PaloVerdeLRCEm Resource

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Re: NEPA Scoping Comments regarding Relicensure of Palo Verde Units 1, 2 and 3

Don't Waste Arizona, Inc. (DWAZ) is a non-profit environmental organization (with a 501 c 3 status granted by the IRS) dedicated to the protection and preservation of the environment in Arizona. DWAZ is headquartered at 6205 South 12th Street, Phoenix, AZ 85042, and can be reached at 602-268-6110. On behalf of itself and it affected members, DWAZ offers the following NEPA scoping comments regarding Relicensure of Palo Verde Units 1, 2 and 3:

Thank you for the opportunity to ask questions about the wisdom of renewing the license of an aging, severely-troubled, nuclear power plant complex that has caused significant economic hardship for a financially troubled company that just asked for a rate increase to forestall an even worse credit rating..

1. **Existing Contamination:** I was disappointed when NRC representatives seemed unaware of the plume of tritium under the nuclear plant, something I found looking through the facility's file at the Arizona Department of Environmental Quality. It raises questions about NRC's oversight. The plume was caused by monsoon rains knocking the "normal" radioactive air emissions from Palo Verde onto the roof of the facility and draining onto an unpaved area where it soaked into the ground.

The levels of tritium in the ground water seem likely to increase. I remind everyone that the National Academy of Sciences agrees - there is no safe dose. According to the National Academy of Sciences in 2005, there is "no threshold dose" below which ionizing radiation is safe.

And years before that, “There is no safe level of exposure and there is no dose of (ionizing) radiation so low that the risk of a malignancy is zero.”--Dr. Karl Morgan, the father of Health Physics.

Historically the significance of internal dosage from fission products has not been appreciated.

Standards for Reference Man ignore those most at risk:

Women are 52 percent more likely to get cancer from the same amount of radiation dose compared to men. Children are at greater risk than adults. A female infant has about a seven times greater chance of getting cancer than a 30-year old male for the same radiation exposure. Pregnant women and the developing fetus are particularly vulnerable to radiation exposure; however, non-cancer reproductive effects are not part of the U.S. regulatory framework for radiation protection.

U.S. radiation exposure regulations and compliance methods often fail women, children and other more radiosensitive groups because they are based on "Reference Man," a hypothetical 20 to 30 year old Caucasian male. At least three federal agencies -- the Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC) and Department of Energy (DOE) -- still use Reference Man in radiation dose regulations and compliance assessment, including the Clean Air Act and safe drinking water rules, despite evidence that the standard is not adequate to protect many groups.

Don't Look Don't Find
In both France and US, for nearly 30 years after the first reactors went on-line, no studies of cancer near reactors were done. Neither utilities nor the NRC conducts health studies; neither monitor local cancer rates near reactors, yet both strongly criticize any studies that suggest harm.

Who to trust?
How about the French?
Official French statistics:
among 39 European nations, 2006 cancer incidence rate is 3rd highest for men and 13th highest for women.
Incidence rate rose 39% from 1980-2005, compared to 10% in U.S.

Perhaps most telling:
thyroid cancer rate in France rose a staggering 433% for males and 186% for females far more than U.S. increases.
A clue, an indicator, if not smoking gun: Doctors know of no other clear-cut cause of thyroid cancer, other than radiation exposure.

Thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average, and that childhood cancer in these counties is also above the national rate.

Mothers Milk Project also this year:
Of 30 milk samples from breastfeeding mothers and goats within 50 miles of Indian Point, nearly all reveal levels of strontium-90 with the highest results occurring closest to Indian Point reactors

Of great concern the presence both of strontium-90 and a related fission product strontium-89. has a short half life, its presence provides strong evidence radioactivity was recently produced from a nearby source.

2. **Arizona's Nuclear Dump**: With Yucca Mountain out of the picture, Palo Verde is really a huge defacto nuclear waste dump, and 20 more years increases waste on site by 50% (even if in dry casks), while continuing the added risk of cooling pools for a total of 60 years. Can the facility handle this securely and reliably?

3. **Shipping to Off-Site Dump?** If a waste disposal site actually becomes available, will that put shipments of highly radioactive wastes on the Interstate 10 near the facility? And what are the potential impacts to transportation and other economic costs associated with such a contingency? As a person with over a decade of emergency planning experience, I am aware of the many disaster drills at Palo Verde, but I don't believe there has been an exercise or a plan involving a worst case scenario of a spill of nuclear wastes from Palo Verde or terrorist attack on a shipment that causes the release of nuclear wastes into the environment. I did see information about a worst case scenario of a nuclear waste spill along Interstate 40, which would take about 156 months to decontaminate to "safe" levels. Further, if the roads to or from Palo Verde are closed for an extended period due to a radioactive spill, would that give terrorists an advantage? Would such a scenario impede response and/or defense?

4. **Population Growth and Contingency Issues:** There are plans for a large development near Palo Verde, bringing in about 140,000 people. The current contingency plan is to evacuate people within a ten mile radius and then wait for federal assistance. (We might want to ask the people of New Orleans what they think about the folly of such a plan…) To move such a large population away from the ten mile radius in a timely manner, when time is so much of the essence, would require enormous resources, including legions of buses that would become contaminated during the evacuation and that would need detailed decontamination afterwards. It is doubtful that buses pulled from normal service for such an evacuation would ever be accepted back to regular duty. The amount of buses needed for such a task is not currently even available today in the Phoenix metro area. In order to be properly prepared, these buses would have to be ready and in the immediate vicinity of Palo Verde. Where will they be stored, and who will maintain them?

5. **Trust Us (?!)** The PV reactors are only now, after an unprecedented length of time, being moved off of the "multiple, repetitive degraded Cornerstone" column, an extreme level of NRC oversight. (http://www.nrc. gov/NRR/OVERSIGH T/ASSESS/ actionmatrix_ summary.html)

But can these people really be trusted? The NRC decided for years that the culture of management at Palo Verde was such a huge problem that it closely scrutinized the plant, and was on the brink of closing the facility. Suddenly, after five years, the NRC decides everything is ok – sounds more like a political decision that reality-based – and we are left wondering if the Palo Verde operators straightened up their act just long enough to get their license renewed with plans to backslide – or did they really, finally, get their act together? What assurances do we have that future violations and noncompliance will be detected and dealt with early enough?

The nuclear industry is admittedly only one big accident away from collapse - is this really the time to "double-down" at this facility?

6. **Bathtub Curve**: At this point, I need to mention the "bathtub curve" - how complex engineering projects have most problems at beginning and end of life-cycle. The **bathtub curve** is widely used in reliability engineering, although the general concept is also applicable to humans. It describes a particular form of the hazard function which comprises three parts:

- The first part is a decreasing failure rate, known as early failures.
- The second part is a constant failure rate, known as random failures.
- The third part is an increasing failure rate, known as wear-out failures.

The name is derived from the cross-sectional shape of the eponymous device.

The bathtub curve is generated by mapping the rate of early "infant mortality" failures when first introduced, the rate of random failures with constant failure rate during its "useful life", and finally the rate of "wear out" failures as the product exceeds its design lifetime.

In less technical terms, in the early life of a product adhering to the bathtub curve, the failure rate is high but rapidly decreasing as defective products are identified and discarded, and early sources of potential failure such as handling and installation error are surmounted. In the mid-life of a product—generally, once it reaches consumers—the failure rate is low and constant. In the late life of the product, the failure rate increases, as age and wear take their toll on the product.

The bathtub curve is often modeled by a piecewise set of three hazard functions,

$$y(t) = \begin{cases} c_0 - c_1 t + \lambda, & 0 \le t \le c_0/c_1 \\ \lambda, & c_0/c_1 < t \le t_0 \\ c_2(t - t_0) + \lambda, & t_0 < t. \end{cases}$$

This is especially concerning as there are plant aging and radiation embrittlement issues

for reactors and their associated equipment. My bet is that nobody knows a lot of what will be happening to the metals after 30 years of radioactive bombardment.

Considering the serious problems at Palo Verde already with leaking pipes and all, will NRC require and monitor the requisite inspections to prevent another problem and outage?

7. **New Crew** As reactors are getting older, the crews that run them didn't build them and likely haven't looked at the original plans even once in their lives. How good is the institutional memory at PV, given they have had such significant problems in the past? What training programs will be in place to assure this doesn't cause problems? There is already a shortage of trained workers for this technology.

8. **Water:** With global warming projections indicating a hotter, drier Southwest, we must be reminded that the vast majority of wastewater from the Phoenix metro area, mainly the discharge from the 91st Avenue Wastewater Treatment plant, goes to cool Palo Verde. With hotter temperatures expected, even more water will be needed. And nuclear power uses more water per Megawatt of power for electrical power generation than any other form of electrical power generation.

Is this sustainable?

Is this water supply for Palo Verde reliable and sufficient?

Is this projected Palo Verde water usage a severe economic disincentive to overall economic growth and even population growth in this part of Arizona? Are the water needs of Palo Verde a type of opportunity cost and opportunity loss brought about by a lack of affordable water for industrial and residential uses?

9. **Carbon impacts:**

If uranium demand rises as projected, the carbon cost of developing less rich ores nullifies any presumed carbon saving from keeping this reactor on-line. Isn't it likely that the true life cycle carbon emissions of nuclear power generation will be officially recognized by EPA and the Congress, and carbon cap and trade or carbon tax strategies will make nuclear power even more unprofitable?

Nuclear power is not at all free from carbon emissions. A number of recent studies have found that when mining, processing, and extensive transportation of uranium in order to make nuclear fuel is considered, the release of carbon dioxide (CO2) as the result of making electricity from uranium is comparable to burning natural gas to make electric power. Additional energy required for decommissioning and disposition of the wastes generated increases this CO2 output substantially. And wasn't it unrealistic, if not the height of arrogance, for a species that has only a few thousand years of recorded history to plan on safely managing radioactive waste for a minimum of 100,000 years?

Thank you.

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Impacts of Future, Expected Population Growth in the Vicinity of Palo Verde and Water Use/Subsidence/Fissuring

The Maricopa Association of Governments (MAG) is the regional planning organization of local government in Maricopa County. MAG's Transportation Policy Committee has "Interstates 8 and 10-Hidden Valley Transportation Framework Study" as one of its upcoming agenda items. This is an early attempt at planning for the transportation needs of a projected population of 2.5 million people in the western part of Maricopa County. That population is almost the size of the Phoenix metro area now.

The NRC needs to fully examine the planned population growth in that area near Palo Verde, and especially in the context of planned or needed groundwater pumping and the potential land subsidence and fissuring, again especially in the area near and including Palo Verde. Some areas of Arizona are especially prone to subsidence and fissuring.

Impacts of Future, Expected Population Growth in the Vicinity of Palo Verde and Terrorism

The number one concern of American citizens about nuclear power plants is the threat of a terrorist attack on a nuclear power plant, whether by foreign or domestic terrorists. All

possible terrorist scenarios regarding Palo Verde need to be examined, along with potential impacts and mitigation, including scenarios where there is a significant population residing near Palo Verde (within ten miles), per NEPA requirements. There have been train derailments caused by someone unknown tampering with the rail lines, a form of domestic terrorism, in western Maricopa County, that still have never been solved. So there is already a history of suspicious actions and concerns about the ability of authorities to prevent these incidents, monitor for them, or prevent them. These incidents indicate a continuing vulnerability to terrorist acts, and should be reviewed as part of the terrorism analysis performed under NEPA.

Impacts of Future, Expected Population Growth in the Vicinity of Palo Verde and Contingency Planning

The current contingency plan is to evacuate people within a ten mile radius and then wait for federal assistance. The strategy for moving hundreds of thousands of people away quickly and perhaps permanently needs to be examined and laid out, as well as any mitigation that could be implemented.

Terrorism Risks

Please consider and address the following questions:

What would the torque be for a full Boeing 747 hitting the generator building at different points of the building, such as the middle point of the generator building, at the point that is connected to the reactor containment building RCB, at the point 25% of the way from the RCB toward the end of the generator building, at the 75% point, all assuming a maximum speed for the aircraft and at a perpendicular strike directly against the generator building?

Is the generator building and the heat transfer area around the primary coolant loops and secondary generator loops strong enough to withstand this impact without a coolant breach?

We know that the RCB is not strong enough for the most powerful strike, as this has been admitted in NRC proceedings. What is the likelihood of a full impact strike causing a meltdown?

Please consider the attached Greenpeace study, *New Nukes and Old Radioactive Waste* in these deliberations and analysis. (P_@_SEJ_2006_Final_Draft)

The Economics of Energy Efficiency, Alternative, and Renewable Energy vs. Nuclear Plant Relicensing

A recent study by an economic analyst at the University of Vermont finds that building 100 new reactors would cost from $1.9 to $4.1 trillion more than getting our electricity from clean renewable energy sources. (See http://www.nirs.org/neconomics/cooperreport_neconomics062009.pdf)

All costs and impacts of energy efficiency programs, alternative and renewable energy sources should be examined against the costs and impacts of relicensing Palo Verde. This analysis should also include water usage, air pollution impacts (Palo Verde has been fined significantly by the Maricopa County Air Quality Department for exceedances of its particulate matter (PM) emissions limits, specifically for excess PM emissions from its cooling towers.), wastes, radioactive emissions, mining impacts and groundwater impacts of uranium mining, sustainability, and the costs in terms of money and of carbon of developing less rich ores for reactor fuel, including the rising costs of the electricity used in the process of making fuel rods, which includes enrichment and fuel processing. The uranium enrichment plant at Paducah, Kentucky is the largest U.S. emitter of CFCs, which destroy the ozone layer.

The average energy efficiency cost for State programs across the U.S. is 3-4 cents per KWH. The average cost of just nuclear fuel, O&M (fixed and variable) is at least 3.7 cents and at most 4.9 cents per KWH, according to the Keystone report. (See page 42 of referenced Keystone report http://www.ne. doe.gov/pdfFiles /rpt_KeystoneReportNuclearPowerJointFactFinding_2007.pdf.) The Keystone report was hailed by Nuclear Engineering International and it was a multidisciplinary report. This averages higher than the average efficiency cost.

A fundamental element in finding that nuclear power is a false solution to climate change is that the economics of nuclear power are not sound – in open markets nuclear cannot compete. Since splitting atoms is not a cost-effective source of electric power, it is even less cost-effective in preventing greenhouse gas emissions. Life cycle costs for nuclear power generation (in the USA) have been estimated at 12 cents a kilowatt hour; whereas life cycle costs for wind power in the same analysis is estimated at 4 cents a kilowatt hour. Others find that expanding nuclear generating capacity is about twice as expensive as expanding generating capacity through investment in wind power. Since the same money will buy 2 – 3 times more electric power when used to purchase wind generated electric power, it is clear that prevention of greenhouse emissions will also be 2 – 3 times greater when buying wind generated electricity than nuclear generated electricity (as opposed to nuclear generating capacity). CO2 production per dollar is not constant. According to the Sovacool study, the average study which passed the test for quality projects that nuclear power will produce 66 grams of CO2/kilowatt- hour, and that wind's life cycle will produce 10 grams. CO2 output is related to KWH, not cost per kilowatt-hour, partly because cost is a fluctuating value, but a KWH is a fixed scientific measurement. Therefore, nuclear power will produce 66 grams CO2/KWH and wind 10 grams, which is 6.6 times the pollution output of CO2. If we can assume that wind is half the price per KWH, then the output becomes 13.2 times the CO2 output per nuclear power compared to wind. However, it is important to note that all the studies reviewed by Sovacool only assume the current ore grade of uranium to continue into the future. We

know that ore grades will decline, as they have already halved over the last 30 years from 3000 ppm to 1500 ppm. The Sovacool report also does not assume any CO2 for long-term waste management and remediation, including unintentional and intentional terrorist environmental breaches.

The average cost should include all costs, including transmission & distribution. DWAZ estimates that the cost of new nuke energy will be about 24 cents/KWH (18 cents for generation plus 7 cents for T&D), wind with T&D is 15 cents on average, and energy efficiency is 3.5. The Cooper and other reports are in the same ballpark on nuclear power.

The cumulative impacts of each source of electricity and/or energy efficiency need to be analyzed, examined, and compared.

The life cycle of nuclear power is not only dependent upon fossil fuels for the production of uranium fuel, decommissioning, and the disposition of wastes generated: it is also dependent upon a grid that is powered by other sources of energy, typically coal. This is due to the simple fact that nuclear reactors cannot "black start"– in other words, they depend on electric power from the external power grid to be able to come on-line. Transition away from the combustion of fossil fuels cannot be accomplished solely by the expansion of nuclear power since it depends on the grid being powered up before reactors can come on-line.

Other studies on the economics of nuclear power generation that should be reviewed and considered in the NEPA analysis are at: http://www.greenpeace.org/raw/ content/usa/ press-center/ reports4/ the-economics- of-nuclear- power.pdf

http://www.earth- policy.org/ Updates/2008/ Update78_ printable. htm

Amory Lovins:
http://www.rmi. org/sitepages/ pid467.php

http://www.arizonap irg.org/uploads/ ee/qD/eeqDk_ cKZXyH5yuhZduZTA /The-High-Cost-of-Nuclear- Power.pdf

http://www.stanford.edu/group/efmh/jacobson/EnergyEnvRev0908.pdf

Also see the attached file, the copy of SEA Energy Costs.

In addition to radiological pollution, nuclear power also contributes massive thermal pollution to both our air and water. It has been estimated that every nuclear reactor daily releases thermal energy –heat-- that is in excess of the heat released by the detonation of a 15 kiloton nuclear bomb blast. Nuclear power contributes significantly to the thermal energy inside Earth's atmosphere, making it contraindicated at this time of rapid global warming.

Nuclear power is not at all free from carbon emissions. A number of recent studies have found that when mining, processing, and extensive transportation of uranium in order to make nuclear fuel is considered, the release of carbon dioxide (CO2) as the result of making electricity from uranium is comparable to burning natural gas to make electric power. Additional energy required for decommissioning and disposition of the wastes generated increases this CO2 output substantially. What if the national and worldwide economic downturn causes a downgrade of the economic viability of funds set aside for decommissioning of Palo Verde? Putting decommissioning off even further increases uncertainty, in light of massive resource depletion and environmental deterioration aspects like global warming. All of these issues need to be analyzed and mitigated.

Relicensing an Aging, Troubled, Nuclear Power Plant vs. the Flexibility of Decentralized Power Production

Another aspect to renewable energy is that it lends itself to something that nuclear power cannot: decentralized power production. Therefore, the NRC needs to fully examine and analyze the economic impacts and reliability aspects of decentralized power vs. nuclear power when examining the relicensure of Palo Verde.

NRC Corruption and Intentional Violation of Federal Regulations and Statutes

The startling revelation that the NRC is proposing to allow an exemption to the regulation requiring the written and operations test for the SRO at Palo Verde by a FONSI brings forward the question of NRC honesty and integrity. There is a question now whether the NRC is acting in a criminal manner in these regards. This must be examined fully and openly. The NRC should examine fully in the EIS the probability and likelihood that the NRC has exhibited now that it has "unclean hands" and that it is evidently a corrupt agency and not capable of regulating Palo Verde. In the course of this investigation and analysis, the NRC should examine whether the decision to lift the scrutiny of Palo Verde in spring 2009 was merely a cynical move to assist with the relicensure process and if it was the agency yielding to political pressure, or if the NRC really did determine, after four to five years of extra scrutiny and concern, that suddenly the operators of Palo Verde had indeed changed their corporate culture and were worthy of less scrutiny. Included with this analysis is the likelihood or increased probability that the NRC's actions will help cause a serious problem at Palo Verde leading to extra charges for ratepayers, at a minimum, or the worst, an incident releasing radiation in unpermitted amounts.

Thank you.

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