summer camps welcome all students entering the 10th, 11th or 12th grades in fall '08 who have an interest in math, science, or engineering to apply. The MEP especially encourages students from minority populations and those would be the first in their families to go to college. Camp fees remain very low to allow all students who have an interest to participate. TEC UP camp is an affordable \$150 while the longer STEP UP camp is \$200. Applications are due by May 30th. More information and application can be found at www.nau.edu/mep.

The EEOP staff is conducting the **Summer Scholars** program, which provides Native American students a one-week, on-campus pre-college experience with emphasis in applied mathematics, science, and technology focusing on local environmental issues. One goal of Summer Scholars is to make students aware of opportunities that exist after high school. Students are encouraged to consider mathematics, science, and technology careers that require post-secondary education. The topic for Summer Scholars 2008 will be “Creating Sustainability in Schools.” Students will work on one of four taskforces: Energy Taskforce, Water Taskforce, Building Taskforce, or the Transportation Taskforce. The EEOP staff is currently recruiting schools to participate in the Summer Scholars 2008 program. If your school is interested, please contact Matthew or Mansel.

The **Summer Enrichment Program (SEP)** serves to help middle school and high school students build and expand their academic and social skills through hard work, while increasing expectations, personal commitment, and assisting students to strive towards a positive future. In 1999, the College of Education at Northern Arizona University created the Summer Enrichment Program (SEP) to serve the middle and high school students in Arizona. SEP is a week-long summer residential academic program providing students the opportunity to experience campus life while still attending high school. The goal of SEP is to get students thinking about themselves as future college students and keep them engaged in learning through innovative interdisciplinary teaching and hands-on, problem-based learning activities. More information can be found at <http://sep.coe.nau.edu/>.

The **Centennial Forest** provides Environmental Education Programs. The vision of the Junior and Senior Forester Academy, Outdoor Leadership Academy is to have fun while connecting kids to the forest and the natural world so that they can learn and teach others about good stewardship, land ethics, and forest health. Campers will use critical thinking skills gained through fun, hands-on activities. More information can be found at <http://www.for.nau.edu/CentennialForest/content/view/549/759>

Future Issues

We are interested in articles sharing stories from students, teachers, or tribal professionals influenced by ITEP or EEOP activities. If you would like to be published in the EEOP newsletter, send Mansel your proposed article.

Credits and Contacts

The US Environmental Protection Agency (USEPA) Office of Air and Radiation provides part of the funding to make this newsletter possible. The newsletter is disseminated on various list serves, however, if you would like to join the newsletter list serve, contact Mansel.

The author of the articles about mercury and uranium drew from several different sources, including Associated Press (AP) releases, several newspapers such as the Arizona Republic and the Arizona Daily Sun, and several websites, including the US EPA website.

Our staff looks forward to providing new services and developing new programs, as well as continuing existing programs. We especially look forward to hearing from you. So please visit our website at <http://www.nau.edu/eeop> or contact us via telephone or email.

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