The Dark Side of Nuclear Power

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*by Eric Joseph Epstein**

In a place far way, not long ago, atomic scientists predicted the dawn of a new day where automobiles would be powered by nuclear fuel and weather could be controlled by atomic clouds. Their high priest promoted nuclear energy as "electricity too cheap to meter"

(Admiral Lewis L. Strauss, Chairman of the U.S. Atomic Energy Commission, September 16th, 1954, in a speech by National Association of Science Writers)

Well, the fairy tale is baaaaack! Actually it never died, and has been **replaying itself in your pocketbook for the last 40 years**. Nuclear power never went away, it just devised a snazzier marketing mantra. A little richer and older, but the industry is still peddling the same **snake oil: The healing power of nuclear generation**.

The industry argues that the problem of greenhouse gases can be solved by building more nuclear power plants which they claim" do not emit green house gasses ...at the ***point of production***. What they don't tell you is what happens to the nuclear wonder pill *before* it is magically transformed into **green penicillin**.

The **nuclear-carbon shell game** only works if you ignore the environmental cost on the "**front end**" and "**back end**" of nuclear power production. From the moment uranium is mined, milled, enriched, fabricated and transported it releases large quantities of airborne pollutants.

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* *Mr. Epstein is the Chairman of Three Mile Island Alert, Inc.*, tmia.com, *a safe-energy organization based in Harrisburg, Pennsylvania and founded in 1977. TMIA monitors Peach Bottom, Susquehanna, and Three Mile Island nuclear generating stations.*

With a nuclear friendly administration in Washington and Harrisburg (but not Wall Street), fanciful myths about nuclear energy abound and multiply. Consumers, taxpayers and citizens have been told that nuclear power deserves a **second chance** because it is now **environmentally friendly**. Of course this argument is disingenuous, and ignores the factual reality of nuclear power's **twin legacy** of air pollution and contamination of water resources and **long-lived nuclear waste**.

Since the meltdown at Three Mile Island, those of us who live in reactor communities have understood that our **health** and **wealth** are the **price we must pay for nuclear progress**.

Haven't you wondered why nuclear power's **renaissance**, which comes after a **Dark Age** that began on March 28, 1979 in my hometown, is not painted as big commercial banners?

Glad you asked.

The "**clean air myth**" was demolished on May 13, 1999 when the Nuclear Energy Institute's advertising campaign was deemed "misleading" by the National Advertising Division of the Better Business Bureau. The specific ad in question was displayed in *The Atlantic Monthly* (December, 1998). The commercial featured a cute owl singing the praises of nuclear power. Hootie then thanked the NEI for clean air. The Business Bureau stated: "The process currently used to produce at least some, if not most, of the uranium enriched fuels that are necessary to power nuclear energy plants emits substantial amounts of environmentally harmful greenhouse gases." The NEI did not appeal the decision.

However, the Federal Trade Commission found that although the Industry's ads were untruthful, they were not banned because the material was aimed at "opinion leaders." The FTC said they would have pulled the ads, had they targeted consumers! (December 22, 1999).

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How much? Glad you asked.

The enrichment of uranium at the Paducah Gaseous Diffusion plant releases massive amounts of chlorofluorocarbons (**CFCs**) which are more damaging as a global warmer than **carbon dioxide**. Nuclear fuel production in America creates at least 800,000 pounds of CFCs annually. CFCs remain the primary agent for **stratospheric ozone depletion**.

The industry's official **strategy to reduce CFC emissions** was to close its Portsmouth, Ohio enrichment plant and eliminate "roughly half as many miles of leaky pipes." The Ohio fuel plant is closed, but is undergoing a massive site cleanup to recover uranium, treat and isolate contaminated water and sewage, and decontaminate and remove miles of radioactive tubes, pipes, and equipment.

The production of fuel for nuclear reactors is extremely energy intensive. Paducah, the "other" nuclear enrichment plant, requires the electrical output of **two 1000-megawatt carbon dioxide producing coal-fired plants**.

The site is undergoing a massive cleanup financed by taxpayers. According to the GAO:

"DOE expects to complete the cleanup by 2010 at a cost of about $1.3 billion (in addition to the nearly $400 million spent over the past decade on the characterization of the contamination on site and mitigation efforts, such as connecting residences with contaminated drinking water to municipal water). DOE's cleanup plan focuses on six major categories of cleanup. Four of these address the physical contamination at the site: about 10 billion gallons of groundwater contaminated with radioactive and hazardous materials, contaminated surface water in creeks and ditches leaving the site, contamination in soils that may be spread by rain, and tons of buried waste. The two other major categories include treating and disposing of the equivalent of about 52,000 barrels of waste and decontaminating and removing two unused process buildings."

Numerous technical, funding, and regulatory uncertainties present challenges to DOE's ability to complete the cleanup as planned. Technical uncertainties include the planned use of technologies that are unproven or perhaps not well suited to the site's conditions. Also underpinning the plan is the assumption that federal funding for cleanup at Paducah will increase to an average of $124 million annually over the next decade, compared with the last 7 years' annual average funding of $43 million. The plan also includes optimistic assumptions about reaching agreement with regulators on issues such as cleanup levels, strategies, and priorities.

Finally, even when the planned cleanup has been carried out, billions of dollars and many years will be needed to address areas at the Paducah site that are not in the cleanup plan. For example, almost 500,000 tons of depleted uranium will need to be converted to a more stable form and removed from the site. In addition, the plan excludes nearly a million cubic feet of waste and scrap in areas known as DOE Material Storage Areas (DMSA) and 16 unused and inactive buildings and structures. Some of the waste and scrap material pose a risk of an uncontrolled nuclear reaction that could threaten worker safety. (GAO/T-RCED-00-225, June 27, 2000.)

Pennsylvania's nuclear generating stations are large consumers of foreign oil. Emergency diesel generators (EDG) (when their not catching on fire) at Pennsylvania's five nuclear generating stations burn hundreds of thousands of gallons of oil.

For example, according to the plant's tech specs, Three Mile Island (TMI) is required to have a diesel fuel oil tank with sufficient minimum inventory to supply two operating emergency diesel generators for at least seven days. **This minimum inventory is 28,285 gallons**. This equates to each emergency diesel generator consuming about 85 gallons per hour of run-time. EDGs must be run about two hours per month plus one 24-hour run per year, and must be in operation during post-maintenance periods and after equipment breakdowns. One EDG at TMI-1 running 100 hours in a year would consume **8,500 gallons of fuel oil**.

PECO's justification for building more nuclear plants was to wean itself of electrical generation fueled by oil. What's more, these plants are not paid off. Limerick 1 which was supposed to cost **$1.055 billion** wound up weighing in at **$3.8 billion** and won't be paid off until 2011. ("The Economics of Building a Nuclear Power Plant," Cheah and Stout, January 17, 2007) PECO recovered over **$5 billion in "stranded costs"** associated with building Limerick 1 and 2.

PPL's nuclear plants were projected to cost **$1.050** a piece and would up costing **$4.10 billion** and won't be paid off to 2009. PPL recovered **$2.86 billion** in "stranded costs" associated with cost overruns at the nuclear plant.

Limerick is the birthplace of **voodoo economics**.

With all the radioactive baggage associated with nuclear power production, the industry failed to note that nuclear fuel is a **nonrenewable energy** source with escalating costs. The price for uranium ore, the fuel used in nuclear plants, rose every month in 2007 and peaked at **$120** a pound in 2007! This was the same "low-cost" fuel that sold for **$7** a pound in 2001, now sells for $50, and most of which us supplied from dependable foreign "allies" like Russia and Kazakhstan and Australia (when their mines aren't flooded). Or, we can generate more homegrown green house gasses to ensure a reliable domestic supply of nuclear fuel which has nowhere to go after it is burned.

Production of nuclear fuel creates more terrorist targets, more costs, more proliferation, **more toxic waste (30 metric tons annually *per reactor)* less safety, less security and fewer resources for alternative energy development**.

The relicensing of Peach Bottom and the SSES will create an additional **2,400 tons** of HLRW, while TMI's single unit will create another **600 tons** of nuclear waste on an Island in the River that empties into the Chesapeake Bay.

Currently there is **58,000** tons high level radioactive garbage scattered among 72 sites and 103 reactors.

*Nuclear Garbage On The River**

Peach Bottom 2 **(July 1974-2034)**
Est. on-site tonnage of HLRW: **840 metric tons**

Peach Bottom 3 **(December 1974-2034)**
Est. on-site tonnage of HLRW: **840 metric tons**

Shutdown from 1987-1989

PECO was ordered by the Nuclear Regulatory Commission (NRC) to shutdown Peach Bottom-2 and -3 on March 31, 1987 due to operator misconduct, corporate malfeasance and blatant disregard for the health and safety of area.

Susquehanna 1 **(June, 1983-2023)**
Est. on-site tonnage of HLRW: **720 metric tons**

Susquehanna 2 **(February 1985-2025)**
Est. on-site tonnage of HLRW: **660 metric tons**

Cost Overruns

PPL's nuclear plants were projected to cost $1.050 a piece and would up costing $4.10 billion and won't be paid off to 2009. PPL recovered $2.86 billion in "stranded costs" associated with cost overruns at the nuclear plant.

Three Mile Island -1 **(September 1974-2014)**
Est. on-site tonnage of HLRW: **810 metric tons**

Shutdown from 1979 - 1985 due to meltdown at sister reactor.

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* Low-level radioactive waste space runs out in **2008** when Barnwell, South Carolina closes to states outside of the Atlantic Compact. Pennsylvania belongs to the Appalachian Compact.

Nuclear owls must also drink water. When it comes t**o water consumption, fish kills, thermal inversion and effluent discharges**, nuclear plants are sometimes viewed as **benign monsters**.

Nuclear power plants use millions of gallons daily to cool their superheated reactor core and perform industrial applications. There are three nuclear generation stations on the Susquehanna River. Two plants with three units are located on the Lower Susquehanna, and have the capacity to **draw in as much as half the flow of a River in a day**.

Three Mile Island and Peach Bottom have returned water to the River at temperatures in excess of **110 degrees**. It is not uncommon for these plants to discharge **chlorinated water** (necessary to minimize bacterial contamination of turbines) or **Clamtrol** (chemical agent used to defeat Asiatic clam infestation) directly into the River.

Water Consumption: Fossil Power Plants

(Source: EPA)

Technology	**gallons/kWh**	**liters/kWh**
Nuclear	0.62	2.30
Coal	0.49	1.90
Oil	0.43	1.60
Combined Cycle Gas	0.25	0.95

A sample of the magnitude of the amount of water used at nuclear power plant is readily evidenced at PPL's Susquehanna Steam Electric Station (SSES).

Located on The Susquehanna River in Luzerne County, every day the plant loses **14.93 million gallons** of water per unit as vapor out of the cooling tower stack. Eleven million gallons per day are returned to the river as cooling tower basin blow down. On average, **29.86 million gallons per day** are taken from the river and not returned. These consumption levels are achieved at the SSES with a **closed-cycle cooling system** which recycles intake water; thereby, reducing the volume of water taken into the plant.

PPL's Susquehanna Electric Steam Station (SSES) plans to increase the volume of surface water it removes from the Susquehanna River up to an additional **66 million gallons per day regardless of seasonal fluctuations, impending water restrictions, or periods of drought**. According to the NRC, "With the Extended Power Uprate, SSES will pump river water to be used as make-up water for the Cooling Towers at an average rate of 42,300 gallons per minute (gpm)."

Communities and ecosystems that depend on limited water resources will be adversely affected, and according to the PPL and the NRC more fish and aquatic life will be killed and harmed as a result of the uprate's impact on the River environment.

TMI-Alert successfully prosecuted a water theft case against PPL relating to an unauthorized 2001 power uprate. PPL agreed to pay a **$500,000**. In December 2006, Peach Bottom paid a **$640,000** for similar infractions.

Peach Bottom does not use a **closed-cooling system**.

TMI vaporizes large quantities of coolant and also discharges water as **blow down**.

Both **plants kill large numbers of fish and aquatic life, consume millions of gallons of water**, and are **not required to conserve** resources during drought conditions.

Water shortages on the Lower Susquehanna reached critical levels in the summer of 2002. For the month of August 2002, 66 of 67 Pennsylvania counties had below normal precipitation On August 9th, 2002, Governor Schweiker extended the drought emergency for 14 counties across Southcentral and Southeast Pennsylvania.

Precipitation deficits at or exceeding 10.0 inches were recorded in several counties, included **Dauphin County**. The greatest deficit of 14.6 inches was in **Lancaster County**, and departures from normal precipitation range attacked **York County** (Source: Pennsylvania Department of Environmental Protection, *Drought Report* and *Drought Conditions Summary*, August-September, 2002).

Peach Bottom is located in Lancaster and York Counties while Three Mile Island is situated in Dauphin and Lancaster Counties.

During the 2002 drought nuclear power plants were **exempted from water conservation efforts** and participate in a "voluntary" program. In Pennsylvania, **24 counties were designated as "drought emergencies", and another 31 were on "drought watch**.

The Governor, the Secretary of the DEP, and the Chairman of the Public Utility Commission, implored Pennsylvanians to conserve water. As the *Patriot News* astutely observed: “Warnings about the growing pressure on supplies are increasing, but much of the population continues to take the the availability of water for granted” (Editorial, September 24, 2002). Yet, **no elected official** approached the **five “security conscious”** nuclear power plants to coordinate operation of their assets in a manner that would conserve scarce water resources.

Peach Bottom did not “conserve” water until the plant was **forced to close to address a massive fish kill**. On August 30, 2002, high differential pressures on the circulating water intake screens forced the manual shut down of Peach Bottom. “The problem was caused by a sudden surge in the amount of fish (Gizzard Shad) that entered the intake canal and clogged the screens. Unit 3 power was returned to 100 percent following cleaning of the circulating water screens and restating of the 3’A’ circulating water pump” (Source: Nuclear Regulatory Commission, IR-50-277/02-05; 50-278/02-05).

“**Whether the kills** are legal or not, a former southern Lancaster County worker at the Peach Bottom nuclear plant said he was ‘sickened’ by the large numbers of sport fish he saw sucked out of the Susquehanna. "When the water comes in, fish would swim in through tunnels and swim into wire baskets," said the man who lives in southern Lancaster County and asked that his name not be used. "There were hundreds and hundreds of fish killed each day. Stripers and bass and walleye and gizzard shad and all kinds of fish. It took a forklift to carry them out. "Every species in the river comes in there when they turn those **big intakes on**." (*Intelligencer Journal*, January 15, 2005)

TMI has a similar system for disposing of the fish and other organisms that make it through the intake maze. "If they get that far, they're not going back," said Pete Ressler, a spokesman for TMI owner Exelon Nuclear. "They are dumped into a container and disposed of." (*Intelligencer Journal*, January 15, 2005)

"It's been a concern for years," says Leroy Young, chief of aquatic resources for the Pennsylvania Fish and Boat Commission. "The numbers are significant. There are thousands of larger fish (killed) per facility per year. Entrainment rates (referring to organisms sucked into pipes and killed) can be 10 million or more -- mostly floating eggs and larval fish. "Whether it's having a population level effect, I don't think anyone's measured that yet," Young says. (*Intelligencer Journal*, January 15, 2005)

Utilities say it's not. They say fish populations in rivers such as the Susquehanna are robust and that the loss of millions of fish eggs and much lesser amounts of adult fish doesn't harm the resource. They also note that the mortality of young fish is incredibly high from other natural sources. "From our observations, we do not feel it is a large problem at Brunner Island," says Constance Walker, a PPL spokeswoman. (*Intelligencer Journal*, January 15, 2005).

Millions of fish (game and consumable), fish eggs, shellfish and other organisms are sucked out of the Lower Susquehanna River and killed by nuclear power plants **annually**.

Oops they did it again!

Currently, the Susquehanna River Basin Commission is proposing a new fee structure. **The fee structure** for hydro is four times higher than for the proposed Bell Bend nuclear power plant, i.e., $200,000 vs $50,000. Also, the "withdrawal" fee pricing schedule rewards consumption: The more you use the less per gallon you pay.

Nuclear power plants also contaminate water. Tritium is a radioactive isotope and a byproduct in nuclear reactors . **Over the span of a decade, at least seven events** have occurred at U.S. nuclear facilities where water contaminated with radioactivity leaked into the ground. "**These leaks** were initially undetected and remained undetected for as long as 12 years. In at least one case, the leak was not detected until after an underground plume of several million gallons of contaminated water traveled beyond the nuclear facility's site into drinking wells. In most cases, the leak was finally detected more by happenstance than by rigorous **monitoring**." (Source: Paul Gunter Director, Nuclear Information and Resource Service and David Lochbaum, Nuclear Safety Project Union of Concerned Scientists.)

On June 27, 2006, Exelon, owners and operators of Three Mile Island, repaired leaks from the condensate storage tank. The leaks followed a telephone conduit and flooding manholes/man ways 100's of feet away from the tank. The only reason TMI even started looking for a leak was because water was flowing out of the top of one man way cover (far away from the plant), and Exelon sampled it and found tritium. They pumped all the water out of the man ways and dumped it to their industrial waste treatment system which eventually goes to the river. TMI had no idea the storage tank was leaking, how much, or for how long.

Federal regulations seek to protect public health and safety from harm by limiting how much of these radioactive materials can be released from a nuclear facility to the water (and air) during both routine operation and under accident conditions.

Three Mile Island Alert is disappointed that the Nuclear Regulatory Commission has thus far treated these leaks as isolated events and ignored their generic implications. The NRC has not issued correspondence to other licensees requiring them to verify there are no similar leaks ongoing at their facilities. The NRC has not met with licensees to discuss the situation and develop genuine basis for believing the problem is confined to these few facilities. The NRC has not taken steps necessary to ensure that members of the public are not now being exposed to radiation from undetected leaks.

Nuclear power's greenhouse gas "cure" claims must be examined by tracing its **fuel cycle**. It is clear that the production of nuclear electricity is not "clean", "green" or "carbon free. "

Nuclear energy is not the answer to America's energy addiction. We don't need **nuclear methadone** to cure our consumption habits.

We need to focus on internal sources of renewable energy, and we need to adjust our and modify our consumption patterns. And we need to view **water as a precious resource and limited commodity**; not a nuclear subsidy.

The next time someone tells you nuclear power does not harm the environment, tell them where they can recycle their "junk science"