

RESPONSE TO CONCERNS RAISED IN LETTER DATED APRIL 19, 2010

Dr. Schultes letter provided background comments concerning human health studies, uranium mining impacts, health effects from routine releases, and releases of low-level radioactive waste. His letter asked the following four questions:

1. How can DAEC prove that increases in the radiation exposure in the Cedar Rapids area has [not] occurred and will [not] continue under the new proposed license?
2. How can DAEC assure us that there will be no increase in radiation beyond background levels in the Cedar Rapids area?
3. In connection with the environmental monitoring of DAEC, why is the effect of the nuclear power plant on milk no longer monitored?
4. How can the DAEC assure us that there will be no waste contaminating our air, water, land and living space?

The U.S. Nuclear Regulatory Commission (NRC) staff has taken his comments into consideration in finalizing the supplemental environmental impact statement (SEIS) and offers the following information for consideration.

The NRC's primary mission is to protect the public health and safety and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects (i.e., cancer and other biological impacts) of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations. The NRC actively participates and monitors the work of these organizations to keep current on the latest trends in radiation protection. If the NRC determines that there is a need to revise its radiation protection regulations, it will initiate new rules. The models recognized by the NRC for use by nuclear power reactors to calculate dose incorporate conservative assumptions that account for differences in gender and age to ensure that workers and members of the public are adequately protected from radiation.

Although radiation may cause cancers at high doses, currently there are no reputable scientifically conclusive data that unequivocally establish the occurrence of cancer following exposure to low doses, below about 10 rem (0.1 Sv). However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for larger radiation exposures. Therefore, a linear, no-threshold dose response relationship is used to describe the relationship between radiation dose and detriments such as cancer induction; simply stated, any increase in dose, no matter how small, is assumed to result in an incremental increase in health risk. This theory is accepted by the NRC as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably over-estimates those risks. Based on this theory, the NRC conservatively establishes limits for radioactive effluents and radiation exposures for workers and members of the public. While the public dose limit is 100 mrem

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(1 mSv) for all facilities licensed by the NRC (10 CFR Part 20), the NRC has imposed additional constraints on nuclear power reactors. Each nuclear power reactor, including Duane Arnold, has license conditions that limit the total annual whole body dose to a member of the public outside the facility to 25 mrem (0.25 mSv). In addition, there are license conditions to limit the dose to a member of the public from radioactive material in gaseous effluents to an annual dose of 15 mrem (0.15 mSv) to any organ; for radioactive liquid effluents, the dose limit is 3 mrem (0.03 mSv) to the whole body, and 10 mrem (0.1 mSv) to any organ.

The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small. The doses of radiation that are received by members of the public as a result of exposure to nuclear power facilities are so low (i.e., less than a few millirem) that resulting cancers attributed to the radiation have not been observed and would not be expected. To put this in perspective, each person in this country receives a total annual dose of about 300 millirems (3 mSv) from natural sources of radiation (i.e., radon, 200 mrem; cosmic rays, 27 mrem; terrestrial [soil and rocks], 28 mrem; and radiation within our body, 39 mrem) and about 63 mrem (0.63 mSv) from man-made sources (i.e., medical x-rays, 39 mrem; nuclear medicine, 14 mrem; consumer products, 10 mrem; occupational, 0.9 mrem; nuclear fuel cycle, <1 mrem; and fallout, <1 mrem).

Although a number of studies of cancer incidence in the vicinity of nuclear power facilities have been conducted, there are no studies, accepted by the scientific community, that show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public. The following is a listing of a few studies recognized by the NRC staff.

- In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study covered the period from 1950 to 1984, and evaluated the change in mortality rates before and during facility operations. The study concluded there was no evidence that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby.
- In June 2000, investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at Three Mile Island power plant and cancer deaths among nearby residents. Their study followed 32,000 people who lived within five miles of the plant at the time of the accident.
- The Connecticut Academy of Sciences and Engineering, in January 2001, issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded radiation emissions were so low as to be negligible and found no meaningful associations to the cancers studied.
- The American Cancer Society in 2000, concluded that although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence that links strontium-90 with increases in

breast cancer, prostate cancer, or childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled and involve negligible levels of exposure for nearby communities.

- Also, in 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations, on which the claims were based, Florida officials were not able to identify unusually high rates of cancers in these counties compared with the rest of the state of Florida and the nation.
- In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties with nuclear power plants to similar counties without nuclear plants and found no statistically significant difference.

Recently, the NRC has asked the National Academy of Sciences (NAS) to perform a state-of-the-art study on cancer risk for populations surrounding nuclear power facilities. The NAS study will update the 1990 U.S. National Institutes of Health - National Cancer Institute report, "Cancer in Populations Living near Nuclear Facilities." The study is scheduled to begin in the summer of 2010 and is expected to be completed within three years.

To ensure that U.S. nuclear power plants are operated safely, the NRC licenses the nuclear power plants to operate, licenses the plant operators, and establishes license conditions for the safe operation of each plant. The NRC provides continuous oversight of plants through its Reactor Oversight Process to verify that they are being operated in accordance with NRC regulations. The NRC has full authority to take whatever action is necessary to protect public health, safety, and the environment, and may demand immediate licensee actions, up to and including a plant shutdown.

As part of the license renewal process, the NRC staff reviewed the radiological environmental monitoring program at Duane Arnold. Duane Arnold conducts a radiological environmental monitoring program (REMP) in which radiological impacts to the environment and the public around the Duane Arnold site are monitored, documented, and compared to NRC standards. Duane Arnold summarizes the results of their REMP in an annual report. The reports are publically available on the NRC's public website.

The REMP samples environmental media in the environs around the site to analyze and measure the radioactivity levels that may be present. The media samples are representative of the radiation exposure pathways to the public from plant radioactive effluents. The REMP measures direct radiation, and the airborne and waterborne pathways for radioactivity in the vicinity of the Duane Arnold site. The REMP includes sampling of milk from local farms. The milk samples are analyzed for iodine-131 and gamma-emitting isotopes. In addition, the REMP also measures background radiation (i.e., cosmic sources, naturally occurring radioactive material, including radon and global fallout).

Regarding the disposal of low level radioactive wastes (LLW), the Commission has performed a comprehensive assessment of the impacts associated with the disposal of LLW from nuclear

power reactors. The evaluation is contained in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Reactors." The following is a summary of the Commission's findings:

The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for low-level waste storage during the term of a renewed license and associated impacts will be small. The radiological and nonradiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

As part of the license renewal process, the NRC staff reviewed the radiological effluent release program, low-level radioactive waste program, and the radiological environmental monitoring program at Duane Arnold and found them to meet all applicable NRC requirements. The Staff's radiological human health evaluation of Duane Arnold is provided in Chapter 4 of the SEIS.