

October 26, 2011

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To: **U.S. Nuclear Regulatory Commission (NRC)**

Lisa Regner, License Renewal  
Mailstop TWB-05-BO1 M  
Washington, D.C. 20555

From: **The Alliance For A Clean Environment (ACE)**

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RULES AND REGULATIONS  
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**PART 1 - SECTIONS 1 THROUGH 11**

**Official On-The-Record Public Hearing Testimony For:**

**Limerick Nuclear Power Plant**

**License Renewal**

**NRC I.D. Docket 2011-0166**

*SUNSI Review Complete*  
*Template = ADM-013*

*E-REDS = ADM-03*  
*Cell = L. Regner (LWR2)*

# **The Alliance For A Clean Environment (ACE)**

1189 Foxview Road Pottstown, PA 19465

October 26, 2011

## **To: U.S. Nuclear Regulatory Commission (NRC)**

Lisa Regner, License Renewal  
Mailstop TWB-05-BO1 M  
Washington, D.C. 20555

## **Re: Limerick License Renewal NRC I.D. Docket 2011-0166**

The Alliance For A Clean Environment (ACE) has been investigating environmental and health threats and harms associated with Limerick Nuclear Power Plant for over 11 years. We compiled a body of research and evidence which shows Limerick Nuclear Plant's harms and threats seriously jeopardize our environment and public health. The evidence is clear. The only way to protect the health and safety of our environment and residents of our region is to close Limerick Nuclear Plant, not relicense it.

**ACE is providing NRC with a detailed summary of our extensive investigation. We request:**

- 1. That NRC respond in writing by e-mail to: [aceactivists@comcast.net](mailto:aceactivists@comcast.net), to each concern, question, request, and conclusion, at least 60 days prior to the next public hearing on Limerick's Environmental Impact Statement.**
- 2. That this document and attachments be placed into the official public hearing record, in addition to our comments at the 9-22-11 public hearing, for Limerick Nuclear Plant's Environmental Impact Statement. We ask that all be placed on NRC's website.**

In the past five years, ACE reviewed several of Limerick Nuclear Plant's permits to pollute. They clearly threaten public health and the environment. Exelon requested SIGNIFICANT POLLUTION INCREASES in three of the permits listed below.

- ✓ Exelon's Radiological Monitoring Reports for Limerick's routine releases of radionuclides.
- ✓ Limerick Nuclear Plant's Title V Air Pollution Permit Renewal Under Health Based Standards of the Clean Air Act.
- ✓ Limerick Nuclear Plant's NPDES Permit to release radionuclides and a broad range of other toxics into the Schuylkill River, a vital source of drinking water for almost 2 million people from Pottstown to Philadelphia.
- ✓ Exelon's Docket Request to the Delaware River Basin Commission to pump unlimited unfiltered contaminated mine waters into the river to supplement the flow to operate Limerick. Exelon also requested to reduce low-flow restrictions, eliminate temperature restrictions, reduce monitoring, and eliminate public participation.

For a credible EIS, all of Limerick's harms and threats to public health and the environment must be evaluated in total. NRC must estimate total harms from all continuous pollution threats our region faces from Limerick Nuclear Plant operations, past, present, and future, including the increases Exelon requested. Threats are additive, cumulative, and synergistic. Our region is not exposed to just one radionuclide at a time or one hazardous chemical released at a time from the broad range listed in Limerick's pollution permits. We are continuously exposed to all of them together over time. "Permissible" levels in a pollution permit clearly does not mean it's safe or harmless.

**For NRC's Environmental Impact Statement to be considered credible, NRC must consider all Limerick Nuclear Plant's threats and harms to public health and safety and the environment, in total, regardless of which agency issues the permits. Unless the additive, cumulative, and synergistic harmful health impacts from all routes of exposure are considered for ALL radionuclides, and other toxics are evaluated for their health harms to public health, our community will reject NRC's Environmental Impact Statement for Limerick Nuclear Plant and consider it:**

➤ **Incomplete, Unreliable, and Invalid**

## **WHY NRC's CREDIBILITY IS SUSPECT FOR LIMERICK NUCLEAR PLANT'S ENVIRONMENTAL REVIEW PROCESS:**

We have concerns that NRC's Environmental Review process will be an industry biased sham. Our concern is based on comments made by Lisa Regner 9-22-11. Ms Regner, the NRC person in charge of Limerick's review, before even reviewing information from Limerick's air and water pollution permits, asserted that NRC didn't deal with that kind of pollution. That is NOT acceptable. Our region's residents are exposed to it every day because of Limerick Nuclear Plant's operations.

During Ms. Regner's comments at the 2:00 P.M. meeting she said, "***We need you (the public) to provide regional specific environmental facts to us – to do a thorough, comprehensive, environmental review.***" (On Video)

- But, when ACE officers tried to explain some important facts about Limerick's major air pollution and serious threats to drinking water, using our charts, Ms. Regner asserted that NRC doesn't deal with that kind of pollution.
- Unless all of Limerick's air pollution and water contamination threats to public health are evaluated, how could anyone possibly consider partial information to be a thorough, comprehensive environmental review?

Neither ignorance of the risk, nor fractured permitting between agencies, are acceptable excuses for NRC to ignore and dismiss major threats to public health and the environment when developing an updated Environmental Impact Statement for Limerick Nuclear Plant.

People in our region are continuously exposed to the additive, cumulative, and synergistic harmful health impacts of ALL of Limerick Nuclear Plant's radionuclides, plus the broad range of hazardous pollutants from Limerick into our air and water.

Unfortunately, our region's residents are exposed to all of Limerick's harmful hazardous releases, not just those NRC chooses to deal with. If NRC fails to include all pollution threats in Limerick's EIS, this costly NRC review will be considered a sham done only to rubberstamp Limerick's relicensing.

NRC statements during the public hearing on Limerick's EIS 9-22-11 in italics - (verified on video)

### **1. "*the primary focus is to maintain public health and safety*"**

- **ACE believes that NRC attempting to ignore major air pollution and water contamination threats from Limerick Nuclear Power Plant does not begin to maintain public health and safety. If fact, it abandons public health and safety.**

### **2. "*Purpose of NRC's review is to determine if environmental impacts are reasonable*"**

- "Reasonable" is an unacceptable, subjective evaluation that would be made by people in an agency that has been shown NOT to be objective, but instead biased toward the nuclear industry. What is reasonable to NRC is absolutely unreasonable to so many people around Limerick, especially children, suffering from huge increases above the national averages, for a broad range of environmentally linked diseases and disabilities.

### **3. "*The supplement EIS specific to Limerick could change the conclusions in the generic impact statement.*"**

- If NRC refuses to deal with specific Limerick pollution threats provided by those who reviewed Limerick's permits and refuses to look at the additive, cumulative, and synergistic harms, how could the generic impact statement possibly change for Limerick?

## **THERE ARE COMPELLING LINKS BETWEEN LIMERICK NUCLEAR PLANT'S ROUTINE RADIATION RELEASES AND CANCER**

After Limerick Nuclear Plant started operating in 1985 to the late 1990s, documented cancer registry data provides evidence showing skyrocketing cancer rates (far higher than the national average), especially in children, in communities near Limerick and the county.

- ACE reviewed four Cancer Studies using PA Cancer Registry Data and/or data from the CDC website that all show elevated cancer rates around Limerick.
- ACE collected a body of independent research and other evidence suggesting Limerick Nuclear Plant had to be a major factor in the highly elevated cancers around it.

### **Links between elevated cancers around nuclear plants are obvious and already documented.**

- ✓ Nuclear plants like Limerick routinely release a broad range of radionuclides into the air and water around them,<sup>i</sup>
- ✓ Radiation exposure can lead to cancer at any level.<sup>ii</sup>
- ✓ After a nuclear plant like Limerick starts operating and continuously releasing a broad range of radionuclides into the air and water, people in the region are continuously exposed to additive, cumulative, and synergistic doses of that radiation from all routes of exposure.
- ✓ Long-term exposure to the witches brew of radiation from nuclear plants like Limerick logically causes increases in cancers around it.
- ✓ Limerick Nuclear Plant is clearly a major factor in the shocking cancer increases around Limerick Nuclear Plant since it started operating.

### **NRC LOST CREDIBILITY**

**NRC officials made unsubstantiated claims and conclusions to dismiss and even deny a link between Limerick Nuclear Plant's routine and accidental radiation releases into our air and water and the skyrocketing documented cancer increases far above the national average, especially in children, and those cancers most specifically linked to radiation exposure.**

- **NRC'S PREDETERMINED CONCLUSIONS ARE SHAMELESS AND ARE NOT CREDIBLE.**

10-22-11 In Pottstown, NRC's Lisa Regner inaccurately claimed cancer data on charts and handouts prepared for NRC's public meeting by ACE were anecdotal.

- **Cancer Data was NOT anecdotal. Documented cancer data increases were in fact based on PA Cancer Registry Data and Data from the CDC Website**

**It's NOT credible for NRC employees to assert that Limerick's routine radiation emissions are not a major factor in the documented highly elevated cancers around Limerick, especially in children.**

**Lisa Regner (NRC) made other irresponsible and inaccurate statements showing NRC's INACCURATE PREDETERMINED BIAS about links between cancer and nuclear plant radiation.**

**Additional unsubstantiated claims 9-22-11 from Lisa Regner to ACE officers include:**

- ✓ **Unsubstantiated claims that Limerick's radiation releases were so small there was no harm.**
  - In reality, Ms. Regner, nor anyone else, knows the full extent of actual radionuclides routinely and accidentally released into the air, water, soil, or vegetation from Limerick Nuclear Plant. We rely on incomplete, deceptive data and reports controlled by Exelon, the company with a vested interest in the outcome that has shown it can't be trusted.
  - **NO INDEPENDENT AGENCY EVER DID THE YEAR-LONG MONITORING, TESTING, AND REPORTING AT LIMERICK, FOR ALL RADIONUCLIDES FROM ALL ROUTES OF EXPOSURE ASSOCIATED WITH LIMERICK OPERATIONS.**
  - NRC never took one sample at Limerick, a fact admitted by NRC's Paul Krohn 5-18-11.
  - Regner pointed to PA DEP radiation monitoring which realistically cannot be used to claim to know the full extent of releases, much less spikes. PA DEP does NOT monitor or test for all radionuclides associated with Limerick Nuclear Plant operations, and fails to accurately track and report releases 24 hours a day.

- ✓ **Ms. Regner ignored discussion of other cancer studies also showing elevated cancer rates, especially in children around nuclear plants.** Regner even dismissed the cancer study around German nuclear plants showing highly elevated cancers in children, which led to Germany calling to close all their nuclear plants.

**5-18-11 In Limerick, NRC's Paul Krohn Also Made Inaccurate, Unsubstantiated, Deceptive Claims, Discounting Independent Scientists and Research.**"

1. Paul Krohn, NRC's Branch Chief for Limerick claimed "*There is no research to show health problems. NRC cannot specifically tie cancer studies...around nuclear power plants to them.*"<sup>iv</sup>
  - **THAT IS NOT TRUE! Many Studies Show Links Between Nuclear Plants and Cancer.** U.S. and European studies, as well as four studies on PA Cancer Registry cancer data around Limerick<sup>v</sup>, show increased cancers, especially in children,
2. **Strontium 90 (SR-90) in Baby Teeth Is The Smoking Gun.** The Radiation and Public Health Project's "Tooth Fairy Study" verified Strontium-90 radiation in the baby teeth collected from children around Limerick Nuclear Plant. (Reported 2003).
  - Limerick Nuclear Plant's role in SR-90 in baby teeth around Limerick is clear.
  - Strontium-90 was routinely released into our air and water from Limerick Nuclear Plant since 1985.
  - SR-90 was detected around Limerick in water, milk, soil, and vegetation (2009 Exelon Report).<sup>vi</sup>
  - SR-90 was detected in the teeth of children living in the region around Limerick, at some of the highest levels around nuclear plants studied in the U.S.
  - Limerick Nuclear Plant's 26 years of SR-90 releases were obviously the major factor. Still, 5-18-11, NRC's Branch Chief, Paul Krohn blamed 50-year old bomb testing stating, "*Bomb testing didn't stop that long ago – from a scientific perspective SR-90 in teeth is from bomb testing.*" It is NOT credible to blame decades old bomb testing far distances from Limerick for SR-90 found in baby teeth in the region around Limerick, when Limerick routinely released SR-90 since 1985.

**Background Radiation Levels Were Drastically Increased After Chernobyl/Japan**

<b>Disasters.</b>	Pre-Chernobyl:	80 to 100 Millirems Per Year
	After Chernobyl:	360 Millirems Per Year
	After Japan:	620 Millirems Per Year

- **SEE ATTACHMENTS: 1. NO SAFE DOSE PACKET 2. ACE LETTER TO NRC ON STANDARDS**

**Still, NRC Shamefully Dismissed the Obvious Role of the Chernobyl and Japan Nuclear Disasters In Drastic RADIATION BACKGROUND INCREASES.** 5-18-11 NRC's Paul Krohn asserted nuclear disasters didn't cause increases saying, "a lot of that is ...cosmic rays. Background increased by living changes – add to what people receive each went to about 620 from about 300." When challenged by residents, NRC's Richard Barkley responded, "*NRC didn't assert it was safer. That's just reality.*"

**In essence, NRC legally sanctioned increased radiation health harm to our region, 3-16-11, days after the Japan disaster.**" Why? Exelon will not have to report on radiation detected for Limerick samples, if they are under 620 Millirems Per Year. That is both deceptive and dangerous. When independent scientists and physicians admit there is no safe level of radiation exposure, detection levels for Limerick monitoring should be zero.

**So called "Safe Dose Limits", are arbitrary, deceptive, and clearly NOT PROTECTIVE.** Debate inside EPA sparked "hot dissent" on a plan to radically hike post-accident radiation in food and water. Example: Proposed New Guidance would allow clean-up levels that exceed MCSs under the Safe Drinking Water Act by a factor of 100, 1000, and in two

instances 7 million. EPA Public Employees for Environmental Responsibility (PEER) said, "We all deserve to know why some in EPA want to legitimize exposing the public to radiation at levels vastly higher than what EPA officially considers dangerous."

**We need NRC employees with courage and integrity to speak up to protect health, like those at EPA.** NRC should stop making bogus comparisons between continuous nuclear plant radiation releases and exposure to gamma rays from x-rays and planes. That is deceptive for so many reasons.

**NRC officials refuse to consider the vast body of independent research showing links between nuclear plant radiation releases and cancer.**

- NRC must stop remaining in denial of a body of documented independent research.
- NRC must stop using industry biased unsubstantiated conclusions, to protect nuclear industry interests.
- NRC is involved in a cover-up; a dismissal and/or distortion of the effects of radioactivity from nuclear plants, even regarding the actual harms and deaths from Chernobyl and TMI.
  - ✓ Chernobyl - Almost a million people worldwide died from radioactivity discharged after the 1986 Chernobyl accident, yet NRC continues to use inaccurate low numbers. Research confirms many terrible diseases and disabilities are tied to Chernobyl.<sup>viii</sup>
  - ✓ TMI - That 1979 accident in PA may be responsible for thousands of deaths. "Deadly Deceit: Low Level Radiation - High Level Cover-up" suggests between 50,000 to 100,000 EXCESS DEATHS occurred after the TMI accident.<sup>ix</sup>

**Dr. Jeffrey Patterson, Professor Emeritus, University of Wisconsin's School of Public Health and Past President of Physicians for Social Responsibility says:**

- "Background Radiation" is NOT safe. We live with background radiation, but it does cause cancer".
- "There are absolutely no safe levels of radiation. Adding more radiation ADDS to the health impacts".
- "Exposure to radionuclides...increases risk of cancer.
- "Every effort must be taken to minimize radionuclide content in food and water."

**Dr. Steven Wing, University of North Carolina in Chapel Hill, School of Public Health said:** "Generally accepted thinking is that there is no safe dose in terms of cancer or genetic effects of radiation. The claims of no threat to health...just flies in the face of all the standard models and all the studies that have been done over a long period of time of radiation and cancer".

**Dr. Chris Busby, Scientific Secretary of the European Committee on Radiation Risk said, if one plans on living a long, healthy life, the most obvious way is to reduce radiation exposure.** Dr Busby's Book, "Radiation Toxicity Syndrome" focuses on harms from radiation exposure.

<sup>i</sup> Exelon's Radiological Monitoring Reports for Limerick Nuclear Plant 2009

<sup>ii</sup> "BEIR VII" Report, National Academy of Sciences

<sup>iii</sup> May 18, 2011 - Video Tape of NRC Meeting in Limerick

<sup>iv</sup> May 18, 2011 Video Tape of NRC Meeting in Limerick

<sup>v</sup> PA Cancer Registry and CDC

<sup>vi</sup> Exelon's Radiological Monitoring Reports for Limerick Nuclear Plant 2009

<sup>vii</sup> NRC Press Release 3-16-11

<sup>viii</sup> New York academy of Science - [nyas.org/annals](http://nyas.org/annals), "Consequences to People and the Environment"

<sup>ix</sup> "Deadly Deceit: Low Level Radiation - High Level Cover-up", by Jay Gould and Ben Goldman, 1990

**NRC'S CANCER STUDY AROUND NUCLEAR PLANTS WILL BE A DECEPTIVE TOOL USED BY NRC AND THE NUCLEAR INDUSTRY TO DENY WHAT IS ALREADY PROVEN AND OBVIOUS, JUST LIKE STUDIES DONE BY THE TOBACCO INDUSTRY.**

NRC's industry biased blind denials 5-18-11 and 10-22-11 confirm our conclusion that NRC will not be objective in a cancer study around nuclear plants - that the real objective is to support NRC's baseless claims. We predict the outcome will deny links to support NRC and industry denials, just like studies done by the tobacco industry for years.

- **SEE ATTACHMENT 4-21-10 Letter From ACE to Gregory Jaczko, NRC Chairman Related to: NRC Cancer Study Around U.S. Nuclear Plants. - ACE concludes NRC's Cancer Study is being done to give NRC and the nuclear industry a tool to claim there is no link.**

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## **Cancer Is Not The Only Elevated Health Problem Near Limerick**

**A 2003 EPA report on state data reveals far higher numbers around Limerick Nuclear Plant, than Philadelphia, Reading, and the state average for:**

- ✓ Infant and Neonatal Mortality
- ✓ Malignant Tumors
- ✓ Lower Respiratory Disease
- ✓ Cerebrovascular Disease

## **Radiation and Other Toxics In Limerick's Air Pollution and Water Contamination Can Cause The Kinds Of Highly Elevated Health Harms Listed Above.**

**Many dangerous toxics are associated with Limerick's air pollution and water contamination.**

In a discussion between hearings 9-22-11, NRC's Lisa Regner made several comments which led us to believe she either has little or no knowledge or no interest in the potential for serious health harms from Limerick's major air pollution permit or Limerick's threats to the vital source of drinking water through Limerick's NPDES permit, or toxic threats to the river and public health from mine water pumping to supplement the flow for Limerick operations.

- **Ms. Regner is in charge of Limerick's Environmental Review for Relicensing. This lack of knowledge and/or dismissive attitude are not acceptable when health and lives are in the balance.**

## **NRC REVIEW OF ALL OF LIMERICK NUCLEAR PLANT'S POLLUTION THREATS IS IMPERATIVE! LIMERICK'S HARMS AND THREATS WILL BE DRASTICALLY INCREASING, ACCORDING TO EXELON'S REQUESTS MADE TO OTHER AGENCIES**

1. **Limerick's Cooling Towers are causing DEPLETION that results in all toxic discharges CONCENTRATING in the river that is the vital drinking water source for almost 2 million people from Pottstown to Philadelphia.**
  - Limerick's cooling towers have been causing significant depletion and low flows in the river that are concentrating all the dangerous toxics Limerick is discharging and/or pumping into the river.
  - Water treatment systems do not test for all the toxics associated with Limerick's discharges, much less remove them.
  - To deal with elevated levels of some toxics, water treatment systems add other toxics, further increasing health threats from concentrated toxics.
  - To slightly minimize depletion Exelon pumps more toxics into the river from mine pits.
2. **Limerick Was Granted A 6-Fold INCREASE In Dangerous Air Pollution From Limerick's Cooling Towers in 2009 by PA DEP.**
  - Research blames the kind of air pollution increased for thousands of deaths a year, and increased emergency room visits and hospitalization for everything from asthma and other respiratory problems to heart attacks and strokes.
  - DEP called Limerick's cooling towers an effluent stream into the sky.
  - Massive toxics drawn in with over 20 1/2 billion gallons of Schuylkill River water each year are NOT filtered out by Exelon.
  - Vast amounts of chlorine and other dangerous toxic chemicals are added to the cooling towers every day.
  - Exelon itself proved the air pollution from cooling towers was too dangerous. Exelon refused N.J. DEP's requirement to put up cooling towers at Exelon's Oyster Creek Nuclear Plant in New Jersey, stating air pollution from cooling towers was the reason for non-compliance.
3. **Exelon is asking PA DEP for Limerick's toxic discharge limits into the river to be raised to 4 times Safe Drinking Water Standards. (This is a source of drinking water for almost two**

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million people) Limerick's current limit is already doubled Safe Drinking Water Standards. Limerick's permit reveals that Limerick has even violated the new standard requested.

4. Exelon is asking DRBC to pump more hazardous mine pit water into the river to operate Limerick.
5. While Exelon is asking to significantly increase pollution discharges into the river, at the same time Exelon is asking to reduce and eliminate important safeguards established as part of the licensing process, including:
  - Eliminate temperature restrictions
  - Reduce low-flow restrictions
  - Reduce monitoring requirements
  - Eliminate future public participation when adding more and more contaminated unfiltered mine waters

**IT WOULD NOT BE CREDIBLE FOR NRC TO CLAIM THE ABOVE MENTIONED SIGNIFICANT AND INCREASING ENVIRONMENTAL AND HEALTH THREATS FROM LIMERICK OPERATIONS CAN BE IGNORED IN NRC'S ENVIRONMENTAL IMPACT STATEMENT. THAT WOULD BE ABSURD!**

**NRC HAS THE RESPONSIBILITY TO PROTECT PUBLIC HEALTH AND THE ENVIRONMENT**

1. The NRC is the government agency charged by the U.S. Congress with the grave responsibility to protect public health and safety and the environment related to operation of commercial nuclear reactors in the U.S.
2. Threats to public health and the environment listed above are undeniable and clearly as a result of operating Limerick Nuclear Plant, a commercial U.S. nuclear reactor.
3. 9-22-11 Lisa Regner, NRC's employee responsible for Limerick's Environmental Impact Statement said: (confirmed by video)
  - a. NRC's environmental review will consider impacts and any mitigation of those impacts that NRC considers "significant".
  - b. NRC will determine if environmental impacts are "reasonable".
  - c. NRC consults with various state and federal officials.
  - d. NRC is looking for environmental impacts from the continued operation of Limerick.
  - e. NRC wants to know:
    - ✓ What local issues NRC should focus on during NRC's environmental review of Limerick
    - ✓ What environmental issues NRC should examine during the environmental review
    - ✓ What reasonable alternatives are appropriate for this region.

Lisa Regner said, "*We need you to provide regional specific environmental facts to us - to do a thorough, comprehensive, environmental review. Public comments are an important part - are considered and addressed.*"

ACE is providing Ms. Regner with detailed summaries from our investigations on Limerick's major air and water pollution permits. This clearly identifies issues to focus on and examine in NRC's environmental review. Requested pollution increases, along with the additive, cumulative, and synergistic harmful impacts of radiation and toxic releases (past, present, and future), suggest it would be unethical for NRC to determine that any of these environmental threats are "reasonable" or "not significant".

In fact, increases in Limerick's air and water pollution should be mitigated to the degree possible, by Exelon filtering massive water intake and wastewater discharges, as well as mine water pumping into the river. We believe NRC has an obligation to review our information then ask DEP and DRBC to require Exelon to filter intake, discharges, and mine water, to protect public health and safety until Limerick closes in 2029.

**For 11 years ACE did an intensive investigation on the environmental harms and threats of Limerick Nuclear Plant operations.**

**ACE is submitting for the record, brief detailed summaries of our findings on each issue below, related to Limerick Nuclear Plant's long-term unprecedented environmental harms, threats, and risks.**

**Sections in our report include:**

- 1. Radiation Into Air and Water From Routine and Accidental Emissions**
- 2. Major Air Pollution Under Health Based Standards of the Clean Air Act**
- 3. Schuylkill River Depletion and Major Drinking Water Contamination**
- 4. Radioactive Groundwater Contamination**
- 5. Radiation Reporting Levels Increased Dramatically After Japan Disaster**
- 6. Alarming Cancer Increases, Especially In Children, Since Limerick Started Operating**
- 7. Increased Risk of Meltdown From More Frequent and Stronger Earthquakes and Other Natural Disasters**
- 8. Threats From Unguarded Terrorist Attacks With Planes and Missiles, Cyber Attacks**
- 9. Need for an Updated Evacuation Plan and Increased EPZ**
- 10. Increased Costs to the Public - More Cancers and Other Costly Illnesses, More Emergency Room Visits and Hospitalizations from Drastic Increases in PM-10 and TDS, Treatment For Drinking Water, Environmental Clean-Up**
- 11. Ways to Replace Dangerous, Dirty, Harmful, and Costly Nuclear Power With Safe, Clean, Renewable Energy. Nuclear power is not always reliable.**
- 12. Deadly High Level Radioactive Wastes Packed In Vulnerable Fuel Pools On Site**
- 13. Lax Fire Safety Regulations**
- 14. Aging Deteriorating Equipment - Buried Pipes and Cables**

**Conclusion: Harms, threats, and risks will continue to increase until Limerick's current operating licenses expire in 2029. Taking into account the cumulative long-term harms, it would be negligent for NRC to approve license renewals until 2049. Limerick Nuclear Power Plant Must Be Closed, Not Relicensed Until 2049. We do not believe that an unbiased, thorough, comprehensive, environmental review by NRC can lead to any other conclusion.**

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Copies:

Senator Bob Casey  
Senator Pat Toomey  
Congressman Gerlach  
Congressman Dent  
Congresswoman Schwartz  
Governor Corbett  
PA Senator Rafferty  
PA Senator Dinniman

# **Exelon's Pending Requests For Limerick Nuclear Plant**

## **They All Further Jeopardize Our Region's Environment And Health and Safety**

- 1. Limerick Uprates**
- 2. Limerick Relicensing**
- 3. NPDES Permit Renewal For The Schuylkill River, With Doubled Pollution Increases 4 Times "Safe Drinking Water Standards".**
- 4. Increased Toxic Mine Water Pumping Into The Schuylkill**
- 5. Eliminate Temperature Restrictions, Reduce Low-Flow Restrictions, and Decrease Monitoring Requirements in the Schuylkill River**
- 6. 8 Fold Increase in PM-10 Air Pollution from Limerick's Cooling Towers**

**Approval of all these things mean more dangerous poisons into us and our environment.**

**➤ To Be Credible, NRC's Updated EIS Must Factor In The Consequences Of Each Of These Exelon Requests For Limerick Nuclear Plant**

## **The Alliance For A Clean Environment**

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January 26, 2007

### **Secretary, U.S. Nuclear Regulatory Commission**

Rulemakings and Adjudications Staff.

Washington, DC 20555-0001

SECY@nrc.gov.

Phone (301) 415-1966.

Fax (301) 415-1101.

Submit via website <http://ruleforum.llnl.gov>.

#### **Subject: More Protective Radiation Standards - PRM-51-11**

Federal Register notice

<http://www.epa.gov/fedrgstr/EPA-IMPACT/2006/November/Day-20/i19568.htm>

The Alliance For A Clean Environment (ACE) is a grass roots environmental group with members in the tri-county area surrounding the Limerick Nuclear Power Plant. We urge NRC to approve the petition for rulemaking that would provide more protective radiation standards at older reactors.

For twelve years we have been gathering evidence in an attempt to understand why there is a health crisis in communities in our area. We have documented and are attaching information on alarming elevated cancer rates in Montgomery County (home of the Limerick Nuclear Power Plant), elevated infant and neonatal mortality, and learning disabilities.

1. Cancer incidence increased in Montgomery County since Limerick Nuclear Power Plant went on line in the mid 1980s, for many of the kinds of cancers associated with radiation exposure, such as; Thyroid Cancer Increased by 128%, Breast Cancer 61%, and Leukemia 48%. (1985-86 to 1996-97) PA Cancer Registry Data
2. Childhood cancer deaths (ages 1 to 14) increased by 71% in Montgomery County, while going down in surrounding counties, PA and the U.S. Childhood cancer rates are 92.5% higher than the national average in six communities near the nuclear plant, including one in Chester and one in Berks County.
3. Elevated infant and neonatal mortality are far higher than the state average, and even higher than Philadelphia and Reading (according to state data).
4. Learning disabilities are documented to be double state increases at 94% (1990 to 2000) in Montgomery County.

Children in the shadow of Limerick Nuclear Power Plant are documented to be suffering and dying in record numbers. Statistics are alarming. Childhood cancer statistics are significantly higher near Limerick Nuclear Power Plant than across the state, nation, and tri-county.

- More precautionary radiation standards for fetuses and children are imperative. Children in the region of Limerick Nuclear Power Plant need and deserve radiation standards that will protect them, as do all children who are unfortunate enough to live around nuclear power plants or other sources of radiation emissions.
- NRC's radiation standards still ignore the unique vulnerability of children. Radiation regulations used by NRC are still based on the "Standard Man" (an adult healthy male). This is irresponsible, tragic, and unacceptable. NRC radiation regulations also fail to protect women, people already sick, and the elderly. It is long past time for NRC radiation standards to be more reflective of current science and reality.

**Evidence is clear and compelling that children are the ignored victims of outdated and unprotective radiation standards still used by NRC for regulating nuclear power plants.**

For example:

- Since Limerick Nuclear Power Plant first went on line in the mid 1980's, the statistics above show far higher rates of cancer, leukemia, infant and neonatal mortality. Other environmentally related illnesses have also been rising.
- Lessons of Chernobyl show children were the most vulnerable to radiation exposure, even in small doses, and that children exposed to radiation suffer from higher rates of certain childhood cancers, especially leukemia and thyroid cancer, and have a greater likelihood of developing breast cancer as adults.
  - Dramatic increases are well documented in these same cancers (thyroid cancer, leukemia, and breast cancer) since Limerick Nuclear Power Plant first went on line in the mid 1980s.
- Increases in other childhood cancers have been found near nuclear operations in the Navaho Nation, Brookhaven, New York, and nuclear power stations in Oyster Creek, New Jersey and Clinton, Illinois.
- Increases in down syndrome are found near Yankee Rowe power station in Massachusetts.
- Studies show ionizing radiation is also linked to immune system damage, heart defects, and diabetes in children.
- Evidence shows that after closings of nuclear power plants in the U.S., infant death and childhood cancer rates are reduced.

The American Academy of Pediatrics has identified reasons children are most vulnerable. They stated that children have higher minute ventilation or a higher concentration of tiny capillaries in the lungs, leading to greater radioactivity exposure from the same amount of radioactive material. They also said children are extra sensitive to the DNA-damaging effects of radioactive energy.

The cumulative weight of evidence from the three large releases of radiation (Chernobyl, TMI, and Savannah River), confirm that infants and children are most sensitive to damage from low levels of ionizing radiation. (See Attachment)

**A Moral And Ethical Responsibility To Protect Future Generations**

- Evidence of harm to fetuses and children is overwhelming. We urge NRC, the agency with the mission to protect the public from nuclear power plant radiation, to now take crucial precautionary action for more protective radiation standards that will prevent unnecessary harm to all fetuses and children around nuclear plants.

**Costs of Preventable Childhood Cancer, Illness, and Disability: The Price We Pay**

- Costs, both physical and financial, for unnecessary and preventable lifelong disease and disability are obviously astronomical and avoidable. Links between radiation exposure and a broad range of childhood illness, disease, and disability should no longer be disputed by anyone.
- Financial costs to owners of nuclear plants for providing more protective measures regarding nuclear power plant radiation releases would pale by comparison to the costs society pays for preventable childhood cancer, illness, and disability.

**Since Limerick Nuclear Power Plant went on line in the mid 1980s,  
There Are Alarming Cancer Statistics in Montgomery County  
And Even Worse In Communities Near Limerick Nuclear Power Plant. (See Attachments)**

- **Alarming Increases In Many Cancers** after Limerick Nuclear Power Plant went on line in Montgomery County, home of Limerick Nuclear Plant. (PA Cancer Registry Statistics)
  - **Cancer Death Rate (1995 to 2004) FAR Higher** In 13 Townships and Boroughs Near Limerick Nuclear Power Plant, compared to the rest of Montgomery County.
  
- **Childhood Cancer – Alarming Statistics**
  - **71% Increase in Childhood Cancer Deaths** (Ages 1 to 14)- Montgomery County. 1980's to 90s - Surrounding counties, state, and nation went down
  - **92.5% Above National Average** – (Ages 0 to 19) 1995 to 1999 in communities close to Limerick Nuclear Power Plant – showing an upward trend from 30% higher than the national average in the late 1980s to 60% higher in early 1990s
  
- **Thyroid Cancer Absolutely Soared** In Montgomery County since Limerick went on line.
  - **About 75% Higher than the U.S. Rate** - 1998,1999, and 2000, Montgomery County's Thyroid Cancer Rate - Thyroid Cancer Incidence is rising across the nation which increases the significance of these shocking increases in Montgomery County.
  - **128% Increase** – Montgomery County 1985-86 to 1996-97 A broad range of thyroid problems have also been reported in alarming numbers.
  - Thyroid Cancer Incidence in PA is highest in counties closest to the concentration of nuclear power plants, and in the predominant wind direction from them.
  
- **Leukemia Significantly Higher** - Montgomery County and 6 borough/township area near Limerick
  - **40% above other parts of the tri-county area for at least 15 years** - Total of 106 cases from 1985-99
  - **48% Increase in Montgomery County** (1985-86 to 1996-97)
  - **Almost double the state average** (1985 to 1994).
  
- **Breast Cancer - Significantly Higher In Montgomery County (See Attachments)**
  - **61% Increase** - 1985-86 to 1996-97 - Rising Incidence
  - **39.2% Higher** – (1995-1999) Female Breast Cancer - Compared to the Nation and Tri County 6 Municipalities – 1995 to 1999, in just five years, a total of 263 women were newly diagnosed with Breast Cancer. Among young adult women the most frequently diagnosed cancer, by far, is breast cancer. Considering that breast cancer is a national epidemic, this is cause for precaution.
  - **Female Breast Cancer By Age** (diagnosed 1995-1999) - Compared to the National Average
 

Age	<u>% HIGHER than U.S.</u>
0-29	+ 15.3 %
30-44	+ 51.4 %
45-64	+ 39.3 %
65+	+ 28.6 %
  - Breast cancer is an epidemic across the nation. There is major cause for concern when breast cancer rates in communities near Limerick Nuclear Power Plant are 51.4% higher in young women 30 to 44, and higher in every other age group. Breast cancer links to radiation exposure are well established.
  - Breast Cancer went up in the Philadelphia area after Limerick Nuclear Power Plant started, while going down when a nuclear power plant closed in San Francisco.

- **Brain Cancer**
  - **Almost Doubled** in Montgomery County in a 5 year period - 1995 to 1999
  - **In Pottstown, (Limerick Nuclear Power Plant mailing address), Brain Cancer Rates Are Significantly Higher Than State Average Or Any Municipality Within 12 Miles.**
  - **Brain/Central Nervous System Cancer**  
**32.5% HIGHER than Tri-County**  
**38.3% HIGHER than U.S.**
- State data shows that **Malignant Tumors** are **far higher than the state average**, and even far higher than Philadelphia and Reading. **(See graph)**

Whether radiation releases are accidental or allowed is irrelevant. Limerick Nuclear Power Plant's allowable levels of planned radiation releases from routine operations, as well as unplanned radiation releases from leaks and accidents could be a major factor in the alarming cancer and tumor increases in the areas near Limerick Nuclear Power Plant.

- The BEIR VII Report provides a link - "In BEIR VII, the cancer mortality risks for females are 37.5 percent higher. The risks for all solid tumors, like lung, breast, and kidney, liver, and other solid tumors added together are almost 50 percent greater for women than men, though there are a few specific cancers, including leukemia, for which the risk estimates for men are higher." (Summary estimates are in Table ES-1 on page 28 of the BEIR VII Report prepublication copy, on the Web at <http://books.nap.edu/books/030909156X/html/28.html>.)

The broad range of nuclear power's ionizing radiation has been shown to attack many parts of the body - the thyroid, lungs, liver, spleen, kidneys, ovaries, bone, muscle, and skin. **(See Chart)**

- In Montgomery County, home of Limerick Nuclear Power Plant, in addition to alarming increases in thyroid, leukemia, and breast cancers listed above, there are other alarming cancer increases in other organs from the chart above. For example: Montgomery County Increases 1985-86 to 1996-97 - Kidney Cancer increased 96% and Skin Cancer increased 72%.

A long list of studies by independent experts has long provided evidence that there is no safe dose of radiation so low that the risk of a malignancy is zero. **(See Attachment)**

Massive independent research over the past 20 years provides compelling evidence that exposure to radiation at any level can increase the risk of damage to tissues, cells, and DNA, leading to risk of cancer, leukemia, birth defects, genetic mutations, reproductive disorders, cardiovascular disorders, endocrine system disorders, and immune system damage. There is evidence that specific kinds of ionizing radiation from nuclear power plants is linked to damage of specific organs in the body. **(Identified On Attached Chart Above)**

- Many rising cancers in Montgomery County are in parts of the body (listed on the attached chart) shown as impacted by specific kinds of ionizing radiation from nuclear power plants.

#### **NRC's Irresponsible Dismissal Of BEIR VII Conclusions Cause Lack of Trust And Harm**

ACE has encountered a casual, dismissive attitude about radiation standards and exposure risks from NRC employees. June, 2005, the BEIR VII committee of scientists concluded no level of radiation dose is safe, yet ten months later, at an NRC annual meeting on Limerick Nuclear Power Plant in Limerick, an NRC employee stated NRC would wait hours or days to warn the public of accidents at Limerick, depending on the increased radiation level released. It is difficult to understand why NRC employees have made conclusions and statements to us which deny evidence of harm. That is both unfortunate and absolutely unacceptable. It is difficult to have confidence in NRC employees who make claims which defy both science and logic.

**NRC employee used irresponsible deception to discount the BEIR VII report.**

Fetuses and children are far more at risk from radiation levels permitted to be released at Limerick.

Our question concerned elevated cancers, infant mortality, and other childhood disability around Limerick and their relationship to NRC's outdated, unprotective radiation standards based on the average male, not fetuses and children.

- An NRC employee claimed BEIR VII scientists did not recommend more protective standards in their June, 2005 report and therefore, current standards are protective. Video of this inexplicable comment is available upon request. That NRC response was illogical, irresponsible, and deceptive.
  - Why would the National Academy of Science report recommend any level as safe above ZERO, when their report said there is no safe level?
- The NRC employee also stated that Limerick Nuclear Power Plant's radiation emissions were well below "acceptable standards", a statement he cannot prove.
  - This statement ignores the BEIR VII report claiming no level was safe.
  - There is no attempt to account for the additive, cumulative, and synergistic harmful health impacts of all the kinds of radiation released from Limerick.
  - Exelon, the company with a vested interest in the outcome, is doing all the monitoring, testing, and reporting. Considering what has happened at Exelon's nuclear plants in Chicago, it is difficult to have complete trust in radiation emitted into our water, air, and soil here. In addition, it appears Exelon is not required to test, monitor, or report on all the kinds of radiation associated with nuclear power plants.
  - Without site specific independent and comprehensive testing of our, air, water, soil, or the bodies of our children, to know exactly how much of what kinds of radiation exposure people around Limerick are exposed to regularly (not to mention accidental releases), the NRC employee irresponsibly claimed Limerick's radiation releases were not causing a threat to our children based on levels released by Limerick.
  - There are no NRC studies to show levels of radiation in the bodies of our children.
  - The Radiation and Public Health Project collected teeth of children in our area to measure for Strontium-90 radiation, and found high levels of Strontium-90 in the teeth of children around Limerick Nuclear Power Plant. **See Attachments – RPHP Reports and Graphs)**
- BEIR VII Report estimates the differential risk for children. For instance, the same radiation in the first year of life for boys produces three to four times the cancer risk as exposure between the ages of 20 and 50. Female infants have almost double the risk as male infants. (Table 12 D-1 and D-2, on pages 550-551 of the prepublication copy of the report, <http://books.nap.edu/books/030909156X/html/550.html>)." (excerpted from <http://www.ieer.org/comments/beir/beir7pressrel.html>)
- To truly protect children and other vulnerable populations, NRC radiation standards should be ZERO. Exposure at any level above zero should be unacceptable to NRC based on the body of evidence of harm and the BEIR VII Report.
  - **However, it is a start if NRC demands far more precautionary regulations based on recognition of the unique impacts of radiation exposure to vulnerable populations, especially children. Clearly, more protective radiation standards are long overdue and crucial for the future health of our children.**

- Inexplicably, to date, NRC failed to provide more protective radiation standards that would be more precautionary of children, fetuses, and the more vulnerable such as those already sick. Harm from radiation exposure at any level can no longer be disputed and should NOT be denied or ignored by NRC. Ignoring and/or denying the reality continues to unnecessarily jeopardize the public, especially fetuses, children, and those already sick.
- Hopefully, with more protective regulations, NRC employees will start to take radiation exposure more seriously and make more responsible comments and decisions regarding radiation health impacts to the public, especially fetuses and children.

**Protecting The Public From Radiation Emissions  
Into Their Air, Water, Soil, And Bodies  
From Routine Releases and Accidental Radiation Releases At Nuclear Power Plants  
Should Be A Moral And Ethical Obligation For NRC**

**Necessary Actions For Protecting The Most Vulnerable Populations  
In NRC Radiation Standards**

1. Protect the most vulnerable by accounting for more vulnerable populations in NRC standards.
2. Recognize "allowable" levels are not safe. NRC's "allowable" levels of radionuclides are NOT conservative or protective enough for vulnerable fetuses, growing infants and children, the elderly, and those in poor health. They are based only on the obsolete "standard man", a healthy, white male. They also ignore women, who are, according to the BEIR VII Report, 37- 50% more vulnerable than standard man to the harmful effects of ionizing radiation.
3. Consider radiation damage from inhaling or ingesting radionuclides. NRC does not consider the effects of internal radiation from ingested or inhaled alpha and beta emitters. The amount of polonium-210 that recently killed a former Russian intelligence officer was inaccurately considered by IAEA and NRC to be of the lowest possible risk because NRC failed to account for internal radiation damage.
4. Recognize there is no safe dose. Further, regarding low dose radiation, the BEIR VII panel has concluded, "It is unlikely that a threshold exists for the induction of cancers... Further, there are extensive data on radiation-induced transmissible mutations in mice and other organisms. There is therefore no logical reason to believe that humans would be immune to this sort of harm."
5. Recognize that the public is exposed to additive, cumulative, and synergistic radiation doses, far greater than the exposure threat from just one dose of one kind of radiation at a time as evaluated under current standards. Evidence suggests the public can no longer afford to accept radiation standards which are based on illusion. It is long past time to stop ignoring the magnitude of the potential health impacts from additive, cumulative, and synergistic doses of all radiation exposures, especially to those who are unfortunate enough to live around nuclear power plants.
6. NRC should protect all members of the public from all types of excess radiation exposure from nuclear power and its fuel cycle, gamma, alpha, beta, neutron, particulate, fission products, noble gases, etc. and that measurement and monitoring should include all forms and pathways, not just gamma at the fence line.

7. NRC should recognize that low levels of radiation exposure over time can be just as harmful as one high level dose, and make more responsible decisions to immediately warn the public based on any radiation release above normal.
8. Radiation limits should include accidental nuclear power plant releases, as well as the planned everyday radiation emissions from routine operations.
9. Recognize that it is far more costly to the public, than it is for the nuclear industry, if NRC allows nuclear power plants to avoid spending what is necessary to provide all available filtering and monitoring technologies for their radiation emissions into our air, water, soil, and eventually our bodies.
10. Recognize that prevention is key, due to the fact that some radionuclides that are released into the air, water, and soil and their by-products can continue to damage human health for millions of years. Costs for more protective filtering and monitoring technologies pale by comparison to public's costs if NRC fails to require available prevention technologies. NRC should not succumb to the nuclear industry's quest to reduce economic costs, including deferring maintenance which can increase the radiation released – and the risks. For what are the true costs to the public if NRC fails to take more protective action now?

#### **Petitioner's Request**

ACE commends and is thankful that the petitioner is requesting NRC to prepare a rulemaking that will require that the NRC reconcile its generic environmental impact statement for nuclear power plant operating license renewal applications with current scientific understanding of the health risks of low-level radiation, including but not limited to those discussed in the National Academy of Sciences Health Risks From Exposure to Low Levels of Ionizing Radiation: Biological Effects of Ionizing Radiation (BEIR) VII Phase 2 Report.

- However, we urge NRC to require more protective radiation standards for all older nuclear power plants to protect fetuses, children, the elderly, and those already sick around Limerick Nuclear Power Plant and others.

#### **For A Safer Healthier Future ACE URGES NRC To Exercise Precaution**

We appreciate this opportunity to provide NRC with comments. We hope that as NRC Commissioners you will consider each of our comments, as though your children and grandchildren or other family members were living in the shadow of Limerick Nuclear Power Plant.

**Please send a written response to:**

**ACE President, Dr. Lewis Cuthbert  
P.O. Box 3063  
Stowe, PA 19464**

**The Alliance For A Clean Environment**

1189 Foxview Road  
Pottstown, PA 19465

April 21, 2010

**Gregory B. Jaczko, Chairman**  
**U.S. Nuclear Regulatory Commission**

Mail Stop O-16G4  
Washington, DC 20555-0001  
Fax: (301) 415-3504  
Email: cmriaczko(anrc.-ov)

**RE: Cancer Study Around U.S. Nuclear Power Plants**

Dear Chairman Jaczko,

The Alliance For A Clean Environment is a tri-county grassroots environmental group focused on links between radiation released from Limerick Nuclear Plant since it started operating in 1985 and the alarmingly high rates of cancer in our community, especially in children, (already documented with four cancer studies). Highly elevated infant and neonatal mortality, and other environmentally related diseases and disabilities are also documented with state data.

There is no doubt in our minds that Limerick Nuclear Power Plant's routine radiation emissions are a major factor in all of this. For 25 years Limerick Nuclear Power Plant has routinely released a broad range of radionuclides into our air and water. These radionuclides make their way into the soil, food, and people. The long-term synergistic, additive, and cumulative harmful health impacts from all routes of exposure are unknown, but obviously significant.

If the protocol for this proposed cancer study is not designed to identify and disclose the whole truth, we believe the potential outcome can result in increasing cancers and a broad range of other environmentally related diseases and disabilities in future generations in our region and around other nuclear plants trying to get their licenses extended and approval for uprates. It could also insure increased cancers where new nuclear plants are being proposed.

We are extremely concerned that NRC's involvement in a cancer study around nuclear plants will not lead to full and unbiased disclosure, due to NRC's undeniable preconceived bias. During our 10-year investigation on Limerick Nuclear Plant's links to our health crisis, NRC officials repeatedly and publically made unsubstantiated, indefensible, and illogical public claims that radiation emissions from nuclear plants are too small to cause harm. These unsubstantiated and irresponsible NRC comments (confirmed with video) show NRC's predetermined industry bias in such a study. NRC blindly defends the nuclear industry and their own policies with nothing more than calculations, estimations, and partial monitoring on radiation releases from nuclear plants, which are all reported and controlled by the nuclear industry that has a vested interest in the outcome.

How can NRC be considered objective in a cancer study around nuclear plants? NRC is the agency condoning and defending unknown amounts of routine and accidental radionuclide emissions into the air from the nation's 104 nuclear reactors. The radiation released doesn't magically disappear. Those radionuclides get into the soil, food, and people yet NRC illogically claims there is no harm. With minimal oversight, NRC allows the nuclear industry to monitor and report on only a fraction of the radionuclides that could be in nuclear plant discharges into rivers and other waterways. Without independent data and documentation from all routes of exposures, ranking NRC officials dismiss harms from nuclear plant radiation exposure. NRC never had comprehensive, reliable or defensible data to make any credible conclusion on actual harms from nuclear plant radiation, yet NRC irresponsibly continues to deny harm to this day.

NRC's conflict of interest in this cancer study and motives to deny harm are obvious to many of us.

1. NRC is complicit in the harm, promulgating and overseeing regulations for "permissible" radiation exposures to the public.
2. Many top NRC officials have an industry bias and mentality, since they come from the nuclear industry.
3. 90% of NRC funding comes from nuclear power reactor licensing fees. NRC stands to gain from reactor license extensions and new reactor construction.

**We have no confidence in NRC's objectivity and therefore strongly OPPOSE having NRC fund and oversee a health study, which would clearly be a direct conflict of interest. It is not credible for NRC to assess how well its own regulations and oversight are performing. A reliable cancer study protocol must be comprehensively designed, thoroughly conducted, and fully funded by a completely independent agency and that is clearly not NRC.**

- **NRC should not be directly involved in defining or conducting a health study related to nuclear plants for reasons listed above and many others. Why would anyone believe NRC would sign off on a study conclusion that reveals they have been negligent in their unsubstantiated conclusions about radiation from nuclear plants after all these years?**

The nation cannot afford another "inconclusive by design" study, especially one about the harmful impacts of radiation emissions from nuclear power plants. If NRC controls or remains involved in this study in any way, that will hurt, rather than help, communities already impacted by nuclear plant radiation emissions as well as those where new nuclear plants are proposed. We, and likely many other communities, will consider the study to be industry biased and can have no confidence that it will provide full and accurate disclosure of harms. We believe a study involving NRC will attempt to refute all the previous cancer studies already suggesting obvious links between radiation released from nuclear power plants and cancer.

NRC's objectivity is not only in question. We question NRC's motive for requesting a cancer study at this time. Based on previous experience in this community, we suspect this could be another politically driven cancer study, this time with an objective of muddying the waters to assist efforts for a "nuclear renaissance" and to defend what we think is the obviously dangerous practice of re-licensing old nuclear plants.

The design of the cancer study protocol will determine the outcome. If those paying for the study and designing the protocol have a preconceived political and biased agenda, the study outcome can be manipulated in many ways to reflect preconceived conclusions, in spite of the facts. A previous politically driven cancer study in our community has taught us a great deal about the politics of cancer studies. An elected state official attempted to defend her denial of harm to protect polluters, by wasting \$295,000 of taxpayer money on a 5th cancer study on our community, even though four previous studies already documented alarming elevated cancers. The PA Health Department's politically driven cancer study on behalf of a biased state official, violated ethical breeches toward this community under the International Guidelines for Ethical Review of Epidemiological Studies (IGERES). The PA Health Department manipulated data to hide results and made inaccurate and misleading conclusions.

Many studies already show elevated cancers around nuclear plants. We suspect NRC's request to do a cancer study is an attempt to refute cancer studies in Europe and the U.S. already showing high rates of cancer around nuclear plants, especially in children. Germany decided to close their nuclear plants by the early 2020s to protect their children as a result of a cancer study around German nuclear plants. Yet, despite so many cancer studies showing elevations of cancer around nuclear plants, U.S. politicians are attempting to build as many as 100 more. We believe NRC's cancer study could be a planned tactic to be used as a tool in the arsenal of the nuclear industry and politicians to deny harm and to achieve their agenda for public support on approval for new nuclear plants and re-licensing.

The only way to use limited funding wisely to credibly address the link between nuclear power plant radiation releases and elevated cancers is to delegate and award complete control of the study protocol

and funding to a totally unbiased agency, with the agreement that there be a process totally open to the public with full and fair public participation. Our suggestion is the National Institute of Environmental Health Sciences (NIEHS), that we believe is capable of producing an independent peer reviewed study. We believe an independent study should be comprehensive and expanded to include all health effects associated with living near nuclear power plants. The mission should be "to reduce the burden of environmentally associated diseases and disabilities by defining how environmental exposures affect health, how individuals differ in their susceptibility to these exposures, and how these susceptibilities change over time. That would begin to assess nuclear plant radiation impacts on health.

The NCI 1990 study's methodology was broadly and professionally criticized as significantly flawed. We, like others, are opposed to the NRC study being replicated. A new health study should not incorporate the same NCI mistakes.

Without comprehensive, independent, continuous year-long monitoring data from routine air and water releases of all radionuclides, it is impossible to know how much health harm is done by the synergistic, additive, and cumulative radiation exposures resulting from the routine and accidental radiation releases from nuclear plants. Without this data routine and accidental spikes go unaddressed. This lead to inaccurate conclusions about risks. Risk cannot accurately be determined without including synergistic, additive, and cumulative harmful impacts from all routes of nuclear plant radiation exposures, including air, water, soil, and food. To accurately draw a conclusion about links, you first need to determine exactly how much of each radionuclide was released into the air and water over an extended period of time.

NRC has never required comprehensive, independent, continuous monitoring data for each of over 100 radionuclides from each source that nuclear plants can be releasing into the air around nuclear plants.

- To accurately assess related health risks, one year of continuous, comprehensive monitoring needs to be done for each radionuclide associated with nuclear power production from each source at the nuclear plant. Risks cannot be determined by calculations or estimations, especially when done by the nuclear industry, with a vested interest in the outcome.

There is no comprehensive, independent, continuous monitoring data for all radionuclides likely to be in the radioactive discharges to river or other waterways.

- Accurate risks cannot be accurately determined with all monitoring, testing, and reporting controlled by the nuclear industry, with a vested interest in the outcome. Monitoring results can easily be manipulated with use of arbitrary detection limits being set at high levels, then only reporting on radionuclide levels above the high arbitrary limits. All monitoring data should be reported with limits starting at zero. Given the extreme threat from any level of radiation exposure, all detection limits should be based on any level above zero, whether air or water monitoring.

We believe testing should be expanded on milk, fish, and food grown in fields for all released radionuclides and their decay products.

To accurately determine risk, we also urge in-body testing for all released radionuclides and their decay products. Testing should include the breast milk of mothers and the baby teeth for strontium-90.

There is a lot at stake with a politically charged study on nuclear power plants. If conclusions are to be made about nuclear power plants, they must be based on an unbiased scientific collection of all the evidence for the most complete and accurate picture. The nation needs and deserves full and accurate disclosure of the whole truth. It is not enough to collect cancer registry data. If money is to be spent on determining harms from radiation emissions from nuclear power plants, infant and neonatal mortality, birth defects, thyroid disease, and all other diseases and disabilities associated with nuclear plants need to be collected and evaluated. At nuclear plants like Limerick with cooling towers, the harmful impacts from the massive amounts of particulate matter, all respiratory diseases, heart attacks, and strokes should also be included.

Our community, and we suspect most others impacted by nuclear power's pollution, can't afford to have more baseless, manipulated, and biased conclusions which lead to making things worse. We remind NRC, that since Limerick started operating in 1985, childhood cancer rates soared from 30% higher than the national average in the late 1980s to 92.5% higher than the national average in the late 1990s. Thyroid cancer rates increased by 128% from the mid 1980s to the mid 1990s and are far higher than the national average. Anecdotal evidence suggests that thyroid diseases are widespread and alarming. Many other cancers are documented to have increased dramatically and skyrocketed to rates far higher than national and state averages. Infant and neonatal mortality rates are documented to be far higher than the state average and even higher than Philadelphia and Reading. Learning disabilities increased by 94% (1990 to 2000), double the state average increases. Autism rose in that same time period by 310%. Other health problems are also far higher than the state average or Philadelphia.

Cancer threats from Limerick Nuclear Plant's radiation emissions will keep increasing as long as Limerick continues to operate. We even face increased threats from Limerick Nuclear Power Plant's "uprates". We also face Limerick relicensing that would ensure radiation emissions into our air, water, soil, food, and people for another 20 years.

We are convinced, with good cause, that a biased and unsubstantiated cancer study conclusion that attempts to dismiss nuclear plant radiation emissions as a major factor in our already elevated cancer rates will ensure still higher rates of cancer and more suffering in future generations.

Unfortunately, through our ten-year investigation on Limerick Nuclear Plant's threats to our region, ACE has lost all confidence and trust in NRC's conclusions and objectivity. NRC's industry-biased comments, conclusions, and inaction on many issues were difficult for us to understand, until we realized that those making major NRC decisions had been long-time nuclear industry employees. Letters and videos document many examples of NRC's unsubstantiated claims, inconsistent and illogical conclusions, failure to take timely action on reported risks, failure to require compliance with regulations, and unprotective positions, such as NRC's failure to require protection against a 9/11 type terrorist attack even though terrorists have stated their intent to attack nuclear plants. NRC has shown repeatedly that they value the profits of the nuclear industry more than public health and safety.

Clearly, we believe there is good cause to ask NRC to step away from this study and to support the most independent, comprehensive health study possible. This community and the nation deserves nothing less. We are at a turning point both in this community and in the nation.

We request that this letter be entered as part of the official record for this planned study.

Respectfully,

Dr. Lewis Cuthbert  
ACE President

CC: President Obama  
Senator Casey  
Senator Specter  
Congressman Dent  
Congressman Gerlach  
Congressman Sestak  
Energy Secretary Chu  
Health and Human Services Secretary Sebelius

# **RADIATION**

## **WHY LONG-TERM EXPOSURE TO ROUTINE AND ACCIDENTAL RADIATION RELEASES FROM LIMERICK NUCLEAR PLANT HAVE SERIOUS HARMFUL IMPACTS TO OUR ENVIRONMENT AND PUBLIC HEALTH**

- **Attached Is Evidence That Disputes Deceptive, Unsubstantiated, Illogical Conclusions From Exelon and NRC, Claiming Limerick's Routine and Accidental Radiation Releases Are Too Small To Cause Cancer And Other Health Harms.**

**SUMMARY COMPILED BY ACE 10-26-11  
SUBMITTED TO NRC ON THE RECORD FOR LIMERICK NUCLEAR PLANT'S  
ENVIRONMENTAL IMACT STATEMENT (EIS)**

# NUCLEAR POWER'S RADIATION HEALTH IMPACTS

## THYROID

iodine-131  
beta (gamma), 8 days\*

## SKIN

sulfur-35  
beta, 87 days

## LIVER

cobalt-60  
beta (gamma), 5 yrs.

## OVARIES

The Reproductive Organs are attacked by all radioactive isotopes emitting gamma radiation. In addition, the deadly plutonium-239 is known to concentrate in the gonads. The radiation it emits can cause birth defects, mutations and miscarriages in the first and/or successive generations after exposure.

iodine-131  
gamma, 8 days  
cobalt-60  
gamma, 5 yrs.  
krypton-85  
gamma, 10 yrs.  
ruthenium-106  
gamma, 1 yr.  
zinc-65  
gamma, 245 days  
barium-140  
gamma, 13 days  
potassium-42  
gamma, 12 hrs.  
cesium-137  
gamma, 30 yrs.  
plutonium-239  
alpha, 24,000 yrs.

## MUSCLE

potassium-42  
beta, (gamma), 12 hrs.  
cesium-137 (and gonads)  
beta (gamma), 30 yrs.

## LUNGS

radon-222 (and whole body)  
alpha, 3.8 days  
uranium-233 (and bone)  
alpha, 162,000 yrs.  
plutonium-239 (and bone)  
alpha, 24,000 yrs.  
krypton-85 (and ?)  
beta (gamma), 10 yrs.

## SPLEEN

polonium-210  
alpha, 138 days

## KIDNEYS

ruthenium-106  
gamma (beta), 1 yr.

## BONE

radium-226  
alpha, 1,620 yrs.  
zinc-65  
beta (gamma), 245 days  
strontium-90  
beta, 28 yrs.  
yttrium-90  
beta, 64 hrs.  
promethium-147  
beta, 2 yrs.  
barium-140  
beta (gamma), 13 days  
thorium-234  
beta, 24.1 days  
phosphorus-32  
beta, 14 days  
carbon-14 (and fat)  
beta, 5,600 yrs.

\*The times listed next to the type of ray emitted are the half-lives: how long it takes for half of the radioactive material to break down.



# **#1 On Our List Of Unprecedented Environmental Harms, Threats, and Risks From Limerick**

## **1. Radiation Into Air and Water From Routine and Accidental Emissions**

- ✓ The additive, cumulative, and synergistic radiation doses from continuous releases of all Limerick's radionuclides from all routes of exposure, since 1985 when Limerick started operating 26 years ago are unknown, but obviously significant, given our documented cancer crisis and extremely high infant and neonatal mortality rates.
- ✓ Research shows that low dose exposure over time can be just as harmful as one high level dose with fetuses and children the ignored victims. They can be 10 times more vulnerable to the impacts of radiation exposure than adults.

**The only way to stop Limerick's continuous radiation releases into our air, water, soil, vegetation, food, milk, and bodies, is to close Limerick Nuclear Plant.**

- **As long as Limerick operates vast numbers of families in our region will be continue to subjected to a broad range of radionuclides continuously poisoning our air, water, soil, vegetation, food, milk, and our children.**
- **Limerick's routine radiation emissions over the past 26 years logically are a major factor in our documented health crisis after Limerick started operating. We believe it is unethical to continue to poison our region with radiation from Limerick Nuclear Power Plant, especially after review of the following information which reveals the reality of risks.**

### **Limerick Nuclear Power Plant Must Be Closed, Not Relicensed Until 2049**

#### **Our Exposure Risks Are Additive, Cumulative, Synergistic. 40 Years Is Far Too Long.**

Independent scientists and physicians have presented compelling research suggesting that it's time for NRC to stop unsubstantiated denials of harm.

- The National Academy of Sciences BEIR VII Report says there is no safe level of radiation exposure.
- Research shows low level radiation exposure over time can be just as harmful as one high level dose.
- Because we are continuously exposed to Limerick Nuclear Plant's Routine Radiation Emissions, we are more at risk from other sources of radiation. Other radiation sources should not be used as an excuse to dismiss nuclear plant radiation.
  - ✓ We can choose to avoid other radiation sources. Living near Limerick Nuclear Plant's routine radiation emissions, it is Precautionary to LIMIT (1) Unnecessary Radioactive Medical Tests, like Xrays and Cat Scans (2) Flying (3) Use Of Microwaves, Cell Phones , Etc.

**NRC is charged by Congress with the grave responsibility to protect public health and the environment related to the operation of nuclear plants like Limerick.**

#### **To Add Another 20 Years Of Radiation Exposure To Our Region Would Be Negligent!**

Until Limerick closes, NRC should; (1) Provide families living around Limerick with a guide on how to avoid exposure to Limerick Nuclear Plant's radiation releases, (2) explaining the difference between gamma radiation exposure from planes, etc. and beta radiation from the air and water, and (3) Encourage water treatment plants and residents to use filtration to remove radiation from drinking water to the degree possible.

# **Exposure To Radiation**

**Increases Risk Of Damage To:**

- 1. Tissues**
- 2. Cells**
- 3. DNA**

**Radiation Exposure Potentially Causes:  
Programmed Cell Death (apoptosis)**

**Radiation Exposure Increases Risk Of:**

- 1. Cancer**
- 2. Leukemia**
- 3. Birth Defects**
- 4. Genetic Mutations**
- 5. Reproductive Disorders**
- 6. Immune Disorders**
- 7. Cardiovascular Disorders**
- 8. Endocrine System Disorders**

● **Environmental Harms and Threats  
Are Public Health Harms and Threats**

**NRC's Updated**

**Environmental Impact Statement**

**For Limerick Nuclear Plant**

● **Must Include Independent Estimates On**

**Limerick Nuclear Plant's**

**Additive**

**Cumulative**

**And Synergistic**

**Harmful Health Impacts**

● **Now And In The Future**

**NATIONAL ACADEMY OF SCIENCES BEIR VII REPORT  
And  
PHYSICIANS FOR SOCIAL RESPONSIBILITY  
Say There Is  
"NO SAFE DOSE"**

It is not credible for NRC to continue to claim Limerick's continuous routine and accidental radiation releases are not harming the health of many in our region who are continuously exposed to Limerick's radiation from several routes of exposure.

- **NRC's deceptive claim defies logic, as well as actual research that disputes NRC's unsubstantiated claims.**

Our exposure risks are additive, cumulative, and synergistic. We are continuously exposed to a broad range of Limerick's radionuclides in our air, water, soil, sediment, food, and milk - PLUS other massive hazardous toxics released from Limerick, increasing the threats from Limerick's radiation.

For example, a DEP fact sheet identified the following synergism that disputes inaccurate claims of no harm from nuclear plant radiation by the nuclear industry and NRC:

- ✓ **VOC's + NOx = Ground-Level OZONE - Limerick's air pollution contains both**
- ✓ **RADIATION INTERACTING with OZONE Enhances Cancer Risks**

From Mc Donnell, M.D. Health Effects Research Laboratory - EPA Testimony, April 9, 1987, to U.S. Senate

**"OZONE WORKS SYNERGISTICALLY WITH RADIATION TO ENHANCE THE CANCER-CAUSING EFFECTS OF RADIATION."**

## **RADIATION - The Most Dangerous Carcinogen**

- ✓ **Developing Fetuses, Infants, and Children Are Most Susceptible To The Harmful Impacts From Radiation Exposure.**
  - ✓ **Even In Small Doses Childhood Cancer Is A Key Indicator Of Impacts. Childhood Cancer Rates In This Region Far Exceed The Nation, State, and Tri-County.**
  - ✓ **Children are Extra Sensitive to DNA-Damaging Effects of Radioactive Energy. Radiation Releases Are Confirmed To Be Getting Into Our Children's Bodies**
  - ✓ **Children of Chernobyl Also Confirm Carcinogenic Impacts**
- **Even With Limited Self-Serving Testing By Exelon, The Following Facts From Exelon's Radiological Monitoring Report Proves More Than One Of Limerick's Radionuclides Are In Surface And Drinking Water, Fish, Sediment, Vegetation, Air Particles, and Milk.**

# RADIATION-NO SAFE DOSE

WASHINGTON – June 29, 2005

A new report from:

The National  
Academies'  
National  
Research  
Council says:

# NEWS

THE NATIONAL ACADEMIES  
Advises to the Nation on Science, Engineering, and Medicine

NATIONAL ACADEMY OF SCIENCES • NATIONAL ACADEMY OF ENGINEERING • INSTITUTE OF MEDICINE • NATIONAL RESEARCH COUNCIL

**“A preponderance of scientific evidence shows that even low doses of ionizing radiation are likely to pose some risk of adverse health effects.”**

Specifically, the committee's thorough review of available biological and biophysical data supports a "linear, no-threshold" (LNT) risk model, which says that the smallest dose of low-level ionizing radiation has the potential to cause an increase in health risks to humans.

In the past, some researchers have argued that the LNT model exaggerates adverse health effects, while others have said that it underestimates the harm. The preponderance of evidence supports the LNT model, this new report says.

"The scientific research base shows that there is no threshold of exposure below which low levels of ionizing radiation can be demonstrated to be harmless or beneficial," said committee chair Richard R. Monson, associate dean for professional education and professor of epidemiology, Harvard School of Public Health, Boston. The study committee defined low doses as those ranging from nearly zero to about 100 millisievert (mSv)

"The health risks – particularly the development of solid cancers in organs – rise proportionally with exposure. At low doses of radiation, the risk of inducing solid cancers is very small. As the overall lifetime exposure increases, so does the risk."

The report is the seventh in a series on the biological effects of ionizing radiation.

The report was sponsored by the U.S. departments of Defense, Energy, and Homeland Security, the U.S. Nuclear Regulatory Commission, and the U.S. Environmental Protection Agency. The National Research Council is the principal operating arm of the National Academy of Sciences and the National Academy of Engineering. It is a private, nonprofit institution that provides science and technology advice under a congressional charter.

## No Safe Dose

The scientific consensus is that there is no threshold for radiation damage to humans- no dose which is harmless. These are just a few of the words from members of the scientific community:

"There is no safe level of exposure and there is no dose of radiation so low that the risk of a malignancy is zero"--Dr. Karl Z. Morgan, dubbed the father of Health Physics.<sup>1</sup>

"...there is no safe level of exposure to ionizing radiation, and the search for quantifying such a safe level is in vain."—Rosalie Bertell, PhD.<sup>2</sup>

In 1940, several members of the US Committee on X-Ray and Radium Protection "proposed that the [radiation exposure] standard be lowered by a factor of five in response to the accumulating evidence that ANY amount of radiation, no matter how small, can cause genetic damage, injuring future generations." Gioacchino Failla argued against the lowering of the standards saying that "if genetic damage were to be a consideration for standard-setters, then logically no radiation exposure should be allowed."<sup>3</sup>

"...the human epidemiological evidence establishes—by any reasonable standard of proof—that there is no safe dose or dose-rate...the safe-dose hypothesis is not merely implausible—it is disproven." Dr. J.W. Gofman<sup>4</sup>

"One thing we should take from this (1991 study of Oak Ridge weapons workers by Steve Wing, et al.) is that there isn't any safe level of radiation exposure..." Dr. Carl Shy<sup>5</sup>.

"The reanalysis (of Hanford worker data) provides no support for the idea that...there is reduced cancer effectiveness of radiation at low dose levels..." Drs. G.W. Kneale and A. Stewart<sup>6</sup>.

"There is evidence that single tracks of all types of ionizing radiation can induce a variety of damage including DNA double-strand breaks which are believed to be critical lesions in radiation exposure. There is also a body of experimental evidence that argues against an error-free DNA repair system operating at low doses of ionizing radiation that might result in a dose threshold for the induction of gene and chromosomal mutations." MP Little and CR Muirhead.<sup>7</sup>

"An important feature of alpha irradiation is that, no matter how low the total dose to the whole body, a substantial dose of radiation (approx. .5 Gy) is delivered to an individual cell if it is traversed by a single alpha particle." E Wright<sup>8</sup>.

The U.S. Committee on the Biological Effects of Ionizing Radiations concludes that, despite some evidence of a partial repair mechanism, recent low-dose radiation data "do not contradict the hypothesis, at least with respect to cancer induction and hereditary genetic effects, that the frequency of such effects increases with low-level radiation as a linear, non-threshold function of the dose." (National Research Council BEIR V 1990)

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- 4... *Radiation-Induced Cancer from Low-Dose Exposure: An Independent Analysis*. Committee for Nuclear Responsibility, Inc. 1990:18-16, 18-18. Isbn 0-932682-89-8.
- 5 Garloch, Karen. "Repeated low radiation doses hike leukemia risk, UNC study finds." *The Charlotte Observer*. Wednesday, March 20, 1991.
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- 7... "Curvilinearity in the Dose-Response Curve for Cancer in Japanese Atomic Bomb Survivors." *Environmental Health Perspectives*. 105 (6): 1505. (1997)
- 8... "Chromosomal instability in the descendants of unirradiated surviving cells after alpha particle irradiation." *Proc. Natl. Acad. Sci. USA*. 95: 5730 (1998).

The following are additional studies are not quoted above:

**Epidemiology:**

Stewart, A.M., et al. "Radiation Exposures of Hanford Workers Dying from Cancer and Other Causes." *Health Physics*. Nov (1977).

Stewart, A.M, et al. "Delayed Effects of A-bomb radiation: a review of recent mortality rates and risk estimates for five-year survivors." *Journal Epidemiology and Community Health*. 36(2):80-6 (1982).

Morgenstern, H., et al. "Epidemiologic Study to Determine Possible Adverse Effects to Rocketdyne/Atomic International Workers from Exposure to Ionizing Radiation" Report by the UCLA School of Public Health. September, 1997.

Wing S., et al. "Mortality Among Workers at Oak Ridge National Laboratory." *JAMA*, 26 (11):1397 (1991)

**Cell studies:**

Lorimore S. A., et. al. "Chromosomal Instability in the descendants of unirradiated surviving cells after alpha particle irradiation." *Proc. Natl. Acad. Sci. USA*. 95: 5730-5733 (1998). (Eric Wright is co-author)

Kadhim M. A., et al. "Transmission of chromosomal instability after plutonium alpha particle irradiation." *Nature*. 355:738 (1992). (Eric Wright is co-author)

\*\*Many more published studies (especially cell studies) and entire books show scientific evidence for the tightening of radiation standards in order to adequately protect human health. Those listed above are in no way wholly representative, but merely provided as reference.\*\*

# Radiation and Children: The Ignored Victims

Hundreds of U.S. industrial sites that generate nuclear electricity and manufacture nuclear weapons regularly release radiation to our air, water and soil via the burial of wastes. These same industries are now lobbying for permission from government to release radioactive materials for re-use in consumer products. **There is no safe radiation dose. Whether the release is accidental or allowed is irrelevant.** This dramatic surge in the release and distribution of radiation, makes it ever more clear that we do not need a nuclear accident to cause disease.

## The Tyranny of "Standard Man"

Unfortunately, even when nuclear activities are performed within legal, "allowable limits," our children are not protected. This is for a simple reason: U.S. radiation protection standards assume that the individual exposed to the harmful radiation released is an adult male. A child exposed to the same release of radiation would often experience a larger dose. The "protection" standards ignore this fact.

## The "Allowable" Poison

Radiation regulations are written by international state and federal agencies. Since no industrial scale nuclear operation is possible without the routine release of radioactive materials, regulators have established "allowable" levels of radiation exposure. All life on Earth is exposed to and impacted by natural sources of ionizing radiation. Radiation exposures are increasing due to planned and accidental releases of man-made radioactivity. Nuclear reactors, central to both nuclear electricity and nuclear weapons production, actually make new radioactivity. Natural uranium is radioactive, but putting uranium fuel in a reactor results in wastes that are millions of times "hotter" after only a few years of use. These materials are much more potent in contaminating human and environmental systems. Every radiation exposure carries with it risk of adverse health effects, so increasing radiation exposure increases risk to our health whether the radiation is natural, more biologically available due to human interference, or human-made.

## Children Are More Susceptible

Radiation--invisible, odorless, tasteless--tears at the very fabric of what makes us human: our genetic material. Children and the unborn are especially susceptible because of their rapid cell

division during physical growth. DNA is most vulnerable to radiation impact while cells divide. In addition to cancer and birth defects, evidence exists that radiation is permanently mutating the gene pool and contributing to its gradual weakening, resulting in "developmental deficiencies in the fetus, hereditary disease, accelerated aging, and such non-specific effects as loss of immune competence" [*The New Scientist*].

The work of Dr. Alice Stewart, a British epidemiologist, established in the 1950's that children born to women who received even one abdominal x-ray during pregnancy were four times more likely to suffer childhood cancer as a "post-birth defect."

Childhood disease clusters have been found in many communities with nuclear facilities. This list includes increases in childhood leukemia near reprocessing facilities in La Hague, France and at Sellafield in the British Isles and the Krummel nuclear reactor in Germany. Childhood leukemia cases near Sellafield are associated with occupational exposure to the father before *conception* of the child. Increases in childhood leukemia also occurred Europe-wide after the passage of the Chernobyl radiation cloud. Increases in other childhood cancers have been found near nuclear operations in the Navaho Nation (uranium mining), Brookhaven, New York (nuclear weapons), and nuclear power stations in Oyster Creek, NJ and Clinton, Illinois. Increases in down syndrome are found near Yankee Rowe power station in Massachusetts. Heart defects of various types have been associated with ionizing radiation exposure as well.

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## **Error-ridden Assumptions**

The process of setting radiation standards and also determining whether a particular release of radioactive water or other material meets those standards, requires many assumptions. The first of these is about the individual receiving the radiation dose. Most regulators assume that this individual is the "Standard Man," a fictional individual whose physical characteristics have been defined by officials who set radiation standards. A standard height, weight, age and other parameters are used in equations to project the radiation dose that this hypothetical individual is likely to receive from a given release of radioactivity. Women, fetuses, infants, children, elders and those with compromised immune systems are not Standard Men. Due to many differences including smaller body size, as well as difference in habits (for instance playing outside on the ground), a child may get a radiation dose many times larger than the official dose, based on the Standard Man, as calculated by state and federal radiation "protection" agencies. This larger dose carries with it a greater risk of health consequences. National Council on Radiation Protection (NCRP) states that a child receives 10-50% more of a dose from gamma ground radiation than an adult because their organs are closer to the ground. (NCRP 129 Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site Specific Studies; pg 56 1999). Yet the NRC exposure standards do not account for this difference. This is an external dose scenario. Internal dose scenarios with ingested or inhaled radionuclides often amount to more biological damage to children. For example, Strontium-90 (Sr-90) deposition in the bones can cause bone and blood cancers.

## **Radiation Effects on Real People**

Exposure to radiation increases the risk of damage to tissues, cells, DNA and other vital molecules--potentially causing programmed cell death (apoptosis), genetic mutations, cancers, leukemias, birth defects, and reproductive, immune, cardiovascular, and endocrine system disorders. The varying impacts on health of each of the hundreds of

different radionuclides to which people may be exposed are simply not known.

Since scientists do not truly know the specific impacts a given radionuclide may have on the organs and tissues of a specific person, the translation of the amount of radioactivity to which that person has been exposed (in curies or fractions of a curie) into a radiation dose (in rems or millirems) is basically speculation. That is, determining the quality and the quantity of a radiation dose and biological damage to tissue is far from an exact science.

## **Unenforceable Standards Are Not Protection**

Radiation standards are written in units called "rems" or "millirems" (one one-thousandth of a rem). Like dose calculations, the unit of dose is based on assumptions -- including Standard Man, estimations, averages and computer modeling. As a result, the rem cannot be measured directly; instead it is derived from assumptions and equations, which do not reflect children. No one can say for sure how many rems or millirems any one individual has (or has not) received, therefore standards that use this unit cannot be enforced. An alternative is to prevent the release of radioactivity. When accidents occur it should be assumed that children will be exposed and protective action taken. Most parents support prevention and should seek to avoid any exposure at all. Prevention is the only cure.

*--Cindy Folkers & Mary Olson, August 2004*

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# **RADIATION IS IN OUR ENVIRONMENT FROM LIMERICK NUCLEAR PLANT**

Example: Exelon's 2007 Radiation Results For Limerick Nuclear Plant's  
Radiological Environmental Monitoring Program (REMP) - Offsite Dose Calculation Manual

**From: 2007 RADIATION REPORT TO NRC**

## **Limerick Nuclear Plant Testing - Radiation Detected "Above Background"**

- **Surface and Drinking Water**      **12 Different Radionuclides**
- **Fish**      **9 Different Radionuclides**
- **Sediment and Vegetation**      **8 Different Radionuclides**
- **Air Particulates**      **6 Different Radionuclides**
- **Milk**      **5 Different Radionuclides**

## **15 DIFFERENT RADIONUCLIDES Reported In LIMERICK TESTING**

Exelon's 2007 - 2009 Radiological Reports To NRC For Limerick Nuclear Power Plant

	Radionuclides	½ Life
1.	<b>Cesium Cs-134</b>	<b>30 Years</b>
2.	<b>Cesium Cs-137</b>	<b>30 Years</b>
3.	<b>Iodine I-131</b>	<b>8 Days</b>
4.	<b>Strontium Sr-90</b>	<b>28 Years</b>
5.	<b>Manganese Mn-54</b>	<b>314 Days</b>
6.	<b>Zinc Zn-65</b>	<b>250 Days</b>
7.	<b>Cobalt Co-58</b>	<b>70 Days</b>
8.	<b>Cobalt Co-60</b>	<b>70 Days</b>
9.	<b>Zirconium Zr-95</b>	<b>65 Days</b>
10.	<b>Beryllium Be-7</b>	<b>53 Days</b>
11.	<b>Iron Fe-59</b>	<b>46.6 Days</b>
12.	<b>Niobium Nb-95</b>	<b>35 Days</b>
13.	<b>Barium Ba-140</b>	<b>13 Days</b>
14.	<b>Lanthanum La-140</b>	<b>40 Hours</b>
15.	<b>Potassium K-40</b>	<b>1 Day</b>

NOTE: Radiation Detected In Water, Sediment, Vegetation, Fish Ends Up In Gardens, Food, Milk, And People

- ✓ Harmful Health Impacts From All Routes Of Exposure Are Unknown
- ✓ Other Limerick Radionuclides Are Likely In All Routes of Exposure,  
But NOT Reported Due To Testing Loopholes

From Exelon's 2007 and 2009 Radiological Reports To NRC For Limerick Nuclear Power Plant

## DRINKING WATER And SURFACE WATER TESTING

### 12 Radionuclides - Reported "Above Background"

It's Not Just Tritium

Radionuclides	½ Life
1. Cesium Cs-134	30 Years
2. Cesium Cs-137	30 Years
3. Manganese Mn-54	314 Days
4. Zinc Zn-65	250 Days
5. Cobalt Co-58	70 Days
6. Cobalt Co-60	70 Days
7. Zirconium Zr-95	65 Days
8. Iron Fe-59	46.6 Days
9. Niobium Nb-95	35 Days
10. Iodine I-131	8 Days
11. Barium Ba-140	13 Days
12. Lanthanum La-140	40 Hours

Note: The Hazardous Life of a Radioactive Isotope is Ten to Twenty Times its Half-Life  
Reality: Synergistic, Additive, and Cumulative Harmful Impacts Are Obviously Significant  
Problems: Many Radionuclides go Unreported and Unmonitored  
Exelon, a Company that Can't Be Trusted, Controls the Process

From Exelon's 2007 Radiological Report To NRC For Limerick Nuclear Power Plant Testing

### FISH - 9 Radionuclides Reported "Above Background"

Radionuclides	½ Life
1. Cesium Cs-134	30 Years
2. Cesium Cs-137	30 Years
3. Manganese Mn-54	314 Days
4. Zinc Zn-65	250 Days
5. Cobalt Co-58	70 Days
6. Cobalt Co-60	70 Days
7. Iron Fe - 59	456.6 Days
8. Potassium K-40	1 Day
9. Iodine I-131	8 Days

From Exelon's 2007 Radiological Report To NRC For Limerick Nuclear Power Plant Testing

### SEDIMENT and BROAD LEAF VEGETATION - 8 Reported "Above Background"

Radionuclides	½ Life
1. Beryllium Be-7	53 Days - Unstable
2. Cesium Cs-134	30 Years
3. Cesium Cs-137	30 Years
4. Manganese Mn-54	314 Days
5. Cobalt Co-58	70 Days
6. Cobalt Co-60	70 Days
7. Iodine I-131	8 Days
8. Potassium K-40	1 Day

These Dangerous Radionuclides End Up In Gardens, Food, Milk, Then People.

#### DISTANCES FROM LIMERICK'S REACTOR TO:

**GARDENS** 4 Less Than ONE Mile - 8 ONE to TWO Miles - 3 Within THREE Miles  
**MILK FARMS** 3 TWO to THREE Miles - 2 FOUR to FIVE Miles

## **Examples: Harmful Health Impacts To Specific Parts Of The Body**

- Iodine – 131 Beta / Gamma Emitter **Thyroid  
Ovaries**
- Cobalt – 60 Beta / Gamma Emitter **Liver  
Ovaries**
- Zinc – 65 Gamma / Beta Emitter **Bone  
Ovaries**
- Cesium – 137 Beta / Gamma Emitter **Muscles  
Ovaries**

REPRODUCTIVE ORGANS Are Attacked By All Radioactive Isotopes Emitting Gamma Radiation.

Radiation Can Cause Birth Defects, Mutations, and Miscarriages, in 1<sup>st</sup> and / or Successive Generations After Exposure.

- The National Academy of Sciences declared there really is NO SAFE DOSE.

These radionuclides documented to be in surface and drinking water are of great concern based on an April, 2008 report on "Poisoned Rivers from Nukes".

- Yet, NRC defends levels of Limerick's radiation releases based on outdated, inaccurate, and unprotective science. Three health professionals from the Illinois EPA testified related to big increases in leukemia and other cancers from poisoned waters. In the region around Limerick there is are highly elevated cancers, including leukemia.

Detected In All Drinking Water Samples In Vicinity of Limerick NPP - Since at Least 2007

- **Tritium**
- **Total Gross Beta**
- **Gamma Emitters**

2007 - Surface and Drinking Water

Monthly Samples were Analyzed from continuous sampler for Tritium and Gamma

Tritium - Detected in Drinking Water in Vicinity of LNPP - Well Water  
Detected Downstream in Schuylkill River

Gamma - Detected Vicinity of LNPP In

- Surface Water
- Drinking Water
- **Sediment**
- **Fish**

Fish - Gamma Emitters in predator and Bottom Feeder Fish in Vicinity of Limerick

Cs-137 - Found in every pathway modeled by REMP

Sediment Detected in Vicinity of Limerick

Cesium 137 - Attributed to Limerick Nuclear Plant's liquid release

# IT'S NOT JUST TRITIUM

Lisa Regner, NRC official in charge of Limerick's updated EIS, is the latest in a long line officials who made the FALSE, ABSURD claim to ACE officers over the past 11 years - that radioactive water contamination was "Just Tritium". That false NRC claim still appears in NRC "Fact Sheets".

## Over 100 Radionuclides Are Associated With Producing Nuclear Power

- It is NOT CREDIBLE to claim only one of those Limerick radionuclides is getting into groundwater or surface water. In fact, those claims are absurd and proven wrong in Exelon's own Radiological Monitoring Report for Limerick.
- Documentation From Exelon's Radiological Monitoring Report Below DISPROVES FALSE CLAIMS THAT RADIOACTIVE CONTAMINATION IS JUST TRITIUM

## Limerick Nuclear Power Plant's Radioactive Test Results

### Radionuclides Reported by Exelon In Groundwater and Surface Water

Exelon's 2009 Radiological Report to NRC - For Limerick Nuclear Power Plant

## RADIOACTIVE GROUNDWATER - LIMERICK TEST RESULTS

15 of 15	Gross Beta (dissolved)	Detected
3 of 15	Gross Beta (suspended)	Detected
9 of 15	Gross Alpha (dissolved)	Detected
5 of 15	Gross Alpha (suspended)	Detected
3 of 15	Gamma Emitters	Detected
4 of 5	Uranium 233/234	Detected

## RADIOACTIVE SURFACE WATER - LIMERICK TEST RESULTS

6 of 7	Gross Beta (dissolved)	Detected
1 of 7	Gross Alpha (dissolved)	Detected

## Different Types Of BETA RADIATION From Limerick Nuclear Plant Are Contaminating The Schuylkill River and Groundwater

<u>Beta / Gamma Emitters</u>	<u>Harmful Health Impacts - All Can Cause Cancer</u>
Iodine - 131	Thyroid Ovaries
Cobalt - 60	Liver Ovaries
Zinc - 65	Bone Ovaries
Cesium - 137	Muscles Ovaries
Strontium-90	Bone, Immune, Hormonal, Central Nervous Systems

### NOTE: Synergistic, Additive, and Cumulative Harmful Impacts Are Unknown

- Limerick's Radionuclides Detected In Drinking Water Can Cause Cancer, Birth Defects, Mutations, and Miscarriages, In 1<sup>st</sup> and/or Successive Generations After Exposure
- All Radioactive Isotopes Emitting Gamma Radiation Attack Reproductive Organs
- BEIR VII Report Says There Is NO SAFE LEVEL of EXPOSURE to RADIATION
- POISONED RIVERS FROM NUKES 4/08 Report Big Increase in Leukemia and Other Cancers - Reported by Three EPA Illinois Professionals

**LIMERICK'S**

**ROUTINE**

**RADIATION RELEASES**

**ARE**

**ADDITIVE - CUMULATIVE - SYNERGISTIC**

**LINKS ARE CLEAR!**

# 15 DIFFERENT RADIONUCLIDES Reported In Limerick Testing

Exelon's 2007 - 2009 Radiological Reports To NRC For Limerick Nuclear Power Plant

			<b>1/2 Life</b>
1.	Cesium	Cs-134	30 Years
2.	Cesium	Cs-137	30 Years
3.	Strontium	Sr-90	28 Years
4.	Manganese	Mn-54	314 Days
5.	Zinc	Zn-65	250 Days
6.	Cobalt	Co-58	70 Days
7.	Cobalt	Co-60	70 Days
8.	Zirconium	Zr-95	65 Days
9.	Beryllium	Be-7	53 Days
10.	Iron	Fe-59	46.6 Days
11.	Niobium	Nb-95	35 Days
12.	Iodine	I-131	8 Days
13.	Barium	Ba-140	13 Days
14.	Lanthanum	La-140	40 Hours
15.	Potassium	K-40	1 Day

Problems: Many Radionuclides go Unreported and Unmonitored

**Radiation Detected In Water, Sediment, Vegetation, Fish  
Ends Up In Gardens, Food, Milk, And People**

**What Are Harmful Health Impacts From All Routes Of Exposure?**

# **Serious Radioactive Threats To Water**

## **It's Not Just Tritium**

**PROOF: Exelon's 2009 Radiological Report  
For Limerick Nuclear Plant**

### **LIMERICK'S RADIOACTIVE GROUNDWATER CONTAMINATION**

**15 of 15** Gross Beta (dissolved) Detected - **3 of 15** Gross Beta (suspended) Detected

**9 of 15** Gross Alpha (dissolved) Detected - **5 of 15** Gross Alpha (suspended) Detected

**3 of 15** Gamma Emitters Detected

**4 of 5** Uranium 233/234 Detected

### **LIMERICK'S Surface Water Results - Including Schuylkill River**

**6 of 7** Gross Beta (dissolved) Detected

**1 of 7** Gross Alpha (dissolved) Detected

# Limerick Nuclear Plant's RADIOACTIVE WATER CONTAMINATION

Over 100 Radionuclides Are Associated With Producing Nuclear Power

## IT'S NOT JUST TRITIUM

**TRITIUM is not the only radionuclide in Limerick's radioactive groundwater and wastewater discharges.**

NRC, DEP, and the nuclear industry attempt to downplay and trivialize health risks by misleadingly the public about the harms.

- Suggesting radioactive leaks and discharges at nuclear plants contain only one kind of radiation, tritium, is shameful.
- A broad range of Radionuclides such as strontium, cesium, iodine, and plutonium would logically also be transported in underground pipes leaking into groundwater and discharged into nearby waterways.
- Prolonged exposure to even low doses of these radionuclides in water could cause cancer, genetic mutations, and even birth defects.

They all attempt to trivialize health impacts from nuclear power's radioactive poisoning of drinking water by:

A. Misleadingly suggesting **ONLY ONE** radioactive isotope is in discharges and leaks into drinking water - tritium.

- Exelon's own yearly Radiological Monitoring Reports to NRC for Limerick prove a broad range of radionuclides are poisoning Limerick's waste water discharges and groundwater at Limerick.

B. Misleadingly stating "***tritium is a mildly radioactive isotope***".

- Even IF radioactive contamination was TRITIUM only, TRITIUM is not a harmless radionuclide. Tritium is NOT Benign as NRC suggests.
  - ✓ "Tritium... is not innocuous -- deaths have occurred in industry from occupational overexposure." - R. Lowry Dobson MD, PhD: *The toxicity of tritium* 1979
  - ✓ Tritium can destroy a DNA molecule, according to A Health Physicist, Oak Ridge National Laboratory, 1977

From Exelon Reports To NRC

# **Examples: Limerick Nuclear Plant Radionuclides Contaminating Groundwater and Schuylkill River**

		Harmful Health Impacts
<b>Iodine – 131</b>	Beta / Gamma Emitter	<b>Thyroid Ovaries</b>
<b>Cobalt – 60</b>	Beta / Gamma Emitter	<b>Liver Ovaries</b>
<b>Strontium-90</b>	Beta Emitter	<b>Bone</b>
<b>Zinc – 65</b>	Beta / Gamma Emitter	<b>Bone Ovaries</b>
<b>Cesium – 137</b>	Beta / Gamma Emitter	<b>Muscles Ovaries</b>

**NOTE: Synergistic, Additive, and Cumulative Harmful Impacts Are Unknown**

- **BEIR Report Says There Is NO SAFE LEVEL of EXPOSURE to RADIATION.**

Radionuclides From Limerick's Contamination Of Water Can Cause Cancer, Birth Defects, Mutations, and Miscarriages, In 1<sup>st</sup> and/or Successive Generations After Exposure. All Radioactive Isotopes Emitting Gamma Radiation Attack Reproductive Organs

- **POISONED RIVERS FROM NUKES** 4/08 Report  
**Big Increase in Leukemia and Other Cancers** - Reported by Three EPA Illinois Professionals

# Examples Of Different Types Of BETA RADIATION:

**Beta / Gamma Emitters**

**Harmful Health Impacts**

All Can Cause Cancer

**Iodine – 131**

Thyroid Ovaries

**Cobalt – 60**

Liver Ovaries

**Zinc – 65**

Bone Ovaries

**Cesium – 137**

Muscles Ovaries

**Strontium-90**

Bone Immune, Hormonal, and Central Nervous Systems

➤ **Beta Emitters Above Could All Be In Drinking Water On and Off The Limerick Site**

**NOTE: Synergistic, Additive, and Cumulative Harmful Impacts Are Unknown**

From Exelon's 2007 Radiological Report To NRC For  
**Limerick Nuclear Power Plant**  
**RADIONUCLIDES**

In **Sediment** And **Broad Leaf Vegetation**

**8 Radionuclides Reported "Above Background"**

			<b>½ Life</b>
1.	Beryllium	Be-7	53 Days - Unstable
2.	Cesium	Cs-134	30 Years
3.	Cesium	Cs-137	30 Years
4.	Manganese	Mn-54	314 Days
5.	Cobalt	Co-58	70 Days
6.	Cobalt	Co-60	70 Days
7.	Iodine	I-131	8 Days
8.	Potassium	K-40	1 Day

➤ **These Dangerous Radionuclides End Up In Gardens, Food, Milk, Then People**

➤ **Exelon Reports - DISTANCES FROM LIMERICK'S REACTOR TO:**

**GARDENS**      4 - Less Than ONE Mile      8 - ONE to TWO Miles      3 - Within THREE Miles  
**MILK FARMS**    3 - TWO to THREE Miles      2 - FOUR to FIVE Miles

From Exelon's 2007 Radiological Report To NRC For

# Limerick Nuclear Power Plant Testing

## FISH

### Fish - 9 Radionuclides Reported "Above Background"

			<b>½ Life</b>
1.	Cesium	Cs-134	30 Years
2.	Cesium	Cs-137	30 Years
3.	Manganese	Mn-54	314 Days
4.	Zinc	Zn-65	250 Days
5.	Cobalt	Co-58	70 Days
6.	Cobalt	Co-60	70 Days
7.	Iron	Fe - 59	456.6 Days
8.	Potassium	K-40	1 Day
9.	Iodine	I-131	8 Days

**Fish Kills In The Billions At Nuclear Plants - "Licensed to Kill" - 2001 British Report**

How The Nuclear Industry Destroys Fish and Habitats to Save Money.

[www.beyondnuclear.org](http://www.beyondnuclear.org)

Limerick Nuclear Plant Continuously Releases Radionuclides Above  
Into Our Air, Water, Soil, Sediment - It Gets Into Food, Fish, Milk, and Our Bodies

# **Radiation Exposure Can Affect The Whole Body**

**Research Shows Continuous Low-Dose Radiation Exposure  
Over Time, Can Be Just As Harmful As One High-Level Dose**

**Specific Types Of Radiation Have Been Linked To Damage To:**

- Bone
- Thyroid
- Breast
- Brain
- Bladder
- Kidneys
- Liver
- Pancreas
- Spleen
- Lungs
- Muscle
- Ovaries
- Skin

**Radionuclides Inhaled or Ingested Can Be Even More Harmful to Health**

As Long As Limerick Nuclear Plant Continues To Operate, We Will Be Continuously Exposed To Routine and Accidental Radiation Emissions From Limerick's Radioactive Releases In Many Routes Of Exposure. Limerick's Routine and Accidental Radiation Releases and Discharges Are In Our Air, Water, Milk, Soil, Vegetation, Food, Fish, and Bodies.

**Limerick Needs To Close  
To Reduce Threats To Public Health**

# **Limerick Nuclear Power Plant RELEASES RADIATION Into The Region's Air From Routine Reactor Operations**

**Exelon claims Limerick's radiation emissions are within permissible levels, however PERMISSIBLE DOES NOT MEAN SAFE.**

- ✓ NRC's "acceptable" or "permissible" radiation levels are determined on out-dated science, which totally ignores additive, cumulative and synergistic doses.
- ✓ Limerick's routine releases of a broad range of radioactive poisons are additive, cumulative, and synergistic with each other and all other hazardous emissions in the region's air. Some of Limerick's radioactive poisons have half-lives of millions of years. The additive, cumulative, and synergistic doses of all the kinds of Limerick's radiation make NRC's "permissible" limits a dangerous illusion and irresponsible conclusion.
- ✓ July, 2005 the National Academy of Science reaffirmed their conclusion that there is NO SAFE DOSE of radiation.

**Independent, comprehensive actual data on radiation air releases is not available.**

- ✓ Limerick's radioactive routine releases are not independently, continuously, monitored.
- ✓ NRC relies upon self-reporting and computer modeling from Exelon (the company with a vested interest in the outcome), not on independent monitoring, reporting, and modeling.
- ✓ A significant portion of the environmental monitoring data is extrapolated – it's virtual, NOT REAL.
- ✓ ACE obtained copies of Exelon's reports on Limerick's radiation releases, which are available for review by appointment.

**While Limerick's radiation air releases are considered low-level and acceptable, they are still a threat to the health and safety of the region's residents:**

- ✓ Low-level doses over time can be just as harmful as one high-level dose.
- ✓ Limerick's radiation releases are additive, cumulative, and synergistic.
- ✓ NRC's "acceptable" radiation levels are determined on out-dated science.

**Limerick has had accidental radiation releases. Some were reported in the Pottstown Mercury. See attached article.**

- ✓ Accidental releases are not immediately, completely, or independently verified or documented.

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# "NO Safe Dose"

**Raising Limits = Increased Risks**

*AFTER Japan's Nuclear Disaster*

**NRC Legally Sanctioned**

**INCREASED RADIATION HARM**

**Attached:**

**What This Can Mean To Families Living In Our Region**

**Dangerous Deception!**

# **BACKGROUND RADIATION DOSE SKYROCKETED AFTER JAPAN DISASTER**

March 16, 2011

Shortly After Japan's Nuclear Plants Started Releasing Massive Radiation Into The Air, Water, Soil, and Vegetation,

## **➤ NRC TOOK ACTION TO LEGALLY SANCTION INCREASED RADIATION HARM**

### **NRC INCREASED PERMISSIBLE RADIATION DOSE LIMITS To 620 Millirems Per Year - From 360 Millirems Per Year**

History of Radiation Dose Limits:

- ✓ Radiation Limits were raised after Chernobyl:  
From 80-100 Millirems Per Year to 360 Millirems Per Year.
- ✓ Natural Radiation - Originally 60-80 Millirems Per Year Increased to 80-100 Millirems Per Year in 1964  
(Secret Fallout by Ernest Sternglass - Pg. 213)

**Significance Related to Limerick Nuclear Plant's Yearly Radiological Monitoring Report:**

- ✓ In Essence, Limerick Received Approval for Major Increases in Routine Radiation Releases into Our Air, Water, Soil, Vegetation, Fish, and Milk. Radiation Levels Detected in These Routes of Exposure Will Not Be Reported if They are Under 620 Millirems Per Year.
  - ✓ Limerick Nuclear Plant will only report on radionuclides determined to be "above background", now arbitrarily determined by NRC to be 620 Millirems Per Year, due to the Japan nuclear disaster.
  - ✓ This allows residents to be further deceived about additive, cumulative, and synergistic radiation doses they are receiving from Limerick Nuclear Plant's emissions in many routes of exposure.
- **By 2009, Americans Were Receiving Radiation Doses Each Year That Doubled Yearly Radiation Dose Levels From The 1980s** (Reported May 5th, 2009)  
<http://nukefree.org/news/USradiationdosehasdoubled> Americans (on average) receive more than twice as much radiation each year as in 1980s, according to National Council on Radiation Protection and Measurements.
    - > Logically, people living near routine radiation emissions from nuclear plants, like Limerick, are receiving more radiation doses than the average population.
    - > Raising Radiation Limits Increases Risks - It Doesn't Reduce Them.
  - **NO SAFE DOSE - The 2005 National Academy of Sciences BEIR VII STUDY, funded by the EPA, found that the smallest radiation dose has the potential to cause increased risk to humans.**

# **Limerick's Routine Radiation Emissions Are NOT Safe**

## **RADIATION EXPOSURE LIMITS - IRRESPONSIBLY WEAKENED**

By The Bush Administration's EPA - An Action Sought By NRC And DOE

## **Drastic Hikes Were Permitted In Drinking Water, Air, and Soil**

January 15, 2009 - Right Before The Bush Administration Departed

<http://www.committeetobridgethegap.org/radiation.html>

### **Drinking Water - EPA Radically Increased Permissible Radiation Limits**

Safe Drinking Water Act - New Standards Would Permit Radionuclide Concentrations Up To 7 Million Times Higher Than In Current Radiation Standards

Examples: Increases In Permissible Radiation Concentrations In Water

Strontium-90 - Nearly 1000-Fold Increase

Iodine-131 - 3000 to 100,000-Fold Increase

Nickel-63 - Nearly 25,000 Increase

### **What Does This Mean To Your Drinking Water?**

- 1) **Schuylkill River** - Limerick Nuclear Plant discharges radioactive wastewater into this major source of drinking water 24 hours a day, 365 days a year (over 5 billion gallons each year). Limerick's waste water contains a broad range of radionuclides. Astronomical permissible limits allow Exelon to irresponsibly assert there is no health threat because Limerick meets permissible limits.
- 2) **Radioactive Groundwater** - Limerick leaks into groundwater under the site have led to a broad range of radionuclides detected in 15 of 15 monitoring wells at the Limerick site. Many residential wells are within a short distance from Limerick. Radioactive levels can rise dramatically in residents' drinking water and still irresponsibly be called safe.

## **RADIATION Clean-Up Standards Drastically Weakened**

### **Radiation Clean-Up Standards Were Changed To Be Thousands Of Times More Lax Than Previous Radiation Clean-Up Standards.**

Public Health Was Overridden by Economic Considerations - Rather than specify clean-up standards to protect health, "benchmarks" were weakened to allow radiation doses so immensely high that:

✓ **1 in 4 People Can Get Cancer, On Top of Their Normal Cancer Risk.**

Lax Unprotective Radiation Clean-Up Standards Allow Exelon to Avoid Safe, Comprehensive Clean Up From Limerick Nuclear Power Plant's Radioactive Emissions Into The Region's Water and Soil.

✓ **Vegetation, Food, Milk, and Fish Can Remain Contaminated, Further Jeopardizing Public Health In Our Region.**



## Public Employees for Environmental Responsibility

*Protecting Employees Who Protect Our Environment*

For Immediate Release: April 5, 2010 Contact: Kirsten Stade (202) 265-7337

### **RADIATION EXPOSURE DEBATE RAGES INSIDE EPA — Plan to Radically Hike Post-Accident Radiation in Food & Water Sparks Hot Dissent**

Washington, DC — A plan awaiting approval by the U.S. Environmental Protection Agency that would dramatically increase permissible radioactive releases in drinking water, food and soil after “radiological incidents” is drawing vigorous objections from agency experts, according to agency documents released today by Public Employees for Environmental Responsibility (PEER). At issue is the acceptable level of public health risk following a radiation release, whether an accidental spill or a “dirty bomb” attack.

The radiation arm of EPA, called the Office of Radiation and Indoor Air (ORIA), has prepared an update of the 1992 “Protective Action Guides” (PAG) governing radiation protection decisions for both short-term and long-term cleanup standards. Other divisions within EPA contend the ORIA plan geometrically raises allowable exposure to the public. For example, as Charles Openchowski of EPA’s Office of General Counsel wrote in a January 23, 2009 e-mail to ORIA:

“[T]his guidance would allow cleanup levels that exceed MCLs [Maximum Contamination Limits under the Safe Drinking Water Act] by a factor of 100, 1000, and in two instances 7 million and there is nothing to prevent those levels from being the final cleanup achieved (i.e., it’s not confined to immediate response of emergency phase).”

Another EPA official, Stuart Walker of the Office of Superfund Remediation and Technology Innovation, explains what the proposed new radiation limits in drinking water would mean:

“It also appears that drinking water at the PAG concentrations...may lead to subchronic (acute) effects following exposures of a day or a week. In a population, one should see some express acute effects...that is vomiting, fever, etc.”

“This critical debate is taking place entirely behind closed doors because this plan is ‘guidance’ and does not require public notice as a regulation would,” stated PEER Counsel Christine Erickson. Today, PEER sent EPA Administrator Lisa Jackson a letter calling for a more open and broader examination of the proposed radiation guidance. “We all deserve to know why some in the agency want to legitimize exposing the public to radiation at levels vastly higher than what EPA officially considers dangerous.”

The internal documents show that under the updated PAG a single glass of water could give a lifetime’s permissible exposure. In addition, it would allow long-term cleanup limits thousands of times more lax than anything EPA has ever before accepted. These new limits would cause a cancer in as much as every fourth person exposed.

PEER obtained the internal e-mails after filing a lawsuit this past fall under the Freedom of Information Act (FOIA) but the EPA has yet to turn over thousands more communications. “EPA touts its new transparency but when it comes to matters of controversy the agency still puts up a wall,” added Erickson, who filed the FOIA suit. “Besides the months of stonewalling, we are seeing them pull stunts such as ORIA giving us rebuttals to other EPA documents they have yet to release.”

NRC and PA DEP are quick to down-play or outright misstate the potential health and environmental consequences of risks from Limerick Nuclear Plant's routine and accidental radiation releases.

The second or third sentence in each Limerick reactor incident or radiation release story often from the nuclear industry includes the phrase "no danger to the public".

*New York Times* reported on increased cancer risk from radiation: "But even the new estimate that radiation is a more potent carcinogen than previously believed should cause no concern for the average person, experts said, because the public is not exposed to enough radiation to exceed levels considered safe."<sup>1</sup>

- This is false. Today radiobiologists all agree that "one can no longer speak of a 'safe' dose level."<sup>2</sup> What should have been reported is that the public is not supposed to be exposed to doses that exceed *allowable* levels.

## ***No dose too low*** **Every radiation exposure can cause cancer**

~ A NUKEWATCH FACT SHEET ~

There is no safe level of exposure to radiation, only legally "allowable" doses. Every federal agency that regulates industrial releases or the medical uses of radiation warns that any external or internal exposure to radiation, no matter how small, increases one's risk of cancer.

Following are the official U.S. government regulatory agency assessments: .....

### **U.S. Environmental Protection Agency**

"Based on current scientific evidence, any exposure to radiation can be harmful (or can increase the risk of cancer). .... In other words, it is assumed that no radiation exposure is completely risk free."<sup>3</sup>

"[T]here is no level below which we can say an exposure poses no risk. ... Radiation is a carcinogen. It may also cause other adverse health effects, including genetic defects in the children of exposed parents or mental retardation in the children of mothers exposed during pregnancy."<sup>4</sup>

"Current evidence suggests that any exposure to radiation poses some risk, i.e. there is no level below which we can say an exposure poses no risk."<sup>5</sup>

### **U.S. Department of Energy**

"[T]he effects of low levels of radiation are more difficult to determine because the major effect is a very slight increase in cancer risk. However, U.S. Government regulations assume that the effects of all radiation exposures are cumulative and should be limited as much as reasonably possible."<sup>6</sup>

### **U.S. Nuclear Regulatory Commission**

"[T]he radiation protection community conservatively assumes that any amount of radiation may pose some risk for causing cancer and hereditary effect, and that the risk is higher for higher radiation exposures. A linear no-threshold dose-response relationship is used to describe the relationship between radiation dose and the occurrence of cancer. ... any increase in dose, no matter how small, results in an incremental increase in risk."<sup>7</sup>

### **U.S. Department of Health and Human Services**

"Ionizing radiation is invisible, high-frequency radiation that can damage the DNA or genes inside the body.

"Some patients who receive radiation to treat cancer or other conditions may be at increased cancer risk. ... it is possible that there is a small risk associated with this exposure.

"... children whose mothers received diagnostic X-rays during pregnancy. ... were found to have increased risks of childhood leukemia and other types of cancer, which led to the current ban on diagnostic X-rays in pregnant women."<sup>8</sup>

### **National Academy of Sciences**

The National Academy of Sciences' 7<sup>th</sup> study on the effects of radiation exposure declared that any exposure, regardless of how small, may cause the induction of cancer. BEIR-VII also dismissed as baseless the industry-sponsored sham "hormesis" theory that some radiation exposure is good for you.<sup>9</sup> Committee Chair Richard Monson of Harvard's School of Public Health said, "The scientific research base shows that there is no threshold of exposure below which low levels of ionized radiation can be demonstrated to be harmless or beneficial."<sup>10</sup>

### **National Council on Radiation Protection**

"... every increment of radiation exposure produces an incremental increase in the risk of cancer."<sup>11</sup>

1. Philip Hiltz, "Higher Cancer Risk Found in Low-Level Radiation," *New York Times*, Dec. 20, 1989.
2. Ian Fairlie & Marvin Resnikoff, "No dose too low," *The Bulletin of the Atomic Scientists*, Nov/Dec 1997, p. 54
3. U.S. EPA, "Ionizing Radiation Series," No.2, Air & Radiation, 6601J, EPA 402-F-98-010, May 1998.
4. U.S. EPA, "Radiation: Risks & Realities," Air & Radiation, 6602J, E PA 402-K-92-004, Aug. 1993.
5. *Ibid.*
6. U.S. Dept. of Energy, DOE/NE-0074, "Understanding Radiation," p. 8 & 9. <<http://www.ne.doe.gov/pdfFiles/UNDERRAD.PDF>>.
7. U.S. NRC, "How Does Radiation Affect the Public?" [www.nrc.gov/what-we-do/radiation/affect.html](http://www.nrc.gov/what-we-do/radiation/affect.html).
8. U.S. Dept. of Health & Human Services, "Cancer and the Environment: Ionizing radiation," p. 10. <[www.cancer.gov/images/Documents/5d17e03e-b39f-4b40-a214-e9e9099c4220/Cancer%20and%20the%20Environment.pdf](http://www.cancer.gov/images/Documents/5d17e03e-b39f-4b40-a214-e9e9099c4220/Cancer%20and%20the%20Environment.pdf)>.
9. National Academy of Sciences, "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII, Phase 2," Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, National Research Council, June 29, 2005.
10. Associated Press, "Study: No Radiation Level Safe," June 29, 2005.
11. National Council on Radiation Protection, "Evaluation of the Linear-Non-threshold Dose-Response Model for Ionizing Radiation," NCRP report 136, Bethesda, MD, June 4, 2001, cited in *Science for Democratic Action*, IEER, June 2005.

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## Permissible Levels of Exposure

The US National Council on Radiation Protection and Measurement gave expression to the theoretical resolution of this human dilemma by articulating the implicit reasoning behind subsequent radiation protection standards development:[20]

1. A value judgment which reflects, as it were, a measure of psychological acceptability to an individual of bearing slightly more than a normal share of radiation-induced defective genes.
2. A value judgment representing society's acceptance of incremental damage to the population gene pool, when weighted by the total of occupationally exposed persons, or rather those of reproductive capacity as involved in Genetically Significant Dose calculation.
3. A value judgment derived from past experience of the somatic effects of occupational exposure, supplemented by such biomedical and biological experimentation and theory as has relevance.

This is now an internationally accepted approach to setting standards for toxic substances when no safe level of the substance exists.

In short, this elaborate philosophy recognises the fact that *there is no safe level of exposure to ionising radiation*, and the search for quantifying such a safe level is in vain. A *permissible* level, based on a series of value judgments, must then be set. This is essentially a trade-off of health for some 'benefit' -- the worker receives a livelihood, society receives the military 'protection' and electrical power is generated. Efforts to implement these permissible standards would then logically include convincing the individual and society that the 'permissible' health effects are acceptable. This has come to mean that the most undesirable health effects will be infrequent and in line with health effects caused by other socially acceptable industries. Frequently, however, the worker and/or public is given the impression that these 'worst' health effects are the only individual health effects. A second implication of the standards-based-on-value-judgments approach is that unwanted scientific research resulting in public scrutiny of these value judgments must be avoided.

The genetic effect considered by standard setters as most unacceptable is serious transmittable genetic disease in live-born offspring. These severely damaged children are usually a source of suffering for the family and an expense for society which must provide special institutions for the mentally and physically disabled. Severely handicapped people rarely have offspring; many die, are sterile or are institutionalised before they are able to bear children. Workers and the public are told that the probability of having such severely damaged offspring after radiation exposure within permissible levels is slight. By omission, a mildly damaged child or a miscarriage is implied to be 'acceptable'.

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From a column in the *Yomiuri Shinbun* (19 January 1965; evening edition)

A nineteen-year-old girl in Hiroshima committed suicide after leaving a note: 'I caused you too much trouble, so I will die as I planned before.' She had been exposed to the atomic bomb while yet in her mother's womb nineteen years ago. Her mother died three years after the bombing. The daughter suffered from radiation illness; her liver and eyes were affected from infancy. Moreover, her father left

home after the mother died. At present there remain a grandmother, age seventy-five; an elder sister, age twenty-two; and a younger sister, age sixteen. The four women had eked out a living with their own hands. The three sisters were all forced to go to work when they completed junior high school. This girl had no time to get adequate treatment, although she had an A-bomb victim's health book.

As a certified A-bomb victim, she was eligible for certain medical allowances; but the [A-bomb victims' medical care] system provided no assistance with living expenses so that she could seek adequate care without excessive worry about making ends meet. This is a blind spot in present policies for aiding A-bomb victims. Burdened with pain and poverty, her young life had become too exhausted for her to go on . . . .

There is something beyond human expression in her words 'I will die as I planned before.'

Quoted in Kenzaburo Oe, *Hiroshima Notes*, YMCA Press Tokyo (English translator Toshi Yonezawa; English editor David L. Swain).

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Standard setters judge that the most severe damage done directly to the person exposed is a fatal radiation-induced cancer, and again, this is a rare occurrence when exposure is within permissible levels. All other direct damage is by omission considered 'acceptable'.

In its 1959 report recommending occupational standards for internal radiation doses (i.e. radioactive chemicals which are permitted to enter the body through air, water, food or an open wound), the International Commission on Radiological Protection (ICRP) formed the following definition:

*A permissible genetic dose [to sperm and ovum], is that dose [of ionising radiation], which if it were received yearly by each person from conception to the average age of childbearing [taken as 30 years], would result in an acceptable burden to the whole population.[16] [Emphasis added.]*

This might be paraphrased to say that the general public (governments) may be willing to accept the number of blind, deaf, congenitally deformed, mentally retarded and severely diseased children resulting from the permissible exposure level. Defined this way, the problem becomes primarily an economic one, since society needs to estimate the cost of providing services for the severely disabled. Once reduced to an economic problem, some nations may choose to promote early detection of foetal damage during pregnancy and induced abortion when serious handicap is suspected. When a foetus is aborted prior to sixteen weeks' gestation the event may not need to be reported and included in vital statistics. It becomes a non-happening, and the nation appears to be in 'good health', having reduced the number of defective births.

Mild mutations, such as asthma and allergies, are ordinarily not even counted as a 'cost' of pollution. The economic burdens, 'health costs', fall more on the individual and family than on the government. Their pain and grief do not appear in the risk/benefit equation. Parents and children are unaware of the 'acceptable burden' philosophy.

The prediction of the magnitude of the burden of severe genetic ills on an exposed population is essential to this philosophy. However, the data accumulated at Hiroshima and Nagasaki did not give clear answers. Either through ineptitude or loss of survivors of the bombing, who died before their story was told, the researchers failed to find any severe genetic ills clearly attributable to the parental exposure to radiation at low doses.[21] Probably the more fragile individuals in the population died from the blast, fire and trauma of the bombs, the women not surviving long enough to become pregnant.[22]

Governments could not use the research on genetic damage in children of medical radiologists,[23] although this damage was measurable, because, in the early days, radiation exposure to physicians was not measured. No quantitative dose/response estimates could be derived.

Animal studies of radiation-related genetic damage abounded, and the recommending body, ICRP, used (and still uses) mouse studies as a basis of its official predictions of the severe genetic effects of ionising radiation in humans.

As late as 1980, a US National Academy of Science publication from its committee on the Biological Effects of Ionising Radiation[24]stated:  
New data on induced, transmissible genetic damage expressed in first generation progeny of irradiated male mice now allow direct estimation of first generation consequences of gene mutations on humans . . . As with BEIR I, a major obstacle continues to be the almost complete absence of information on radiation-induced genetic effects in humans. Hence, we still rely almost exclusively on experimental data, to the extent possible from studies involving mammalian species [i.e. mice].

These mouse studies are used as the basis of prediction, and permissible doses are set so that the expected number of severe transmittable genetic effects in children of those exposed could be presumed to be an *acceptable* burden for governments choosing a nuclear strategy.

The introductory section of ICRP Publication 2, 1959, states:  
The permissible dose for an individual is that dose, accumulated over a long period of time or resulting from a single exposure, which, in the light of present knowledge carries a negligible probability of *severe* somatic [damage to the individual] or genetic [damage to the offspring] injuries, furthermore, it is such a dose that any effects that *ensue more frequently* are limited to those of a minor nature that would not be considered *unacceptable* by the exposed individual and by competent medical authorities. Section 30.[16] [Emphasis added.]

Mild mutations are notably happenings of a minor nature, normally neither reported nor monitored in the population. They are likely to be statistically hidden by normal biological variations and unconnected in the mind of the individual or his/her physician with the exposure. The publication continues:  
The permissible doses *can therefore be expected to produce effects* [illnesses] that could be detectable only by statistical methods applied to large groups. Section 31.[16] [Emphasis added.]

In spite of this clarity, no such statistical audit of all health effects including chronic diseases in exposed people and mild mutations in their offspring has ever been done. More than 25 years have expired since this document was published and the world is more than 35 years into the nuclear age.

As late as 1965, ICRP Publication 9[25] stated:  
The commission believes that this level [5 rems radiation exposure per 30 years for the general public] provides *reasonable latitude* for the expansion of atomic energy programs in the foreseeable future. It should be emphasised that the limit may not in fact represent a proper balance between possible harm and probable benefit because of the uncertainty in assessing the risks and benefits that would justify the exposure. [Emphasis added.]

The committee protected itself against accusations of wrongdoing but failed to protect the public from its possible error. It defines its role as recommending, with the responsibility of action to protect worker and public health resting with individual national governments. Governments in turn tend to rely on ICRP recommendations as the best thought of internationally respected experts.

In spite of this uncertainty about responsibility and safety levels for exposure of the public, 5 rem per year, rather than per 30 years, was permitted for workers in the nuclear industry. The 5 rem per 30 years was set as the *average* dose to a population, with a maximum of 0.5 rem per year (15 rem per 30 years) for any individual member of the public.

For twenty years, between 1945 and 1965, health research on the effects of ionising radiation exposure has focused on *estimating* (not measuring) the number of *excess* radiation-induced fatal cancers and *excess severe* genetic diseases to be expected in a population (i.e. a whole country) given the *average estimated* exposure to radiation for the country. Disputes among scientists usually have to do

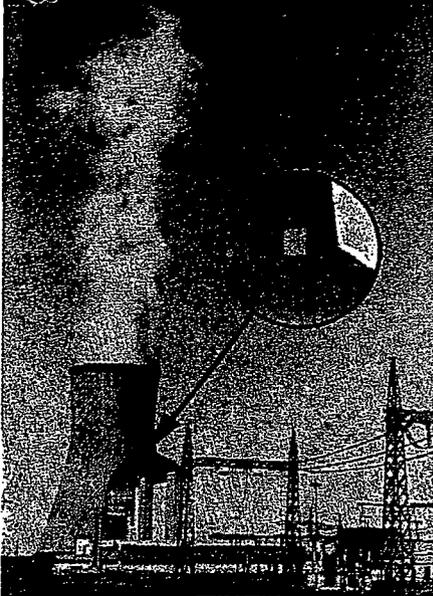
with the magnitude of these numbers. Omitted from this research are other radiation-related human tragedies such as earlier occurrence of cancers which should have been deferred to old age or even might not have occurred at all because the individual would have died naturally before the tumour became life-threatening. These are not excess cancers, they are accelerated cancers. This approach also omits other physiological disorders such as malfunctioning thyroid glands, cardio-vascular diseases, rashes and allergies, inability to fight off contagious diseases, chronic respiratory diseases and mildly damaged or diseased offspring. The implications of such 'mild' health effects on species survival seem to have either escaped the planners of military and energy technology, or to have been deliberately not articulated. Other obvious limitations of this national averaging approach include the failure to deal with global distribution of air and water with the result that deaths and the cumulative damage to future generations are not limited to one country.

The usual procedure for setting the standard for a toxic substance or environmental hazard is to decide the relevant medical symptoms of toxicity and determine a dose level below which these symptoms do not occur in a normal healthy adult. This cut-off point is sometimes called the tolerance level and it represents a sort of guide to the human ability to compensate for the presence of the toxic substance and maintain normal health. The tolerance level for a substance, if one can be determined, is then divided by a factor (usually 10) to give a safe level. This allows for human variability with respect to the tolerance level and also for biological damage which may occur below the level at which there are visible signs of toxicity, i.e. sub-clinical toxicity.

Human experience with ionising radiation had been recorded for more than fifty years prior to the nuclear age, the early history of handling radioactive material having been fraught with tragedy. The discoverer of the X-ray, W. K. Roentgen, died of bone cancer in 1923, and the two pioneers in its medical use, Madame Marie Curie and her daughter, Irene, both died of aplastic anaemia at ages 67 and 59 respectively. At that time, bone marrow studies were rarely done, and it was difficult, using blood alone, to distinguish aplastic anaemia from leukaemia. Both diseases are known to be radiation-related. Stories of early radiologists who had to have fingers or arms amputated abound. There were major epidemics among radiation workers, such as that among the women who painted the radium dials of watches to make them glow in the dark. Finally, there were the horrifying nuclear blasts in Hiroshima and Nagasaki.

The painful period of growth in understanding the harmful effects of ionising radiation on the human body was marked by periodic lowering of the level of radiation exposures permitted to workers in radiation-related occupations. For example, permissible occupational exposure to ionising radiation in the United States was set at 52 roentgen (X-ray) per year in 1925,[26] 36 roentgen per year in 1934,[27] 15 rem per year in 1949[28] and 5 to 12 rem per year from 1959 (depending on average per year over age 18) to the present.[29] Recently there has been an effort to increase permissible doses of ionising radiation to certain organs such as thyroid and bone marrow[30] in spite of research showing the radiosensitivity of these tissues. This newer trend probably reflects economic rather than physiological pressures, especially given the lack of an acceptable audit of physiological cost.

## Nuclear Plant Releases to Air, Water and Soil



Reactor Building vent at a typical 1000-megawatt pressurized-water reactor.

It does not take  
an accident . . .



Water discharge area at a nuclear power plant on Lake Michigan. Note the flow from four big ejection outlets.

Radioactive gaseous and liquid releases to air, water and soil from nuclear power plants include:

planned releases from the reactor's routine operation

and

unplanned releases from leaks and accidents.

# Hidden Radioactive Releases from Nuclear Power Plants in the United States

## WHAT ARE THE DANGERS?

Nuclear Information and Resource Service  
Washington, D.C.  
[www.nirs.org](http://www.nirs.org) [nirsnet@nirs.org](mailto:nirsnet@nirs.org)

World Information Service on Energy  
Amsterdam  
[www.antenna.nl/wise](http://www.antenna.nl/wise)

November 2005

## What you ARE NOT supposed to know:

1. It doesn't take an accident for a nuclear power plant to release radioactivity into our air, water and soil. All it takes is the plant's everyday **routine operation**, and federal regulations permit these radioactive releases.
2. Radioactivity is measured in "curies." A large medical center, with as many as 1000 laboratories in which radioactive materials are used, may have a combined inventory of only about **two** curies. In contrast, an average operating nuclear power reactor will have approximately **16 billion** curies in its reactor core. This is the equivalent long-lived radioactivity of at least 1,000 Hiroshima bombs.
3. A reactor's fuel rods, pipes, tanks and valves can leak. **Mechanical failure and human error** can also cause leaks. As a nuclear plant ages, so does its equipment – and leaks generally increase.
4. Some contaminated water is intentionally removed from the reactor vessel to reduce the amount of the radioactive and corrosive chemicals that damage valves and pipes. This water is filtered and then either recycled back into the cooling system or released into the environment.
5. A typical 1000-megawatt pressurized-water reactor (with a cooling tower) takes in 20,000 gallons of river, lake or ocean water per minute for cooling, circulates it through a 50-mile maze of pipes, returns 5,000 gallons per minute to the same body of water, and releases the remainder to the atmosphere as vapor. A similar reactor without a cooling tower can take in as much as one-half million gallons per minute. **The discharge water is contaminated with radioactive elements in amounts that are not precisely tracked, but are potentially biologically damaging.**
6. Some radioactive fission gases, stripped from the reactor cooling water, are retained in decay tanks for days before being released into the atmosphere through filtered **rooftop vents**. Some gases leak into the power plant buildings' interiors and are released during periodic "purges" or "ventings." These airborne gases contaminate not only the air, but also fall out upon soil and water.
7. Radioactive releases from a nuclear power reactor's **routine** operation often are **not fully detected or reported**. Accidental releases may not be completely verified or documented.
8. Accurate, economically-feasible filtering and monitoring technologies **do not exist** for some of the major reactor by-products, such as radioactive hydrogen (tritium) and noble gases, such as krypton and xenon. Some liquids and gases are retained temporarily in tanks so that the shorter-lived radioactive materials can break down before the batch is released to the environment.
9. Government regulations allow radioactive water containing "permissible" levels of contamination to be released to the environment. **Permissible does not mean safe**. Detectors at reactors are set to allow contaminated water to be released, **unfiltered**, if below the "permissible" legal levels.
10. The Nuclear Regulatory Commission relies upon self-reporting and computer modeling from reactor operators to track radioactive releases and their projected dispersion. A significant portion of the environmental monitoring data is extrapolated – **it's virtual, not real**.
11. Accurate accounting of all radioactive wastes released to the air, water and soil from the **entire reactor fuel production system** is simply not available. The system includes uranium mines and mills, chemical conversion, enrichment and fuel fabrication plants, nuclear power reactors, and radioactive waste storage pools, casks, and trenches.
12. Increasing economic pressures to reduce costs, due to the deregulation of the electric power industry, could further reduce the already unreliable monitoring and reporting of radioactive releases. Deferred maintenance can increase the radioactivity released – and the risks.
13. Many of the reactor's radioactive by-products continue giving off radioactive particles and rays for enormously long periods – described in terms of "half-lives." A radioactive material gives off hazardous radiation for **at least ten half-lives**. One of the radioactive isotopes of iodine (iodine-129) has a **half-life of 16 million years**; technetium-99 = 211,000 years; and plutonium-239 = 24,000 years. Xenon-135, a noble gas, decays into cesium-135, an isotope with a 2.3-million-year half-life.
14. **Every exposure to radiation increases the risk** of damage to tissues, cells, DNA and other vital molecules, potentially causing programmed cell death (apoptosis), genetic mutations, cancers, leukemias, birth defects, and reproductive, immune, cardiovascular and endocrine system disorders.

This pamphlet is intended for reprint. You are encouraged to copy and distribute it widely.

# **Ernest Sternglass, Ph.D.**

**Emeritus Professor of Radiological Physics**

Dr. Sternglass made his first presentation in Pottstown decades ago to try to prevent unnecessary health harm by testifying in opposition to building Limerick Nuclear Power Plant.

**August 3, 2004, Ernest Sternglass made a presentation in Pottstown, which enabled our community to have a better understanding of radiation health risks from living near a nuclear plant.**

**Ernest Sternglass carried out extensive studies of the effects of nuclear fallout and reactor releases on human health, particularly on the developing fetus and infants.**

- **ACE obtained copies of his slide presentation referencing research on harmful radiation health impacts, available for review.**
- **Dr. Sternglass also appeared on ACE's PCTV show, discussing the impacts of radiation on health, especially related to nuclear plants. For a video copy of his appearance on "The ACE Report" call ACE (610) 326-6433.**

Dr. Sternglass testified at hearings concerning nuclear bomb test fallout and nuclear reactor releases on human health at the U.S. Congress, the National Academy of Sciences, U.S. Government Regulatory Agencies, and State Legislatures

Ernest Sternglass is the author of over one hundred and fifty scientific papers in the areas of health effects of fission products released into the environment, instrumentation, particle physics and cosmology, and radiological imaging.

## **Dr. Ernest Sternglass is the Author of:**

### **Low-Level Radiation**

Published by Ballantine in 1972

### **Secret Fallout**

Published by McGraw-Hill in 1981

### **Before the Big Bang**

Published by Hour Walls Eight Windows, New York in 1997

Ernest Sternglass received a B.E.E., M.S., and a Ph.D from Cornell University. He started his career as Assistant to the Director of the Westinghouse Research Laboratory, 1952 to 1967, where he worked on the physics of electronic imaging systems for use in medicine and astronomy.

In 1967, Dr. Sternglass became director of the University of Pittsburgh's School of Medicine Radiological Physics and Engineering Laboratory, to develop new imaging techniques to improve the diagnostic value of X-ray and nuclear medicine examinations and to reduce the dose required using electronic and computer technology. This significantly reduced the radiation risks in mammography for detecting breast cancer.

Dr. Ernest Sternglass currently serves as the Scientific Director of the Radiation and Public Health Project, an independent non-profit research organization with headquarters in New York City.

## **Janette Sherman, M.D.**

Dr. Sherman is a well-respected toxicologist and doctor of internal medicine.

November, 2000, Dr. Sherman made two presentations in Pottstown, one for physicians and health care professionals and one for the public.

**Dr. Sherman is the author of two books which answer the questions:**

1. "WHY," Why did I get sick?
2. Why is the cancer rate so high?
3. Why was this child born with birth defects?

### • **Life's Delicate Balance**

**Focuses on the Causes and Prevention of Cancer,  
Especially Breast Cancer in both women and men.**

- a. Analyses identify the links between toxic chemicals and ionizing radiation like that released into our air and water from the Limerick Nuclear Power Plant.
- b. Dispels "myths" of risk for cancer
- c. It provides insight into the economic and political factors fueling the cancer epidemic and what can be done to end this tragic disease.
- d. For more info: [www.lifesdelicatebalance.com](http://www.lifesdelicatebalance.com)

### • **Chemical Exposure and Disease**

**Provides investigative and diagnostic techniques with case-reports for all body systems: Brain, Pulmonary, Reproductive, Gastrointestinal, etc.**

- a. It covers dangerous industries releasing hazardous chemicals and examples of chemicals causing endocrine-disruption, neurological damage, cancer, and birth defects.
- b. This book DISPELS the notion that "MORE STUDIES are needed" before we can take action to prevent harm.

Dr. Sherman left us with no doubt that nuclear plants emit radiation that can enter our bodies and damage our health in many ways, in extremely tiny amounts. It became clear that radiation is released from Limerick Nuclear Power Plant's routine operations into our air, water, and soil.

Dr. Sherman explained how synergistic combinations can cause great damage to human health, especially children. Even very small amounts of potent carcinogens such as radiation, can create a dangerous and even deadly situation. Dr. Sherman's presentation in Pottstown verified dangerous threats to health in this region due to massive hazardous chemical combinations emitted into our air.

*Published on Thursday, July 29, 2010 by CommonDreams.org*

## **Don't Be Fooled: Nuclear Power Kills**

**by John LaForge**

Two of the nuclear industry's talking points these days are that "nuclear power hasn't killed anyone" and that "no one died at Three Mile Island."

The 1986 Chernobyl catastrophe puts the lie to such deception, but the deliberate denial of thousands of other deaths is also part of the industry's effort. For younger people who have no experience or recall of reactor explosions and meltdowns, steam bursts or radioactive waste spills, pro-nuclear propaganda has convinced many of them that radiation is merely medicinal or dental and must be harmless. On the contrary, there is no safe dose of radiation, and any exposure no matter how little increases the risk of cancer and other diseases.

A quick look at the record of some of the deadliest radiation accidents counters efforts by the Nuclear Energy Institute, and some in Congress, to whitewash their poisoned nuclear power and win another \$32 billion in taxpayer giveaways for building new reactors. What follows is a sampling -- a completely footnoted version of the list is available from Nukewatch [1].

### **January 3, 1961: Three killed in Idaho**

The experimental boiling-water reactor called SL-1 (Stationary Low-Power Plant No.1) in Idaho blew apart killing three technicians. Two Army Specialists, John Byrnes, age 25 and Richard McKinley, age 22, and Richard Legg, a 25 year old Navy Electricians Mate died in the explosion. According to Arlington National Cemetery Records, "One technician was blown to the ceiling of the containment dome and impaled on a control rod. The men were so heavily exposed to radiation that their hands had to be buried separately with other radioactive waste, and their bodies were interred in lead coffins."

### **July 27, 1972: Two killed at Surry reactor**

At the Surry Unit 2 pressurized water reactor in Virginia, pressurized steam burst through a corroded pipe and scalded two workers to death.

### **March 28, 1979: Three Mile Island and infant mortality**

Exposure to radioactive fallout and contaminated water released by the meltdown at Three Mile Island may have caused thousands of deaths. Among many, two books, "Deadly Deceit: Low Level Radiation High Level Cover-up" by Jay Gould and Ben Goldman, 1990, and Joe Mangano's "Low-Level Radiation and Immune System Damage: An Atomic Era Legacy," 1999, document these fatalities.

Infant deaths in surrounding counties soared 53 percent in the first month after TMI; 27 percent in the first year. As originally published, the federal government's own Monthly Vital Statistics Report shows a statistically significant rise in infant mortality rates shortly after the accident.

Studying 10 counties closest to TMI, deaths from birth defects were 15-to-35 percent higher afterward than before the accident; breast cancer incidence rose seven percent higher; these increases far exceeded those elsewhere in Pennsylvania. Gould suggests that between 50,000 and 100,000 excess deaths occurred after the TMI accident.

In counties downwind of the accident, leukemia deaths among kids under 10 (1980-to-1984) jumped almost 50 percent compared to the national rate. From 1980-1984 death rates in the three nearest counties were considerably higher than 1970-74 (before the reactor opened) for leukemia, female breast, thyroid and bone and joint cancers.

### **March 26, 1986: From 4,000 to 125,000 Chernobyl deaths**

Estimates of deaths caused by Chernobyl vary widely. The *St. Paul Pioneer Press* reported April 27, 1995 that Ukrainian Health Minister Andrei Serdyuk had announced the latest Ukrainian estimate of Chernobyl's death toll at 125,000 from illnesses traced to radiation.

The United Nations reported Sept. 6, 2005 that its scientists predicted about 4,000 eventual radiation-related deaths among 600,000 people in the affected area. CNN reported April 26, 1997, "Ukrainian authorities say over 4,000 died of radiation-related illnesses.

The *Wisconsin State Journal* noted on April 15, 1991 that "The most senior scientist at the Chernobyl nuclear power station says the disaster claimed up to 10,000 lives, thousands more than Soviet authorities have admitted, a London newspaper reported on Sunday.

The *Milwaukee Journal*, on April 21, 1991 reported, "Many Soviet and Western researchers dispute the official death toll of only 32, saying that at least 500 people and possibly as many as 7,000 have died of cancer and other illnesses."

### **December 9, 1986: Four more killed at Surry**

Again at the Surry Reactor Unit 2, a similar pressurized steam burned four people to death after an unchecked and corroded 18-inch steel feed-water pipe broke and spewed 30,000 gallons of extremely hot pressurized water.

### **March 11, 1997: Cancer deaths unknown at Tokaimura**

Japan's Tokaimura reprocessing facility suffered explosions and fire at this experimental waste treatment site. At least 37 people were seriously contaminated, 34 internally through inhalation. Experts said, "a massive amount of heat and energy was released" in the explosion at the state-run facility. A lack of medical follow-up for the contaminated workers has allowed the industry to deny that deaths resulted.

### **September 30, 1999: Two killed at Tokaimura**

Workers at Japan's Tokaimura uranium processing complex caused a "uranium criticality burst" that killed two men, exposed at least 600 residents in the surrounding community to a burst of neutron radiation, and caused the evacuation of thousands. One worker died of radiation poisoning after 82 days of agonizing pain, the other took 210 days to die.

### **August 9, 2004: Five killed at Mihama**

At the Mihama reactor in Japan, a burst of highly pressurized steam at 390° F, killed five workers and severely burned 11 others when a corroded pipe ruptured and burned them to death. The accident was Japan's deadliest at a nuclear reactor. About 800 tons of water escaped from the large pipe that had not been inspected in 28 years.

John LaForge is on the Nukewatch [1] staff and edits its Quarterly.

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**AIR  
POLLUTION**

**From  
LIMERICK  
NUCLEAR PLANT**

**A MAJOR PUBLIC  
HEALTH THREAT**

# **Limerick Nuclear Power Plant - A Major Air Pollution Source Under Health Based Standards Of The Clean Air Act**

**Documents Not Attached Are Available For Review (610) 326-2387**

1. Limerick Air Pollution Sources and Pollutants – Graphic. Source: PA DEP Title V Air Pollution Permit summarized in the graphic by ACE 2009
2. Lists of Limerick Nuclear Plant's kinds of air pollution, air pollutants, and sources. Source: PA DEP Title V Air Pollution Permit - Listed by ACE after review of the permit in 2009.
3. Limerick Nuclear Plant's PA DEP Title V Air Pollution Permit (46-00038) Provides The Proof – Only Major Air Pollution Sources Are Required to Submit Title V Permits. Sample pages are included from Limerick Nuclear Plant's most recent Title V Permit Issued to the owner, Exelon, December 2009.
4. "Nuclear Plant is a Major Source of Air Pollution - 2/14/09 Op-ed summary of Limerick Nuclear Power Plant's air pollution permit, informing the public of health risks from the ACE Board of Directors
5. ACE's January 2010 Analysis of PA DEP's Public Response Document Identifies Why Limerick's Air Pollution is a Major Health Threat to our region and Why This Permit and the Permitting Process Failed to Protect Public Health.
6. Recommendations and Requests from ACE January 2010 to PA DEP Secretary John Hanger, identifying concerns with the permit and requesting him to take action to reduce specific air pollution threats that his agency permitted to be drastically increased, instead of requiring filtration.
7. Particulate Matter (PM10), the major air pollution threat from Limerick Nuclear Plant to the families in the region. 12/7/09 PA DEP permitted PM 10 emissions to be emitted over 6 times higher than current limits without requirement for filtration and in addition to an automatically permitted 3 Ton Increase.
8. List of PM 10 Harmful Health Effects, Sources: EPA and ATSDR
9. Toxics Carried With Limerick Nuclear Plant's Massive Cooling Tower Drift
10. 324 Pounds Per Day Toxic Chemicals Added to Limerick's Cooling Tower's, Source: MSDS Sheets Provided by Exelon In 2004
11. List of automatically permitted toxics in Limerick's Title V permit.
12. Documented harmful health impacts of pollutants with automatically permitted increases. Source: EPA These pollutants are regulated by EPA under health standards of the Clean Air Act because of their toxicity to humans.
13. Air in the Region Already in the Top 10% of the worst in the US – For the very pollutants permitted to have automatic increases in Limerick's Title V permit.
14. List of Air Pollution Studies – Compiled by ACE
15. List of Air Pollution Studies on Children – Compiled by ACE

● **State Data  
Reported By EPA In 2003 Shows**

**LEVELS OF HEALTH HARMS  
Around Limerick Nuclear Plant Are**

**FAR HIGHER THAN  
Philadelphia, Reading And The State Average For:**

- ✓ **Infant and Neonatal Mortality**
- ✓ **Malignant Tumors**
- ✓ **Cerebrovascular Disease**
- ✓ **Respiratory Diseases**

**Research Suggests**

● **Limerick's Air Pollution  
Is A Major Factor**

# **Limerick Nuclear Power Plant**

## **A MAJOR AIR POLLUTION SOURCE**

**Under the Clean Air Act**

### **LIMERICK NUCLEAR PLANT'S AIR POLLUTION INCLUDES:**

1. Radiation - from routine operations and accidental releases
2. Schuylkill River Toxics - from withdrawing 56.2 Million Gallons Per Day
3. Toxic Chemicals - from adding over 300 lbs per day to Cooling Towers
4. Greenhouse Gases, Combustion Chemicals & By-products - from Boilers, Etc.
5. Waste Fuel - from a Boiler

### **AIR POLLUTANTS - from Limerick Nuclear Plant Include:**

- Radiation
  - NOx
  - VOCs
  - PM10
  - SO2
  - Arsenic
  - Cadmium
  - Chromium
  - Lead
  - PCBs
  - Halogens
- This dangerous SYNERGISTIC MIX is continuously threatening the health of families in this region, especially children. ADDITIVE and CUMULATIVE HEALTH IMPACTS could be significant over time.

### **SOURCES of Limerick Nuclear Plant's Air Pollution Include:**

- 2 Cooling towers
  - 3 Boilers
  - 8 Generators
  - 8 Diesel Oil Tanks
  - 8 Day Tanks
  - Degreasing Unit
  - Emergency Spray Pond
  - Various Waste Oil Sources
- **There is NO FILTRATION FOR TOXICS from any of the sources.**

Information Compiled By The Alliance For A Clean Environment (ACE)  
From Limerick's Title V Permit – For More Information (610) 326-2387

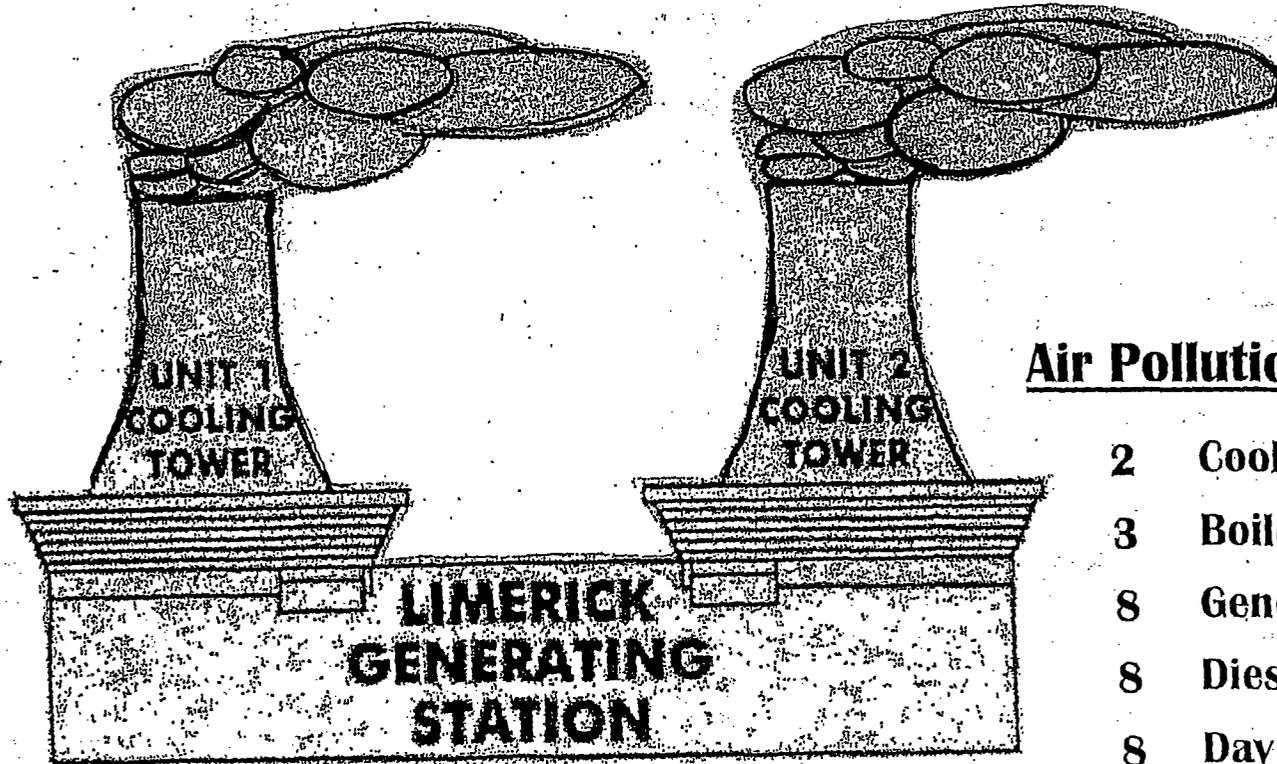
# Major Air Polluter

## Limerick Nuclear Plant

### Air Pollutants

- **RADIATION**

- NOx
- VOCs
- PM10
- SO2
- Arsenic
- Cadmium
- Chromium
- Lead
- PCBs
- Halogens



### Air Pollution Sources

- 2 Cooling Towers
- 3 Boilers
- 8 Generators
- 8 Diesel Oil Tanks
- 8 Day Tanks
- 1 Degreasing Unit
- 1 Emergency Spray Pond
- Various Waste Oil Sources

**All Have Harmful Health Impacts!**

**Synergistic, Additive, Cumulative Harmful Health Impacts Unknown, But Undoubtedly Significant**

# **PM10**

## **Particulate Matter**

### **Tiny Airborne Particles**

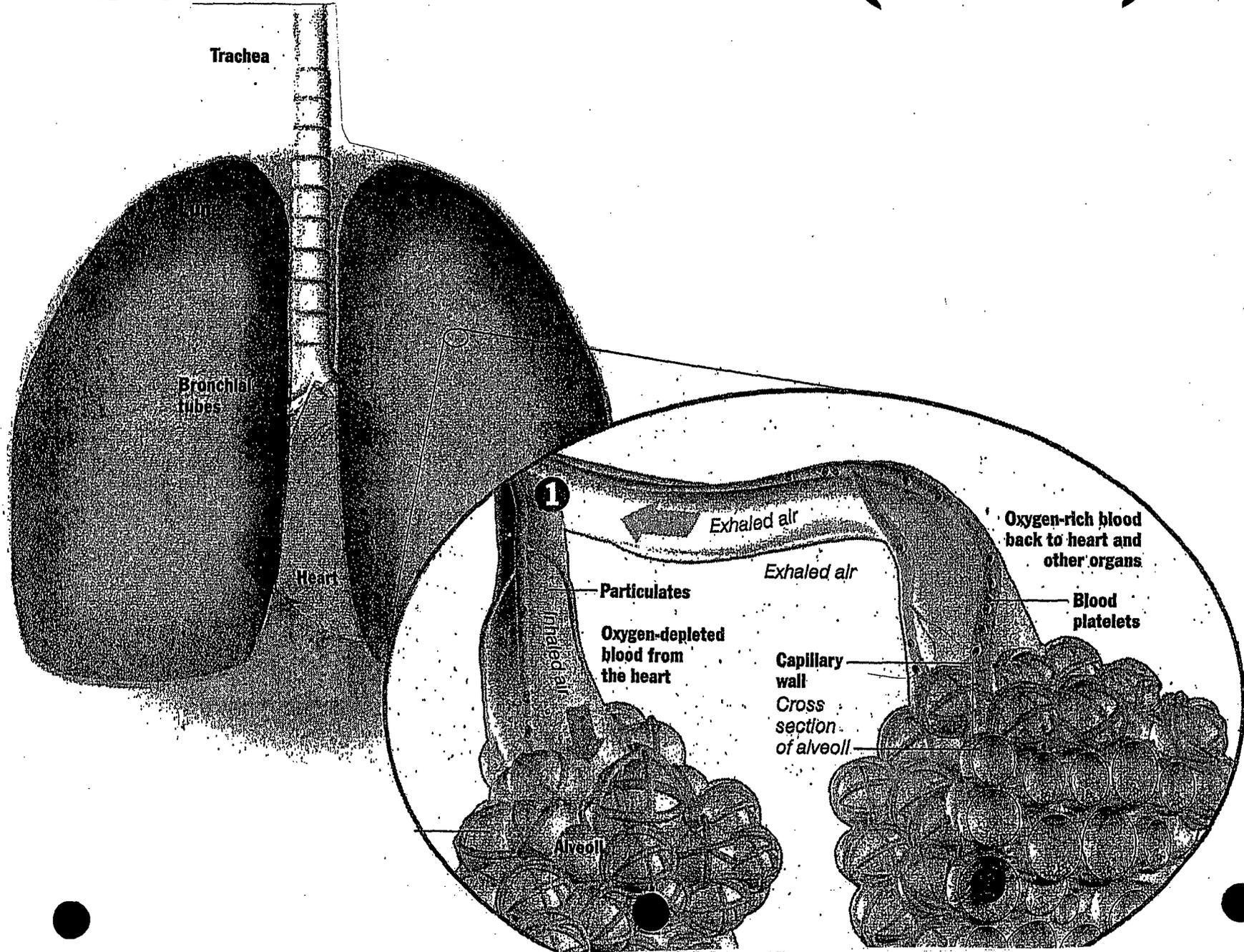
**Penetrates Deep Into Lungs  
And Enters The Bloodstream**

**Transports Radiation, Heavy Metals, Etc.**

**Long Term PM 10 Health Effects Are Linked To:**

- **Increased Heart Attacks**
- **Strokes**
- **Aggravates Asthma**
- **Inflames The Lungs Like A Sunburn On Skin**
- **Increased Respiratory Disease**
- **Decreased Lung Function**
- **Increased Hospital Admission**
- **Increased Emergency Room Visits**
- **Premature Death**  
**Blamed For Thousands Of Deaths Each Year**

# Particulate Matter (PM10)



# Limerick Nuclear Plant's Dangerous Air Pollution Harms Health

Limerick Nuclear Plant Is A Major Air Polluter Under Health-Based Standards Of The Clean Air Act

## Major Concern - Drastic Increases Permitted In PM-10 FROM COOLING TOWERS

Drastic Increases In Dangerous Particulate Matter (PM-10) from Limerick's two cooling towers were permitted (more than 6 times higher original permit limits).<sup>i</sup> How many more people will get sick and die as a result of the nasty witches brew of toxic chemicals massively spewed out in aerosol form from Limerick's cooling towers?

Drastic PM-10 increases are indefensible. Montgomery County is already among the highest for PM-10 emissions in the nation.<sup>ii</sup> PM-10 is regulated under health based standards of the Clean Air Act, because it causes serious harm to health.<sup>iii</sup> It's blamed for thousands of deaths each year.

- PM-10 can penetrate deep into the lungs, enter the bloodstream and lead to increased heart attacks, strokes, aggravated asthma, lung inflammation with increased respiratory disease and decreased lung function.
- Costs to the public will increase with more emergency room visits and hospital admissions.
- Instead of PM-10 permit increases, Exelon should have been required to reduce PM-10 air pollution by filtering Schuylkill River water intake for Total Dissolved Solids.
- PM-10 is also emitted from Limerick's Emergency Spray Pond, three Boilers, and eight generators.

January 2010, ACE presented agency and elected officials with an expose and list of recommendations and requests related to permitted PM-10 increases at Limerick Nuclear Plant. All were ignored.

- Public Health was ignored by agency regulators and elected officials to protect Exelon's profits.

### Exelon Admits Cooling Tower Air Pollution Is Harmful.<sup>iv</sup>

Exelon used **Cooling Tower Air Pollution**, as an excuse to avoid spending millions to build cooling towers at Oyster Creek. Exelon said, "**Cooling Towers Would Create Air Pollution**".

### Exhaust Flow Volumes Increased In Limerick's Title V Permit

#### Air Pollutants In Limerick's Permits

Nox  
VOCs  
PM-10  
SO<sub>2</sub>  
Arsenic  
Cadmium  
Chromium  
Lead  
PCBs  
Halogens

#### Air Pollution Sources In Limerick's Permit

2 Cooling Towers  
3 Boilers  
8 Generators  
8 Diesel Tanks  
8 Day Tanks  
Degreasing Unit  
Emergency Spray Pond  
Various Waste Oil Sources

### There Is NO Filtration For Toxics From Any Of Limerick Nuclear Plant's 32 Sources

**Numerous Studies Have Been Compiled Showing The Kinds Of Air Pollution Produced By Limerick's 32 Sources, Contribute To A Broad Range of Disease and Disabilities.**

**Dr. Devra Davis reported that there are more than 1,000 studies from 20 countries all showing you can predict a certain death rate for asthma, heart disease, and lung disorders based on the amount of air pollution.<sup>v</sup>**

- World Health Organization Estimated Air Pollution Would Cause About 8 Million Deaths Worldwide by 2020
- American Cancer Society
- Harvard School of Public Health
- John's Hopkins School of Public Health
- Cedars-Sinai Medical Center

Research Shows Health Threats From Cooling Towers Also Include Pathogens

**Cooling Towers May Host New Pathogens<sup>vi</sup>**

Cooling Towers Spray Infectious Pathogens Into Our Air. The Pathogens Can Cause Disease in Humans, Even Legionella.

When questioned about health harm from Limerick 5-18-11, NRC Branch Chief Paul Krohn said, "There is no research to show health problems".

- **Scientific research shows that Krohn's statement is simply not true. That kind of denial of readily available research places NRC's credibility and objectivity into question.**

**Fractured Agency Permitting Is NO Excuse To Dismiss Serious Environmental and Health Impacts From Limerick's Major Air Pollution.**

- NRC must include and give full consideration to the harmful impacts to human health and the environment resulting from the more than 6-fold approved increase in PM-10 from Limerick's cooling towers PLUS all Limerick's other air pollution toxics and sources. PM-10 causes respiratory, cardiovascular diseases, as well as other illness. How many additional emergency room visits, hospital visits, and deaths will be caused just from Limerick Nuclear Plant's massive cooling tower emissions of PM-10?
- 20 more years of exposure to the massive toxic brew of air pollution from Limerick and its harmful impacts is unacceptable. Limerick must close now.

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<sup>i</sup> Limerick Title V Permit Renewal TVOP-46-00038 12-7-09

<sup>ii</sup> EPA Air Pollution Data - Compiled At [www.scorecard.org](http://www.scorecard.org)

<sup>iii</sup> <http://epa.gov/air/particlepollution/>

<sup>iv</sup> AP 3-19-10 Article in Mercury by Wayne Parry "Exelon Threatens to Shut Down N.J. Nuke Plant"

<sup>v</sup> Statistics and Facts in Hard Science Show: Air Pollution Kills and Cripples, Net Works 2001

<sup>vi</sup> Cooling Towers May Host New Pathogens – Research by Sharon G. Berk and colleagues - ScienceDaily 8-28-06

# Limerick Nuclear Power Plant's COOLING TOWER DRIFT

**DRIFT IS SPRAY DROPLETS – NOT VAPOR**  
**Drift Droplets Are Contaminated With Everything In The System**

## Radiological and Toxic Chemicals Are Carried Into The Air With Limerick's Drift

### **Toxic Chemicals In Limerick Nuclear Plant's Drift Come From:**

1. Schuylkill River Water Withdrawn  
56.2 Million Gallons Per Day      20 ½ Billion Gallons Per Year
2. Chemicals Added To Cooling Towers  
324 Pounds Used EACH DAY      118,260 Pounds Used PER YEAR

### **What Health Risks Do We Face From Limerick Steam and Drift?**

Limerick Emits Up To 42 Million Gallons Per Day Toxic Filled Steam - Over 15 Billion Gallons Per Year

### PM10 in Drift Can Contain:

- ✓ **Radiation** – Examples: Radioactive Iodine 131 – Major Isotope Known To Be Released  
Radioactive Crypton – Upsets of electromagnetic imbalance
- ✓ **Heavy Metals**
- ✓ **Microbes** (Including Viruses) from river water intake
- ✓ **Toxic Chemicals** (Chlorine, Bromine, Anti-Rust, etc.) added to protect the cooling towers

### There Is NO Filtration - Exposure Risk Is Unknown

- **WHY Is PM10 (Particulate Matter) The Only Cooling Tower Air Pollutant Reported By Exelon?**
- **WHY Are PM 10 Emissions ESTIMATED, NOT MEASURED?**

### Toxics Synergize and Blow Sideways at Far Distances

#### **DRIFT Travels From One County and Even Country to Another**

- Dispute Over Russian Border - 1 country complained about cooling towers contaminating their side of the border.
- Levels over site boundary were greater than permitted - Maine Yankee violations led to company stopping using one chemical after testing

#### **How far are drift toxics carried from Limerick Nuclear Plant?**

- 2 Cooling Towers Are 500 Feet High (Comparable to a Building over 40 Stories High)
  - Independent measurements are needed over Limerick Nuclear Plant site boundary

#### **TOXICS CONCENTRATE When They Hit Land and Dry.**

- River Bend - Needed a separate parking lot to shelter cars due to active concentrations

Source ID: 102  
Source Name: COOLING TOWER #2

SOURCE CAPACITY: 28.6 M Gal/HR WATER

Proc -EP  
102 -->S13

### I. RESTRICTIONS.

No additional requirements exist except as provided in other sections of this permit including Section B (relating to Title V General Requirements).

### II. TESTING REQUIREMENTS.

*Want testing done*  
No additional testing requirements exist except as provided in other sections of this permit including Section B (relating to Title V General Requirements).

### III. MONITORING REQUIREMENTS.

#001 [25 Pa. Code §127.441]

*Operating permit terms and conditions.*

[Additional authority for this permit condition is also derived from 25 Pa. Code Section 127.511]

The permittee shall <sup>how</sup> monitor and calculate the particulate matter (PM10) emissions from this source on a daily basis using Department approved methods.

### IV. RECORDKEEPING REQUIREMENTS.

#002 [25 Pa. Code §127.441]

*Operating permit terms and conditions.*

[Additional authority for this permit condition is also derived from 25 Pa. Code Section 127.511]

The permittee shall record the particulate matter (PM10) emissions from this source on a daily basis using Department approved methods.



# LIMERICK NUCLEAR POWER PLANT

## USES HAZARDOUS SUBSTANCES

TO TREAT SCHUYLKILL RIVER & PERKIOMEN CREEK WATER  
MILLIONS of GALLONS of WATER get SUCKED IN EVERY YEAR

### How do these chemicals increase air pollution health threats?

They synergize and add to Limerick's radiation emissions!  
Mist from the river water is continuously emitted into our air.

#### 1. **SULFURIC ACID** – synonym: battery acid

Various concentrations used as a liquid – On EPA Hazardous Substance List

##### **Health Impacts:**

- International Agency for Research on Cancer (IARC) classified "strong inorganic acid mists containing sulfuric acid" as a Category 1 carcinogen, a substance that is "carcinogenic to humans."
- Inhalation of fumes or ACID MIST can cause:
  - a. Irritation or corrosive burns to the upper respiratory system, including nose, mouth, and throat.
  - b. Lung irritation and pulmonary edema can also occur
- Can cause severe burns
- Eyes – mist contact may irritate or burn eyes
- Unusual chronic toxicity such as around Limerick
  - a. Erosion of teeth
  - b. Lesions of the skin
  - c. Tracheo-bronchitis
  - d. Mouth Inflammation
  - e. Conjunctivitis
  - f. Gastritis

#### 2. **Corrosion Inhibitor** – AZ8104 - Ingredients:

- A. **CHLOROTOLYLTRIAZOLE SODIUM SALT** - Potential Irritant
- B. **DICHLOROTOLYLTRIAZOLE** - Potential Irritant
- C. **BENZOTRIAZOLE, METHYL, SODIUM SALT** - Corrosive (eyes and skin)

##### **Potential Health Impacts:**

- **ACUTE SKIN EFFECTS** – primary route of exposure - May cause irritation to the skin
- **ACUTE EYE EFFECTS:** Severe irritant to the eyes
- **ACUTE RESPIRATORY EFFECTS:** Mists/aerosols may cause irritation to upper respiratory tract.
- **TARGET ORGANS** – Prolonged or repeated exposures may cause primary irritant dermatitis.

Aquatic Toxicology show effects on fish.

Must be discarded as HAZARDOUS WASTE.

#### 3. **Microbial Control Agent** – Ingredients:

A. **(C12-16) ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE**  
Corrosive (eyes and skin)

B. **ETHYL ALCOHOL (ETHANOL)**

Irritant (eyes) Potential liver and kidney toxin  
May cause CNS depression

##### **Potential Health Effects**

- 1) **ACUTE SKIN EFFECTS:** Primary route of exposure  
Severe irritant to the skin. Potential skin sensitizer.
- 2) **ACUTE EYE EFFECTS:** Corrosive to eyes
- 3) **ACUTE RESPIRATORY EFFECTS:** Vapors, gases, mists and/or aerosols may cause irritation to upper respiratory tract.

- 4) TARGET ORGANS: Prolonged or repeated exposures may cause CNS depression, skin sensitization, and/or toxicity to the liver and kidney.
- 5) SYMPTOMS OF EXPOSURE: Inhalation of vapors/mists/aerosols may cause severe irritation or burns.

Registered EPA Biocide – must be disposed as hazardous waste  
 Considered a SERIOUS HAZARD

4. **Sodium Hypochlorite Solution** Synonym: **CHLORINE BLEACH**

PRECAUTIONARY STATEMENTS  
 HAZARDOUS TO HUMANS AND DOMESTIC ANIMALS  
 TOXIC TO FISH AND AQUATIC ORGANISMS – PESTICIDE

**Health Impacts:**

- 1) INHALATION: Inhalation of hypochlorous acid fumes may cause severe respiratory tract irritation and pulmonary edema.
  - 2) SKIN: Skin contact may cause severe irritation and burns
  - 3) EYE CONTACT – Eye contact may cause severe irritation and burns
  - 4) CHRONIC EFFECTS – No Data
- Exposure Limits:  
 Hypochlorous Acid, Sodium Salt – 1 ppm  
 Sodium Hydroxide – 2 ppm ceiling  
 Not tested for carcinogenic effects

5. **Foamrol AF 1441 – ANTIFOAM – Hazardous Ingredients**

- A. **Distillates (PETROLEUM), SOLVENT refined and/or severely hydrotreated paraffinic** – Potential irritant
- B. **ALCOHOLS, (C-16) Irritant (eyes) may cause defatting-type dermatitis**

**Potential Health Effects:**

- 1) ACUTE SKIN EFFECTS: Primary route of exposure; May cause slight irritation to the skin. May cause dermatitis
- 2) ACUTE EYE EFFECTS: May cause moderate irritation to eyes
- 3) ACUTE RESPIRATORY EFFECTS: Mists / aerosols may cause irritation to upper respiratory tract.
- 4) TARGET ORGANS: Prolonged or repeated exposure may cause defatting-type dermatitis
- 5) Symptoms of exposure – redness or itching of skin.

6. **FLOGARD MS 65210 – CORROSION INHIBITOR – Ingredients:**

- A. **PHOSPHORIC ACID – Corrosive**
- B. **ZINC SULFATE – Severe Irritant; potential reproductive toxic**
- C. **ZINC OXIDE – Nuisance Particulate**

**Potential Health Effects**

- 1) ACUTE SKIN EFFECTS: Primary route of exposure: Severe irritant to the skin
- 2) ACUTE EYE EFFECTS: Corrosive to the eyes.
- 3) ACUTE RESPIRATORY EFFECTS: Mists/aerosols cause irritation to the upper respiratory tract.
- 4) TARGET ORGANS: Prolonged or repeated exposures may cause primary irritant dermatitis. Product component may cause reproductive toxicity at maternal toxic levels (based on animal testing)
- 5) SYMPTOMS OF EXPOSURE: Inhalation may cause irritation of mucous membranes and respiratory tract. Skin contact causes severe irritation or burns.
- 6) Considered a SERIOUS HEALTH HAZARD

**Summary from Material Safety Data Sheets (MSDS)**

Obtained by ACE from Limerick Nuclear Power Plant Public Relations - Under FOIA  
 For complete information call The Alliance For A Clean Environment (ACE)

(610) 326-6433

Exelon Nuclear  
Limerick Generating Station  
P.O. Box 2300  
Sanatoga, PA 19464

www.exeloncorp.com

July 30, 2004

Donna Cuthbert  
Alliance For A Clean Environment  
P.O. Box 3063  
Stowe, PA 19464

Dear Donna,

Thank you for your interest in Limerick Generating Station's cooling towers. As a courtesy to your organization, we are providing the following information you requested:

1. Testing data from the Schuylkill River and Perkiomen Creek intakes for the past ten years
2. Material Safety Data Sheets for the water treatment chemicals used in our cooling tower basins
3. Complete 24-hour wind pattern data for February 17 and May 14, 2004

#### Cooling Tower Water Analysis

Water samples are taken periodically from both the Perkiomen Creek and the Schuylkill River intakes. Listed below are the constituents we measure for at those sources:

- Conductivity
- Ph – Acidity/Alkalinity
- Fecal Coliform
- Total Gamma Isotopic Activity, microcuries per milliliter
- Soluble Copper, parts per billion
- Soluble Iron, parts per billion
- Soluble Manganese, parts per billion
- Soluble Zinc, parts per billion
- Calcium Hardness, parts per million
- Magnesium Hardness, parts per million

The calcium and magnesium in the river water has the potential for leaving hard water spots under the right atmospheric conditions.

### Cooling Tower Water Treatment

The water in Limerick Generating Station's cooling towers is treated for the purpose of minimizing corrosion of plant piping and components, as well as to prevent scale buildup in the plant's condensers and heat exchangers. The following additives are used in extremely dilute amounts:

- Bio-Rid™ – A broad-spectrum biocide used to kill algae, bacteria, etc.
- Sodium Hypochlorite Solution – A broad-spectrum biocide – bleach
- Spectrus CT1300 – Aquatic biocide, microbial control
- Sulfuric Acid – Used to adjust Ph
- Flogard MS6210 – Mild steel corrosion inhibitor
- Depositrol PY5204 – Silt dispersant
- Depositrol BL5400 – Scale inhibitor
- Foamtrol AF1441 – Foam control
- Inhibitor AZ8104 – Copper corrosion inhibitor

### Meteorological Data

Limerick Generating Station has two meteorological towers for monitoring weather conditions at the site. The reports included with this letter provide the wind speed and wind direction recorded over a twenty-four hour period on February 17 and May 14, 2004.

I hope you find this information helpful. Also included is some other general information that you may find informative. If you have any questions we would be glad to address them.

Everyone at Limerick Generating Station takes the safe, secure operation of our plant very seriously, as well as our responsibility to the environment and our community.

In closing, I would like to take this opportunity to invite you and members of The Alliance For A Clean Environment to meet with us at your convenience and discuss any questions you might have about Limerick Generating Station. I would also be glad to arrange a site visit for your organization and show you first-hand how our plant and the cooling towers work.

Regards,



Bryan C. Hanson  
Plant Manager  
Limerick Generating Station

**The Alliance For A Clean Environment  
P.O. Box 3063  
Stowe, PA 19464**

**June 10, 2004**

**Lisa Warsack  
Limerick Nuclear Power Plant  
Evergreen and Sanatoga Roads  
Sanatoga, PA 19464**

Dear Lisa,

This letter is a follow up to our phone conversation yesterday, June 9, 2004, to review incidents in question and clarify our requests.

ACE first contacted NRC about film and spots on cars in the area of the hospital and Occidental parking lot in a communication on February 27, 2004.

NRC responded by phone and said no radiation was present in the mist escaping from the Limerick Nuclear Plant and that the spots would be from river water. I asked for the toxic substances which were present in the river water intake. NRC said they could only discuss radiation and suggested we call Limerick to inquire further.

You then also stated there was no radiation in the mist from the towers and said the film was from minerals in the river water used for cooling the towers. I asked about other toxic chemicals and metals in the river water which could be present in the mist emitted from the towers. You were going to investigate and get back to me in writing, as I requested. That was well over two months ago and we have had no communication from you concerning the February 17, 2004 incident.

ACE has now had reports of "stuff" on cars in the Occidental parking lot and another location nearby on May 14, 2004. We understand Occidental said it came from Limerick, just as with the February 17, 2004, incident. In our phone conversation yesterday, you agreed to check wind direction and patterns for May 14, 2004, to help identify or verify the source.

Over the past eight years ACE had numerous reports of residue on cars, lawn furniture, lawn mowers, etc., in the neighborhoods near the Limerick Nuclear Plant and Occidental. You have said that the mist water vapor from the Limerick towers creates light powder mineral salts from the river. We are concerned the mist would also logically carry into our air whatever toxic chemicals and metals there are in the river water.

You told me yesterday that the Limerick Nuclear Power Plant treats the river water to destroy harmful substances before it is used, much the same way a swimming pool is treated. Since you treat the river water like swimming pool water, there could be a wide array of other chemicals emitted with the mist from the towers. I therefore requested MSDS sheets on all the products used by Limerick to treat the river water.

Chemical threats about which we are most concerned from the Schuylkill River would not likely be removed with the process you refer to with swimming pools. You were not sure about the HAPs in the river water, but would let me know. At the same time, you claimed that we could not be sure that HAPs found in the mist from Limerick's towers were from the river water. You said the mist would pick up other HAPs emitted into the air.

To be clear, ACE is asking you for:

1. MSDS sheets on all products used by your facility to treat the river water for the towers.
2. All Limerick Nuclear Power plant testing data for all chemicals and bacteria in the river water, both from the Schuylkill River and the Perkiomen intakes, for the past 10 years.
3. Complete wind pattern data for both February 17 and May 14.

We look forward to receiving a written response from you, including requested information within the next 30 days. Thank you for your cooperation in advance.

Sincerely,



Donna Cuthbert  
ACE Vice President

SmartZone Communications Center Collaboration Suite

aceactivists@comcast.net

New Information

Friday, January 08, 2010 7:54:36 AM

From: aceactivists@comcast.net  
To: Carol.Collier@drbc.state.nj.us  
Cc: William.Muszynski@drbc.state.nj.us

Attachments: Limerick Title V - ACE response to DEP Resp Doc 12-15-09.docx (92.3KB)

Ms. Collier,

ACE has done an analysis and expose on DEP's Comment Response Document for Limerick Nuclear Plant's Title V Permit Renewal.

This documnet connects the dots between Schuylkill River contamination and Limerick Nuclear Power Plant's air pollution from the cooling towers.

DEP claims evaporated water and drift from the cooling towers are considered an effluent stream. (Pg. 18)

In other words, DEP makes the case that cooling tower steam is an effluent stream into the sky.

→ Pollution goes from the river to the sky.

This is really about health threats to our region from contaminated Schuylkill River water going directly into our air.

→ DEP deferred one of the important decisions in this air permit to DRBC.

DEP's Comment Response Document provides more reason for Exelon to be required to FILTER CONTAMINATED MINE WATER BEFORE pumping it into the Schuykil River.

Billions of gallons of unfiltered contamianted mine water pumped into the ever depleting Schuylkill River, clearly jeopardizes families in our region in so many ways.

- Anything in the mine water can end up in our air from Limerick Nuclear Power Plant's cooling tower effluent. The water in the spray pond is also Schuylkill River water.  
*and*

**We urge you to review the attached ACE comments to DEP, particularly sections related to cooling tower PM 10 emissions, Cooling Tower Drift, and the Emergency Spray Pond.**

Dr. Lewis Cuthbert

**Alliance For A Clean Environment**  
1189 Foxview Road Pottstown, PA 19465

January 30, 2010

**Lisa Jackson**  
**EPA Administrator**

Ariel Rios Building  
1200 Pennsylvania Avenue, N.W.  
Washington, DC 20460  
(202) 272-0167

**RE: Major Air Pollution - Limerick Nuclear Power Plant's Title V Permit and Increases**

Dear Administrator Jackson,

The Alliance For A Clean Environment (ACE) commends your actions to attempt to strengthen air pollution standards to protect public health. ACE is a tri-county group grassroots group in PA with over 1,000 members, in the region of Limerick Nuclear Power Plant in Montgomery County. We are extremely concerned about Limerick Nuclear Plant's air pollution health threats in our heavily populated region.

Limerick Nuclear Plant's Title V permit proves nuclear plants are NOT emissions free, as frequently advertised. We were shocked while reviewing Limerick's Title V air permit renewal. There are 30 different air pollution sources listed at Limerick. Radiation, the signature pollutant at a nuclear plant, was excluded from Limerick's Title V permit. We understand all permitted air pollution from a major air polluter is to be included in a Title V permit. Radiation is both regulated and permitted.

This is about public health, permitted poisons into our family's air, and costs to the public for dangerous, unnecessary air pollution. Nuclear power plant air pollution has national implications. Similar kinds of air pollution threats likely exist around most nuclear plants. President Obama is seeking \$54 billion for new nuclear reactors, inaccurately claiming they are safe and clean. Candidate Obama understood nuclear power is neither safe nor clean, expressing concern for his daughters growing up in Chicago, surrounded by nuclear reactors. He spoke out against taxpayer subsidies for nuclear power. Many of our members said they voted for President Obama largely based on his understanding of the threats from nuclear power. We wonder if President Obama is aware of the actual air pollution threats from nuclear plants.

Since Limerick Nuclear Plant started operating in the mid 1980s, cancer increases have skyrocketed, They are documented to be far higher than the national average, especially in children. Respiratory diseases are far higher than the state average. Infant and neonatal mortality rates are far higher than the state average, and even higher than Philadelphia and Reading.

Families in our region paid the ultimate price of Limerick Nuclear Plant's air pollution, yet we were denied an opportunity to fully understand the consequences and comment before the Southeast PA Department of Environmental Protection issued a 5-year Title V Air Permit Renewal (with huge increases) to Limerick Nuclear Power Plant.

PA DEP permitted a request by Exelon that will result in enormous increases in PM 10 emissions from Limerick's cooling towers, over 6 times higher than the current permit. This is a region long overexposed to dangerous concentrations of PM 10 emissions. We believe this is also the responsibility of EPA. It is about what appear to be violations of health based standards under the Clean Air Act. EPA Region 3 apparently reviewed the request, then ignored the health threats and signed off.

The major issue of concern is:

- DEP permitted the conditions to result in increased PM 10 emissions from Limerick's cooling towers at least 6 times higher than original permit limits. This is indefensible.
- Serious health threats from PM 10 are indisputable, including links to heart attacks, strokes, aggravated asthma, increased respiratory disease, decreased lung function, increased emergency room visits and hospitalizations, and death.
- Limerick Nuclear Plant also emits PM 10 from 3 boilers, 8 generators, and a spray pond. Actual totals are unknown. There is no PM 10 air testing. Exelon estimates PM 10 emissions.

Additional issues of significant concern related to Limerick Nuclear Plant's Title V Air Pollution Permit Renewal and SE DEP's Comment Response Document include:

1. Radiation, Limerick's Most Harmful Air Pollution, Illogically Omitted From This Air Permit
2. Calculating / Estimating Emissions
3. No Actual Air Monitoring or Stack Testing
4. No Filtration On Any Air Pollution Source
5. Increased Permit Limits /Changed Permit Conditions (Regardless of Increased Health Threats)
6. Exelon's Requests For Double Increases In Exhaust Flow Volumes
7. Burning contaminated waste oil. (Waste Derived Liquid Fuel (WDLF))

The financial costs to the public for not preventing air pollution have been shown to be astronomical. DEP has made permitting decisions that abandon the public's health and financial interests, and instead protect Exelon's profits. Exelon should be required to prevent unnecessary disease and disabilities by installing the best filtration on all air pollution sources.

Exelon should be required to reduce PM 10 emissions from Limerick's cooling towers, by filtering Schuylkill River water intake for Total Dissolved Solids. Montgomery County was already in the top 10% of the nation for PM 10 emissions and health impacts, according to EPA data compiled by Scorecard.

**As EPA Administrator, we urge you to direct your staff to review the issues and facts identified in detail in ACE's response to PA DEP's response document for Limerick Nuclear Power Plant's Title V Renewal. For clarity, we also ask you to have your staff review the one hour ACE Report TV show that is going out to 65,000 homes in prime time each week, for six weeks.**

- **If it is your position to condone such a gigantic increase of PM 10 emissions from Limerick's cooling towers in this heavily populated region, please clearly state the reason for your position.**
- **If not, EPA can rectify this injustice by taking action on recommendations and requests from The Alliance For A Clean Environment (ACE) attached expose on DEP's Comment Response Document for Limerick Nuclear Power Plant's major air pollution permit under the Clean Air Act issued 12-7-09.**

We look forward to your review and comments.

Thank you,

Dr. Lewis Cuthbert  
ACE President

CC: Senator Casey  
Senator Specter  
Congressman Gerlach  
Congressman Dent  
Congressman Sestak

To: PA DEP Secretary John Hanger

From: The Alliance For A Clean Environment  
Dr. Lewis Cuthbert, President

January 1, 2010

**RE: Request To Review Attached ACE Document and Consider Taking Action On The Recommendations and Requests Related To SE DEP's Public Response Document and Limerick Nuclear Power Plant Title V Permit Renewal TVOP-46-00038**

Secretary Hanger,

ACE is providing you with an expose on important issues regarding public health and Limerick Nuclear Power Plant's Title V Air Pollution Permit Renewal issued December 7, 2009, by your Southeast Regional Office.

The financial costs to the public for not preventing air pollution are astronomical, yet SE DEP has opted to make a permitting decision that abandons the public's health and financial interests, and instead, protects Exelon's profits.

Southeast DEP's Regional Office had an opportunity to reduce air pollution at Limerick Nuclear Power Plant, especially PM 10, which as you know, kills and cripples.

**Instead, SE DEP made a permitting decision that will result in allowing increased PM 10 emissions (nearly 6 times higher than original limits) from Limerick's cooling towers.**

- **Given the indisputable serious health threats from PM 10, this is indefensible.**
- **There is no need for any increased PM 10 limits in this Title V permit renewal. Exelon can and should meet applicable standards by filtering Schuylkill River water intake for Total Dissolved Solids. That filtration would lead to actual reductions in PM 10 emissions from the cooling towers and other air pollution sources at Limerick.**

December 11, 2009, ACE received PA DEP's Comment Response Document for this permit.

- **Attached is a 15 page analysis and expose of the most important issues related to Limerick's Nuclear Plant's Title V Permit Renewal and SE DEP's Comment Response Document.**

In December, 2008, ACE first reviewed Limerick Nuclear Plant's DRAFT Title V Permit Renewal and immediately presented SE DEP with a long list of important questions and concerns related to this permit renewal.

- ACE intended to share SE DEP's answers with the public, before the permit was issued, to give the public an opportunity to comment.
  - However, we received NO answers to any of our questions until a year later, on December 11, 2009, after the permit was issued.
  - We repeatedly requested a public hearing. SE DEP denied all our requests.
- **SE DEP essentially denied the public a voice in this process about very serious air pollution threats to the families in our region and beyond. You have an opportunity to rectify this injustice.**

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## THE MERCURY

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A4 / Friday, November 14, 2008

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**NOTICE OF INTENT TO ISSUE**  
**Title V Operating Permit Renewal**  
**Permit No. 46-00038**  
**Montgomery County**

The Department of Environmental Protection (PADEP) intends to renew a Title V Operating Permit to Exelon Generation Company/ Limerick Generation Station, located in Limerick Township, Montgomery County.

Exelon Generation Company/ Limerick Generation Station, is a major facility subject to the operating permit requirements of Title V of the Federal Clean Air Act and 25 Pa. Code, Chapter 127, Subchapters F (relating to operating permit requirements) and G (relating to Title V operating permit requirements). The facility's major source of emissions are three 57.1 MMBTU/hr boilers and eight 27 MMBTU/hr emergency generators, which primarily emit nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (PM). The facility also operates two cooling towers and an emergency spray pond, which primarily emit PM.

Copies of the Title V renewal application, proposed permit and other relevant information are available for public review at DEP's Southeast Regional Office, 2 East Main Street, Norristown, PA 19401. An appointment to review the documents may be scheduled by contacting the Records Management Section of the DEP at 484-250-5910 between 8:00 A.M. and 400 P.M., Monday through Friday, except holidays.

Interested persons may submit written comments, suggestions, or objections to Ms. Janine Tulloch-Reid, Air Quality Engineer Manager, 2 East Main Street, Norristown, PA 19401, within thirty (30) days of this notice. Written comments should include the name, address and telephone number of the person(s) submitting the comments along with the reference number of the proposed permit.

The Department reserves the right to hold a public hearing on the proposed action based upon the information received during the comment period. The Department will give notice of any scheduled public hearing at least thirty days in advance of the hearing as per 25 PA Code, Section 127.521. The hearing notice will be published in the Pennsylvania Bulletin and a newspaper of general circulation where the facility is located.

18452101

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
AIR QUALITY PROGRAM**

TITLE V/STATE OPERATING PERMIT  
ISSUE DATE: 2/8/00 EFFECTIVE DATE: 3/1/00  
EXPIRATION DATE: 3/1/2005

In accordance with the provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and 25 Pa. Code Chapter 127, the Owner, [and Operator if noted] (hereinafter referred to as permittee) identified below is authorized by the Department of Environmental Protection (Department) to operate the air emission source(s) more fully described in the site inventory list. This Facility is subject to all terms and conditions specified in this permit. Nothing in this permit relieves the permittee from its obligations to comply with all applicable Federal, State and Local laws and regulations.

The regulatory or statutory authority for each permit condition is set forth in brackets. All terms and conditions in this permit are federally enforceable unless otherwise designated as "State-Only" requirements.

TITLE V PERMIT NO: 46-00038  
TAX-ID/PLANT CODE 23-0970240/21

OWNER PECO ENERGY CO  
MAILING EVERGREEN & SANATOGA RDS  
ADDRESS SANATOGA, PA. 19464

PLANT LIMERICK GENERATING STATION  
LOCATION 46 Montgomery County 46932 Limerick Twp  
SIC CODE 4911 Trans. & Utilities - Electric Services

RESPONSIBLE OFFICIAL  
NAME ~~JAMES VON SUSKIL~~ Ron D  
TITLE VICE PRESIDENT, LIMERICK GENERATING STATION

PERMIT CONTACT PERSON  
NAME ~~MARIE B GOLSON~~ Tod Tierney  
TITLE ENVIRONMENTAL MANAGER  
PHONE (610)718-2500

[SIGNATURE]   
FRANCINE CARLINI, SOUTHEAST REGION AIR PROGRAM MANAGER

## **PM 10 - Permit Issue**

In Limerick's Title V Permit Renewal TVOP-46-00038, Exelon requested PA DEP a huge increase in blowdown water from 1,256 ppmw to 10,000 ppmw for each cooling tower. Reason according to Exelon:

- **Limiting blowdown TDS to 1,256 for each cooling tower restricts particulate matter (PM) and creates an unnecessary risk to Limerick for noncompliance.**

"PA DEP Air Quality Bureau will not set the limit on TDS concentration for the blowdown entering Outfall 001, since this is a Water Quality issue." DEP changed the language of the permit so that Exelon complies with both Air Quality and Water Quality requirements.

- **Limerick Nuclear Plant Was Permitted Conditions That Allow Possibly An 8-Fold INCREASE From The Cooling Towers In PM-10 Emissions, A Dangerous Clean Air Act Pollutant Blamed For Thousands Of Deaths Each Year.**

**This should NOT have happened.**

- **Limerick is in Montgomery County, which already ranks in the top 10% of the nation for dangerous PM-10 emissions.**

## **PM10 - 14 Sources From Limerick Nuclear Plant**

- **2 Cooling Towers**

PM 10 is emitted into the region's air with 35 to 42 Million Gallons of Steam Every Day

- **3 Boilers**
- **8 Generators**
- **The Emergency Spray Pond**

- ✓ PM 10 carries with it other dangerous toxics that are withdrawn from the polluted Schuylkill River  
56 million gallons of water are withdrawn from the river every day – there is no filtration.
- ✓ Many toxic chemicals are added to the cooling tower waters (324 pounds per day).
- ✓ Potential toxics carried with PM10 include:  
Radiation Heavy Metals Pathogens Corrosive Chemical Additives

**How Much PM 10 Is Emitting From All These Sources?  
NO ONE KNOWS FOR SURE! WHY?**

**Exelon "ESTIMATES" and "CALCULATES" PM10 Emissions**

**SECTION D. Source Level Requirements**

Source ID: 101

→ Source Name: COOLING TOWER 1

Source Capacity/Throughput: 119.000 Th Tons/HR RIVER WATER

PROC  
101STAC  
S12**I. RESTRICTIONS.**

Emission Restriction(s).

# 001 [25 Pa. Code §123.13]

Processes

No person may permit the emission into the outdoor atmosphere of particulate matter from this source in excess of 0.02 gr/dscf, pursuant to 25 Pa. Code § 123.13 (c)(1)(iii).

**II. TESTING REQUIREMENTS.**

# 002 [25 Pa. Code §127.441]

Operating permit terms and conditions.

Using a Department approved method, the permittee shall perform weekly tests for Total Dissolved Solids (TDS) in parts per million by weight from the 24-hour Composite Samples taken for compliance with NPDES Permit PA0051926 for Outfall 001 for Total Suspended Solids (TSS).

**III. MONITORING REQUIREMENTS.**

# 003 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The permittee shall monitor the average circulation flow rate through this cooling tower on a weekly basis when this source is in operation

**IV. RECORDKEEPING REQUIREMENTS.**

# 004 [25 Pa. Code §127.441]

Operating permit terms and conditions.

(a). The permittee shall keep records of the following for this source on a weekly basis when this source is in operation:

- (1). The average circulation flow rate of cooling water through this source.
- (2). The testing results of the weekly 24-hour composite sample for TDS content of the blowdown water in Outfall 001.

(b). The permittee shall keep manufacturer's specifications for the design drift rate for this cooling tower on file. If the design drift rate is not available, the permittee may use the factors for drift rate determination in AP-42 (5th Edition, Volume 1, Chapter 13.4) to estimate the amount of water lost as drift from this cooling tower.

(c). The permittee shall estimate and record the monthly and 12-month rolling sum emissions of particulate matter from this cooling tower to the atmosphere.

**SECTION D. Source Level Requirements**

Source ID: 102

Source Name: COOLING TOWER 2

Source Capacity/Throughput:

119.000 Th Tons/HR

RIVER WATER

**I. RESTRICTIONS.**

Emission Restriction(s).

**# 001 [25 Pa. Code §123.13]**

Processes

No person may permit the emission into the outdoor atmosphere of particulate matter from this source in excess of 0.02 gr/dscf, pursuant to 25 Pa. Code § 123.13 (c)(1)(iii).

**II. TESTING REQUIREMENTS.****# 002 [25 Pa. Code §127.441]**

Operating permit terms and conditions.

Using a Department approved method, the permittee shall perform weekly tests for Total Dissolved Solids (TDS) in parts per million by weight from the 24-hour Composite Samples taken for compliance with NPDES Permit PA0051926 for Outfall 001 for Total Suspended Solids (TSS).

**III. MONITORING REQUIREMENTS.****# 003 [25 Pa. Code §127.441]**

Operating permit terms and conditions.

The permittee shall monitor the average circulation flow rate through this cooling tower on a weekly basis when this source is in operation

**IV. RECORDKEEPING REQUIREMENTS.****# 004 [25 Pa. Code §127.441]**

Operating permit terms and conditions.

(a). The permittee shall keep records of the following for this source on a weekly basis when this source is in operation:

- (1). The average circulation flow rate of cooling water through this source.
- (2). The testing results of the weekly 24-hour composite sample for TDS content of the blowdown water in Outfall 001.

(b). The permittee shall keep manufacturer's specifications for the design drift rate for this cooling tower on file. If the design drift rate is not available, the permittee may use the factors for drift rate determination in AP-42 (5th Edition, Volume 1, Chapter 13.4) to estimate the amount of water lost as drift from this cooling tower.

(c). The permittee shall estimate and record the monthly and 12-month rolling sum emissions of particulate matter from this cooling tower to the atmosphere.

**American Lung Association Gave Montgomery County**

## **A Grade Of "F" For Unhealthy Air**

(2003 Report)

**Montgomery County Has 2<sup>nd</sup> Dirtiest Air In The State**

**Far Worse Than Philadelphia, Berks, and Chester Counties**

- Montgomery County Had 2<sup>nd</sup> Dirtiest Air in the State, Far Worse Than Philadelphia, Berks, or Chester Counties, "State of the Air Report for 1999-2001." It's Not Much Better Now.

## **Still, DEP Permitted INCREASES In Limerick's Title V Permit**

<b>PM10</b>	<b>Particulate Matter</b>	<b>3 TONS</b>
<b>VOCs</b>	<b>Volatile Organic Compounds</b>	<b>5 TONS</b>
<b>SO2</b>	<b>Oxides of Sulfur</b>	<b>8 TONS</b>
<b>NOx</b>	<b>Nitrogen Oxides</b>	<b>5 TONS</b>
<b>CO</b>	<b>Carbon Monoxide</b>	<b>20 TONS</b>

**Exelon Should Be Required To Reduce,  
NOT INCREASE THESE EMISSIONS**

**Our Region Is Already Overexposed Compared To The Nation**

**Top 10% Of The Nation For Emissions Of  
PM-10 and VOCs**

**Top 20% For SO2 Emissions**

# Example: Health Impacts and Synergism

## **VOCs Volatile Organic Compounds**

- ✓ Cancer
  - ✓ Leukemia
  - ✓ Liver Damage
  - ✓ Kidney Damage
  - ✓ Digestive Disorders
  - ✓ Neurological Disorders
  - ✓ Reproductive Problems
  - ✓ Decreased Immune Function Leading to Many Illnesses
- VOC's Extremely TOXIC In Small Amounts***

## **(NOx) Nitrogen Oxides**

Toxicant to:

- ✓ Blood
- ✓ Cardiovascular
- ✓ Endocrine
- ✓ Immune System
- ✓ Reproductive
- ✓ Neurological
- ✓ Skin and Sense Organ

NO<sub>x</sub> reacts with moisture and other compounds to form nitric acid and related particles.

## ***VOC's + NOx = Ground-Level OZONE***

**Acute, Short Term Effects include:**

- ✓ Shortness of Breath
- ✓ Phlegm Build Up
- ✓ Coughing, Wheezing
- ✓ Watery Eyes, Runny Nose
- ✓ Sore Throat
- ✓ Head Colds
- ✓ Chest Colds
- ✓ Chest Pain

**Repeated Exposure Can Result In:**

- ✓ Permanent Lung Damage
- ✓ Respiratory Infection
- ✓ Lung Inflammation
- ✓ Aggravate Asthma

## **RADIATION INTERACTING with OZONE Enhances Cancer Risks**

From Mc Donnell, M.D. Health Effects Research Laboratory

EPA Testimony, April 9, 1987, to U.S. Senate

**“OZONE WORKS SYNERGISTICALLY WITH RADIATION TO  
ENHANCE THE CANCER-CAUSING EFFECTS OF RADIATION.”**

## **Limerick Nuclear Power Plant Air Pollution**

### **ACE Conclusions 12/16/09**

#### **To DEP Comment Response Document 12-3-09**

#### **Limerick Nuclear Plant Title V Air Permit TVOP-46-00038**

**ACE has identified and commented on major problems, omissions, oversights, and flaws based on DEP's Comment Response Document on Limerick Nuclear Plant's Title V Air Pollution Permit. This document highlights the fact that PA DEP's air pollution permitting process for Limerick Nuclear Plant provides nothing more than an illusion of protection.**

#### **DEP Comment Response Document verifies that:**

- There is no real accounting of harmful air pollution from 2 cooling towers, 3 boilers, 8 generators, and many other sources at Limerick, and clearly no protection from it.
- There is no real attempt by PA DEP to require Exelon to minimize the air pollution from Limerick Nuclear Power Plant, which threatens the health of hundreds of thousands of families in our region.
- It appears to us that two of the issues should be procedural violations of Clean Air Act requirements under Title V.

#### **Major Issues include:**

1. Radionuclide Emissions Illogically Omitted
2. Calculating and Estimating Emissions
3. No Actual Air Monitoring by Anyone
4. Absence of Pollution Control Equipment
5. Failure of DEP to provide requested accounting of Low-Level Radioactive Waste Amounts Transported Off-Site, before and after burning Waste Derived Liquid Fuel (WDLF)
6. Changing / Relaxing Permit Conditions, based on Exelon's requests, regardless of health threats to our region
7. No Explanation for Major Increases requested in Exhaust Flow Volumes from many sources (more than doubled)

**Radionuclide Emissions** are excluded from Limerick Nuclear Plant's Title V permit, even though health based standards under Title V requirements of the Clean Air Act call for all regulated air pollution from a major air pollution facility to be included in a Title V permit for that facility.

- **Exclusion of radiation is illogical and should be a violation of Clean Air Act Title V permitting requirements.**
  - Radionuclides are hazardous air pollutants verified in DEP's comment response document (pg. 17).
  - Radionuclides are the signature air pollutant from a nuclear plant.
  - Radionuclide emissions are the greatest threat to public health from a nuclear plant.
  - Radionuclide emissions are regulated and reported by nuclear plants.
  - Radionuclide standards are set by EPA.
  - Title V requirements are established by EPA under the Clean Air Act's health based standards. They call for all air pollutants from a major air pollution facility to be listed in the Title V permit.
  - EPA has illogically declined to regulate radionuclides from nuclear plants, even though EPA regulates all other air pollution from nuclear plants under Title V permit requirements.

Fractured regulating allows nuclear plants to ignore health based federal requirements under the Clean Air Act. Fractured regulating allows a loophole to dismiss radionuclide emissions, the signature air pollutants at nuclear plants. DEP's comment response document verifies that:

- ✓ DEP issues federal Title V permits, yet even as an Agreement State, the authority to regulate radionuclide air pollution from a nuclear plant is not included.
  - ✓ EPA develops environmental standards for radionuclides and regulations used under Title V permitting, but EPA declined to regulate nuclear plants.
  - ✓ EPA has given jurisdiction of radionuclide emissions from nuclear plants to NRC, an agency that has nothing to do with Title V permitting.
- **It appears radionuclides have not been included in Title V permitting requirements simply because EPA is declining to regulate them and DEP, even as an Agreement State, is ignoring radionuclide air emission from nuclear plants. DEP's excuses for omission of radionuclides in the response document are lame.**
- (Pg.17) DEP illogically claims radionuclides (hazardous air pollutants) were omitted from health based Title V permitting requirements for nuclear plants because they are measured a different way. Regardless of the way radionuclides are measured, they are permitted and reported, they are the greatest threat to public health, and should be included in the Title V permit for Limerick Nuclear Plant.
  - (Pg. 3) Excuses to exclude radionuclides from Limerick's Title V include:
    - a. *"To minimize duplication"* – We dismiss this excuse. Title V requires all other air permits to be combined into this one document – that should include radionuclide air emissions from nuclear plants.
    - b. *"EPA declined to regulate nuclear plants because NRC provides an ample margin of safety to protect public health."* – When NRC does no independent monitoring for the 100 radionuclides associated with nuclear power plants, NRC cannot convincingly prove that it is protecting public health. When the National Academy of Sciences says there is no safe level of radiation exposure, no one including NRC is preventing harm to public health.
    - c. *"Even though PA has become an agreement state responsible for radioactive materials, NRC was to keep authority for review, evaluation and approval of sealed sources and devices containing nuclear materials..."*

Pg. 13 – Limerick's Title V Operating Permit was issued February 8, 2000. Title V permits are supposed to be renewed every 5 years, which should have been in 2005. Yet, this renewal is just being issued in 2009, almost 4 years late.

- **Why has DEP waited until 2009 to issue the first Title V Permit Renewal, when it should have been renewed in 2005? Isn't this a violation of Title V requirement for renewals?**

Pg. 4 – DEP says low-level radioactive wastes (filters, resins, tools, equipment, protective gloves, clothing, respiratory equipment, are stored on-site in high integrity concrete vaults in the rad-waste building and not transported off-site. Massive amounts of this waste are produced regularly.

- The response document says:
  - ✓ Class B and C are not transported off-site.
- **How much of Class B and Class C waste can the rad-waste building continue to hold, year after year? Won't it eventually run out of space?**
  - ✓ Class A radioactive wastes are stored on-site until short-lived radonucleides decay to safer levels and there is enough to transport it to the US NRC licensed disposal site near Clive, Utah.

**12/11/08 ACE requested that DEP provide an accounting of the amount of this waste transported off site recently, compared to before Pottstown Landfill closed in 2005 and Barnwell, S.C. closed in July, 2008.**

- **DEP's response document failed to provide that requested accounting of these wastes before and after closing of Pottstown Landfill and Barnwell, S.C.**

Pg. 5 – The response document verifies that the only testing for radiation is in water.

- **There is no testing for radiation emissions.**

Pg. 7 – Ash from burning Waste Derived Liquid Fuel (WDLF) in Boiler A is emitted to the atmosphere as particulate matter.

Pg. 8 – DEP approved burning of WDLF through plan approval 46-302-052A on 4/20/95

- Radioactive WDLF is not permitted to be burned in Boiler A.
- It is tested for radioactivity per batch.
- Permit limits are based on best available technology for Boiler A for burning WDLF

Pg. 8 – DEP says incineration is not done at the facility, yet answered the following question without correction, "Is Contaminant Level Reporting for burning Limerick's waste done with continuous monitoring and testing or largely estimated by Exelon for reporting?"

- **Exelon estimates its emission using emission factors**
- **NRC employees stated in phone conversations that incineration is being done at Limerick, but that DEP allowed it and that NRC had nothing to do with it.**

Pg. 8 – DEP admits:

- **NO stack testing was done, including for Boiler A**
- **NO pollution control equipment is on the Boilers.**

Pg. 9 – DEP claims limits for Boiler A arsenic, cadmium, chromium, lead, PCB, and total Halogens are considered best available technology for Boiler A

- **Even though there's NO pollution control equipment**

Pg. 9 – DEP claims limits ensure that there are no toxic levels emitted into the air after burning in Boiler A. DEP claims limiting metals and other contaminants in WDLF prevents concentrations from exceeding any level of concern when burning WDLF.

- **There's absolutely NO PROOF of DEP's claims.**
- **DEP NEVER conducted independent testing of WDLF**
- **DEP never did a stack test, nor required filtration.**

Pg. 9 – DEP admits their oversight consists of periodic, unannounced inspections of the facility.

- **DEP employees can't see air emissions. Inspections don't reveal violations of toxic levels emitted into our air.**

Pg. 9 – DEP claims WDLF used in 2003 and 2004 was the same batch of WDLF tested in 2001 and that WDLF was not burned since then.

- **DEP says WDLF results can be found in the enforcement files on Exelon-Limerick. If results are in the enforcement section, it suggests there were violations.**

Pg. 9 – Not surprisingly, the only air quality violation found by DEP was a reporting violation in 1998 and the water quality violation this year was for late submittal of a report.

- **Accidental releases of radiation have been reported in the Mercury that should be considered air pollution violations. However, they can be ignored because radionuclides are excluded from the Title V permit.**

Pg. 10 – DEP admits that ash from Boiler A is not tested for radioactivity.

Pg. 10 – DEP says WDLF toxics come through use, storage, and handling of fuel unsuitable for its original purpose due to the presence of chemical or physical impurities.

- **So why has Exelon been permitted to use unsuitable fuel with chemical impurities in Boiler A, when the toxics end up in our air?**

Pg. 11 – DEP admits,

- **There are NO air pollution controls for emissions from the 3 boilers or the vast numbers of generators to remove or sequester greenhouse gases.**

Pg. 12 – DEP claims Exelon has not requested increases in emissions as part of this permit renewal application.

- **A page from a previous application suggests otherwise – It seems that huge increases in exhaust from many sources were requested. See attached page.**

Pg. 12 – DEP illogically stated that de minimis increases may not occur at a facility if the de minimis increase would violate Clean Air Act requirements. DEP has no accurate idea how much in total of each regulated pollutant is actually emitted from each source at Limerick Nuclear Power Plant.

- **Of major concern at Limerick Nuclear Power Plant are PM10 emissions. We believe if all Limerick's PM10 sources were accurately determined and added to the PM10 in our region, there could be a serious violation of the Clean Air Act.**
- **Exelon simply calculates and estimates PM10 from massive steam from towers, and many other sources at the site. We do not believe DEP knows how much PM10 is actually emitted from Limerick Nuclear Plant. Given the serious health impacts from PM10 entering the lungs of people, we believe it is imperative for DEP to find a verifiable way to measure PM10 from all Limerick's sources.**

Pg. 13 – DEP has only taken fuel samples to determine sulfur content.

- **DEP never did any actual independent monitoring or testing of air pollution on any equipment used at Limerick.**

Pg. 13 – DEP says Exelon monitors operating data (**NOT EMISSIONS DATA**) and uses that in conjunction with emission factors to determine pollutant emissions from each source listed in the Title V Operating Permit.

**PROBLEM – NO ONE ACCURATELY DETERMINES AIR POLLUTION FROM LIMERICK.**

- **There is NO actual continuous monitoring by Exelon, DEP, or EPA to accurately determine air emissions from each of about 30 air pollution sources at Limerick Nuclear Plant.**

Pg. 13 – DEP illogically claims that emission factors provide reliable results for Exelon to determine emissions from sources listed in Limerick's Title V Operating Permit.

**PROBLEM – EMISSION FACTORS ARE A FLAWED MEASURE**

- **EPA did not establish emission factors on Limerick's equipment and emissions, but instead on stack test data from similar sources around the country.**

Pg. 13 – DEP admits:

- **There are NO monitoring stations for criteria pollutants located within the 10-mile radius of Limerick Nuclear Plant.**

### **Cooling Towers and Cooling Tower Drift**

Pg. 14 – DEP claims that they are unaware of any dispersion modeling or deposition studies for cooling tower drift.

- **Yet DEP refers to dispersion modeling elsewhere showing what they called a negligible impact approximately 13.9 miles from the facility.**
- **And, DEP admits they did NO dispersion modeling on cooling tower drift for Limerick.**

Pg. 15 – DEP claims there is no need for pre-treatment of Schuylkill River water based on Exelon's testing of Schuylkill River intake.

- **We disagree. Toxics withdrawn with Schuylkill River water go into our air. The Schuylkill River was determined to be the 11<sup>th</sup> most toxic river in the US. To claim no need for pretreatment, there needs to be independent Schuylkill River water monitoring over all seasons for all toxics, showing all levels found, and not only averages.**
- **Water testing fraud and abuse confirmed elsewhere, along with excluded toxics and some of the questionable data reported on others all suggest the need for independent monitoring and reporting of Schuylkill River water intake.**
- **Exelon testing reveals:**
  - ✓ Not all toxics that could be associated with Schuylkill River water were tested by Exelon in water withdrawn, including pathogens.
  - ✓ It appears levels were averaged. Highest levels were not reported.
  - ✓ Some reported levels are very suspicious. For example:
    - Total Dissolved Solids (TDS) were reported by Exelon at 186 mg/L average for untreated and unfiltered Schuylkill River water. On Pg. 18 DEP admits TDS levels from the Schuylkill River have a variable content.
    - After changing of filters for our personal water treatment system, the Superior Water tech testing still found TDS levels at 180 after filtration.

Pg. 16 – DEP says testing of blowdown is equivalent to testing concentration of pollutants in cooling tower drift. While this is likely true,

- **Independent testing needs to be done in all seasons by someone other than those hired by Exelon, the company with a vested interest in the outcome.**

Pg. 16 – DEP says VOC emissions from Limerick are found at

[http://www.ahs2.dep.state.pa.us/eFACTSWeb/criteria\\_facilityemissions.aspx](http://www.ahs2.dep.state.pa.us/eFACTSWeb/criteria_facilityemissions.aspx), yet there are no results found there.

Pg. 18 – DEP claims that fugitive particulate matter emissions requirements do not apply because evaporated water and drift from the cooling towers are considered an effluent stream, not fugitive emissions.

- **This is a DEP word game. The drift is clearly a visible plume (containing PM10 and all the toxics that are carried with the PM10) across the boundary line of Limerick.**

### **Emergency Spray Pond**

Pg. 18 – The Emergency Spray Pond contains the same water that is in the Schuylkill River. Water is removed through evaporation, drift, or Outfall 001, which is the outfall from the cooling towers.

- **PM 10 emissions from the Emergency Spray Pond may be variable and are only estimated.**
- **DEP tries to improve accuracy of data collected of the pollutants emitted for purpose of emissions reporting and fees, not to determine health risks.**

Pg. 19 – Particulate matter emissions occur when water is being sprayed in the Emergency Spray Pond. Various operations at Limerick send water to the Emergency Spray Pond for cooling. PM10 emissions are dependent on TDS content of water in the pond. River or creek water has a variable TDS content.

- **PM10 emissions from the spray pond are dependent on TDS content, highlighting the need to do independent monitoring of TDS throughout the year.**

Pg. 28 – Exelon asked to remove the permit requirement to monitor and calculate the PM10 by using actual Emergency Spray Pond operating hours.

- Exelon claims it has no system in place to monitor and/or record actual operating hours of the Emergency Spray Pond.
- Exelon claims it is also not possible to install a single hour meter as several pumps are used all of which can be triggered from multiple locations depending on the equipment utilizing the cooling pond.
- **Exelon and DEP agreed that the method for determining PM10 from the Emergency Spray Pond needs to be re-evaluated, and that Exelon would continue the current method until a new alternative is approved by DEP.**
- **In reality, this could be another 5 years, until the next Title V permit renewal.**

Pg. 29 – Exelon requested deletion of the added permit language requiring Exelon to monitor the hours of operation of the Emergency Spray Pond.

- **DEP deleted from the Title V permit, the requirement for Exelon to monitor the hours of operation of the Emergency Spray Pond.**
- **At Exelon's request, DEP also deleted the condition to record actual hours of operation of the Emergency Spray Pond.**

### **Emergency Generators**

Pg. 19 – Emergency Generators were installed prior to 1994. They operate on fuel similar to diesel fuel. DEP requires Exelon to minimize NOx and VOC emissions.

- **This requirement is meaningless. DEP does not require filtration and does no testing. DEP has no accurate idea whether or not NOX and VOC limits are even met.**

### **Permit Changes**

Pg. 20 – DEP admits that this proposed permit is not the same as the existing permit and that changes have been made in the Title V Permit under Section G – Miscellaneous #007

### **Voltz Degreaser**

Pg. 20 – Voltz Degreaser uses cleaning solvent containing VOCs, which evaporate and result in fugitive VOC emissions into our air. Waste solvent is removed from the facility as waste.

### **Boiler A**

Pages 21,22 - Exelon objected to the requirement to monitor the hours of operation, claiming that Boiler A is not currently equipped with a runtime hour meter to daily monitor the hours of operation and that installation and maintenance of a runtime hour meter poses a burden of both time and cost.

- DEP caved in to Exelon's requests and removed the condition from the permit that required monitoring and recordkeeping for hours of operation.
- DEP allows Exelon to **calculate** PM, Sox, and NOx emissions on a monthly basis.
- EPA requested clarification that particulate matter emission limit for Boiler A apply per boiler.

### **Boilers B and C**

Pg. 23 – Exelon requested and received removal from the Title V permit, the same requirement to monitor hours of operations for Boilers B and C, for the same reasons.

- DEP also allows Exelon to **calculate** PM, Sox, and NOx emissions on a monthly basis for Boilers B and C.

## Cooling Towers - #1 and #2

Pages 25, 26, 27

Exelon requested the limit for Total Dissolved Solids (TDS) for each cooling tower be INCREASED from 1,256 ppmw to 10,000 ppmw.

Exelon admits limiting the blowdown TDS to 1,256 ppmw restricts Particulate Matter (PM) and creates an unnecessary risk to the facility for noncompliance.

- Exelon admits that cooling tower water is primarily a function of dissolved solids levels of upstream water.
- Exelon admits that TDS varies greatly over the year with fluctuations in water temperatures.
- Exelon says TDS is affected by 4 concentrating cycles which could cause Limerick to be non-compliant at the current limit (1,256 ppmw).
- The current limit was derived from information provided by Exelon for the latest NPDES application.
- Exelon says it is imperative that sufficient margin exists within TDS concentration limit so that compliance can be demonstrated.
- Exelon says a concentration limit of 10,000 ppmw would allow the use of water with different uncontrollable dissolved solids levels and would not pose risk of non-compliance.

DEP employee, Sohan Garg, Permitting Section of Water Quality Management, said the TDS concentration permit limit will not be considered until March 2011 when the NPDES permit is set to be renewed.

- Garg also stated this increase may be obtained from DRBC.
  - However, the Air Quality Bureau has made a calculation in a Technical Review Memo for this Title V Renewal to demonstrate that a TDS concentration of 10,000 ppmw in Outfall 001 would still demonstrate compliance with applicable requirements.

### PROBLEMS

1. Exelon Performs ONLY WEEKLY 24 HOUR COMPOSITE SAMPLES of blowdown from the cooling towers – Weekly composite samples dilute actual PM10 threats to the health of all under the plume.
2. Regardless of the enormous PM10 threat to public health from the cooling tower drift, DEP caves in AGAIN – DEP changed language of the permit so that Exelon complies with both Air Quality and Water Quality requirements.

This is just one more example of why ACE has long held frustration with DEP and the illusion of protection in their permitting process. When a major polluter violates permit conditions, PA DEP simply changes the conditions in the permit so they are met, regardless of health risks to families in our region.

For more detailed information on air pollution threats from Limerick Nuclear Power Plant,  
Call The Alliance For A Clean Environment (ACE), (610) 326-2387

## **The Alliance For A Clean Environment Comments 12/31/09**

### **On PA DEP 12-3-09 Comment Response Document For**

#### **Limerick Nuclear Power Plant's Title V Air Pollution Permit TVOP-46-00038**

ACE presented PA DEP with important concerns about Limerick Nuclear Power Plant's Title V Permit Renewal in December, 2008. After the permit renewal was issued one year later, DEP finally responded. The public was never given an opportunity to be fully informed about these issues, or to respond on a public hearing record, since DEP denied our request for a public hearing. Therefore, after careful review of PA DEP's Comment Response Document and considering the health threats involved for hundreds of thousands of people in our region, ACE feels compelled to comment on omissions, oversights, and flaws related to Limerick Nuclear Plant's Title V Air Pollution Permit Renewal, and urge PA DEP to review and add these comments to the official record.

#### **Major Issues include:**

- 1. Radionuclide Emissions Illogically Omitted**
- 2. Calculating / Estimating Emissions Instead of Actual Monitoring / Testing**
- 3. No Actual Perimeter Monitoring On Toxics Listed In This Permit**
- 4. No Requirement For Filtration On Any Of Multiple Air Pollution Sources At Limerick**
- 5. Increased Permit Limits /Changed Permit Conditions (Regardless of Increased Health Threats)**
- 6. Exelon's Requests For Major Increases In Exhaust Flow Volumes - Unaddressed**
- 7. DEP's Failure To Account For Specific Destinations of Massive Volumes of Low-Level Radioactive Wastes, Before and After Burning Waste Derived Liquid Fuel (WDLF)**

#### **PA DEP's Comment Response Document Verifies That:**

- Limerick Nuclear Power Plant's harmful air pollution from 2 cooling towers, 3 boilers, 8 generators, an emergency spray pond, and other sources are not actually measured. Exelon calculates and estimates emissions. Actual real time emissions are unknown. Health threats from spikes and accidental emissions go unaddressed. There is no continuous perimeter air monitoring for the broad range of toxics associated with Limerick Nuclear Plant's emissions.
- PA DEP makes no attempt to protect our region from this unknown, but significant air pollution threat. PA DEP fails to require Exelon to filter any of its air pollution sources which threaten the health of hundreds of thousands of families in our region.
- Standards for allowable limits are nothing more than an illusion of protection. Allowable limits are based on estimates, not actual air pollution emitted into our air from all the sources at Limerick Nuclear Plant. Allowable limits fail to account for the synergistic, additive, and cumulative harmful health impacts, or for those impacts to fetuses, children, and those already with cancer and other environmentally related diseases and disabilities.
- PA DEP is allowing a drastic increase in PM10 emissions from the cooling towers, even though research shows this kind of air pollution kills and cripples, and the Clean Air Act calls for reductions to protect public health, not increases. Once again, instead of requiring reductions in dangerous air pollution, 'DEP permits dramatic increases so Exelon can avoid being in violation.
- Potential Violations Of Title V Clean Air Act Requirements
  1. Failure to include all permitted air pollution at a facility. Radiation is the signature air pollutant at Limerick Nuclear Power Plant. Radiation is regulated and permitted, yet excluded.
  2. Failure to update the Title V every 5 years. It has been 9 years for Limerick's Title V Renewal

**Of Major Concern - PM 10 From Cooling Towers #1 and #2** (Permit Pages 25, 26, 27)

**We strenuously object to DEP changing language in Limerick's Title V Renewal Permit to accommodate Exelon's requests to increases Total Dissolved Solids limits.**

- **DEP, in essence, has permitted drastic increases in PM 10 emissions from the cooling towers (almost 6 times higher).**
- **DEP Permitted Total Dissolved Solids Limits To Be:  
Dramatically Increased From 3,512 ppmw To 20,000 ppmw**
- **Increased Total Dissolved Solids = Increased Cooling Tower PM10 Emissions**  
Confirmed by Exelon in Comment Response Document Information

The response document confirms that Exelon requested this permit increase to avoid violations. Drastic permit violations for PM 10 from the cooling towers may have gone undetected for years. But DEP would never know since Exelon is permitted to simply calculate and estimate PM 10 emissions in the enormous amounts of steam Limerick generates every day.

**PM 10 emissions are a serious threat to public health.** Still, DEP allowed drastic permit increases, by simply changing permit language to accommodate Exelon's request to avoid violations. **DEP caved in to Exelon, allowing an almost 6 times higher TDS limit, knowing that permitted increase would result in dramatic increases in PM 10 limits from the cooling towers.**

- **To protect public health, instead of allowing drastic increased PM 10 limits, DEP should have required Total Dissolved Solids (TDS) filtration of Schuylkill River water to minimize PM 10 emissions from Limerick's cooling towers.**

Our region's health was unnecessarily jeopardized yet again by DEP's irresponsible permitting decisions which value polluters' profits over public health. DEP's air pollution permits provide nothing more than an illusion of protection. **When a major polluter violates permit conditions, PA DEP simply changes the conditions in the permit, regardless of health risks to families in our region.**

**We remind DEP that the cooling towers are not the only source of Particulate Matter (PM-10) at Limerick Nuclear Power Plant. PM 10, a serious threat to public health, is emitted from all the following Limerick Nuclear Power Plant sources listed below:**

- 2 Cooling Towers
- 3 Boilers
- 8 Generators
- Emergency Spray Pond

**DEP's Comment Response Document made it clear that DEP has no accurate accounting for PM 10 emissions from any of Limerick Nuclear Power Plant's Sources.**

- **DEP allows Exelon to simply "ESTIMATE" and "CALCULATE" PM10 Emissions.**

**We remind DEP of the specific Serious Harmful Health Impacts of PM 10. PM Can Penetrate Deep Into The Lungs And Enter The Bloodstream. PM Has Been Blamed for Thousands of Deaths a Year. Long Term Health Effects From PM10 Have Been Linked To:**

- ✓ Increased Heart Attacks
- ✓ Strokes
- ✓ Aggravates Asthma
- ✓ Inflames The Lungs Like A Sunburn On Skin

- ✓ Increased Respiratory Disease
- ✓ Decreased Lung Function
- ✓ Increased Hospital Admission
- ✓ Increased Emergency Room Visits
- ✓ Premature Death

**Limerick Nuclear Plant Other Harmful Air Pollution Can Be Transported With PM 10:**

- Radiation
- Heavy Metals
- Pathogens
- Other Toxic Corrosive Chemicals From River Water, Cooling Tower Additives, and Combustion Sources

**Details – Cooling Towers - TDS / PM10**

ACE identified Comment Response Document Statements / Issues - Followed by Our Comments

Exelon requested the limit for Total Dissolved Solids (TDS) for

- ✓ EACH cooling tower be INCREASED from 1,256 ppmw to 10,000 ppmw.

Exelon admits:

- ✓ Limiting blowdown of Total Dissolved Solids to 1,256 ppmw for each cooling tower
  - Restricts Particulate Matter (PM)
  - Creates risk to the facility for noncompliance.

**ACE comments:**

1. **Exelon's violations, (noncompliance), represent increased health threats to our region. DEP's decision to simply increase Exelon limits allows Exelon to avoid violations, but ignored unnecessary health threats to vast numbers of families in our region.**
2. **In order to protect public health, Exelon should be required to filter TDS from the Schuylkill River water intake, to minimize PM10 emissions from the cooling towers.**

Exelon admits:

- ✓ TDS in cooling tower water is primarily a function of dissolved solids levels of upstream water.
- ✓ TDS varies greatly over the year with fluctuations in water temperatures.
- ✓ TDS is affected by 4 concentrating cycles which could cause Limerick to be non-compliant at the current limit (1,256 ppmw).

The current limit was derived from information provided by Exelon for the latest NPDES application.

Exelon now says:

- ✓ It is imperative that sufficient margin exists within TDS concentration limit so that compliance can be demonstrated.
- ✓ A concentration limit of 10,000 ppmw [per cooling tower] would allow the use of water with different uncontrollable dissolved solids levels and would not pose risk of non-compliance.

**ACE Comments:**

1. **Exelon is actually adding to the upstream TDS concentrations in Schuylkill River water by pumping massive amounts of Wadesville Mine Water into the river upstream.**
  2. **Exelon's current request to DRBC to start pumping water from other mines into the river will logically increase TDS concentrations over time.**
  3. **Lower Schuylkill River flows will also increase TDS concentrations, as well as toxics. Exelon is currently asking DRBC to lower Schuylkill River flow restrictions. Limerick's excessive consumptive use is depleting the river by billions of gallons each year.**
- **Could Exelon's requests to dramatically increase TDS limits be in anticipation of INCREASED TDS concentrations in the Schuylkill River, as a result of Limerick's massive on-going yearly depletion of Schuylkill River water, and massive pumping of mine water into the river upstream for Limerick Nuclear Power Plant operations?**

DEP employee, Sohan Garg, Permitting Section of Water Quality Management, said:

- ✓ The TDS concentration permit limit will not be considered until March 2011 when the NPDES permit is set to be renewed.
- ✓ This increase may be obtained from DRBC.

The Air Quality Bureau made a calculation in a Technical Review Memo for this Title V Renewal to demonstrate that a TDS concentration of 10,000 ppmw would demonstrate compliance..

#### **ACE Comments:**

1. **DEP issued this 2009, 5-year Title V Permit Renewal, allowing Limerick Nuclear Plant to have dramatic PM 10 increases, even though the NPDES permit controlling TDS limits (therefore PM 10 Emissions) is not due to be considered until March, 2011.**
2. **To our knowledge, DRBC did not allow increased TDS limits before this permit was issued, yet this permit renewal language was changed to allow dramatically increased PM10 limits.**
3. **In reality, based on nothing more than a CALCULATION, DEP's Air Quality Bureau has further jeopardized our region, by legally permitting Exelon to dramatically increase cooling tower PM 10 by increasing TDS limits:  
From 3,512 ppmw To 20,000 ppmw**
4. **In fact, DEP issued this 5-year air permit renewal, legally permitting increases nearly 6 times higher in PM 10 cooling tower emissions, based only on unverifiable 'calculations' in a flawed and unprotective process. We have no confidence that Exelon's calculations are accurate nor that they represent actual cooling tower PM 10 health threats to our region.**
  - **PM 10 calculations are not made on what is actually coming out of the cooling towers, but instead on samples of blowdown from the cooling towers. The response document verifies that there is no off-site air monitoring.**
  - **Exelon, the company with a vested interest in the outcome even controls the process for blowdown samples used to make calculations, with no actual on-site DEP verification.**
  - **Exelon admits that levels vary greatly, yet DEP allows samples to determine PM 10 calculations to be taken only weekly.**
  - **Samples are diluted by taking weekly 24-hr. composites. Composites fail to identify peak PM10 emissions which can jeopardize all under the plume.**
5. **DEP allows a PM10 Increase of 3 PM10 Tons Per Year = 6,000 Pounds Per Year. In reality, DEP has no accurate idea of how much PM10 is emitted from all the PM10 sources at Limerick each year. We strenuously object to this boiler plate language in Limerick's Title V Permit. This allows Exelon a dangerous loophole with which to avoid violations. That is unacceptable.**
  - **DEP permitting decisions for PM 10 from Limerick's cooling towers should have included requiring filtering of TDS in the Schuylkill River water intake, to prevent an almost 6 fold increase in PM 10 emissions from the cooling towers.**
  - **DEP has failed to require TDS filtration of Schuylkill River water intake and therefore failed to reduce unnecessary risks to protect public health.**

#### **Cooling Towers and Cooling Tower Drift**

DEP claims to be unaware of any dispersion modeling or deposition studies for cooling tower drift. (Pg. 14)

**ACE Comments:**

1. DEP claims to be unaware of dispersion modeling or deposition studies for cooling tower drift, yet in the same document DEP acknowledges dispersion modeling has been done on cooling tower drift elsewhere. This contradiction speaks volumes.
2. DEP refers to dispersion modeling that found what DEP defined as “**negligible impact approximately 13.9 miles from the facility**”. This is amazing. The evacuation zone around Limerick is only 10 miles.
3. The fact is: DEP knows dispersion modeling has been done and that there is an impact almost 14 miles from the nuclear plant. ‘Negligible’ is arbitrary. Negligible impact to fetuses and infants or those already sick? And, what kind of impact would be determined 1, 2,3,4,5, or even 10 miles away?
4. What DEP considers negligible in modeling for another nuclear plant has little relevance to Limerick Nuclear Plant’s health impacts on families in our toxic damaged region.
  - DEP admits cooling tower drift impacts were found almost 14 miles away from another nuclear plant. **Yet, NO dispersion modeling was done on cooling tower drift for Limerick Nuclear Power Plant.**

DEP claims fugitive particulate matter emissions requirements do not apply because evaporated water and drift from the cooling towers are considered an effluent stream, not fugitive emissions. (Pg. 18)

**ACE Comments:**

1. Particulate emissions from the cooling towers are listed as a pollutant in Limerick Nuclear Power Plant’s Title V air pollution permit. So how is it possible that fugitive emissions requirements would not apply?
2. Drift is clearly a visible plume continuously traveling across the boundary line of Limerick Nuclear Plant.
3. DEP’s explanation is absurd. How could anyone consider cooling tower drift massively emitted into our air, an effluent stream? This appears to be yet another DEP word game.

DEP says testing of blowdown is equivalent to testing concentration of pollutants in cooling tower drift. (Pg.16)

**ACE Comments:**

1. This may or may not be true, The drift was never tested for all toxics associated with Limerick Nuclear Power Plant. The drift could contain the broad range of air pollutants from the vast number of air pollution sources at Limerick Nuclear Plant site.
2. **To determine the accuracy of the claim that testing blowdown is the same as testing the concentration of pollutants in cooling tower drift, independent monitoring and testing should be done in all seasons – not a company hired by Exelon, the company with a vested interest in the outcome.**

**NO Pre-Treatment or Filtration for TDS or Toxics in Schuylkill River Water**

DEP claims there is no need for pre-treatment of Schuylkill River water based on Exelon’s testing of Schuylkill River intake. (Pg. 15)

## ACE Comments:

1. **We strongly disagree. DEP admits Total Dissolved Solids (TDS) determine the amount of PM10 from the cooling towers. It should be incumbent on DEP to require filtration for TDS from all water withdrawn that will end up as massive steam in our air contaminated with PM10. PM10 kills and cripples. Any amount reduced, is a reduction of health threats.**
2. **Filtration results in actual removal. Filtration should be required instead of pre-treatment which can include adding toxic chemicals, such as those which Exelon adds to the cooling towers to attempt to kill pathogens in the river water and to protect their equipment.**
3. **Exelon's request for drastic increases in TDS limits (nearly 6 times higher) validates the need for filtration to protect the public from PM10 and other harmful emissions.**
4. **Evidence suggests filtration for TDS should be imperative. Not many years ago, the Schuylkill River was determined to be the 11<sup>th</sup> most toxic river in the US.**
5. **Schuylkill River TDS threats could increase dramatically in the future due to Limerick's own excessive need for consumptive water for the cooling towers:**
  - **Exelon has been permitted to massively pump contaminated mine water into the Schuylkill River from a mine upstream. Exelon may soon be permitted to pump into the river far more mine water from other mines. TDS could dramatically increase in the Schuylkill River from this process.**
  - **Limerick will continue to reduce the flow of the Schuylkill River each year by billions of gallons, even with added mine waters. As long as Limerick operates the flow will diminish, concentrating TDS and toxics in the river.**
6. **Limerick Nuclear Power Plant can withdraw 56 million gallons per day from the Schuylkill River. Up to 42 million gallons per day are emitted as steam into our air from the cooling towers. To claim there is no need for pretreatment / filtration of Schuylkill River water is ludicrous.**

### Exelon's Schuylkill River Testing

7. **Exelon's Schuylkill River water testing is inadequate for many reasons. Unless there is continuous independent monitoring and testing for all toxics associated with Schuylkill River contamination, it is unprotective to claim that massive amounts of contaminated water which ends up in our air as steam for all to breathe should not be filtered first.**
  - A. **Exelon testing reveals:**
    - ✓ Not all toxics that could be associated with Schuylkill River water were tested.
    - ✓ Highest levels detected are not reported - Exelon uses averages - On Pg. 18 DEP admits TDS levels from the Schuylkill River have a variable content.
    - ✓ Some levels appear suspicious. For example:
      - Total Dissolved Solids (TDS) were reported by Exelon at 186 mg/L average for untreated and unfiltered Schuylkill River water.
      - After changing of filters for a sophisticated local personal water treatment system (professionally installed), the Superior Water tech found TDS levels still at 180 after filtration.
      - How could TDS levels from water taken immediately after a new filter was installed be similar to TDS levels found by Exelon directly from the Schuylkill River?
      - DEP can't verify that the water Exelon tested as Schuylkill River water intake, actually came from the Schuylkill River.
  - B. **Exelon, the company with a vested interest in the outcome controls the entire testing and reporting process, with little, if any, actual hands-on independent verification.**

- ✓ Water testing fraud and abuse at certain labs has been documented, even in PA.
- ✓ We have no confidence in Exelon's testing and reporting based on Exelon's own water contamination scandal elsewhere.

- **The Schuylkill River is contaminated with a broad range of toxics from many sources, including Exelon's pumping of mine water into the river for Limerick Nuclear Plant's operations. Massive amounts of this contaminated water end up in our air (up to 42 million gallons per day), through Limerick Nuclear Power Plant steam. Schuylkill River toxics don't magically disappear. Yet, DEP has put on blinders, relies on test results by Exelon that are questionable at best, and inexplicably claimed there is no need for filtration. If this water was filtered for Total Dissolve Solids, there would be far less risk to families in our region from the PM 10 that is emitted from Limerick's cooling towers.**

### **PM10 Emissions - Emergency Spray Pond**

The Emergency Spray Pond contains the same water that is in the Schuylkill River. Water is removed through evaporation, drift, or Outfall 001, which is the outfall from the cooling towers. (Pg. 18)

#### **ACE Comments:**

1. **DEP says this water is the same water as in the Schuylkill River. This is one more important reason for Exelon to be required to filter river water it withdraws for Limerick Nuclear Power Plant.**
2. **PM 10 emissions from the Emergency Spray Pond may be variable, yet peak emissions are not required to be measured or reported, even though peaks significantly increase risks.**
3. **Emergency Spray Pond PM10 emissions are estimated by Exelon, not accurately measured.**
4. **DEP claims to try to improve accuracy of data collected for pollutants emitted for the purpose of emissions reporting and fees, but ironically, not to determine health risks.**

Particulate matter emissions occur when water is being sprayed in the Emergency Spray Pond. Various Limerick operations send water to the Emergency Spray Pond for cooling. PM10 emissions are dependent on TDS content of water in the pond. River or creek water has a variable TDS content. (Pg. 19)

#### **ACE Comments:**

5. **Total Dissolved Solids content from sources sending water to the spray pond for cooling, determines PM 10 emissions from the spray pond, highlighting the need to filter out TDS from the river water withdrawn which is used for the various operations.**

Exelon asked to remove permit requirements to monitor and calculate PM10 by using actual Emergency Spray Pond operating hours. (Pg. 28) Exelon requested deletion of the added permit language requiring Exelon to monitor the hours of operation of the Emergency Spray Pond. (Pg. 29)

- Exelon claims it has no system in place to monitor and/or record actual operating hours of the Emergency Spray Pond.
- Exelon claims it is also not possible to install a single hour meter as several pumps are used all of which can be triggered from multiple locations depending on the equipment utilizing the cooling pond.

**ACE Comments:**

6. Exelon and DEP agreed that the method for determining PM10 from the Emergency Spray Pond needs to be re-evaluated. We agree, but we believe it should be more accurately measured, not less accurately.
  7. It is not clear to us how fluctuating TDS levels can be accurately determined by hours of operation. Common sense suggests more accurate TDS levels can only be determined with actual regular testing.
  8. Exelon should not be able to use "no system in place" as an excuse not to measure pollution that will lead to PM 10 emissions in our air.
  9. At Exelon's request, DEP deleted from the Title V permit the requirement for Exelon to monitor the hours of operation and the condition to record actual hours of operation of the Emergency Spray Pond, allowing Exelon to continue to simply calculate or estimate PM 10 emissions from the Spray Pond.
  10. Exelon should not be able to continue unsubstantiated estimates until a new alternative is approved by DEP, which in reality could be another 5 years, until the next Title V permit renewal.
- **ACE and PEN are requesting to be notified, with an opportunity to comment, before any proposed new method for measuring PM 10 emissions from the Emergency Pond is approved by DEP.**

**RADIONUCLIDE AIR EMISSIONS – NOT TESTED and EXCLUDED FROM TITLE V**

The response document verifies that **there is no testing for radionuclide air emissions, only testing for radiation in water (Pg. 5).**

- **Radionuclides, the signature emissions from Limerick Nuclear Power Plant, and the greatest threat to the health of our region, have illogically been excluded from this Title V air pollution permit.**
- **A broad range of radionuclides are routinely and accidentally emitted into our air from Limerick Nuclear Power Plant.**

**DEP / EPA Excuse For Exclusion of Radionuclide Air Emissions Is Illogical**

Health based standards under Title V requirements of the Clean Air Act call for all regulated air pollution from a major air pollution facility to be included in a Title V permit for that facility. It should be a violation of Clean Air Act Title V requirements to exclude radionuclide emissions from Limerick's Title V Permit.

**Exclusion is illogical. Radionuclides are:**

- ✓ Hazardous air pollutants verified in DEP's comment response document (pg. 17)
- ✓ The signature hazardous air pollutant from Limerick Nuclear Plant
- ✓ The greatest air pollutant threat to public health from Limerick
- ✓ Regulated, reported, and permitted

**The response document shows that EPA has illogically declined to regulate radionuclides for nuclear plants, even though:**

- EPA sets standards for Radionuclides.

- EPA establishes Title V requirements under Clean Air Act health based standards.
- Those Title V requirements call for all permitted air pollutants from a major air pollution facility to be listed in the Title V permit.

**Fractured regulating and permitting has allowed nuclear plants to ignore health based federal requirements under the Clean Air Act. Fractured regulating allows a loophole to dismiss radionuclide emissions, the signature air pollutants at nuclear plants.**

DEP's comment response document verifies that:

- ✓ DEP issues federal Title V permits, yet even as an Agreement State, the authority to regulate radionuclide air pollution from a nuclear plant is not included.
- ✓ EPA develops environmental standards for radionuclides and regulations used under Title V permitting, but EPA declined to regulate nuclear plants.
- ✓ EPA gave jurisdiction of radionuclide air emissions from nuclear plants to NRC, an agency that has nothing to do with Title V air permitting.

**It appears radionuclides were not included in Title V permitting requirements simply because:**

- EPA is illogically declining to regulate them.**
- DEP, even as an Agreement State, has chosen to ignore radionuclide air emission from nuclear plants.**

**DEP's excuses to omit radionuclide emissions from Limerick's Title V permit lack credibility.**

- ✓ DEP illogically claims radionuclides (hazardous air pollutants) were **omitted** from health based Title V permitting requirements for nuclear plants **because they are measured a different way.** (Pg.17)
  - **Regardless of the way radionuclides are measured, they are permitted and reported, they are the greatest threat to public health, and should be included in the Title V permit for Limerick Nuclear Plant.**
- ✓ (Pg. 3) **Excuses** to exclude radionuclides from Limerick's Title V include:
  - "To minimize duplication"*
    - **We dismiss this excuse. Title V requires all other air permits to be combined into this one document – minimally from nuclear plants, that should include radionuclide air emissions.**
  - "EPA declined to regulate nuclear plants because NRC provides an ample margin of safety to protect public health."*
    - **When NRC does no independent monitoring for the 100 radionuclides associated with nuclear power plants, NRC cannot convincingly prove that it is protecting public health. When the National Academy of Sciences says there is no safe level of radiation exposure, no one including NRC is preventing harm to public health from Limerick's radiation emissions..**
  - "Even though PA has become an agreement state responsible for radioactive materials, NRC was to keep authority for review, evaluation and approval of sealed sources and devices containing nuclear materials..."*
    - **This is an evasive and irrelevant response to the radionuclide air emissions we are discussing for this Title V permit.**

### **Limerick's Title V Permit Renewal - Issued 4 Years Late**

Limerick's Title V Operating Permit was issued February 8, 2000. (Pg. 13)

**Limerick Nuclear Plant's Title V Permit Renewal should have been issued in 2005, according to the requirement for renewal every 5 years.**

- 1. DEP did not provide any explanation of why Limerick's first Title V Permit Renewal was issued 4 years late.**
- 2. It seems this should be a significant technical violation of Title V requirements for permit renewals.**

## **Boilers at Limerick Nuclear Plant**

### **Boiler A and Waste Derived Liquid Fuel**

### **Radioactive Wastes**

12/08 ACE asked DEP to provide yearly totals for the massive amounts of Limerick Nuclear Plant's radioactive wastes and how much was transported off-site, before and after closing of Pottstown Landfill and Barnwell, S.C.

- DEP's Comment Response Document failed to provide the information we requested 12/08 about radioactive waste disposal totals transported off-site. We still don't know how much radioactive waste Limerick transported off-site each year before and after closing of Barnwell, S.C. and Pottstown Landfill.**

**DEP provided information on radioactive wastes that we did not request, but which left us with additional questions about Limerick's radioactive wastes.**

For Example on Pg. 4 – DEP says low-level radioactive wastes (filters, resins, tools, equipment, protective gloves, clothing, and respiratory equipment are stored on-site in high integrity concrete vaults in the rad-waste building and not transported off-site. The response document says Class B and C radioactive wastes are not transported off-site.

### **Questions Triggered by DEP's Comment Response Document:**

Given DEP's list above, logic suggests the routine radioactive waste stream is enormous. DEP says that Class B and C are stored on site in the rad-waste building.

- a. How large are the high integrity concrete vaults that store the routine radioactive wastes listed above?**
- b. How many are there?**
- c. How much Class B and Class C radioactive waste can the rad-waste building continue to hold, year after year?**
- d. Won't it eventually run out of space?**
- e. Then where will Limerick's radioactive wastes go? Will they have to build other high-integrity concrete vaults on site in Limerick, to store the routine waste listed above?**

DEP says Class A radioactive wastes are stored on-site until short-lived radionuclides decay to safer levels and there is enough to transport it to the US NRC licensed disposal site near Clive, Utah.

- a. Where on site is this radioactive waste stored until it decays to safer levels for transport to Utah?**
- b. Are there specific standards for 'safer levels' of transport for each radionuclide? If not, why not? If so, please provide acceptable 'safer' levels for each radionuclide and for their decay radionuclides before wastes can be transported.**
- c. Does DEP require testing for the radioactive decay products in the soil, water, food?**

- d. How much radioactive waste is considered enough to transport?
- e. How is it transported?
- f. Are the trucks or trains decontaminated after the trip? Who pays for that?
- g. Are those who transport the waste given proper protective gear?

## **Boiler A – Waste Derived Liquid Fuel (WDLF) - Incineration**

**DEP's document included confusing messages concerning Boiler A and Incineration.**

**DEP states burning Waste Derived Liquid Fuel was approved 4/20/95, but claims that Exelon has not burned Waste Derived Liquid Fuel since 2004.**

Pg. 8 – DEP approved burning of WDLF through plan approval 46-302-052A on 4/20/95

- Radioactive WDLF is not permitted to be burned in Boiler A. It is tested for radioactivity per batch.
- Permit limits are based on best available technology burning WDLF in Boiler A

Pg. 9 – DEP claims WDLF used in 2003 and 2004 was the same batch of WDLF tested in 2001 and that WDLF was not burned since then.

- DEP says WDLF results can be found in the enforcement files on Exelon-Limerick.

**We are still puzzled about what is going on with Boiler A.**

**If WDLF results from 2003-04 are in the enforcement files on Exelon-Limerick. That suggests violations occurred.**

- **What were the specific WDLF violations?**

**If WDLF has not been burned since 2004:**

- **Why hasn't Boiler A been changed to traditional boiler permitting for this permit renewal, 5 years later?**
- **Why are typical incineration toxics still permitted in Boiler A, when WDLF has not been burned for 5 years and these toxics are not included in Boilers B and C emissions?**

Pg. 9 – DEP claims limits for Arsenic, Cadmium, Chromium, Lead, PCB, and Total Halogens are considered best available technology for Boiler A, even though:

- **There's NO filtration required on Boiler A for these harmful toxics.**

Pg. 9 – DEP claims limits ensure that there are no toxic levels emitted into the air after burning in Boiler A. DEP claims limiting metals and other contaminants in WDLF prevents concentrations from exceeding any level of concern when burning WDLF.

- **DEP can't possibly be sure of potential threats. There's absolutely NO PROOF of DEP's claims.**
- **DEP NEVER conducted independent testing of WDLF.**
- **DEP never did a stack test, including on Boiler A**
- **DEP does not require filtration.**

Pg. 7 – Ash from burning Waste Derived Liquid Fuel (WDLF) in Boiler A is emitted to the atmosphere as particulate matter.

- **If Exelon is no longer using WDLF, why is there still ash permitted as particulate matter from Boiler A?**

Pg. 10 – DEP says WDLF toxics come through use, storage, and handling of fuel unsuitable for its original purpose due to the presence of chemical or physical impurities.

- **Why was Exelon permitted to use fuel unsuitable for its original purpose in Boiler A in the first place, when the chemical impurities end up in our air from burning that fuel in Boiler A?**
- **The toxics from ‘unsuitable fuel’, regardless of the levels from this ‘unsuitable’ fuel, end up in our air, along with all the other harmful air pollution at Limerick, including radiation.**

**Exelon claims WDLF has not been burned in Boiler A since 2004. DEP has no real proof otherwise. Adding the pollutants listed from burning WDLF in Boiler A adds significant health threats to the already extraordinary threats from Limerick’s radiation emissions.**

- **ACE urges DEP to remove the WDLF permitting language from Limerick’s Title V permit. Clearly, it should not have been permitted in the first place, and if it is no longer being used, there is no justification to keep Waste Derived Liquid Fuel (WDLF) in Limerick Nuclear Plant’s Title V permit.**
- **ACE believes the WDLF permitting language and permitted pollutants must be removed from the permit, because it provides a loophole and opens the door to incineration of radioactive wastes in Boiler A at Limerick Nuclear Plant.**

## **Incineration**

**Burning radioactive waste in a boiler at Limerick would be a form of incineration. Boilers are not incinerators. They were not designed to incinerate waste. To burn radioactive waste in boilers at Limerick would be incineration without safeguards.**

**We have no confidence that DEP really knows if radioactive waste is being burned or not.**

Pg. 10 – DEP admits that ash from Boiler A is not tested for radioactivity.

Pg. 8 – DEP admits:

- **NO stack testing was done, including for radiation from Boiler A**

Pg. 5 – The response document verifies that the only testing for radiation is in water.

- **There is no testing for radiation air emissions.**

**NRC employees said incineration is going on at Limerick, but that NRC had nothing to do with it, that it was permitted by DEP.**

**This makes us wonder if DEP is unaware, duplicitous, or if word games are being used on behalf of Exelon. Clearly, if radioactive wastes were being burned in Boiler A at Limerick Nuclear Plant, that is a form of incineration without incineration regulations. It took us five years to get DEP to admit what was obvious from the beginning related to burning landfill gas in Oxy’s boilers – that incineration regulations needed to apply.**

Pg. 8 – DEP claims that incineration is not done at the facility;

- Yet curiously, DEP answered the following question in the Response Document, "Is Contaminant Level Reporting for burning Limerick's waste done with continuous monitoring and testing or largely estimated by Exelon for reporting?"
- DEP claimed it wasn't done, but verified that Exelon estimates its emission using emission factors.

### **Exhaust Flow Increases Requested – Many More Than Doubled**

Pg. 12 – DEP claims Exelon has not requested increases in emissions as part of this permit renewal application.

- **Yet, a page from the application suggests otherwise. Exelon requested enormous increases in the exhaust flow from many sources.**
- **It seems to us that exhaust flow increases should mean increased emissions.**
- **While DEP's Response Document claims Exelon did not request increases in emissions, DEP failed to explain Exelon's application requests for more than doubled exhaust flow volumes.**
- **DEP failed to make it clear if DEP allowed the drastic exhaust flow increases requested by Exelon or not.**

### **Permit Changes**

Pg. 20 – DEP admits that this proposed permit is not the same as the existing permit and that changes have been made in the Title V Permit under Section G – Miscellaneous #007

### **It Appears That DEP Has No Reliable Accurate Actual Data On How Much Air Pollution Is Emitted From Limerick Nuclear Power Plant.**

Pg. 9 – DEP admits their oversight consists of periodic, unannounced inspections of the facility.

- **In reality, DEP employees can't see air emissions. DEP inspections fail to identify actual air emissions or reveal violations of toxic levels of air pollution.**

Pg. 8 – DEP admits:

- **NO stack testing was done on any Boiler.**
- **NO filtration / pollution control equipment is on any of the Boilers.**

Pg. 13 – DEP says Exelon monitors operating data (**NOT EMISSIONS DATA**) and uses that in conjunction with emission factors to determine pollutant emissions from each source listed in the Title V Operating Permit.

- **PROBLEM – NO ONE ACCURATELY DETERMINES AIR POLLUTION FROM LIMERICK.**
- **There is NO actual continuous monitoring by Exelon, DEP, or EPA to accurately determine air emissions from each of about 30 air pollution sources at Limerick Nuclear Plant.**

Pg. 13 – DEP admits:

- **There are NO monitoring stations for criteria pollutants located within the 10-mile radius of Limerick Nuclear Plant.**

Pg. 13 – DEP illogically claims that emission factors provide reliable results for Exelon to determine emissions from sources listed in Limerick's Title V Operating Permit.

- **PROBLEM – EMISSION FACTORS ARE A FLAWED MEASURE**
- **EPA did not establish emission factors on Limerick's equipment and emissions, but instead on stack test data from similar sources around the country.**

Pg. 13 – DEP has only taken fuel samples to determine sulfur content.

- **DEP never did any actual independent monitoring or testing for air pollution from Limerick Nuclear Plant, or stack testing from any equipment used at Limerick.**

### **DEP Fails Yet Again to Prevent Air Pollution In Our Region**

#### **DEP's Permitting Is Clearly Only An Illusion Of Protection**

Pg. 9 – Not surprisingly, the only air quality violation found by DEP was a reporting violation in 1998 and the water quality violation this year was for late submittal of a report.

- **Accidental releases of radiation have been reported in the Mercury that should be considered air pollution violations, but have been ignored by DEP because radionuclides have been illogically excluded from Title V permitting.**

Pg. 8 – DEP admits:

- **NO stack testing was done on any Boiler.**
- **NO filtration / pollution control equipment is on any of the Boilers.**

Pg. 11 – DEP admits,

- **There are NO air pollution controls for emissions from any the 3 boilers.**

**In fact, there is no attempt to require filtration to reduce harmful air emissions from any of the 30 air pollution sources listed in Limerick Nuclear Plant's Title V permit.**

#### **Boiler A**

Pages 21,22 - Exelon objected to the requirement to monitor the hours of operation, claiming that Boiler A is not currently equipped with a runtime hour meter to daily monitor the hours of operation and that installation and maintenance of a runtime hour meter poses a burden of both time and cost.

- **DEP caved in to Exelon's requests and removed the condition from the permit that required monitoring and recordkeeping for hours of operation.**
- **DEP allows Exelon to calculate PM, Sox, and NOx emissions on a monthly basis.**
- **EPA even had to request clarification on the particulate matter emission limit for Boiler A.**

#### **Boilers B and C**

Pg. 23 – Exelon requested and received removal from the Title V permit, the same requirement to monitor hours of operations for Boilers B and C, for the same reasons.

- **DEP allows Exelon to also calculate PM, Sox, and NOx emissions on a monthly basis for Boilers B and C.**

Pg. 12 – DEP illogically stated that de minimis increases may not occur at a facility if the de minimis increase would violate Clean Air Act requirements.

- **Yet, DEP's response document shows DEP has no accurate idea of how much of any toxic is actually emitted from Limerick.**
- **There is no actual requirement for continuous perimeter air testing for any of the toxics listed in this permit as de minimis.**
- **DEP has no accurate idea if Clean Air Act limits are being violated at Limerick Nuclear Power Plant or not.**
- **Restricting de minimis emissions increases is meaningless, when the baseline is not accurately determined.**

Pg. 19 – Emergency Generators were installed prior to 1994. They operate on fuel similar to diesel fuel. DEP requires Exelon to minimize NOx and VOC emissions.

- **This requirement is meaningless.**
- **DEP does not require filtration and does no testing. DEP has no accurate idea whether or not NOx and VOC limits are even met, much less minimized.**

### **Voltz Degreaser**

Pg. 20 – Voltz Degreaser uses cleaning solvent containing VOCs, which evaporate and result in fugitive VOC emissions into our air. Waste solvent is removed from the facility as waste.

Pg. 16 – DEP says VOC emissions from Limerick are found at [http://www.ahs2.dep.state.pa.us/eFACTSWeb/criteria\\_facilityemissions.aspx](http://www.ahs2.dep.state.pa.us/eFACTSWeb/criteria_facilityemissions.aspx), yet there are no results found at that address.

- **ACE is requesting an address for VOC levels, as well as how they are established, because they can be contributing to the cancer-causing effects of the radiation emitted from Limerick.**

**High rates of cancer and other environmentally related illnesses in our region make it clear that precaution and prevention of carcinogens and other harmful toxics emitted into our air from Limerick Nuclear Power Plant should be reduced and minimized to the degree possible.**

- **We urge DEP to require the most protective filtration equipment on all of Limerick's air pollution sources.**

**Exelon is unlikely to install the most protective air filtration equipment without being required to do so. Therefore, if Exelon refuses:**

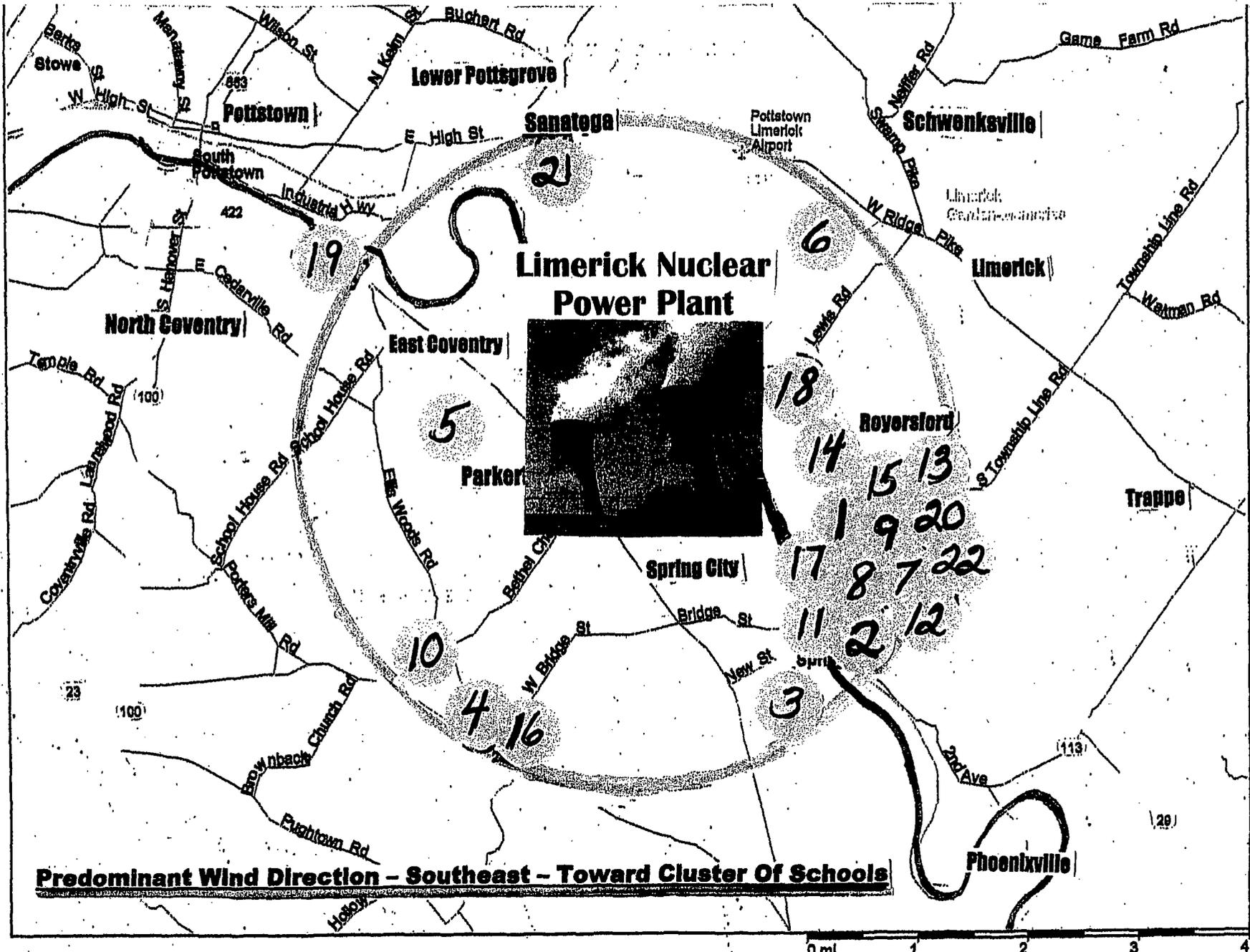
- **We urge DEP to do independent site-specific stack testing on all of Limerick's air pollution sources as well perimeter and off-site air monitoring for all the toxics associated with Limerick Nuclear Power Plant's air pollution, throughout the next few years, to more accurately determine air pollution threats from Limerick for the next 5-year Title V permit renewal.**
  - **We remind DEP that when DEP finally did the testing repeatedly requested by ACE over many years, related to Pottstown Landfill gas, DEP found major air pollution and equipment violations. We believe the same could be true at Limerick.**

**As requested earlier, ACE urges DEP to rescind the nearly 6 times increase in TDS limits that allow huge increases in PM 10, and at the same time suggest to Exelon that filtering Schuylkill River water will also keep them from violating pre-existing TDS limits.**

**There are far too many unanswered questions and issues associated with this permit renewal. ACE and PEN are requesting to be immediately notified of any proposed changes whatsoever to Limerick's Title V permit in the future, whether DEP considers them minor or not. This time there must be full public participation.**

**Please send responses to:  
Dr. Lewis Cuthbert  
The Alliance For A Clean Environment (ACE)  
1189 Foxview Road  
Pottstown, PA 19465**

# Schools, Pre-Schools, Daycare Centers Within 2-3 Miles Of Limerick Nuclear Power Plant



# **CHILDREN MOST AT RISK**

## **22 Schools, Pre-Schools, and Daycare Centers Are Within 3 Miles Of Limerick Nuclear Power Plant's Routine Radiation Emissions and Other Dangerous Air Pollution**

### **Most Schools Are In The Predominant Wind Direction**

1.	Brooke Elementary	339 Lewis Road
2.	Royersford Elementary	450 S. Spring Street
3.	Spring City Elementary	190 S. Wall Street
4.	Vincent Elementary	340 Ridge Road
5.	East Coventry Elementary	932 Sanatoga Road
6.	Limerick Elementary	81 N. Limerick Center Road
7.	Spring-Ford High School	350 S. Lewis Road
8.	Spring-Ford Intermediate School	700 Washington Street
9.	Sacred Heart School	Lewis Road and Washington Street
10.	Montessori Academy	952 Bethel Church Road
11.	Episcopal Nursery School	209 S. 3 <sup>rd</sup> Avenue Royersford
12.	Royersford Baptist Church RBC	452 Lewis Road
13.	Chesterbrook Academy	70 Buckwalter Road
14.	Country Tyme Early Education Center	441 N. Lewis Road
15.	The Goddard School	197 Royersford Road
16.	Grace Assembly Daycare	Route 23 and W. Bridge Street
17.	Kids Kare Korner	380 Church Street
18.	Malvern School	538 N. Lewis Road
19.	Our House Early Learning Center	1426 New Schuylkill Road
20.	Tiny Treasures	1030 Main Street
21.	Wee Care Child Development Center	2573 E. High Street
22.	Wonder Years Preschool and Learning Center	433 S. Lewis Road

PottsMerc.com  
**OPINION**

A8 / Saturday, April 11, 2009



## READERS' VIEWS

### Nuclear plants are a major source of air, water pollution

In her March 7 response about ACE's Feb. 14 letter, Candace Davison, a nuclear society public relations person, suggests we have little to be concerned about related to Limerick Nuclear Power Plant's air pollution. That statement defies logic and is not supported by the facts.

Ms. Davison's claims are nothing more than her opinion. She defends the nuclear industry regardless of what health research has already proven around nuclear plants. Why would anyone believe her claims about human health when she works for a group that supports the nuclear industry?

Nuclear power is unquestionably unsafe for human health and the environment. No contaminants are as toxic as radioactive chemicals emitted by nuclear reactors. Reputable sources and government data including the BEIR VII Report, or National Academy of Sciences Blue Ribbon Panel, cite that there is *no safe dose of radiation*.

Radiation, combined with many other air pollutants emitted from Limerick Nuclear Plant, make this toxic mix very dangerous. The region's families are forced to breathe these synergistic toxics 365 days a year. CDC data proves much higher than normal cancer rates (especially in children) in the Greater Pottstown region. State data shows that infant and neonatal mortality are far higher than the state average and even higher than Philadelphia or Reading.

Limerick Nuclear Power Plant is a major air pollution source according to Title V permitting under the Clean Air Act. This is an uncomfortable fact for an industry trying to claim it is a clean energy source.

Ms. Davison, nor anyone else, can accurately determine the full extent of Limerick Nuclear Plant's total harmful air pollution impacts, especially to fetuses, children, the elderly, or cancer victims and others already with environmentally related diseases and disabilities. Each toxic pollutant is not continuously or accurately measured out the stacks by anyone. Exelon, the company with a vest-

ed interest in the outcome, controls all data and reporting, relying largely on calculations.

In addition to routine and accidental radiation releases, Limerick Nuclear Power Plant emits:

1. A broad range of toxics with 35 to 42 million gallons of steam every day
2. NOx, PM10, SO2, and CO from 3 boilers and other sources.
3. Arsenic, Cadmium, Chromium, Lead, PCBs, and Halogens from a boiler.

Many reject nuclear industry spin inaccurately suggesting fossil fuels are the only real competitor to nuclear power. Department of Energy facts suggest otherwise. DOE says solar and wind power alone can supply far more than our entire nation's current and future energy needs.

Solar and wind power will be far cheaper for taxpayers, far safer for the environment and public health, and get us off foreign oil far faster than nuclear power. Solar and wind won't threaten the water supply or produce enormous amounts of deadly radioactive poisons, creating defacto high-level radioactive waste dumps in back yards where energy is produced. Limerick Nuclear Plant did that to us.

The least Limerick Nuclear Plant can do to attempt to be a good environmental neighbor is to install the best air filtration equipment on all sources for all toxics and the most protective filtration for the contaminated mine waters added to the Schuylkill River for Limerick's operations. Exelon's extraordinary profits suggest this can be done without raising rates.

#### ACE BOARD OF DIRECTORS

Letters should be addressed to:  
Readers' Views  
The Mercury  
24 N. Hanover St.  
Pottstown, PA 19464 or e-mail: letters@pottsmc.com

A6 / Saturday, February 14, 2009



## ANOTHER VIEW

# Nuclear plant is a major source of air pollution

Limerick Nuclear Power Plant emits so much dangerous air pollution (in addition to radiation) that it's considered a major air pollution source under the Clean Air Act. So much for advertisements claiming nuclear power is safe, clean energy. Not only is nuclear power a threat to water quality and quantity, Limerick Nuclear Power Plant's Title V permit shows it's a major air polluter.

November 14, 2008 there was a notice in the Mercury for a Limerick Nuclear Plant Title V permit renewal. This permit requires major air pollution sources to list all their air pollution sources. Since that time we received and reviewed the permit. We were shocked at not only what was in the permit, but also what was incredibly left out of the permit.

The loopholes are unprotective and unacceptable. Almost anything goes.

- Radiation, the signature toxic at a nuclear plant, was excluded even though radiation emissions are regulated by EPA and reported by Exelon to NRC.

- No air pollution control equipment is required on any of the many sources.

- Reported emissions are based on illusion, not reality. Annual reports are largely based on Exelon's own "calculations" and "estimates", not on actual emissions testing. There is no independent testing.

- Exelon can increase dangerous air pollution from the nuclear plant without going through any kind of review or approval process.

- There are all kinds of exemptions.

- Preapproved permit revisions are allowed under economic incentives.

Limerick Nuclear Power Plant air pollution includes a broad range of radionuclides and toxics from cooling towers, combustion chemicals, waste fuel, and others.

Pollutants Include: Radiation, NOx, VOCs, PM10, SO2, Arsenic, Cadmium, Chromium,

Lead, PCBs, Halogens

Sources Include:

- 2 Cooling towers
- 3 Boilers
- 8 Generators
- 8 Diesel Oil Tanks
- 8 Day Tanks
- Degreasing Unit
- Emergency Spray Pond
- Various Waste Oil Sources

Limerick Nuclear Plant's additive, cumulative, and synergistic harmful health impacts are unknown, but clearly significant. Most impacted are children, the elderly, and those already sick. Examples of Synergism:

- NOx + SO2 = acid rain which can jeopardize water, soil and food. When NOx and SO2 meet with steam (35 to 42 million gallons per day emitted from Limerick towers), sulfuric and nitric acids can be formed in the air causing major respiratory damage and other health harms when inhaled. Limerick's permit allows automatic (TONS per year) increases in both.

- NOx + VOCs with sunlight increases ozone, which kills thousands of people each year and sends many more for hospital emergency room visits.

- Ozone works synergistically with radiation to enhance the cancer causing effects of radiation.

Families are impacted throughout our region. Learn more - watch PCTV Channel 28, Tuesdays, 7 to 8 p.m. Of major concern: Exelon's requests for increased exhaust flow volumes from many sources - some more than doubled. Exelon added a new source and is burning waste in a boiler.

Minimally, ACE believes Exelon should be required to install the most protective pollution control equipment for all Limerick's air pollution sources. If you agree, contact ACE - 610-326-2387 or 610-326-6433. Leave your name, phone, and/or e-mail address to be updated and notified if DEP holds a public hearing.

THE ACE BOARD OF DIRECTORS

Guest  
Columnist

# Statistics And Facts In Hard Science Show: Air Pollution Kills And Cripples

The hard science just keeps rolling in: air pollution kills and cripples. In the latest study picked up by the national press, scientists from Pittsburgh's Carnegie Mellon (publishing in *Science* magazine) report that more people die from polluted air than from traffic accidents. "There are more than a thousand studies from 20 countries all showing that you can predict a certain death rate based on the amount of pollution," says Devra Lee Davis, one of the study's authors. The deaths are from asthma, heart disease, and lung disorders. Although her study concentrated on just four cities, she is certain the conclusions are applicable worldwide; the data are consistent with a World Health Organization study that estimated that air pollution would cause about 8 million deaths worldwide by 2020.

Studies such as this one— and by such august bodies as the American Cancer Society and Harvard Medical School— offer impeccable hard science and reach the same conclusions. Smoking, body weight, occupational exposures, air temperature and other risk factors have all been factored out. Millions of people as 'data' make the findings comprehensive. And scientists point directly to the causes: Ozone, particulates, carbon dioxide, sulfur dioxide, volatile organic compounds. Our nation's sources, they say, are these: coal-fired power plants, industrial boilers, and gas and diesel-powered vehicles. On bad air days in the country's major cities (the only place scientists look at present), the death rate jumps.

The National Resources Defense Council, working with data from Harvard and the American Cancer Society in a methodology suggested by Dr. Joel Schwartz of the Harvard School of Public Health, states that the elderly and those with heart and lung disease have lifespans shortened by 1 to 2 years from air pollution alone. A Johns Hopkins study of deaths and particulate levels in 20 large cities between 1987 and 1994 (including Philadelphia and Pittsburgh in their

data) correlated an extra death for every hundred deaths when the particulate level rose 20 micrograms per meter over 24 hours. (EPA's allowable level of such particles in 24 hours is 150 micrograms per meter, and most cities average much less than that, but the particles are taking their toll of 1 in 100 per 20 micrograms nonetheless. Scientists have not found a level at which the particulates' ill effects do not occur.)

Statistics such as Cedars-Sinai Medical Center findings of 12,000 people per year suffering sudden fatal heart attacks triggered by smog, and 10% of infant mortality caused by particulate pollution (Kaiser, Swiss study of 8 U.S. cities) continue to describe the exact level at which air kills. However, the price of such air on the living is also tremendous. "Total mortality is a relatively crude indicator of population health," says Dr. Samet, chair of Johns Hopkins School of Public Health. "Even though we are using this crude measure, we are still finding an effect." Chronic bronchitis, susceptibility to bacteria and flus, and the myriad diseases which take advantage of depressed immune systems all result from the current levels of air pollution, costing billions of dollars of lost work time.

In short, the current condition of our air is a public health issue. Scientists agree that a lot should be done, and quickly. Dr. Davis of the air pollution/car crash study put this most succinctly. "We hope that policymakers will understand that energy decisions and technology decisions are fundamentally public health decisions," she said. "We're not talking about Buck Rogers-like, futuristic technologies... If the technologies we now have on the shelf were adopted quickly, they would have an immediate effect on public health."

*Our thanks to AP, Reuters, CNN, Salon, and the National Resources Defense Council for disseminating the information we have used in this article. See the current issue of Science magazine (week of August 17) for the Davis story 'Fossil Fuel Cuts Would Reduce Early Deaths, Illness.'*

## INVISIBLE KILLERS: FINE PARTICLES

Eight studies of air pollution in U.S. cities have now shown that fine particles (the invisible soot emitted by incinerators, automobiles, power plants and heating units) are presently killing about 60,000 Americans each year.<sup>1</sup> More than a dozen studies have, in one way or another, confirmed this relationship. Furthermore, there appears to be no threshold, no level below which effects disappear. This means that people are being killed by air pollution levels well within existing federal standards.

To summarize bluntly, any increase in fine particles in the atmosphere kills someone. The victims remain nameless, but they have been deprived of life all the same. Mere compliance with federal standards does not protect the public. Any increase in the number of small particles in the air elevates the death rate. This has obvious implications for certain technologies: incinerators and fossil-fuel-powered machines (automobiles and trucks, power plants and heating units). To protect public health, these technologies must be avoided, or fitted with expensive control equipment, or replaced by cleaner alternatives.

People have known for a long time that particles in the air can kill. In 1952, a dense smog killed 4000 people during one week in London, and since then no one has doubted the cause-and-effect relationship. The question, therefore, isn't whether airborne particles can harm humans, but rather, how much pollution causes how much damage, and, secondly, is there a threshold, an amount below which no effects are seen?

Throughout the '50s and '60s, complacent authorities assumed there was a threshold -- some amount that was safe. However, after 1975, a revolution took place in scientific understanding of fine particles and health. In 1979, the National Research Council of the National Academy of Sciences,<sup>2</sup> and the United Nations,<sup>3</sup> both published book-length studies of the dangers of small particles to humans. Here is the current view: humans evolved in an environment where dust was made up of large particles. Humans therefore evolved means for protecting themselves against large particles. Large particles are filtered out by hairs inside the nose, mucous membranes in the throat and airways, and other mechanisms. However, modern combustion machines produce small particles which pass right by these natural protections and then enter the deep lung. In the deep lung, air comes into contact with a person's blood stream; this is where oxygen passes into the body and carbon dioxide passes out with each breath we take. Putting tiny particles of pollution directly in contact with the surface of the deep lung is a recipe for trouble. Because of their origin in combustion processes, most fine particles are coated with toxic materials -- metals like lead and mercury, or toxic organics like polycyclic aromatic

hydrocarbons (PAHs). So fine particles provide a uniquely efficient carrier, giving dangerous toxins direct entry into the blood stream.

Armed with new knowledge, in 1987, U.S. Environmental Protection Agency (EPA) established new, stricter standards for particles in the air. The 1987 standard, which governs today, is expressed in terms of small particles (also called particulate matter) that measure 10 micrometers or less in diameter. (A meter is 39 inches and a micrometer is a millionth of a meter.) These are called respirable or inhalable particles because, as we saw above, they are small enough to get into the deep lung where they cause various kinds of damage. The shorthand way to refer to these pollutants is  $PM_{10}$  (meaning Particulate Matter 10 micrometers or less in diameter). Current U.S. standards say that the ambient air (the general air we all breathe) may contain no more than 50 micrograms ( $\mu g$ ) of  $PM_{10}$  particles per cubic meter ( $m^3$ ) of air as an annual average, and the one-day average should exceed 150 micrograms per cubic meter ( $\mu g/m^3$ ) only one day each year. (A gram is 1/28th of an ounce and a microgram is a millionth of a gram.)

Since 1987, evidence has been accumulating, showing that the 1987 standards do not protect human health. The question about the existence of a  $PM_{10}$  threshold was addressed first by Joel Schwartz of U.S. Environmental Protection Agency (EPA). Schwartz reviewed data on air pollution and deaths from London, 1958-1972, and showed there was no threshold down to the lowest observed levels of air pollution.<sup>4</sup> A study published last month in the *New England Journal of Medicine*, of six U.S. cities, including several that are not heavily polluted, such as Portage, Wisconsin and Topeka, Kansas, shows death rates increasing with just  $15 \mu g/m^3$  of  $PM_{10}$  pollutants.<sup>5</sup> In all, at least 8 studies have now shown that  $PM_{10}$  at any level kills people. It seems clear there is no threshold.

A study of people in Steubenville, Ohio, showed that each increase of  $100 \mu g/m^3$  of total suspended particles (of which  $PM_{10}$  represents about half) is associated with a 4% increase in the death rate, with no threshold.<sup>6</sup> Interestingly, the Steubenville study showed that the death rate changes as fine particle levels change, but not as sulphur dioxide levels change.

In Philadelphia, a close relationship between  $PM_{10}$  pollutants and the death rate was observed.<sup>7</sup> Once again sulfur dioxide levels did not correlate with the death rate, but particle concentrations did. Here each increase of  $100 \mu g/m^3$  of total suspended particles (of which  $PM_{10}$  makes up half) was associated with a 7% increase in the death rate. There was no threshold.

A study of people in Detroit showed that a 6% increase in the death rate was associated with each increase of  $100 \mu g/m^3$  of total suspended particles (of which  $PM_{10}$  makes up half).<sup>8</sup> There was no evidence of a threshold. Sulfur dioxide levels were not signifi-

cantly associated with increases in the death rate.

Studies<sup>9</sup> of St. Louis, Missouri and Kingston, Tennessee, showed that the death rate increased 16% (St. Louis) and 17% (Kingston) with each addition of 100  $\mu\text{g}/\text{m}^3$  of  $\text{PM}_{10}$  pollutants to the air. Associations with gaseous pollutants -- sulfur dioxide, nitrogen oxides and ozone -- did not come close to achieving statistical significance.

In the Utah Valley, a study of the population of Provo revealed that the daily death rate was closely associated with levels of  $\text{PM}_{10}$  pollution.<sup>10</sup> The Utah Valley is unique because  $\text{PM}_{10}$  is the only pollution present there in significant quantities (contributed chiefly by a steel mill). For every increase of 100  $\mu\text{g}/\text{m}^3$  of  $\text{PM}_{10}$  pollutants, there was a 16% increase in the death rate, and no threshold was observed.

In all cities, the increase in deaths was most notable among people older than 65 and in people with chronic obstructive pulmonary disease (COPD) or cardiovascular disease.

There is a remarkable consistency apparent in all these studies: a 100  $\mu\text{g}/\text{m}^3$  increase in  $\text{PM}_{10}$  is always accompanied by an 8% to 17% increase in the death rate. Joel Schwartz, the only EPA employee ever given a "genius award" by the MacArthur Foundation, re-analyzed data from London's 1952 killer smog and showed that the death rate increased 6.4% for each increase of 100  $\mu\text{g}/\text{m}^3$  total suspended particles, or about 13% for each 100  $\mu\text{g}/\text{m}^3$  increase in  $\text{PM}_{10}$  pollutants--again, remarkably consistent with the other studies.

No epidemiological study can prove a cause and effect relationship because it is always possible that some key factor was not considered. Until last month, skeptics could say smoking might explain why death rates increase as  $\text{PM}_{10}$  concentrations increase. But the study published last month in the *New England Journal of Medicine* looked at 8111 adults in six American cities and showed that smoking did not explain the increased death rate observable when  $\text{PM}_{10}$  concentrations rise.<sup>5</sup> Smoking has now been ruled out.

Joel Schwartz recently quoted the British researcher, Bradford Hill, saying, "All scientific work is incomplete... All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears

to demand at a given time." Then Schwartz added: "At this given time, the knowledge we already have seems to demand a reduction in population exposure to airborne particles."<sup>1</sup>

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[1] Seven studies are reviewed by Joel Schwartz, "Particulate Air Pollution and Daily Mortality: A Synthesis," *Public Health Reviews 1991/1992* Vol. 19 (1992), pgs. 39-60. For the 8th, see footnote 5. The 60,000 figure is taken from "Air Pollution in Typical U.S. Cities Increases Death Risk," press release dated May 13, 1991, from the Harvard School of Public Health, Boston, Mass. describing findings later reported in Joel Schwartz and Douglas W. Dockery, "Increased Mortality in Philadelphia Associated With Daily Air Pollution Concentrations," *American Review of Respiratory Disease* Vol. 145 (1992), pgs. 600-604. Two million deaths occur in the U.S. each year; according to Schwartz and Dockery, fine particles account for 3%. See also, Michael Weisskopf, "Particles in the Air Help Kill 60,000 a Year, Study Says," *Washington Post* May 17, 1991, pg. A13.

[2] National Research Council, *Airborne Particles* (Baltimore: University Park Press, 1979).

[3] United Nations, *Fine Particulate Pollution* (NY: Pergamon Press, 1979).

[4] Joel Schwartz and Allan Marcus, "Mortality and Air Pollution in London: A Time series Analysis," *American Journal of Epidemiology* Vol. 131 (1990), pgs. 185-194.

[5] Douglas Dockery and others, "An Association Between Air Pollution and Mortality in Six U.S. Cities," *New England Journal of Medicine* Vol. 329 (1993), pgs. 1753-1759; see also pgs. 1807-1808.

[6] Joel Schwartz and Douglas Dockery, "Particulate Air Pollution and Daily Mortality in Steubenville, Ohio," *American Journal of Epidemiology* Vol. 135 (1992), pgs. 12-19; see also pgs. 20 and 23 for discussion of the Steubenville study.

[7] Philadelphia study cited in note 1, above.

[8] Joel Schwartz, "Particulate Pollution and Daily Mortality in Detroit," *Environmental Research* Vol. 56 (1991), pgs. 204-213.

[9] Douglas W. Dockery and others, "Air Pollution and Daily Mortality: Associations with Particulates and Acid Aerosols," *Environmental Research* Vol. 59 (1992), pgs. 362-373.

[10] C. Arden Pope III and others, "Daily Mortality and  $\text{PM}_{10}$  Pollution in Utah Valley," *Archives of Environmental Health* Vol. 47 (1992), pgs. 211-217.

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# **Air pollution 'can thicken blood'**

**Air pollution thickens the blood and increases the likelihood of inflammation, according to research.**

**Pollution can penetrate deep into the body.**

The study may help explain why poor air is linked to an increased risk of heart attacks and stroke, as well as worsening respiratory problems.

University of Edinburgh researchers focused on ultra-fine pollutants known as particulate matter, which they say may be able to alter cell function.

Details are carried in the Occupational and Environmental Medicine journal.

The researchers tested the inflammatory and blood clotting responses of human immune cells called macrophages, lung cells and cells taken from the umbilical cord.

Each was tested six and 24 hours after exposure to particulate matter.

The results showed that levels of clotting factors, which thicken the blood, were raised in almost all the cell types.

The rate of death in immune cells also significantly increased, and exposure to the pollutants boosted inflammatory activity.

The researchers say their findings strongly suggest that particulate matter has the ability to alter cell function.

## **Deep penetration**

They believe that factors which trigger clotting may also trigger inflammation, and vice versa, so that if one begins to take hold, it is highly likely that the other will follow.

Recent research has shown that particulate matter is so tiny that, when inhaled, it can pass through the lungs directly into the bloodstream.

This may mean that its effect on macrophages could be deadly in people who are at risk of heart disease.

# Tiny air pollutants can trigger heart attack, according to study

By LISA FALKENBERG  
Associated Press Writer 6/12/01

DALLAS — High levels of air pollution can trigger heart attacks in at-risk people exposed for even a short time, a study has found.

Researchers who interviewed 772 Boston-area patients about four days after their attacks found that the onset of symptoms correlated with times of high daily air pollution.

Tiny, invisible particles long have been thought to cause long-term cardiovascular diseases. The new study is the first to examine short-term effects on the heart, said senior author Dr. Murray Mittleman, director of cardiovascular epidemiology at Boston's Beth Israel Deaconess Medical Center.

The study of 489 men and 283 women, conducted from January 1995 to May 1996, defined at-risk people as obese, inactive or those with a history of heart problems.

The results appear in Tuesday's edition of *Circulation*, a journal of the American Heart Association.

The pollution particles are called PM-2.5, for particulate matter less than 2.5 microme-

ters in diameter. They're emitted by cars, power plants and industry, as well as fireplaces and wood-burning stoves.

Studies in the past five years have linked deaths and hospital admissions to a spike in PM-2.5 levels. In the study, risk for heart attack peaked two hours and 24 hours after patients were exposed to increased levels of the particles.

After two hours, risk increased 48 percent in the hours when pollution was the worst, compared to the best hours; after 24 hours, risk increased 62 percent.

The study also examined health risks caused by ozone, a chief ingredient of smog that's created when air pollutants mix. Ozone has been linked to lung and breathing problems, but researchers in this study found no data linking it to heart attacks, Mittleman said.

The study did not address how the particles trigger heart attacks.

Researchers noted that Boston does not have excessive pollution and meets federal air quality standards, so the risk could be even worse in high-pollution cities such as Houston and Los Angeles.

## Smallest aerosol pollutants linked to disease

In August 1986, labor disputes shut down the Geneva steel plant west of Orem, Utah. Thirteen months later, the mill resumed operations under a new owner. It also resumed belching huge quantities of particulates — dust-sized aerosol pollutants — from its coking ovens and open-hearth furnaces. Almost at once, people living nearby began commenting on a decline in air quality — and in the health of their children.

Now, a researcher at Brigham Young University in Provo, Utah, has confirmed that respiratory health among area residents improved during the plant's shutdown. And for the first time, his study links a region's increased levels of the smallest particulates — 10 microns and smaller — with increased rates of children's hospitalization for bronchitis, asthma, pneumonia and pleurisy.

The Environmental Protection Agency made aerosols 10 microns and smaller ( $PM_{10}$ ) its new gauge of hazardous air particulates in July 1987. Previously, the agency measured and set limits only on "total suspended particulates" — the total dust wafting in air.

The State of Utah, however, had begun continuous  $PM_{10}$  monitoring in the Orem area two years earlier. So by mid-1988, Brigham Young environmental economist C. Arden Pope III had roughly three years' worth of data to analyze, including more than a year's data preceding Geneva's shutdown. That's important, he notes in the *MAY AMERICAN JOURNAL OF PUBLIC HEALTH*, because the steel mill emits approximately 82 percent of the area's industrial  $PM_{10}$  emissions when it's operating. Even after accounting for other, largely seasonal sources, such as household wood stoves, Pope found that Geneva's emissions represent 47 to 80 percent of the area's  $PM_{10}$  total.

His analysis shows that  $PM_{10}$  levels in the area climb in the fall and peak in the winter. While mean  $PM_{10}$  concentrations in the fall of 1985 were 35 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air — just 13 percent higher than a year later, when the steel mill was shut down — fall hospitalizations for Utah County children with bronchitis and asthma were more than twice as high in 1985 as they were in the fall of 1986. In fall 1987, after the plant reopened, hospitalization of children with bronchitis and asthma exceeded even the 1985 level. Adult hospitalizations for these diseases showed no similar increase that fall.

In the winter of 1985-86, mean  $PM_{10}$  levels were  $90 \mu\text{g}/\text{m}^3$  — 75 percent higher than the next winter's mean. Hospitalizations of children with bronchitis and asthma in the 1985-86 winter season were more than three times as numerous and admissions for pneumonia and pleurisy almost 2.5 times as numerous as in the

following winter, when the mill was closed. Winter increases also showed up in adult hospitalizations for bronchitis and asthma. Pope says  $PM_{10}$  levels can explain 30 percent of the variability between years in the adult hospitalizations.

Pope acknowledges that in a study like this — identifying correlations only — "there's no way to establish absolute cause and effect." However, he told *SCIENCE NEWS*, "this study does find some very damning correlations."

Pope's analysis is "a landmark study," says Douglas W. Dockery of the Harvard School of Public Health in Boston. In epidemiology, he explains, "you look for unique situations where there is a natural experiment going on." Geneva's shutdown provided such an experiment, he says, enabling Pope to identify a strong relationship between small particulates and respiratory disease.

Dockery recently found a similar association in his study of 5,422 children aged 10 to 12 from six U.S. cities: Portage, Wis.; Watertown, Mass.; Topeka, Kan.; St. Louis, Mo.; Kingston, Tenn.; and Steubenville, Ohio. Of the seven measures of air pollution he analyzed — including total suspended particulates, ozone, nitrogen oxides and sulfur dioxide — only particulates 15 microns and smaller ( $PM_{15}$ ) served as a strong predictor of respiratory disease.

Dockery's study shows that children living in the "dirtiest" city — steel town Steubenville, with an average annual  $PM_{15}$  level of  $58.8 \mu\text{g}/\text{m}^3$  — run more than double the bronchitis risk of children in the "cleanest" city, Portage, with its average annual  $PM_{15}$  level of  $20.1 \mu\text{g}/\text{m}^3$ . Children with asthma and persistent wheezing represented the majority of the excess bronchitis cases in the more polluted communities, Dockery and his colleagues report in the *MARCH AMERICAN REVIEW OF RESPIRATORY DISEASE*.

The Brigham Young and Harvard studies are the first to focus on the smallest particulates and to confirm what researchers have long suspected — that these aerosols are the most important in terms of respiratory-disease risk. Pope focused on acute effects of exposure, while Dockery's group focused on long-term effects.

Both analyses yield evidence that EPA's current  $PM_{10}$  standard is not sufficient to protect children's health. For instance, even though Orem-area  $PM_{10}$  levels never exceeded EPA's 24-hour standard of  $150 \mu\text{g}/\text{m}^3$  in fall months, twice as many local children were hospitalized for bronchitis and asthma in years when the plant was operating compared with the year when it wasn't. Similarly, Dockery found "health effects occurring at levels below the current annual average  $PM_{10}$  standard" of  $50 \mu\text{g}/\text{m}^3$ .

— J. Raloff

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Science News

# Health & Environment

## D I G E S T



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Featuring information from its Health & Environment Network

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### Feature

## → Airborne Particulates: A Deadly Public Health Concern

Particulate air pollution has been with us since the discovery of fire. The chimney is an early tribute to our realization that there is a downside to combustion-smoke. As the centuries passed, we increasingly realized the health hazards of smoke and the particulates it releases into the air. We know now—and have documented in a series of studies over the last 40 years—that these particulates annually contribute to the premature deaths of thousands of people.

One of the earliest documentations of the danger of smoke was made by John Graunt when he reported in 1662 that weekly deaths in London were higher during weeks with "Great Stinking Fog," that is, fog combined with coal smoke. In December 1952, dramatic events in London made it clear that this type of pollution could kill. That month, a combination of weather fronts produced a sharp drop in wind speeds. With little wind to move them along, cold air and clouds settled over the Thames Valley, causing a temperature inversion. Particle concentrations shot up by an average of 1200  $\mu\text{g}/\text{m}^3$  in the London Administrative County, and the daily death rate more than tripled. As the air cleared, the daily death rate followed air pollution levels back down again. Meanwhile other

towns in England without a low-lying inversion to trap the smoke experienced little change in the daily death rate.

This event prompted the British to initiate measures to control the burning of coal for heating domestic space, measures similar to those American cities had undertaken somewhat earlier. The British also began collecting more detailed data, assembling statistics on daily deaths, weather and air pollution in London for the winters of 1958/59 through 1971/72. Examination of those data showed several episodes similar to the one in 1952, each associated with a substantial increase in daily deaths. Most interestingly, the largest episode, in December 1962, elicited an almost identical increase in sulfur dioxide concentrations as had the one in 1952, while the increase in particle concentrations was only one third as great. The number of daily deaths in 1962 also increased only one third, indicating that the particles were the principal factor in the deaths.

Unfortunately, the statistical methodology of the time could only examine episodes. When attention turned to smaller incidents of particulate air pollution, the expected increase in daily deaths was well within the nor-

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by Joel Schwartz,  
Environmental  
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Health

mal range of variation of daily mortality, and hence undetectable. However, by the late 1980s, with more sophisticated statistical methodology, regression analysis of day-to-day changes in particle concentrations and daily deaths showed a strong association, with no evidence of a threshold (Schwartz and Marcus, 1990).

At about the same time, Fairley analyzed daily deaths and particulate air pollution in Santa Clara, CA, again just using the winter months, and reported an association between the two. The finding was of interest for two reasons. First, particulate concentrations were much lower in Santa Clara in the 1980s than they had been in London in the 1960s. Second, essentially no sulfur dioxide was present in Santa Clara, confirming that the association was with the particles and not the sulfur dioxide. As wintertime studies, neither location had to worry about confounding by ozone.

Since that time, airborne particles have consistently been associated with increased daily deaths in studies on three continents, as shown in Table 1. The percentage increase for a 100 $\mu\text{g}/\text{m}^3$  increase in  $\text{PM}_{10}$  (particulate matter 10  $\mu\text{M}$  or less) was quite consistent across these studies, while there was a substantial difference in coincident weather patterns and coincident exposure to other pollutants. This fact is a strong indication that air particles are a factor in these deaths. Moreover, if the London episode of 1952 is examined in the same relative risk model, the events of that episode are explainable by a 7 percent increase in daily deaths per 100  $\mu\text{g}/\text{m}^3$  increase in particle concentration. This result is quite consistent with the reports in Table 1.

Schwartz and Dockery (1992) examined the relationship between daily death rates and particulate exposure in light of age and cause-specific risks in Philadelphia, and Schwartz et al (1996) have done the same analyses for data from six other eastern US cities. These analyses show that the percentage increase in daily deaths of those exposed to particulates is somewhat higher for persons aged 65 and older, is moderately

higher for deaths from cardiovascular disease, and is highest for deaths from chronic obstructive lung disease and pneumonia. In contrast, almost no increase was found in the same situation for cancer deaths. This pattern parallels what was seen in London in 1952. A further examination of the Philadelphia data showed that the increase in sudden deaths and deaths outside of hospitals was larger than the increase in all deaths, and that most of the additional heart disease deaths during such a period were in persons with lung disease as well. This is also the pattern that was seen in London in 1952, an episode whose cause is not in doubt.

Evidence of the association between air pollution and death also was addressed in a recent meta-analysis (Schwartz 1994). The meta-analysis found no difference in slopes between locations where airborne particles were high in the winter and locations where airborne particles were high in the summer. Humid and dry locations likewise show no difference, and the two locations without noticeable  $\text{SO}_2$  or ozone exposure also showed the same mean effect size. This makes confounding by weather, by  $\text{SO}_2$  (mostly present in the winter), or by ozone (mostly present in the summer), unlikely.

Recent papers have tried to avoid weather confounding by reporting results before and after exclusion of extreme weather days, which are the ones most likely to result in confounding. No evidence for confounding has been seen (Schwartz 1996). More recently, more than a dozen studies of hospital admissions for lung disease have added to the evidence that fine combustion particles are toxic at current levels.

In addition to the many time series studies that have examined this association, a number of studies have looked for long-term differences in age-adjusted mortality rates between locations with different air pollution concentrations. Most of these analyses have been ecological, with no control for individual risk factors (e.g. Ozkaynak et al, 1986). However, two recent prospective cohort studies have examined the association between air pollution and life expectan-

cy. The Harvard Six City Study looked at 14-year survival in a cohort of 8,000 adults chosen to be representative of their communities. Air pollution concentrations varied across the six communities. After control for age, sex, smoking, body mass, hypertension, diabetes and occupational exposure, a significant relationship between adjusted mortality and long-term average particulate concentration was found across locations. The association became stronger as the particulate index was changed from TSP to  $PM_{10}$ , and from  $PM_{10}$  to  $PM_{2.5}$ . No evidence of an association was seen for ozone (Dockery et al, 1993). Pope has attempted to replicate these findings in another prospective cohort (Pope et al, 1995). In a cohort of more than 300,000 persons across 151 communities, a similar gradient was seen between fine particle concentration and mortality on follow-up, after control for individual risk factors. These findings in prospective cohort studies

add considerable weight to the evidence, because the likely confounders are quite different than in daily time series, yet similar associations are reported.

What has been missing until recently was toxicological confirmation. This has now been found. A recent report (Godleski, 1996) found that exposure to  $288 \mu g/m^3$  of fine particles for six hours per day for three days resulted in a 37 percent mortality rate in bronchitic rats. Minimal effects were seen in control rats. This has been confirmed in a study of fly ash exposure at somewhat higher concentrations. In addition, inflammatory mediators have been found in the lungs, and most interestingly, in the hearts of the bronchitic rats.

This latest study adds to the overwhelming evidence of the dangers of particulate air pollution. It also serves as further proof that this type of pollution is one of the most serious hazards to public health.

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**Table 1\*. Percent Increase in Daily Deaths for a  $100 \mu g/m^3$  increase in  $PM_{10}$ .**

City	% Increase	(95%CI)
Amsterdam	8	(16--1)
Birmingham	11	(20-2)
Cincinnati	10	(17-5)
Detroit	12	(16-5)
Erfurt, Germany	12	(17-4)
Kingston, TN	16	(57--12)
Los Angeles	5	(10-0)
Minneapolis	9	(15-4)
Philadelphia	12	(17-7)
Provo	15	(23-9)
Santiago	11	(15-8)
Santa Clara	8	(16-2)
Steubenville	8	(10-4)
St. Louis	16	(34-1)
Sao Paolo	14	(21-7)
<i>Overall (weighted avg.)</i>	9	(10-8)

\*The data from the preceding table was compiled by Joel Schwartz based on studies from the individual cities.

## Air Pollution and Daily Mortality

by Suresh Moolgavkar  
Fred Hutchinson Cancer Research  
Center  
University of Washington

At a press conference held on May 8, 1996, the Natural Resources Defense Council (NRDC) released a report (1) that concludes that particulate air pollution in U.S. cities kills approximately 64,000 people annually. Is this credible? I believe that many of the epidemiologic studies reporting associations between particles in the air and mortality suffer from serious methodologic deficiencies. Air pollution, which is a complex mixture consisting of particles and gases, appears to be associated with mortality even at the generally low levels of pollution in U.S. cities, but currently we possess neither the statistical tools nor the biological understanding of mechanisms to tease out the contribution made by each component of the mixture.

The principal scientific issue in epidemiologic studies of air pollution is simply stated. Given that air pollution is a complex mixture, is it possible to isolate the contributions made by individual components of the mixture to adverse effects on human health? To address this issue, we clearly must set a minimum requirement that all copollutants for which data are available be explicitly consid-

ered in epidemiologic analyses. Unfortunately, most epidemiologic studies of particulate matter (PM) have considered a single copollutant, even when data on other copollutants have been available. The mortality studies generally have focused on PM and SO<sub>2</sub>, whereas the studies of hospital admissions have focused on PM and ozone. The results of such analyses are difficult to interpret. The recent analyses of mortality in Philadelphia demonstrated quite clearly that, when all pollutants are considered impartially, it is not possible to attribute the effects of air pollution to any single component (2,3). In particular, the phase IB report of the Health Effects Institute (HEI) Study (3), which was released recently, stated, "Our findings indicate that a single pollutant of the group TSP (total suspended particulates), SO<sub>2</sub>, NO<sub>2</sub>, and CO cannot be readily identified as the best predictor of mortality, because concentrations of the four pollutants were moderately correlated in Philadelphia during the years of this study." This conclusion has implications far beyond the Philadelphia analysis. As the HEI report goes on to say, "Insights into the effects of individual criteria pollutants can be best gained by assessing effects across locations having different pollutant mixtures and not from the results of regression models of data from single locations." It is clear, howev-

er, that when analyses are conducted in different geographic locations, all criteria pollutants in those locations must be given equal consideration. With the exception of the HEI study, I am not aware of any other published epidemiologic study of air pollution that has considered all available criteria pollutants.

Proponents of the particulates-mortality hypothesis argue that an association between particulate pollution and mortality is found even in areas where some of the gaseous pollutants are low. Thus, they argue that if a particulate-mortality association occurs in an area with low levels of a particular copollutant, then this copollutant need not be considered in areas where levels may be high. This argument is fallacious. Although particulates are ubiquitous components of air pollution, they never occur alone, but coexist together with other pollutants known to be toxic. Some of these copollutants may be high in some areas of the country and quite low in others. But, unless the copollutants that coexist with particulates in specific cities are controlled in analyses, particulates will be associated with mortality in any city where air pollution is associated with mortality. A pollution mortality association in areas in which, for example, SO<sub>2</sub> is absent, does not exonerate this pollutant and does not justify ignoring it

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when it is present. The correct interpretation of this finding is that a pollution mortality association can be observed even in the absence of SO<sub>2</sub>. The fallacy of the argument is illustrated by the following example, which I have used before. If two individuals who ingested sugar laced with strychnine and sugar laced with cyanide, respectively, dropped dead, would we blame the sugar?

Finally, some recent studies (4,5) have found little evidence of an association between particulates and mortality, even when particulates were the only pollutant considered in the analyses. These studies are generally ignored by the proponents of the particulates mortality hypothesis.

A coherence argument has been invoked in support of a causal association between particulates and mortality. Simply stated, this argument says that consistency of effects across a spectrum of health outcomes strengthens the case that an association between particulates and a specific health endpoint is not spurious. Thus, for example, if

an association is observed between particulates and mortality, say respiratory mortality, then one should expect also to see an association between particulates and hospital admissions for respiratory causes. If such an association is not seen, then one might suspect that the observed particulates-mortality association simply occurred by chance.

The coherence argument makes good sense, but I have strong reservations about the manner in which it has been applied. In particular, the coherence argument does not relieve the investigator of the obligation to control carefully for copollutants in analyses. Thus, if a particulates-mortality association is observed, and if this association is spurious because a copollutant was not considered in the analysis, then the same spurious association would be seen with hospital admissions unless, in this case, the copollutant was taken into account. Unfortunately, studies of the adverse health effects of particulates in a given area all failed to consider the same copollutants so that the same spurious association of

particulates could be seen with various endpoints.

Finally, there is only limited toxicologic evidence of adverse health effects associated with exposure to particulates, although such evidence is now actively being sought. Schwartz believes that the recent experiments of Godleski provide "toxicological confirmation" that the mortality associated with air pollution can be attributed to the particulate component. It should be noted, however, that the compromised (bronchitic) animals used in Godleski's experiments were created by exposure to high concentrations of SO<sub>2</sub>. Furthermore, one crucial experimental group was missing in this study: we do not know the mortality rate in compromised animals exposed to high concentrations of gaseous pollutants.

I believe that, taken together, epidemio-

*Although particulates are ubiquitous components of air pollution, they never occur alone, but coexist together with other pollutants known to be toxic.*

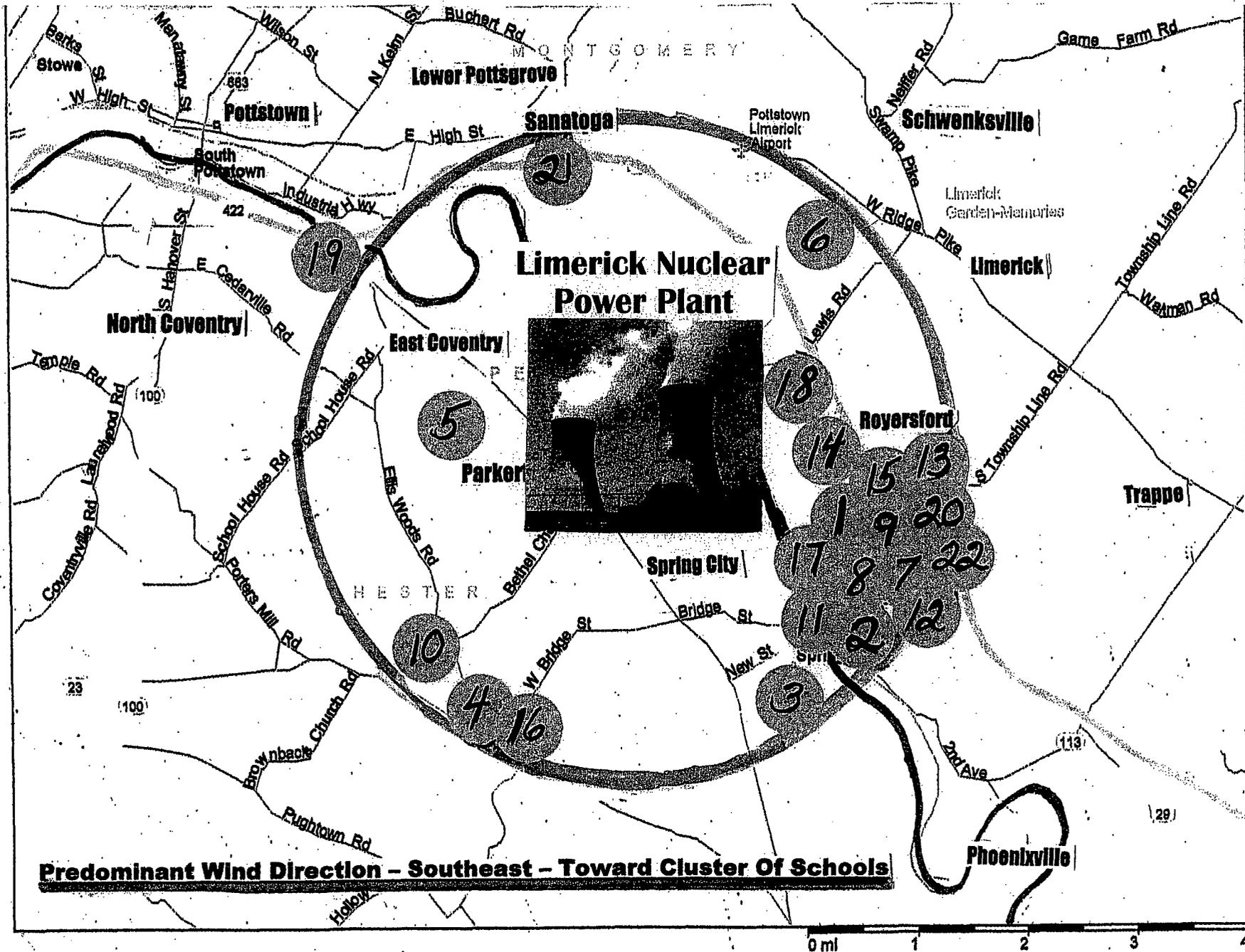
logic studies of air pollution provide evidence of adverse health effects, including increased mortality, even at the generally low levels of pollution found in U.S. and Canadian studies. For reasons that I have

summarized above and discussed in much greater detail in a forthcoming paper (6), however, it is premature to single out any single component of air pollution as being responsible. However, even if one accepts that some fraction of deaths is attributable to particulate air pollution, however, the annual estimate of 64,000 in the NRDC report depends upon a number of questionable assumptions. The calculations are based on the estimate of risk from the ACS II study (7), which is likely to be much too large. The main reason for this is that, in this study, the effects of weather and other pollutants on mortality were not controlled. Furthermore, the NRDC assumes a linear dose-response relationship without threshold for the particulates-mortality association. As discussed in more detail in (6), the data simply do not support this assumption. For these reasons I believe that the NRDC estimates are highly inflated. It is premature to attempt to estimate the number of deaths attributable to any component of air pollution.

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# Schools, Pre-Schools, Daycare Centers Within 2-3 Miles Of Limerick Nuclear Power Plant



**Predominant Wind Direction - Southeast - Toward Cluster Of Schools**

# **Children**

## **Most Impacted Victims Of Air Pollution**

### **Standards Fail To Protect Children**

#### **Up To 10 Times More Vulnerable To Toxic Chemicals Than Adults**

- **There Are 22 Schools, Pre-Schools, and Day Cares Within 2-3 Miles From Limerick Nuclear Power Plant**
- **Minimally, within the 10-Mile Evacuation Zone children could be impacted.**
- **Tooth Fairy Study Shows Strontium-90 In Children's Teeth.**

# **AIR POLLUTION STUDIES - CHILDREN**

- **STUDY LINKS CHILD CANCER WITH AIR POLLUTION**

Associated Press, January 20, 2007

- **CHILDHOOD CANCER and COMBUSTION BY-PRODUCTS**

University of Massachusetts Lowell – 2003

- **AUTISM Disorders Related to Hazardous Air Pollutants**

California Health Department June, 2006

- **Air Pollution: Health Hazards to Children**

Policy Committee on Environmental Health PEDIATRICS Vol.114 No.6 December, 2004

- **Children, Air Pollution And Standards**

## **AIR POLLUTION IS SIX TIMES GREATER FOR CHILDREN**

Profiles On Environmental Health Vol. #1 November 1989

- **FETAL DEATHS CLIMB WITH AIR POLLUTION**

Science News, Vol. 153

- **Poor Air “Harms Lungs Of Unborn”**

### **Air Pollution Can Damage The Lungs Of Children Even Before Birth**

BBC News Online – Alex Kirby, Environment Correspondent in Budapest, Hungary

- **ASTHMA: PREVENTION May Be The Only Cure**

Journal of American Medical Association 1990

## **Financial Costs to the Public For Not Preventing Air Pollution are Astronomical,**

- **Yet SE DEP Opted to Make Permitting Decisions That Abandon Public Health and Financial Interests, and Instead, Protect Exelon's Profits.**

The Southeast office of PA DEP essentially denied the public a voice in a permitting process about very serious air pollution threats to families in our region and beyond from Limerick Nuclear Power Plant.

DEP has an opportunity to rectify this injustice by taking actions on recommendations and requests which The Alliance For A Clean Environment (ACE) provided to them January 2, 2010, in our expose on DEP's Comment Response Document for Limerick Nuclear Power Plant's major air pollution permit under the Clean Air Act. For details contact ACE (610) 326-2387

DEP essentially allowed increased PM 10 emissions from Limerick's cooling towers nearly 6 times higher than original limits. This is indefensible, given the indisputable serious health threats from PM 10. Research shows it kills and cripples. Limerick also emits PM 10 from 3 boilers, 8 generators, and a spray pond. Actual PM 10 totals are unknown, since Exelon is permitted to calculate them.

Montgomery County was already in the top 10% of the nation for PM 10 emissions according to EPA's polluter reported data compiled by Scorecard. SE DEP should require PM 10 reductions, not permit increases. There's no need to increase PM 10 limits in Limerick Nuclear Plant's Title V permit renewal. Exelon can and should filter Schuylkill River water intake for Total Dissolved Solids to reduce PM 10 emissions from the cooling towers.

Other important issues related to Limerick's Nuclear Plant's Title V Air Pollution Permit Renewal and SE DEP's Comment Response Document include:

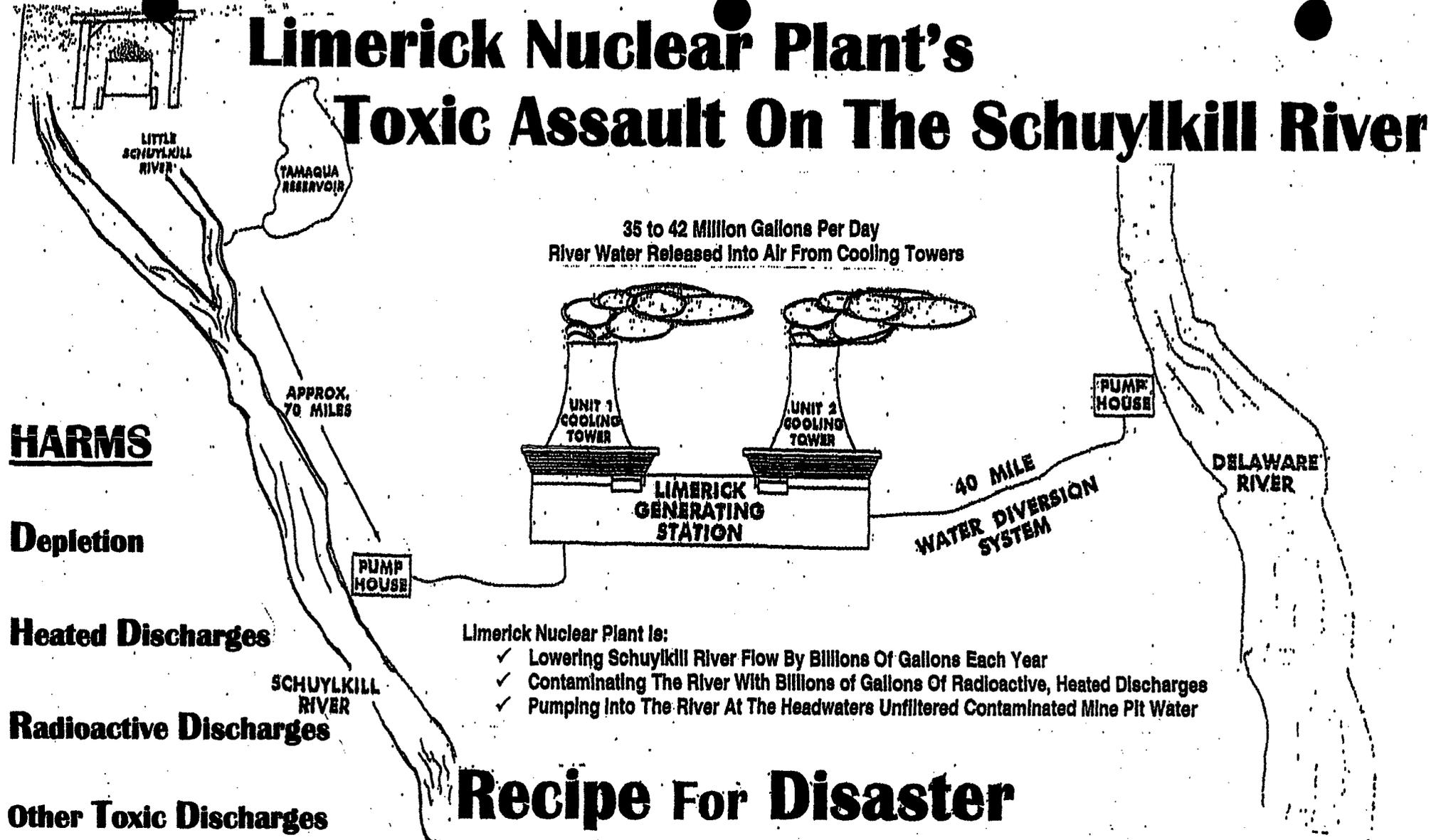
1. Radionuclide Emissions Illogically Omitted
2. Calculating / Estimating Emissions Instead Of Actual Monitoring / Testing
3. No Actual Perimeter Monitoring On Toxics Listed In This Permit
4. No Requirement For Filtration On Any Of Multiple Air Pollution Sources At Limerick
5. Increased Permit Limits /Changed Permit Conditions (Regardless of Increased Health Threats)
6. Exelon's Requests For Major Increases In Exhaust Flow Volumes - Unaddressed
7. DEP's Failure To Account For Specific Destinations Of Massive Volumes Of Low-Level Radioactive Wastes, Before And After Burning Waste Derived Liquid Fuel (WDLF)

This is about public health, permitted poisons in your family's air, and costs to you for dangerous, unnecessary air pollution. You will pay one way or the other, yet you were denied an opportunity to fully understand the consequences and comment before this permit was issued. 12/11/08 ACE presented SE DEP with questions and concerns, intending to share answers with the public, before the permit was issued. DEP failed to answer questions until 12/09, a year later, after the permit was issued. Requests for a public hearing were denied.

ACE contacted PA DEP Secretary Hanger, State Senators Rafferty and Dinniman, State Representatives Quigley, Hennessey, and Vereb 1/2/10, to review and support recommendations and requests in ACE's expose on Limerick's 5-year air pollution permit issued 12-7-10. They should be protecting your health and pocketbook. Exelon should be required to filter Schuylkill River water intake to reduce dangerous air pollution from Limerick Nuclear Plant's cooling towers and other sources. ACE will keep you informed.

WADESVILLE MINE

# Limerick Nuclear Plant's Toxic Assault On The Schuylkill River



## HARMS

Depletion

Heated Discharges

Radioactive Discharges

Other Toxic Discharges

Toxic Mine Water Pumping

Limerick Nuclear Plant is:

- ✓ Lowering Schuylkill River Flow By Billions Of Gallons Each Year
- ✓ Contaminating The River With Billions Of Gallons Of Radioactive, Heated Discharges
- ✓ Pumping Into The River At The Headwaters Unfiltered Contaminated Mine Pit Water

## Recipe For Disaster Lower Flows - Increased Contamination

The Schuylkill River Is A Vital Public Drinking Water Source For Almost 2 Million People From Pottstown To Philadelphia.

Billions of Gallons of Contaminated Mine Water Were Pumped Into the River To Operate Limerick Nuclear Plant. Exelon Wants to Pump Billions More!

Public Hearing  
Coming Soon

Protect The River!  
Ask For Filtration

# **Limerick Nuclear Power Plant's**

## **Toxic Assault On The Schuylkill River**

### **A Recipe For Drinking Water Disaster**

#### **1. Lower Flows Caused By Limerick Operations:**

- **Can Lead To Severe Drinking Water Shortages**
- **Are Causing Concentrated Contamination**

#### **2. Increasing Health And Financial Threats From:**

- **Radioactive And Heated Discharges**
- **Hazardous Stew Of Chemical Discharges**
- **Toxic Mine Water Pumping Into The River**

➤ **How Can The Schuylkill River Continue To Be An Ample, Safe Usable Drinking Water Source For The Almost Two Million People Who Depend On It From Pottstown to Philadelphia, Unless Limerick Is Closed?**

# **Water Worries Are Increasing!**

**Exelon Requests, If Approved, Will Increase Threats  
DEP, DRBC, and NRC Are Making Crucial Decisions In 2011**

**Attached Are Details Of Threats And Suggested Solutions!**

**Prevention and Precaution Are Imperative  
To Prevent A Drinking Water Disaster  
For Almost 2 Million People From Pottstown To Philadelphia**

Documented Threats and Harms  
Summarized By The Alliance For A Clean Environment (ACE) January, 2011

**Limerick Nuclear Plant's Assault On The Schuylkill River Threatens to Permanently  
Damage The Schuylkill River In Many Ways.**

**Decisions Are Being Made Now On Exelon's Current Requests Below.**

1. Double Increase In Wastewater Discharges (Schuylkill River)
2. Reduce Low-Flow Restrictions (Schuylkill River)
3. Eliminate Temperature Restrictions (Schuylkill River)
4. More Toxic Mine Water Pumping (Schuylkill River)
5. Less Monitoring
6. Uprates - Using More Water and Discharging More Toxics To Run Limerick Harder
7. Relicensing - Increased Water Depletion and Increased Radioactive Poisoning For 20 Years Longer

**Precaution and Prevention Are Imperative To Avoid A Drinking Water Disaster. Limerick Should Be  
Closed, NOT Relicensed.**

**Concerns About Not Having Enough Safe Usable Drinking Water In The Future Are Based On:**

ACE's Reviews Of Limerick Nuclear Plant's:

1. 2011 NPDES Permit Renewal Request to DEP For Permit No. PA0051926
2. 2009 Radiological Report By Exelon To NRC
3. Exelon's Current Docket Requests to DRBC

Plus Exelon's Plans For:

4. Uprates
5. Relicensing

**Limerick's Cooling Towers Deplete The Schuylkill River. Schuylkill River depletion will increase dramatically every year, as long as Limerick Nuclear Plant continues to operate.**

**Limerick Nuclear Plant DEPLETES the Schuylkill River every year - by 12 billion gallons or more.  
Every Year Limerick Nuclear Plant:**

✓ **Withdraws 20 1/2 Billion Gallons and Returns Only 5 Billion Gallons**

Not more than 3 billion gallons appear to have been supplemented in any one year.

To increase pumping of contaminated mine water to supplement the flow to operate Limerick is negligent.

**By 1999 The Schuylkill River Had "RECORD LOW FLOWS" - Limerick Started to Operate In 1985.**

**How much will the Schuylkill River flow be depleted by 2029 when Limerick's current license expires?**

### **DRINKING WATER SHORTAGES - A REAL CONCERN**

DEP's late 1990s booklet titled "Water Is Life", shows DEP was concerned about the water supply for years. Increasing heat and droughts, along with aging water systems, suggest we could experience water shortages as communities have elsewhere. For example: *"Two Million Without Drinking Water"* Boston, 2010. Our region could be next to be without drinking water.

**LOW FLOWS CONCENTRATE TOXICS - Depleting River Flows Lower Water Quality** The more depleted the river becomes, the greater the threat there is to public health from drinking the water. DRBC admits that reduced river flows lower water quality, degrade aquatic habitat and affect boating, fishing, and other in-stream uses. Limerick's radioactive discharges into the Schuylkill River, 24 hours a day, 365 days a year, are the greatest concern.

**To avoid future drinking water shortages and water too contaminated for safe use, for almost two million people from Pottstown to Philadelphia, Limerick Nuclear Plant should be closed in 2029 when its 40 year license expires.**

➤ **THERE'S NOT ENOUGH WATER to operate Limerick Nuclear Plant until 2049!  
Limerick Relicensing Would Result In Even Less Water with Drastically Increased Toxics.**

After 25 Years, There Is No Accurate Independent Data Or Disclosure On Actual Damage Already Done To The Schuylkill River, The Vital Drinking Water Source for Almost Two Million People. Limerick's 1984 Environmental Impact Statement, based on "estimates" made before Limerick started operating, is being used for 2011 decisions by DEP, DRBC, and NRC, that would allow more harm to this vital public drinking water source.

Exelon's requests increase the risk of catastrophic consequences to drinking water. NRC, DEP, and DRBC are the regulatory agencies that will be making upcoming decisions. History suggests these agencies will make decisions to protect Exelon's profits, not our water.

**Agencies Are Failing To Acknowledge The Severe Threats To Drinking Water As A Result Of Their Permitting Decisions. DEP's Decisions On Limerick's NPDES Permit Are Linked To Other Current Exelon Requests to DRBC and NRC.** For example:

1. **Radiological Discharges into the Schuylkill River**, 24 hours a day, 7 days a week, 365 days a year are NOT Adequately Addressed or Fully Disclosed in Limerick's NPDES Permit Requests to DEP, even though data for Limerick's Radionuclides Identified in surface water, fish, and sediment is available in Exelon's Yearly Radiological Monitoring Reports to NRC.
2. **Exelon's Request for Drastic Increases in Limerick's Pollution Discharges** Related to Exelon's Docket Requests to DRBC To Increase Toxic Pollution and Reduce Safeguards: (1) Allow Increased Toxic Mine Water Pumping Into The River, (2) Reduce Low-Flow Restrictions, (3) Reduce Monitoring, (4) Eliminate Temperature Restrictions, and (5) Eliminate Public Participation.

3. **Exelon's Plans for "Uprates" to Run Limerick Harder and "Relicensing" to Run Limerick Longer Related To Limerick's NPDES Permit.** Of concern: (1) Ever-Increasing Depletion of the River, (2) Lower Flows Concentrating Ever-Increasing Amounts of Dangerous Contamination.

Limerick's serious threats to the Schuylkill River water supply will continue and increase as long as Limerick continues to operate. Limerick's current 40-year license expires in 2029. Exelon wants 20 more years, but evidence suggests that could completely destroy the drinking water supply for almost two million people.

1. Will There Be Enough Water For Almost 2 Million People?
2. Will The Water Become Too Radiated and Heated For Safe Use As A Result Of Limerick's Discharges?
3. Will Mine Water Pumping Into The River Contaminate The River Too Much For Safe Use?

### **Consequences of DEP's Decisions on Limerick's NPDES Permit:**

DEP decisions on Exelon's requests in Limerick's NPDES permit could have major harmful consequences to the public - both in increased costs for water and threats to health. DEP is due to make these decisions in March, 2011.

Major Issues:

1. **Exelon Wants DEP To Permit Limerick's Total Dissolved Solids (TDS) Limits To Increase:**

- ✓ **FOUR Times Higher Than Safe Drinking Water Standards**
- ✓ **TWO Times Higher Than Current Limerick Nuclear Plant Limit**

500 mg/l	Safe Drinking Water Standard
1,000 mg/l	Current Limit
2,000 mg/l	Exelon's Request

**Harmful Consequences To The Public If DEP Approves Exelon's Requested Increase:**

- 1) **Higher Costs to Public Drinking Water Systems and Their Customers Including:**
  - Pottstown
  - Phoenixville
  - Aqua PA
  - American Water Works
  - Philadelphia (Only 20.7 Miles Away)
- 2) **Increased Risks to Health For All Using Water From Treatment Systems Above**
- 3) **Increased Threats to Ecosystems**

**Limerick Nuclear Plant's Current NPDES Permit Limit VIOLATIONS**

**13 Of 16 TDS Samples Violated Limerick's NPDES Permit Limit (2009 - 2010)**

- Violations Were Up To 2,419 mg/l - Five Times Safe Drinking Water Standards
- 2000 mg/l - Exelon Requested Increase Would Still Be Violated.

**Violations Should Not Be Cause To Raise Permit Limits - Four Times Safe Drinking Water Standards**

- **Exelon Should Be Fined And / Or Forced To Filter - NOT Get Permit Limits Doubled**
- **To Prevent Unnecessary Public Water Costs and Harms - FILTRATION IS IMPERATIVE**

**Solutions:**

- A. **DEP Should DENY Exelon's Request For A TDS Permit Limit FOUR Times Safe Drinking Water Standards And Double Limerick's Current Limit.**
- B. **Instead of Permit Increases and Costly Increases to the Public, DEP Should Require Filtration to Avoid Violations and Unnecessary Costs to the Public.**
  - Why should water treatment systems and their customers be forced to pay more, just to maximize Exelon's profits? Either Exelon pays to filter Limerick discharges before they enter this vital drinking water source, or the public eventually pays with their health and their pocketbooks.
- C. **DEP Should Fine Exelon for all Past, Current, and Future PERMIT VIOLATIONS**
  - Fines should be used for legal battles likely required to get Exelon to **FILTER** all Limerick Discharges to minimize health and financial threats to the public.

## 2. RADIOACTIVE WASTEWATER - Limerick Discharges Into The Schuylkill River

**24 Hours a Day 7 Days a Week 365 Days a Year**  
**14.1 Million Gallons Per Day - 5 Billion Gallons Per Year**

**RADIOACTIVE SOURCES** Discharging Into Schuylkill River From Limerick Nuclear Plant (Outfall 001)

- Cooling Towers
- Spray Pond
- Holding Pond
- Closed Cooling Water Loops
- Treated Radwaste

Over 100 Different Radionuclides Are Associated With Producing Nuclear Power. Many are discharged with the wastewater.

**1,312,320 GALLONS of RADIOACTIVE WATER are STORED in 18 TANKS at Limerick**

**Exelon's 2007 and 2009 Radiological Reports To NRC For Limerick Nuclear Power Plant Reveal:**

Limerick Test Results - RADIOACTIVE SURFACE WATER

**6 of 7 Samples Detected Gross Beta (dissolved) - 1 of 7 Detected Gross Alpha (dissolved)**

### **Exelon's 2009 Radiological Report to NRC - For Limerick Nuclear Power Plant**

#### **In WATER - 12 Different Radionuclides Were Reported**

		$\frac{1}{2}$ Life
1.	<b>Iodine I-131</b>	8 Days
2.	Cesium Cs-134	30 Years
3.	Cesium Cs-137	30 Years
4.	Manganese Mn-54	314 Days
5.	Zinc Zn-65	250 Days
6.	Cobalt Co-58	70 Days
7.	Cobalt Co-60	70 Days
8.	Zirconium Zr-95	65 Days
9.	Iron Fe-59	46.6 Days
10.	Niobium Nb-95	35 Days
11.	Barium Ba-140	13 Days
12.	Lanthanum La-140	40 Hours

### In FISH - 9 Different Radionuclides Were Reported

1.	Iodine I-131	8 Days
2.	Cesium Cs-134	30 Years
3.	Cesium Cs-137	30 Years
4.	Manganese Mn-54	314 Days
5.	Zinc Zn-65	250 Days
6.	Cobalt Co-58	70 Days
7.	Cobalt Co-60	70 Days
8.	Iron Fe - 59	456.6 Days
9.	Potassium K-40	1 Day

Note: The Hazardous Life of a Radioactive Isotope is Ten to Twenty Times its Half-Life  
Reality: Synergistic, Additive, and Cumulative Harmful Impacts Are Obviously Significant  
Problems: Many Radionuclides go Unreported and Unmonitored - Sampling Is Woefully Inadequate and Controlled by Exelon, a Company that Can't Be Trusted

### 3. HEATED DISCHARGES Go Into The Schuylkill River From Limerick Nuclear Plant 24 Hours a Day 7 Days a Week 365 Days a Year 14.1 Million Gallons Per Day - 5 Billion Gallons Per Year

Major Issue: Exelon Wants DEP to Eliminate Schuylkill River Temperature Restrictions In Limerick Nuclear Plant's NPDES Permit

- Thermal Discharge Limits Are An Important Safeguard to the Schuylkill River, Its Ecosystems, and Public Health.
- Eliminating Limerick's Temperature Restriction on Its Discharge Limit Could Further Jeopardize this vital drinking water source.

Exelon used a 1984 Environmental Impact Statement on Limerick Nuclear Plant, which was based on "ESTIMATES" from BEFORE Limerick started operating to justify eliminating temperature restrictions for this 2011 NPDES Permit.

#### Likely Consequences of Approval to Eliminate Temperature Restrictions:

- 1) Potentially irreversible damage to ecosystems
- 2) Potential threats to human health from using the river for recreation.

Example: Triathlon participant died in the Schuylkill River, June, 2010

That part of the event was discontinued, claiming the river was Overheated at 89 Degrees.

#### Solution:

- **DEP Should Deny Exelon's Request to Eliminate Temperature Restrictions. Instead, Exelon Should Reduce Heated Discharges in times of extreme heat and drought.**

### 4. A DANGEROUS MIX - Limerick Discharges Into The Schuylkill River

Radiation + 94,000 to 192,000 lbs of Extremely Toxic Chemicals Are Used at Limerick Every Day

**RADIOACTIVE and CHEMICAL WASTEWATER STORED** at Limerick Nuclear Plant. A Few Examples:

- **RADIONUCLIDES** 1,312,320 Gallons 18 Tanks
- **ACID CHEMICALS** 68,600 Gallons 20 Tanks
- **SULFURIC ACID** 22,000 Gallons 2 Tanks
- **DIESEL** 334,000 Gallons 16 Tanks

## EVERY DAY - Over 94,293 to 192,614 Pounds Per Day Of Toxic Chemicals Below Are Used At Limerick Nuclear Plant

➤ **Toxics Don't Just Disappear - They Are Either Discharged Into Water or Air.**

<u>Chemical Substance or Trade Name</u>	<u>Average / Maximum Per DAY</u>	<u>Effluent</u>	<u>Detection</u>
• Sulfuric Acid	40,000 to 60,000 lbs Per Day	6 to 9 PH Units	.01 Standard PH
• Sodium Hypochlorite	16,000 to 58,000 lbs Per DAY	TRO Limits	50 as TRO
• Sodium Bromide	1,600 to 2,800 lbs Per DAY	TRO Limits	50 as TRO
• Foamtrol AF1441	450 to 900 lbs Per DAY	2-4 mg/l	CALCULATED
• AB Aquashade	450 to 900 lbs Per DAY	.02- .03 mg/l	20
• Inhibitor AZ8104	1,000 to 2,000 lbs Per DAY	8 -19 mg/l	CALCULATED
• Flogard MS6210	450 to 1,000 lbs Per DAY	3 -9 mg/l	CALCULATED
• Depositrol BL5400	160 to 320 lbs Per DAY	1-3 mg/l	CALCULATED
• Depositrol PY5204	2,000 to 3,000 lbs Per DAY	16 to 26 mg/l	CALCULATED
• Spectrus CT1300	1,200 to 2,000 lbs Per DAY	.20 mg/l	.052 mg/l
• Polyfloc AP1120	1.5 to 3 lbs Per DAY	.01 mg/l	CALCULATED
• Klaraid CDP1346	120 to 200 lbs Per DAY	.34 -.56	CALCULATED
• Depositrol BL5307	1,000 to 3,000 lbs Per DAY	.005 - .009	1000
• Continuum AEC3120	8 to 16 lbs Per DAY	.1 - .2	CALCULATED
• Spectrus DT 1400	4,690 to 9,520 lbs Per DAY	TSS Limit	200 at TSS
• Spectrus NX1100	1 to 2 lbs Per DAY	< 1 by dilution	CALCULATED
• Spectrus BD1500	1,000 to 1,500 lbs Per DAY	11-17 mg/l	CALCULATED
• Spectrus NX1103	20 to 120 lbs Per DAY	.01 mg/l	CALCULATED
• SURE-COOL 1393	240 to 321 lbs Per DAY	2-4 mg/l	organic phosphate test
• C-9	937 to 1,000 lbs Per DAY	4-9 mg/l	zinc test, .01 mg/l
• 3D TRASAR 3DT197	1,000 to 2,200 lbs Per DAY	3-19 mg/l	tolytriazole test. .01 mg/l
• 3D TRASAR 3DT 121	2,000 to 3,000 lbs Per DAY	11-25 mg/l	active polymer test.6 mg/l
• 3D TRASAR 3DT 138	1,000 to 4,000 lbs Per DAY	.013 -.025 mg/l	same as above
• H-550	300 to 1,000 lbs Per DAY	.02-.05 mg/l	Gluteraldehyde test, 20ppm
• NALCO 7469	450 to 900 lbs Per DAY	4-8 mg/l	CALCULATED
• NALCO H150M	1,200 to 2,000 lbs Per DAY	3-5 mg/l	Active quat test .020 mg/l
• NALCO 1315 from H150M	14,370 to 28,560 lbs Per DAY	TSS Limit	Feed based on detox
• NALCO 8136	120 to 200 lbs Per DAY	.03-.06 mg.l	CALCULATED
• NALCO 73310	126 to 252 lbs Per DAY	1.4-2.8 mg/l	Nitrite test, 2 mg/l
• NALCO 73551	1,500 to 3,000 lbs Per DAY	10-20 mg/l	CALCULATED
• Ferroquest LP7200	600 to 600 lbs Per DAY	6.7 mg/l	CALCULATED
• Ferroquest LP7202	300 to 300 lbs Per DAY	3.4 mg/l	CALCULATED

**The 94,000 to 192,000 Pounds of Toxic and Corrosive Chemicals Above Are Added Every Day To:**

- ✓ **Cooling Towers**
- ✓ **Spray Pond Raw Water**
- ✓ **Other Systems**

**Limerick Uses Massive Amounts Of The Toxic Chemicals Above Every Day For:**

<b>Corrosion Inhibitors</b>	<b>Dispersants</b>
<b>Scale Inhibitors</b>	<b>Surfactants</b>
<b>Biocides</b>	<b>Microbio/Algicides</b>
<b>Coagulants</b>	<b>Anti-Scalants</b>
<b>Scale Removers</b>	

## **92,000 to 194,000 lbs of Toxic Chemicals Used Every Day Don't Just Disappear! They End Up In Limerick Nuclear Plant's Waste Water And Air Pollution**

### **Evidence Above Suggests Exelon Must Start To Filter All Discharges!**

#### **5. NINE Discharge Points From Limerick Nuclear Plant Go Directly Into The Schuylkill River. FOURTEEN Discharge Into Possum Hollow Run - Which Flows To The Schuylkill River.**

- Other than Outfall 001, which discharges radiation and other toxics directly to the Schuylkill River diffuser, the Permit Does Not Specify How Much of Which Radionuclides or Other Toxics could be discharged from each of these discharge points, during routine operations much less leaks and spills - It is our conclusion that no one knows for sure.
- In fact, it is troubling that DEP has not required limits to be established for all toxics associated with Limerick's waste water.

### **Exelon's Plans To Run Limerick Nuclear Plant Harder and Longer Would Increase All Threats To The Schuylkill River Listed In This Report**

#### **➤ Limerick Upgrades Increase Water Use and Water Pollution In The Schuylkill River**

Upgrades will use and pollute even more Schuylkill River water, adding to already alarming depletion of the river and dangerous concentrations of the dangerous toxics in Limerick's discharges.

#### **➤ Relicensing Limerick Would Extend and Increase Schuylkill River Water Depletion and Dangerous Water Contamination.**

##### **Limerick Nuclear Power Plant's license expires in 2029.**

- a. Depletion from Limerick Nuclear Plant operations, added to ever-increasing droughts, suggest people using the Schuylkill River for drinking water could experience shortages even before Limerick's license expires.
- b. The Schuylkill River had record low flows already in 1999.
- c. Every year Limerick continues to operate, the Schuylkill River will be depleted by 12 to 15 Billion Gallons more each year.
- d. Every year Limerick operates massive amounts of radioactive wastewater will be discharged into the Schuylkill River 24 hours a day, 365 days a year.
- e. Limerick will continue to discharge extraordinary amounts of toxics with its wastewater as long as Limerick operates.
- f. Clearly, pumping several billion gallons of unfiltered contaminated mine water into the river to supplement river flows to operate Limerick is not the answer.

#### **Exelon wants to operate Limerick Nuclear Plant 20 More Years After 2029 - until 2049**

What would the consequences be on the Schuylkill River and Drinking Water? How can the Schuylkill River possibly continue to be a safe and usable drinking water source for the almost 2 million who need it?

In summary:

After ACE's review of Limerick's NPDES Permit and Exelon's Radiological Monitoring Report to NRC, it appears we could be witnessing a drinking water disaster in the making.

Attached documents should make clear why we have come to believe Limerick Nuclear Plant is the worst threat to drinking water we investigated in over 15 years.

Even more alarming, threats to drinking water could dramatically increase this year if Exelon's current requests to DEP, DRBC, and NRC are approved.

This report details why we have become more alarmed than ever about Limerick Nuclear Plant's role in future drinking water shortages and water too poisoned to safely be used.

Decisions will be made soon. Two million people need NRC's attention to this.

➤ **We urge you to review and give full consideration to the information we are provided to you for the EIS.**

#### **Toxic Discharges - Four Times Safe Drinking Water Standards**

Exelon has asked DEP to **double other toxic discharge limits** into the Schuylkill River to **FOUR times Safe Drinking Water Standards**. This will **cost water treatment systems more** (including Phoenixville, Aqua PA, American Water Works, and Philadelphia only 21 miles away), to treat water drawn from the Schuylkill River. Ultimately their water customers will pay more, a real hardship for many in this economy. Exelon could avoid increased costs for water systems and their customers by filtering Limerick's discharges. Limerick violated its permit limits in 13 of 16 samples in 2009-2010, up to almost FIVE times Safe Drinking Water Standards.

- **DEP should require filtration**, instead of drastically increasing Limerick's permit limit. If Exelon refuses, DEP should levy significant fines on Exelon for all past, present, and future Limerick violations until filtration looks like a bargain. Either Exelon pays to filter or the public pays with their health and pocketbook. Exelon is making a fortune operating Limerick and should not force the public to pay more for water.

#### **24 Discharge Points - 23 End Up In The Schuylkill River**

As you know, since 2006, we have been concerned about unfiltered toxic mine water pumping into the Schuylkill River by Exelon to supplement the flow of the Schuylkill River to operate Limerick Nuclear Plant. We still are, but that threat is amplified by magnitudes as a result of Limerick Nuclear Plant's shocking toxic discharges to the river from the Limerick site itself. Up to 194,000 pounds of toxic, corrosive chemicals are used EVERY DAY at Limerick in the cooling towers and other liquid storage areas. They don't disappear. Much of it ends up in water discharges. There are 24 discharge points from Limerick - nine into the Schuylkill River - 14 into Possum Hollow Run which eventually flows into the Schuylkill River. See attachment for details.

#### **Radioactive Surface and Groundwater**

There are **radioactive drinking water threats** from Limerick Nuclear Plant's radioactive wastewater discharges into the Schuylkill River 24 hours, 7 days a week, 365 days a year. Radiation is not being filtered out at water treatment plants. Testing confirms many radionuclides are in the water and fish. **Radioactive leaks and spills have contaminated groundwater at Limerick**, confirmed by Exelon's own testing. And it's not just Tritium, though that would be bad enough. Even with inadequate monitoring controlled by Exelon, 15 of 15 monitoring wells detected beta radionuclides. See attachments for details.

There are ways to minimize Limerick's extraordinary threats to drinking water. ACE believes if action is taken immediately before decisions are made this year on all Exelon's requests, the public's risks and costs related to

drinking water can be reduced. But that will take willingness to face the facts and courage to take action. We have made suggestions for actions needed by each agency making decisions that impact drinking water in the future.

1. DEP should deny Exelon's request for doubled increases in TDS limits (increases four times higher than Safe Drinking Water Standards) in Limerick's NPDES permit, and instead require filtration of Limerick's discharges, to avoid increased costs to water treatment systems and their customers from Limerick to Philadelphia.
2. DEP should deny Exelon's request in Limerick's NPDES permit and DRBC should deny Exelon's request in the Docket, to eliminate temperature restrictions. This can avoid permanent damage to Schuylkill River ecosystems and minimize threats to the public who use the river for recreation.
3. DRBC should deny Exelon's Docket Requests to pump more unfiltered contaminated mine water into the Schuylkill River. If Exelon wants to continue to pump toxic mine water into a drinking water source to operate Limerick, then Exelon should be required to filter the mine water first.
4. DRBC should say NO to Exelon's requests to reduce low flow restrictions and reduce monitoring requirements. Low flows concentrate toxics which are discharged into the river.
5. NRC should say NO to relicensing Limerick Nuclear Plant for 20 more years, until 2049, based on what will happen to drinking water for almost two million people.
  - A. Each year Limerick continues to operate, the Schuylkill River will become more depleted and more poisoned. Limerick Nuclear Plant should be closed when its 40-year license expires in 2029. The longer and harder the plant is run, the more risk there will be for water shortages and water too poisoned to be used safely, for almost two million people from Pottstown to Philadelphia.
  - B. Risks increase dramatically for more radioactive leaks into groundwater with every year Limerick operates. There are countless opportunities for more radioactive leaks into groundwater from the miles of buried pipes under Limerick continuously carrying highly radioactive and corrosive fluids. Leaks could go undetected in the aging and corroding pipes for long periods of time, spreading further and making even more drinking water wells radioactive.

Without at least a year of comprehensive, independent monitoring, testing, and reporting, it is impossible to determine the extent of damage to water in the future. Regulatory agencies are irrationally making decisions based on estimates.

Approvals of Exelon's requests could lead to a drinking water crisis. This needs immediate attention. We ask both for your suggestions and help to protect the drinking water in the Schuylkill River for almost two million people from Pottstown to Philadelphia, as well as hundreds of well owners around Limerick and in bordering townships.

Considering the current financial constraints at DEP, we have not requested a formal on-the-record public hearing for Limerick Nuclear Power Plant's NPDES Permit Renewal. But, we have sent DEP a long list of concerns, questions, and requests which we believe need to be answered to obtain full disclosure on the issues critical to drinking water for almost two million people from Pottstown to Philadelphia.

**To date, we failed to get a detailed written responses to all concerns, questions, and requests to our detailed comments .**

# **How Many Years Can This Be Safe?**

**More Contamination + More Depletion = Drinking Water Disaster**

**The Evidence Suggests NRC Must Close Limerick Nuclear Plant To Save The Schuylkill River, A Vital Drinking Water Source For Almost 2 Million People From Pottstown To Philadelphia**

## **To Summarize Limerick Nuclear Plant's Major Threats and Harms:**

1. **Radioactive Discharges 24/7**
2. **Heated Discharges 24/7**
3. **Drastic Increases In Other Toxic Discharges From Limerick**
4. **More Pumping Of Contaminated Unfiltered Mine Water Into The River To Supplement The Flow To Operate Limerick**
5. **Schuylkill River Depletion Through Massive Water Withdrawal and Use by Limerick's Cooling Towers.**
6. **Exelon Wants To Minimize and/or Eliminate Safeguards**
  - (1) Eliminate Temperature Restrictions
  - (2) Lower Flow Restrictions
  - (3) Reduce Monitoring
  - (4) Eliminate Public Participation

Compiled by ACE, The Alliance For A Clean Environment 10-26-11

**Limerick Nuclear Plant is slowly destroying the Schuylkill River, a vital drinking water source for almost two million people from Pottstown to Philadelphia.**

Exelon, owner of Limerick, has a license to operate until 2029. They have asked the Nuclear Regulatory Commission to operate until 2049. Ironically, before Limerick Nuclear Plant was built, it was clear the Schuylkill River could not sustain Limerick's water needs. That is why a pipeline was required to bring water from the Delaware River to the nuclear plant, but it was not nearly enough.

The facts are clear. The Alliance For A Clean Environment reviewed dockets and permits that should make clear to anyone the unprecedented threats and harms to the Schuylkill River caused by Limerick operations. Testimony, obtained by ACE through FOIA, from Limerick's original public hearing prior to construction, shows people knew the Schuylkill River could NOT sustain the damage from Limerick Operations. Yet, Limerick was licensed for 40 years, until 2029. Now Exelon wants to operate Limerick 20 more years, until 2049. That is an unacceptable risk to almost 2 million people who need the river for drinking water.

Each year Limerick operates, the river will become more depleted, and more poisoned with radiation, other toxics from Limerick, and contamination from unfiltered mine water to supplement the flow to operate Limerick. Due to depletion from Limerick's cooling towers and contamination from its unparalleled toxic discharges, it is not clear if there will be enough safe drinking water even until 2029 when Limerick's license should expire.

Exelon asked PA DEP for permit increases that will further jeopardize public health and eventually cost water treatment systems and their customers more for their water. Exelon asked the Delaware River Basin Commission (DRBC) for permission to ignore low flow and heat restrictions, and to add more toxic water from more mines.

There is much at stake for almost two million people who need the water in the Schuylkill River to survive. Decisions will be made within this year. Questions you need to ask yourself:

- ✓ Whose water is it?
- ✓ Is Exelon entitled to continue to use and pollute the river for profit for another 20 years after Limerick's license runs out in 2029, while seriously jeopardizing a vital water source for so many people and other businesses?
- ✓ Are you willing to stand by while the Schuylkill River is being dedicated to the nuclear plant?

Exelon has been buying silence and support from elected officials and large organizations, regardless of Limerick's unprecedented threats to the Schuylkill River. In fact, an Astroturf group was formed in the last few years, the PA Energy Alliance. Its main function is to promote nuclear power in PA. They help Exelon deceive residents, while Exelon gets permits to poison the air and water even more.

**Harms are clear.** Yet, the Schuylkill River Heritage Foundation, under the direction of Kurt Zwilk, is one shameful example of an organization that should be protecting the Schuylkill River, but for Exelon's donations instead turns a blind eye to the unprecedented harms to the Schuylkill River from Limerick's operations. They shamelessly help Exelon make deceptive claims they protect the river. Limerick clearly does far more harm than any benefits that their donations provided.

- Tim Fenschel - Schuylkill River Heritage Member, Testified To NRC 9-22-11 In Pottstown, In Support Of Limerick Relicensing Until 2049, Valuing Exelon Donations Over The Health and Safety of The River And People Using It.

## **LIMERICK NUCLEAR POWER PLANT IS CAUSING UNPRECEDENTED HARMS**

**Agencies that are supposed to protect the river failed to do that.**

- **The only way to save the Schuylkill River is to close Limerick Nuclear Plant when its current license expires in 2029.**

1. HARMS WERE NEVER INDEPENDENTLY MONITORED OVER TIME.
2. ADDITIVE, CUMULATIVE, SYNERGISTIC HARMS FROM 1985 TO DATE, HAVE NEVER BEEN EVALUATED.
3. BEFORE AN UPDATED EIS IS ISSUED, THAT MUST BE DONE.
4. IF THERE IS NO FUNDING FOR COMPREHENSIVE INDEPENDENT TESTING OF ALL HARMS TO THE RIVER, THEN LIMERICK MUST BE CLOSED.

## **Evidence Shows We Don't Need Limerick Nuclear Plant's Electric.**

Evidence shows there is no need to relicense Limerick and continue this destruction of the Schuylkill River. ACE is providing NRC with a packet showing how solar and wind power can provide viable clean, safe, base load power for our future. Exelon employees can and should start to be retrained to provide energy efficiency and transition to safe, cheaper greener technologies.

# **Limerick Nuclear Plant's Current License Expires In 2029 Exelon Want To Operate Limerick 20 More Years To 2049**

## **WHY WOULD NRC ALLOW 20 MORE YEARS WHEN A VITAL DRINKING WATER SOURCE IS AT STAKE?**

### **PROBLEMS: Every Day Limerick Operates The Schuylkill River Becomes:**

- ✓ More Radioactive And More Heated
- ✓ More Contaminated With Many Other Dangerous Toxics
- ✓ More Depleted From Cooling Towers
- ✓ More Dangerous From Concentrations of Toxics

### **Every Day Limerick Operates Drinking Water Is More At Risk!**

- ✓ Radioactive Discharges 24/7
- ✓ Other Dangerous Toxics Discharged 4 Times Safe Drinking Water Standards
- ✓ Cooling Towers Are Significantly Depleting The River, Even After Supplementation
- ✓ Depletion Concentrates Radiation and Other Toxics

### **Health Threats and Costs Will Keep Increasing For Water Customers Of:**

- ✓ Pottstown
- ✓ Phoenixville
- ✓ American Water Works
- ✓ Aqua PA
- ✓ Philadelphia

**Health Threats:** Exelon, Limerick's owner, asked DEP to drastically increase the pollution Limerick discharges from Limerick and asked DRBC to add more contaminated mine waters to the river to supplement the flow for Limerick. Water treatment companies do not continuously monitor for all radionuclides associated with Limerick Nuclear Plant energy production, nor do they filter for them. They also do not monitor and report on, or filter out, all toxics in mine waters. In fact, water companies largely treat water with more toxics.

**Costs:** Chemicals used to treat the water are costly. Some toxics released from Limerick and metals released with mine water can damage water treatment equipment. Limerick's increased pollution into the river will eventually cost water treatment systems and their customers more money.

Look At Reality - Threats and Harms Will Increase Based On Exelon's Current Requests:

#### **Exelon Asked To:**

- ✓ Eliminate Low-Flow Restrictions
- ✓ Raise Temperature Restrictions
- ✓ Reduce Monitoring Requirements
- ✓ Eliminate Public Participation

#### **Harms And Threats Will Increase From Increasing Water Use and Hazardous Discharges:**

- ✓ Water Depletion
- ✓ Water Contamination
- ✓ Concentration of Toxics
- ✓ Public Health Threats
- ✓ Higher Costs For Water
- ✓ Harm To Wildlife Drinking The Water
- ✓ Ecosystem Damage From Limerick's Heated and Radioactive Discharges

## **Harms Impact Ecosystems, Fish, Wildlife, And Recreation** **8 Exelon Requests To DRBC Are Listed Below**

### **If Approved, They Can Lead To A Drinking Water Disaster**

#### **Comments That Follow Each Are Based On ACE's Intensive Investigation**

1. **Massive Water Withdrawal From The Schuylkill River For Limerick Nuclear Power Plant Operations**  
56.2 Million Gallons Per Day = 20,513,000,000 Gallons Per Year
  - Limerick Nuclear Power Plant's extraordinary water withdrawal is depleting the public water supply.
2. **Continued Discharge of Radioactive and Heated Water From Limerick Nuclear Plant**  
14.2 Million Gallons Per Day = 5,183,000,000 Gallons Per Year
  - Only ¼ of Limerick's water withdrawal is returned to the river – and that is radiated and heated.
  - This is a major threat to Philadelphia's water supply and quality.
3. **Reduce Low-Flow Restrictions**
  - Concentrations of contaminants pumped into the river increase as flows decrease.
4. **Modify Monitoring Requirements**
  - Safeguards related to Exelon's Demonstration Project are already inadequate, with no truly independent public interest oversight.
  - Reducing Exelon's monitoring requirements, while allowing Exelon to increase threats is a recipe for disaster.
5. **Eliminate Temperature Restrictions**
  - Temperature restrictions are an important safeguard for the health of the Schuylkill River ecosystems.
  - Comprehensive independent monitoring is imperative before any decision is made to eliminate temperature restriction. Evidence suggests Exelon's testing and claims must be independently verified to protect the public's interests.
6. **Continue UNFILTERED PUMPING of Billions of Gallons Each Year Of Contaminated Wadesville Mine Water In the 6 Lowest Flow Months (May to October)**
  - Over 6 Billion Gallons of contaminated Wadesville Mine Water were pumped into the river at 24,300 Gallons Per minute, 24 hours per day, during the 6 lowest flow months of the year, each year. It started in 2003.
  - There are obvious harms, a fact admitted by Exelon, stating there is "little harm". However, there has still never been a comprehensive independent study to determine the extent of harm. The testing protocol and data are controlled by those with a vested interest in the outcome.
7. **More Contaminated UNFILTERED Water Added From Other Mine Pools**
  - Additive, cumulative, and synergistic harms over time from adding more and more contaminated mine water to a river that is continuously being depleted are unavoidable and could result in devastating consequences.
  - Before allowing more mine pools to be pumped into the source of drinking water for over 1 ¾ million people, there must be a comprehensive study of what has already happened, and predictions of what could happen in the future, by an independent public interest expert.
8. **Eliminate Public Participation In Future DRBC Decisions**
  - As additional contaminated unfiltered mine waters would be added to the Schuylkill River by Exelon, all future decisions would be made exclusively by the head of DRBC.

**DRBC Approval Of Exelon's Requests Would Allow Increased Pollution While Reducing Safeguards**

## To Protect The Schuylkill River, A Vital Public Drinking Water Source:

1. Exelon Must FILTER Mine Water It Pumps Into The Schuylkill River
2. DRBC Must DELAY APPROVALS Until Completion Of A Comprehensive Independent Study, To Determine Past, Present, and Future Harms, Followed By An On-The-Record Public Hearing

PROBLEM: DRBC Ignores The Serious and Obvious Threats At The Public's Expense. In Reality:

- ✓ The public's water supply is not being protected by those with a mission and expectation to do that. DRBC and DEP are just as responsible for harms to date. They both promote and defend Exelon's unfiltered pumping of contaminated mine water into the river and fail to provide adequate oversight.
- ✓ Toxics continuously pumped into the river at 24,300 gallons per minute over six months with mine water do not magically disappear through dilution. DILUTION DOES NOT REMOVE TOXICS.
- ✓ Exelon is choosing to pollute the Schuylkill River, a vital public drinking water source for Almost Two Million People From Pottstown to Philadelphia, when Exelon can and should filter the mine water to prevent harm.
- ✓ PRIOR to pumping contaminated mine water into the Schuylkill River, DRBC and DEP can and must require Exelon to use the most effective filtration to attempt to meet "Safe Drinking Water Standards".
- ✓ Harms to the Schuylkill River will increase if DRBC approves Exelon's requests, yet the harms are being ignored because Exelon donates to a fund which results in a deceptive tactic claiming to restore the river, while they are destroying it. Donations do not negate harms caused by Exelon's pumping of billions of gallons of contaminated mine water into the river.

**DRBC can and must stop the intentional contamination of the Schuylkill River and shifting the burden of costs to the public.**

### DRBC / DEP Have Failed To Protect The Schuylkill River

- A 1997 Report Shows These Agencies Allowed The Schuylkill River To Be A Toxic Dumping Ground:  
***"Poisoning Our Waters; How the Government Permits Pollution"***
- The Schuylkill River Has Already Become Highly Contaminated.  
**In 1997, The Schuylkill River Already Ranked 11<sup>th</sup> In The Nation, In RECIEVING TOXIC CHEMICALS,**

## **HOW LONG WILL THE SCHUYLKILL RIVER REMAIN A SAFE VIABLE DRINKING WATER SOURCE?**

- Will There Be Enough Safe Drinking Water Until 2029 When Limerick's Current License Expires? What Will Happen After 5, 10, or 15 Years With Over 12 Billion Gallons More of Depletion Each Year?
- How Can The Schuylkill River Continue to Sustain Limerick's Depletion and Contamination and Remain A Safe Usable Source of Water?
- Is NRC Willing To Allow This Vital Drinking Water Source to be Dedicated to Operating Limerick Nuclear Plant?
- Should Water Treatment Systems and Their Customers Have To Pay More To Attempt to Make Water Safer?
- Even if damage could be remediated, and that is not likely, who would pay for damage to the river and ecosystems? **Taxpayers And/Or Ratepayers?**

### **The Schuylkill River Is At Risk As Are All Who Need It For Survival**

- **PRECAUTION IS IMPERATIVE! Relicensing Would Be Negligent!**  
Limerick Nuclear Plant's Unprecedented Harms and Threats to the Schuylkill River Must Be Ended. The Only Way To Eliminate The Grave Threats and Harms Is To Close Limerick.

### **RADIOACTIVE RISKS WILL INCREASE EACH YEAR AS LONG AS LIMERICK OPERATES! IT MUST BE CLOSED!**

- Limerick will continue to discharge over 5 billion gallons of radioactive wastewater each year into the Schuylkill River until they close, scheduled in 2029 (90 Billion Gallons More). Radioactive impacts are additive, cumulative, and synergistic. Some radionuclides remain in the environment for many years.
- Limerick Nuclear Plant depleted the Schuylkill River each year by about 12 to 15 billion gallons, withdrawing 20 billion gallons and only returning 5. Limerick opened in 1985. By 1999, it reached record low flows.
- Low Schuylkill River flows concentrate radiation discharged into the river.

# **Iodine-131 Found In Philadelphia Water**

## **Why Limerick Nuclear Plant Is The Major Source Of Radiation In Philadelphia's Drinking Water**

### **LIMERICK NUCLEAR PLANT DISCHARGES RADIOACTIVE WASTEWATER INTO THE SCHUYLKILL RIVER**

**24 Hours A Day - 7 Days A Week - 365 Days A Year**

**14.1 Million Gallons Per Day - 5 Billion Gallons Per Year**

Limerick Sources Of Radioactive Discharges Include:

Spray Pond - Holding Pond - Closed Cooling Water Loops - Treated Radwaste

- **Philadelphia is downstream from Limerick's continuous radioactive discharges into the Schuylkill River (just over 20 miles) and draws drinking water from the Schuylkill River.**
- **The half-life of IODINE-131, the radionuclide tested and detected in Philadelphia drinking water at the highest levels found in the nation, is 8 days, far longer than the time it takes Limerick's discharges to reach Philadelphia.**
- 5 of the highest readings for radioactive iodine in the U.S. were found in Philadelphia drinking water supply.
- The EPA says the most common source of Iodine-131 is from the "fission of uranium atoms during operation of nuclear reactors".
- Testing was done nationwide in the spring of 2011, in connection with the Fukushima meltdowns. But Fukushima, nor any other source, while potentially contributing factors, cannot explain radiation detected at the highest levels in the nation in Philadelphia's drinking water. The elephant in the room is clearly Limerick.
  - ✓ Iodine-131 is listed in Exelon's own Radiological monitoring report for Limerick, in both water and fish.
  - ✓ Radiation was already detected in Philadelphia water in 2007, before Fukushima.

# Exelon's 2009 Radiological Report to NRC - For Limerick Nuclear Power Plant

## In WATER - 12 Different Radionuclides Were Reported

		<sup>1/2</sup> Life	
1.	<b>Iodine I-131</b>	<b>8</b>	<b>Days</b>
2.	Cesium Cs-134	30	Years
3.	Cesium Cs-137	30	Years
4.	Manganese Mn-54	314	Days
5.	Zinc Zn-65	250	Days
6.	Cobalt Co-58	70	Days
7.	Cobalt Co-60	70	Days
8.	Zirconium Zr-95	65	Days
9.	Iron Fe-59	46.6	Days
10.	Niobium Nb-95	35	Days
11.	Barium Ba-140	13	Days
12.	Lanthanum La-140	40	Hours

## In FISH - 9 Different Radionuclides Were Reported

1.	<b>Iodine I-131</b>	<b>8</b>	<b>Days</b>
2.	Cesium Cs-134	30	Years
3.	Cesium Cs-137	30	Years
4.	Manganese Mn-54	314	Days
5.	Zinc Zn-65	250	Days
6.	Cobalt Co-58	70	Days
7.	Cobalt Co-60	70	Days
8.	Iron Fe - 59	456.6	Days
9.	Potassium K-40	1	Day

Note: The Hazardous Life of a Radioactive Isotope is Ten to Twenty Times its Half-Life  
Reality: Synergistic, Additive, and Cumulative Harmful Impacts Are Obviously Significant  
Problems: Many Radionuclides go Unreported and Unmonitored - Sampling Is Woefully Inadequate and Controlled by Exelon, a Company that Can't Be Trusted

## Iodine-131 Found In Philadelphia Water



Scott Bomboy MyFoxPhilly.com

PHILADELPHIA - New data released by the EPA show three of the five highest readings for radioactive iodine in the U.S. are in the Philadelphia drinking water supply.

A blogger on Forbes first spotted the data on Sunday in a database of water tests posted on the EPA Web site.

**Read All Findings at** / [www.epa.gov/japan2011/rert/radnet-sampling-data.html#water](http://www.epa.gov/japan2011/rert/radnet-sampling-data.html#water)

The EPA site shows the effects of the Fukushima nuclear accident on American supplies of milk and water.

The EPA said in a previous statement "detections in air, precipitation, and milk were expected, and the levels detected have been far below levels of public-health concern."

However, some scientists don't agree with the EPA guidelines on radiation. The Physicians for Social Responsibility, a prominent anti-nuclear group, believes there is no safe level of exposure to radiation .

The EPA says the most common source of Iodine-131 from the "fission of uranium atoms during operation of nuclear reactors and by plutonium (or uranium) in the detonation of nuclear weapons."

The newest data release has samples from 66 sites across the U.S. and 21 sites picked up traces of Iodine-131 in the water supply.

The sample from Philadelphia's Queen Lane Treatment Plant showed 2.2 picoCuries per liter—the highest drinking-water level shown in the U.S. after the Fukushima accident.

**Latest EPA Data: Iodine-131 Levels In Drinking Water**

## **Limerick Nuclear Plant, The Obvious Major Source Of Radiation In Philadelphia Drinking Water**

**Letter to Philadelphia Inquirer**

**Radiation confirmed in Philadelphia drinking water is no surprise to us.**

**Limerick Nuclear Power Plant, just 21 miles away, discharges radioactive wastewater into the Schuylkill River, 24 hours a day, 365 days a year, confirmed in Limerick's NPDES permit renewal application to PA DEP.**

**Iodine-131 is just one radionuclide discharged with Limerick's 5 billion gallons of radioactive wastewater annually.**

**Recently we sent a summary packet to Chris Crockett, Philadelphia's acting deputy commissioner for Philadelphia's Water Department. It identified serious concerns and questions based on our review of Exelon's NPDES permit for Limerick Nuclear Plant and related harms to Schuylkill River water quality and quantity.**

**A few years ago we met with Chris Crockett's staff about Limerick Nuclear Plant's harmful impacts on Philadelphia water, including depletion, which concentrates Limerick's radioactive discharges.**

**We were surprised that the Inquirer reported 4-12-11, that Crockett said he was unsure how long it would take to determine the reason for relatively high [radiation] levels found. Harmful radiation impacts from Japan and other sources are additive, cumulative, and synergistic to Limerick's serious threats to Philadelphia water.**

Chris Crockett should be commended for adding carbon filtration at the Queen Lane plant. However, Exelon should pay, rather than Philadelphia taxpayers.

Dr. Lewis Cuthbert, President  
Alliance For A Clean Environment  
aceactivists@comcast.net

## **DRASTIC INCREASES REQUESTED IN Limerick Nuclear Plant's NPDES Permit For Total Dissolved Solids (TDS) Discharges**

### **Exelon Wants DEP To Allow:**

#### **➤ 4 Times Safe Drinking Water Standards**

500 mg/l	<b>Safe Drinking Water Standard</b>
1,000 mg/l	<b>Current Limit</b>
2,000 mg/l	<b>Exelon's Request</b>

#### **How Could That Impact The Public?**

- Higher Costs - For Drinking Water From Schuylkill River
- Increased Health Threats - From More River Pollution

## **LIMERICK VIOLATED NPDES PERMIT LIMITS**

### **➤ Limerick Nuclear Plant Violated Its NPDES Permit Limit for TDS: 13 of 16 Samples Violated Permit Limits (2009 - 2010) Violations Were Up To 5 Times Safe Drinking Water Standards**

TDS sampling shows at times Limerick would violate even the newly requested permit limit of 2000 mg/l, especially in the hottest, lowest flow seasons of the year.

One Example of Exelon's TDS sampling data shows why filtration is imperative: Limerick's Daily Volume of TDS into the Schuylkill River from just one sample from one discharge pipe (Outfall 001) reached 2,419 mg/l

### **➤ Exelon Should Be Fined, Not Getting Increased Permit Limits**

Exelon's Assertion That Limerick's TDS Violations Are An Excuse To Demand Increased TDS Permit Limits Is Both Outrageous and Unacceptable. Limerick Nuclear Plant's TDS VIOLATIONS Should NOT Be Justification To INCREASE Limerick's NPDES Permit Limit Into A Public Water Source Where Water Treatment Companies Must Meet the 500 mg/l Drinking Water Standard.

- That's 5 TIMES Safe Drinking Water Standards.
- In heat and drought conditions wouldn't DEP expect even the new limit of 2,000 mg/l to be violated?
- How much will drinking water companies have to pay to treat that water to reach the 500 mg/l TDS limit for the water they sell their customers?
- How much more will customers pay for their water because of DEP increasing TDS limits at Limerick?
- Exelon admitted Limerick's current 1,000 mg/l TDS limit is not being met and that at times blowdown contains greater than 2,000 mg/l TDS.

➤ **Exelon Should be Required to Filter Its Waste Water Discharges for TDS.**

The only solution to prevent unnecessary harm and costs to the public from massive TDS discharges from Limerick, is to require FILTRATION for TDS discharges into the Schuylkill River.

1. If Exelon Refuses To Provide Filtration, DEP Should Levy Significant Fines For All Past, Current, and Future Violations.
2. Fines and Interest for Non-Payment Should Continue Until Exelon Agrees To Provide Filters to Meet Current NPDES Limits for TDS. Even Current Limits Already Double Safe Drinking Water Standards.
3. Limerick's excessive TDS discharges obviously contribute to increased costs for treatment and removal at water treatment systems. Exelon either pays for filtration of their TDS waste water discharges as a cost of doing their business, or the public pays in the end.
4. DEP should examine all past sampling data to determine the extent of past TDS Permit Limit Violations, then FINE Exelon for each and every NPDES permit violation for TDS, according to the extent of the violation. Fines from past violations could pay for split sample testing.
5. To justify the requirement for filtration, ACE urges DEP to do split sampling during June, July, August, and September of 2011, when TDS levels could be the highest. We believe this is the only way to have reliable, trustworthy data to determine actual TDS discharges from Limerick nuclear Plant.

Exelon claims the majority of Limerick's TDS permit violations are attributable to TDS in Limerick's Schuylkill River water intake. That appears to be disputed by data in Exelon's own permit application data.

**Exelon's own data suggests Limerick's additions to TDS are over 2,000 mg/l.**

Exelon's Analysis Results Table - Pollutant Group 1 - Module 4

Limerick Outfall 001	Maximum Daily TDS	-	Concentration 2,419	-	Mass 286,458
Schuylkill River Intake	Maximum Daily TDS	-	Concentration 403	-	Mass 188,976

**Wouldn't TDS produced at Limerick hold and concentrate radionuclides and other toxics associated with Limerick's operations?**

That could increase health threats as well as costs to water treatment plant customers beyond Limerick, as well as all who use the river for recreation.

➤ **Harmful Long-Term Consequences From TDS Violations and Future Increases Need To Be Fully Understood and Disclosed PRIOR to issuance of the NPDES permit.**

1. Do Limerick's other toxics concentrate in Total Dissolved Solids, including the wide range of long-lived radionuclides discharged from various underground radioactive liquid discharge pipes at Limerick?
2. If so, is that a consideration if TDS permit limits were dramatically increased?

3. Has DEP considered all the actual health, environmental, and financial costs to the public from the synergistic, additive, and cumulative toxic impacts from Limerick's TDS discharges over 25 years? Or what the impacts could be to the public if increased TDS limits were approved?

#### **Who is in charge of these important decisions? DEP or DRBC?**

Item 8 of Permit Reference Page 33 suggests to us that Exelon has attempted to manipulate DEP into allowing DRBC to make NPDES decisions. Exelon is attempting to have DRBC regulate NPDES limits, instead of DEP.

- June 14, 2010 DEP/Exelon had a pre-application meeting. ACE requested minutes from the meeting but never received them.

#### **PA DEP NPDES Permit Renewal - PM 10 Issues**

- In Limerick's Title V Permit Renewal TVOP-46-00038, Exelon requested PA DEP a huge increase in blowdown water from 1,256 ppmw to 10,000 ppmw for each cooling tower.
- Reason according to Exelon: Limiting blowdown TDS to 1,256 for each cooling tower restricts particulate matter (PM) and creates an unnecessary risk to Limerick for noncompliance.
- "PA DEP Air Quality Bureau will not set the limit on TDS concentration for the blowdown entering Outfall 001, since this is a Water Quality issue."
- "A calculation was made in the Technical Review Memo for the Title V Renewal to demonstrate that a TDS concentration of 10,000 ppmw in Outfall 001 would still demonstrate compliance with requirements." "Exelon/Limerick already performs weekly 240-hour composite samples of the blowdown from the cooling towers."
- **DEP changed the language of the permit so that Exelon complies with both Air Quality and Water Quality requirements.**

### **Exelon's Mine Water Pumping For Limerick Increases Schuylkill River TDS Levels. Scientific studies pinpoint mine drainage as a major source of total dissolved solids.**

Exelon's massive mine water pumping into the Schuylkill River since 2003, to supplement the river flow for Limerick operations, has contributed to higher levels of TDS in the Schuylkill River.

1. Exelon is trying to get approval to pump more and more mine water into the Schuylkill River to operate Limerick. Over time, won't that increase total dissolved solids problems at Limerick's intake, as well as problems and costs for every water treatment plant from Pottstown to Philadelphia?
  2. What were the TDS levels in Limerick Nuclear Plant's withdrawals from the Schuylkill River BEFORE mine water pumping started in 2003?
  3. Since mine water pumping started, we understand TDS levels increased at the Pottstown WWTP.
  4. Has DEP compared TDS intake at Limerick, before and after 2003?
- **Independent data is needed, to compare TDS levels prior to 2003 with 2011 TDS data over June, July, August, September, and October. DEP should fine Exelon for Limerick's 2010 TDS violations at Limerick to pay for split sampling.**

### **Doubling Limerick's Current TDS Limits Would Be Negligent.**

In summary, the ACE Rationale for DEP to DENY Exelon's Request to Raise TDS Limits in Limerick's NPDES Permit and for DEP to INSTEAD REQUIRE Exelon to Filter both intake and discharges for TDS is based on two major points.

#### **1. INCREASED AIR POLLUTION**

In essence, DEP admitted that raising TDS limits will result in INCREASED PM-10 emissions from Limerick's cooling towers. Without a doubt this will cause INCREASED THREATS TO PUBLIC HEALTH.

- To protect public health DEP should be requiring reductions in PM-10 emissions through TDS filtration, not allowing circumstances that lead to potentially an 8 times higher increase in PM-10 emissions.

2. **INCREASED COSTS TO PUBLIC WATER TREATMENT SYSTEMS, AND ULTIMATELY THE PUBLIC.** Higher TDS limits for discharges into the Schuylkill River from Limerick will eventually result in increased costs to water treatment systems from Limerick to Philadelphia.
- Public water costs will increase for customers. In these hard economic times, that is unacceptable. Either Exelon pays to filter out TDS from Limerick's discharges, or public water customers pay later.
  - DEP must stop shifting the burden for the astronomical costs of pollution onto the public, especially in such hard economic times.

Exelon makes billions of dollars in profits each year. Its CEO makes millions. Exelon can afford to filter Limerick's intake and discharges for TDS out of enormous profits and bonuses.

### **Limerick Nuclear Plant Has 24 Discharge Points From The Site**

- 9 Into Schuylkill River
- 14 Into Possum Hollow Run - Which Also End Up In The Schuylkill River
- 1 Into Sanatoga Creek

**Over 94,000 to 192,000 Pounds of Toxic and Corrosive Chemicals Are Added Every Day To: Cooling Towers, Spray Pond Raw Water, Other Systems.**

- **These chemicals do not disappear. Many end up in the wastewater, and possibly other discharge points into the river, yet not all discharge points are continuously monitored for all hazardous chemicals used at Limerick Nuclear Plant every day.**

### **If Exelon Wants To Continue To Operate Until 2029, Exelon Should Start To Filter All Wastewater Discharges!**

#### **What Happens In Drought?**

- PA Experienced Droughts 4 of 6 Years by Late 1900s
- Water Was Rationed for Citizens, But Not For Limerick Nuclear Plant

#### **What Happens From Limerick's Increased and Continued Depletion?**

1. Limerick Uprates Will Require More Water
2. Limerick Relicensing Would Continue Schuylkill River DEPLETION 20 Years Longer

### **PROOF: "Water Is Life" - DEP Booklet**

- **Schuylkill River Flow Reached Record Low Levels In 1999 - 14 Years After Limerick Started Operating**
  - Water Shortages Became More Frequent and Pronounced By The Late 90s!
  - Stream Flows and Groundwater Levels Reached All-Time Seasonal Lows

## **IN OUR VIEW**

**Limerick should not be able to continue to destroy a vital drinking water source for profit.**

**Limerick is requesting increases in dangerous pollution discharges, and at the same time trying to eliminate and minimize important safeguards.**

**Exelon says Limerick can't meet its current NPDES permit limits so it needs the limit to be raised to 4 times "Safe Drinking Water Standards". When this is a source of drinking water,**

- **Exelon should spend the money to filter the water to meet its current limit or close now.**

**Exelon says it wants to pump unlimited amounts of contaminated unfiltered mine water into the river to supplement the flow of the river to operate Limerick.**

- **Exelon makes a fortune operating Limerick. They claim to need to pump contaminated mine water into the river. If they won't pay to filter it first, Limerick should close now.**



**Limerick Nuclear Power Plant**  
**Discharges Into The Schuylkill River**  
**1/4 Of The Water It Withdraws**

**14.2 Million Gallons Per Day - Over 5 Billion Gallons Per Year**

**Limerick Nuclear Plant Discharges Are:**

**Radioactive Discharges**

- ✓ All Monitoring, Testing, and Reporting to NRC Is Done By Exelon - Sample Attached
- ✓ There's NO independent continuous monitoring for all potential radionuclides discharged, nor for compliance with Exelon's NPDES Radiation Discharge Permit Limits.
- ✓ There are also accidental radiation discharges, which could go undetected and/or not reported. Accidental radiation releases may not be completely verified or documented at all.
- ✓ Accurate filtering and monitoring technologies don't exist for some radiation reactor by-products
- ✓ Reactor detectors are set to allow radioactive water to be released if below "permissible limits"
- ✓ So-called "Permissible Limits" are based on outdated science and ignore additive, cumulative, and synergistic harmful impacts.
- ✓ Health Professionals from Illinois EPA have testified that there are big increases in leukemia and other cancers associated with Poisoned River from Nukes – Details attached
- ✓ A British study found Fish Kills in the Billions at Nuclear Plants – Details attached.

**Heated Discharges**

- ✓ Higher river temperatures can significantly harm the ecosystem, yet Exelon, the company with a vested interest in the outcome, is the only one assessing the harm.
- ✓ A picture of heated discharges from another nuclear plant is attached for clarity.

**Radioactive, Heated Discharges Can Clearly Jeopardize Schuylkill River Water Quality, Yet Exelon Is Asking DRBC To Reduce and/or Eliminate The Only Safeguards:**

- 1. Eliminate Temperature Restrictions**
- 2. Reduce Low-Flow Restrictions**
- 3. Reduce Monitoring**

**Approval of Exelon's requests must be denied to minimize harmful impacts to the Schuylkill River, the vital public water source all the way to Philadelphia.**

# Exelon

## Monitoring, Testing, Reports, or Claims

### About Limerick Nuclear Plant

### Harms And Threats To The Schuylkill River

# Can't Be Trusted

## Examples of Exelon Deception About Schuylkill River Water

### 1. Water Withdrawal Claims:

69 million gallons per day in 1970

30 million gallons per day in the news reported October 8, 2008

56.2 million gallons per day in previous and current DRBC dockets

### 3. Conflicting Claims About Water Amounts Emitted From Limerick's Cooling Towers:

35 million gallons per day in 1970

38,059,065 to 40,723,200 Gallons Per Day

(1/6/95 to EPA - Licensee Indicated Conservative Consumptive Flow Increase)

42 million gallons per day in current DRBC docket

35 million gallons per day - 1/06 Mercury and 6/17/08 to Pottstown

17.5 million gallons per day average use July 22, 2008 – Republican Herald

7 million gallons per day - October 8, 2008 – Mercury Special On Schuylkill River

### 2. Underreporting and Underpayment for Schuylkill River Water - Appears Evident in a 2007 Review - See ACE Report

**For A Credible Updated EIS, NRC Must Provide Comprehensive, Independent Year-Long Monitoring, Testing, and Reporting For All Potential Threats and Harms From 1985 to 2011.**

**Absent That, NRC Should NOT Relicense Limerick And Jeopardize The Drinking Water for Almost 2 Million People.**

DELAWARE RIVER BASIN COMMISSION  
P. O. BOX 360  
TRENTON, N. J. 08603

NOTICE OF PUBLIC HEARING

Notice is hereby given that the Delaware River Basin Commission will hold a public hearing on Thursday, July 16, 1970, in the South Auditorium of the American Society for Testing and Materials Building, 1916 Race Street, Philadelphia, Pa., beginning at 10 a.m. The subject of the hearing will be two proposed nuclear generating stations as described below. The purpose of the hearing is to receive testimony on the effects of these two projects on the water resources in the area.

Newbold Island Generating Station: An electric generating station proposed by Public Service Electric and Gas Company. Two generating units, each with an electrical capacity of 1,100,000 kilowatts, are scheduled for immediate construction on Newbold Island in Bordentown Township, Burlington County, New Jersey. Heat for the generation of steam will be obtained from nuclear fuel, utilizing the boiling water cycle. Cooling water drawn from the Delaware River will be provided for steam turbine condensers by a closed loop system utilizing four natural draft hyperbolic cooling towers, each approximately 400 feet high. Water requirements are estimated to be 153 million gallons per day, of which an average of 43 million gallons per day will be evaporated to the atmosphere. Groundwater withdrawals and foundation dewatering operations are to be undertaken during construction of the project.

→ Limerick Generating Station: An electric generating station proposed by the Philadelphia Electric Company. Two generating units, with an electrical capacity of 1,100,000 kilowatts each, are scheduled for early construction on the east bank of the Schuylkill River about two miles southeast of Pottstown in Limerick Township, Montgomery County, Pennsylvania. The nuclear system includes a single cycle, forced circulation boiling water reactor, producing steam for direct use in the steam turbine. Four hyperbolic, natural draft cooling towers, each approximately 400 feet high, will provide the necessary cooling. Two water intake structures are proposed, one on the Perkiomen Creek and one on the Schuylkill River. Water requirements are estimated at 69 million gallons per day, of which an average of 35 million gallons per day will be evaporated to the atmosphere. Delaware River water is proposed to be transferred to the Perkiomen Creek watershed by pipeline to augment flows and supply cooling tower makeup water at the proposed Limerick Generating Station.

Documents relating to the items listed for hearing may be examined at the Commission's offices. All persons wishing to testify are requested to register in advance with the Secretary to the Commission.

W. Brinton Whitall, Secretary  
(609) 883-9500  
June 29, 1970



Delaware River Basin Commission  
DELAWARE • NEW JERSEY  
PENNSYLVANIA • NEW YORK  
UNITED STATES OF AMERICA

## Delaware River Basin Commission

25 State Police Drive

PO Box 7360

West Trenton, New Jersey

08628-0360

Phone: (609) 883-9500 Fax: (609) 883-9522

Web Site: <http://www.drbc.net>

Carol R. Collier

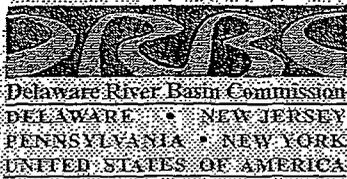
Executive Director

Robert Tudor

Deputy Executive Director

### NOTICE OF APPLICATIONS RECEIVED (NAR)

- Exelon Nuclear -- Limerick Generating Station D-69-210 CP-13. An application for the renewal with modifications of the Commission's past approvals of water resource operations at the applicant's nuclear powered Limerick Generating Station (LGS), located in Limerick Township, Montgomery County, Pennsylvania. The Commission's past approvals relating to the LGS consist of a series of dockets and resolutions dating from March 23, 1973 (D-69-210 CP) through October 27, 2004 (D-69-210 CP (FINAL) (Revision 12)). In accordance with the authority granted the Executive Director by one or more of these dockets, the project has also received several Executive Directive approvals, the latest of which, dated April 3, 2008, approved an extension of two LGS demonstration projects through December 31, 2008. Since 2003, the applicant has conducted the Water Supply Modification Demonstration Project and the Wadesville Mine Pool Withdrawal and Streamflow Augmentation Demonstration Project in conjunction with its water withdrawals. The applicant has requested docket modifications to provide long-term approval of operations and surface water withdrawals based on its experience gained during the two demonstration projects. The applicant has also requested consolidation of the Commission's various LGS-related approvals into a single comprehensive docket. The comprehensive docket would address the surface water withdrawals requested to meet consumptive and non-consumptive needs at LGS, and the surface water discharge to the Schuylkill River of up to 14.2 million gallons per day (mgd) of blowdown from the LGS facility. The applicant requests approval of a surface water withdrawal of up to ~~56.2 mgd~~ (42 mgd consumptive plus 14.2 non-consumptive) or 1.686 billion gallons per 30 days (bg/30) to supply the consumptive and non-consumptive needs of the LGS. This request does not represent an increase in the existing water withdrawal. The project water withdrawals are located in the Schuylkill and Delaware River watersheds. The withdrawals will be primarily from the Schuylkill River, as augmented by water from the Wadesville Mine Pool, the Borough of Tamaqua Water Authority's Still Creek Reservoir, and the East Branch Perkiomen Creek (augmented with water withdrawn from the Delaware River via the Point Pleasant Pumping Station and Bradshaw Reservoir.) The applicant has further requested that the docket provide the Executive Director with authority to approve alternate augmentation sources and has requested modifications to its existing dockets to incorporate into the single comprehensive renewal docket modified provisions of the demonstration projects. Among other things, the applicant is requesting that the Schuylkill River low flow restriction be reduced from 560 cfs with two units operating and 530 cfs with one unit operating, to 379 cfs with either one or two units operating; that the Delaware River remain an approved source of consumptive cooling water for LGS; that the Still Creek Reservoir and Wadesville Mine Pool remain approved Schuylkill River augmentation sources; that the limit for Still Creek releases to augment Schuylkill River flows for purposes of LGS operations be increased from 36 mgd to 43.3 mgd; that the temperature restriction of 59° F. applicable to Schuylkill River withdrawals be eliminated; that the 4-day/2-day travel time requirements for Schuylkill River augmentation sources be eliminated; that river and stream monitoring requirements be modified; and that the Restoration and Monitoring Fund be continued.



## Delaware River Basin Commission

25 State Police Drive

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Phone: (609) 883-9500 Fax: (609) 883-9522

Web Site: <http://www.drbc.net>

**Carol R. Collier**  
Executive Director

**Robert Tudor**  
Deputy Executive Director

### NOTICE OF APPLICATIONS RECEIVED (NAR)

The Commission recently received applications from the sponsors of the following projects for approval pursuant to Section 3.8, Article 11, and/or Article 10.3 of the *Delaware River Basin Compact*. These projects currently are under review by the Commission staff in consultation with other public agencies. Individuals or organizations having a special interest in any projects or information relating to a project's impacts on water and related land resources of the Delaware River Basin are invited to submit written comments to the Commission's Executive Director, Carol R. Collier. Please refer to the appropriate docket number, listed below, on all correspondence. Such public hearings as may be required for these projects will be announced at a later date in accordance with the Commission's *Rules of Practice and Procedure*. Please refer to the Commission's website ([www.nj.gov/drbc/dockets/status.htm](http://www.nj.gov/drbc/dockets/status.htm)) to track the status of these projects.

Pamela M. Bush, Esquire  
Commission Secretary  
April 14, 2008

Contact: Pamela Bush  
609-883-9500 ext. 203

Power uprate will not change the method of generating electricity nor the method of handling any influents from nor effluents to the environment. Therefore, no new or different types of environmental impacts are expected.

The staff reviewed the nonradiological impact of operation at uprated power levels on influents from the Perkiomen Creek, Schuylkill and Delaware Rivers and effluents to the Schuylkill River. LGS, Units 1 and 2 each have a closed-loop circulating water system and cooling tower for dissipating heat from the main turbine condensers. The cooling towers are operated in accordance with the requirements of National Pollution Discharge Elimination System (NPDES) Permit No. PA0051926. The current permit was renewed on December 12, 1994 and is effective through December 31, 1999. The only increase in LGS water intake due to operation at power uprate conditions is due to increased evaporation in the hyperbolic natural draft cooling towers. In the January 6, 1995 letter, the licensee indicated that the existing consumptive flow will conservatively increase from 38,059,065 to 40,723,200 gallons per day (total for both units), depending on atmospheric conditions. The velocity of the intake water will increase less than 7 percent. Makeup is drawn from the Schuylkill River, Perkiomen Creek, or the Delaware River, depending on flow and temperature. When makeup is drawn from the Delaware River through the Point Pleasant Pumping Station via the Bradshaw Station, 3 percent additional evaporative losses must be considered. The increase makeup flow (including evaporative losses), is within the existing water diversion consumptive use limit of 42,000,000 gallons per day specified in the original permitting evaluations.

Makeup water requirements for systems and components other than the cooling towers are not expected to change due to operation at uprated power levels. The licensee indicated that the only potential change is due to increased reactor operating pressure which could slightly increase leakage through valve packing. System leakage, however, is processed through the liquid radwaste system and returned to the condensate storage tank for reuse. Based on the above considerations, the staff concluded that the effect of makeup requirements at uprated power levels on the environment is not significant.

The licensee does not expect any increase in the cooling tower blowdown due to the physical limitation in the blowdown system. Likewise, the licensee does not expect any increase in the blowdown discharge velocity. However, the licensee indicated that the blowdown discharge temperature will increase less than 0.1 deg.F. This temperature rise will have an insignificant effect on the thermal plume. This increase is within the NPDES permit limit.

An increase in cooling tower drift is not anticipated for operation at uprated conditions. Drift is a function of physical geometry, water flow, and wind conditions, none of which are changed by power uprate. Therefore, the licensee has indicated that the original evaluation of impacts to the terrestrial environment is not altered.

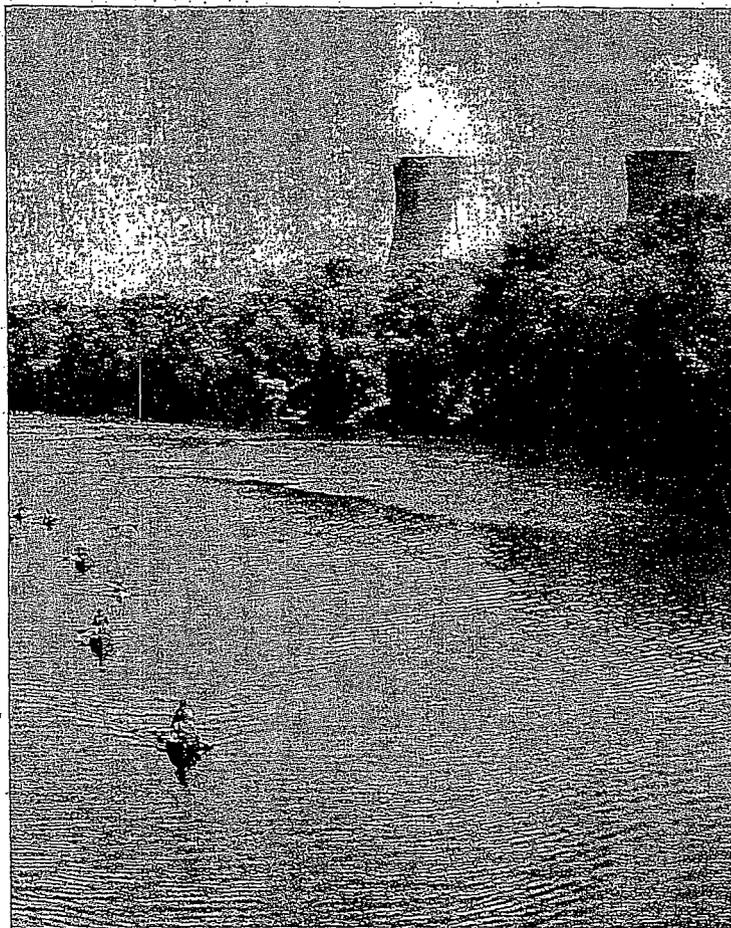
The only changes to the cooling tower water chemistry are due to

# RESTORING THE RIVER



John Strickler/The Mercury

Ron DeGregorio, vice president of Exelon Nuclear, said the company's decision to put the savings from its change in water sources into a fund to help improve the quality of water in the Schuylkill Watershed is an example of the company's willingness "to put our money where our mouth is when it comes to the environment." One benefit of Exelon's pilot project will be higher water levels when the annual Schuylkill River Sojourn, pictured at right passing the cooling towers last year in Limerick, rides down the length of the river in June.



Daniel P. Creighton/The Mercury

## New fund will help improve Schuylkill River water quality

Mercury Staff Report

POTTSTOWN — Plans by the area's landmark nuclear power plant to draw additional water out of the Schuylkill River have resulted in the creation of a fund to improve water quality in the river and its tributaries.

Announced Tuesday with the presentation of an oversized \$158,000 check from Exelon Nuclear, the program has been dubbed the Schuylkill River Restoration Fund.

Money from this fund, which should be available as grants later this year, will be used specifically for projects that improve water quality in the water-

shed, said Kurt Zwinkl, executive of the Schuylkill River Heritage Area, which will administer the fund.

"Anything that improves the quality of water in the river, improves the quality of life for the 3.2 million people who live within its watershed," said Ron Downie, president of the Schuylkill River Greenway Association, which manages the heritage area.

The engine driving these events is Exelon's use of water from the Delaware River, the drinking water source for more than 1 million people, for its cooling process.

Overall, the plant uses an average of

35 million gallons of water a day from a variety of sources.

Although Exelon takes some water from the Schuylkill for cooling, the Delaware River Basin Commission — a quasi-federal agency that controls water withdrawals in the 13,539-square-mile, four-state watershed — limits that amount.

During dry, low-flow periods, or when the temperature of the Schuylkill is too high, Exelon must instead use water from the Delaware, accessed through a series of pipes and aqueducts that empty into Perkiomen Creek, from

(See RIVER RESTORATION on A3)

# New fund will help improve river water quality

(RIVER RESTORATION from A1)

where it is then pumped to the plant in Limerick.

Two years ago, Exelon proposed taking water that had collected in the abandoned Wadesville coal mines pool in the Schuylkill's headwaters and, presuming it was not too contaminated, pumping it into the Schuylkill in order to augment the river's flow.

In the ensuing two years, data collected showed little harm to the river or to the Pottstown Water Treatment Plant, which is the farthest upstream public water intake on the river and the only one between the headwaters and the power plant, said Craig Wyler, a senior engineer with Exelon.

(Updates on the data taken on that water is available at the DRBC's Web site — <http://www.nj.gov/drbc/drbc.htm>)

Wyler also said the first two years had shown that when the mine pool is left alone during the winter, when the extra water is not needed in the Schuylkill, the pool refills, making it a renewable resource.

Now, as part of a continuation of its "demonstration project," Exelon will continue the practice of periodically adding water to the Schuylkill at least through Dec. 31, 2008.

As a result, it will be required to draw less water from the Delaware River.

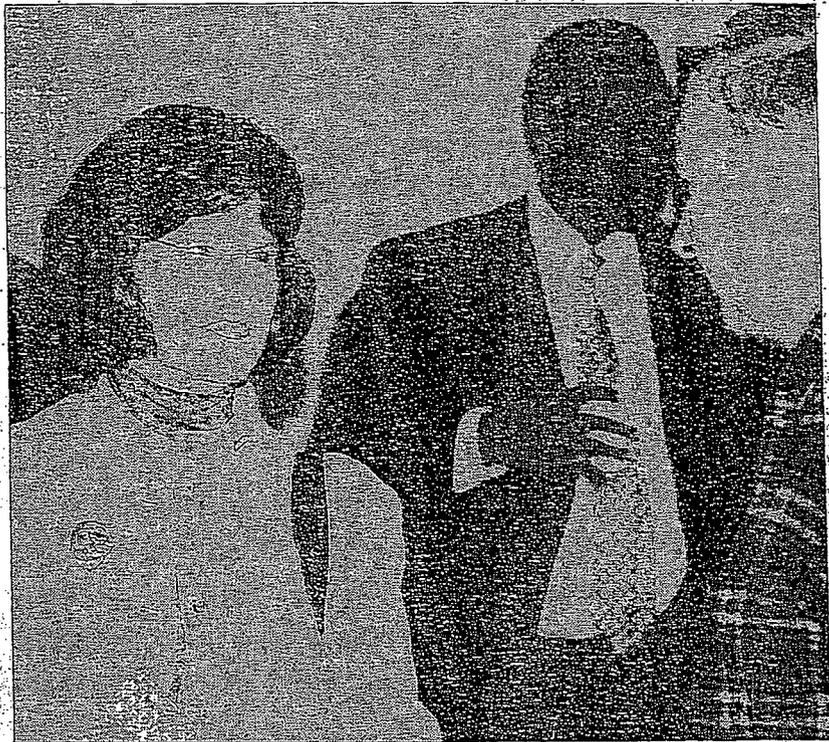
In fact, the \$158,000 Exelon presented Tuesday was based on the amount of water not taken from the Delaware last year.

Exelon spokeswoman Beth Rapczynski said in 2005, the augmented flows in the Schuylkill prevented the withdrawal of 2.5 billion gallons of water from the Delaware.

And the company's payments into the fund will continue each year and be dependent on the amount of water that no longer has to be pumped from the Delaware to support the nuclear plant.

Rapczynski said weather conditions will determine how much Delaware River water is saved in 2006, and so the company is reluctant to make a prediction about the amount it will contribute to the fund next year.

Carol R. Collier, director of the DRBC, was among the numerous officials who hailed the project and



Carol Collier, executive director of the Delaware River Basin Commission, talks prior to the news conference.

attended the announcement, held at the Schuylkill Greenway's headquarters on College Drive in Pottstown.

"Whenever you have a utility get creative and dedicate itself to a stewardship program like this, you get a real win," Collier said, praising Exelon for taking the money it had saved by not using Delaware River water and "instead of putting it into their pocket, bringing it to the Schuylkill River Valley for restoration projects."

The project also addresses another pervasive environmental problem in Pennsylvania — abandoned mine drainage — said Cathy Curran Myers, the deputy secretary of Pennsylvania's Department of Environmental Protection.

Myers called mine drainage one of the commonwealth's "great environmental liabilities," and said she is pleased the project had "found a way for it to be used as an asset."

She said it is indicative of the innovation found in the Schuylkill Action Network, a broad-based group of government and private organizations dedicated to improving the quality of water in the Schuylkill Watershed.

The network's inclusive cutting-edge approach to water quality pro-

tection is now being held up as an example around the state and the country, she said.

The fund announced Tuesday will likely be accessed by those groups that have already identified hundreds of projects that will have an immediate impact on water quality in the watershed, she said.

The fund can also be used as matching money to access the state's Growing Greener II funds, said state Rep. Thomas Quigley, R-146th Dist., who was the primary sponsor of the Growing Greener legislation in the state Assembly and was on hand Tuesday to praise the establishment of the fund.

"Everyone looks to the federal and state government for money, but now, thanks to the innovation of corporations like Exelon, we can all benefit," said Quigley.

"We take environmental stewardship to heart," said Ron DeGregorio, vice president of Exelon Nuclear. "And we put our money where our mouth is when it comes to environmental stewardship."

Zwinkl said the guidelines for grants are currently being outlined and will be announced later this year.

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## Decision awaited on if mine water program should continue

Print Page

*For the past five years, water from an abandoned coal mine in Schuylkill County has been used to support another form of energy — a nuclear power plant about 75 miles downstream.*

BY MARIA HERNE  
STAFF WRITER

[mherne@republicanherald.com](mailto:mherne@republicanherald.com)

Published: Tuesday, July 22, 2008 7:20 AM EDT

For the past five years, water from an abandoned coal mine in Schuylkill County has been used to support another form of energy — a nuclear power plant about 75 miles downstream.

Exelon Nuclear, the owners of the Limerick Generating Station, a nuclear power plant in Montgomery County, has been pumping water from a Wadesville mine pool into the East Norwegian Creek to augment water levels in the Schuylkill River, which ends up flowing through the cooling towers of a nuclear reactor.

In 2002, the Delaware River Basin Commission, a federal agency that monitors and controls water withdrawals in the 13,539-square-mile, four-state watershed, approved the plan on a short-term basis with an operating and monitoring plan in place.

But now the trial period is up, and environmental officials must decide if the project should be scrapped or supported.

"We'll be reviewing the data from the past five years and plan to make a decision on it by Dec. 31," said Katherine O'Hara, a DRBC spokeswoman.

Exelon uses an average of 17.5 million gallons of water a day, including water from the Delaware River, a drinking water source for more than 1 million people, for its cooling process, said Rachelle Benson, a media spokesperson for Exelon Nuclear.

The Limerick plant consists of two units which are cooled by closed-cycle natural draft cooling towers that require a combined average of 24,300 gallons per minute and a maximum of 29,200 gallons per minute at full power, according to company reports.

In 2002, when Exelon evaluated other suitable water sources to increase flow into the river, it discovered the abandoned Wadesville mine pool, which is on the grounds of a former colliery owned by Reading Anthracite.

According to a report commissioned through the U.S. Department of Energy, the Wadesville Pool is not acidic, unlike other abandoned mine drainage. It was found to contain alkaline water, with a near-neutral pH between 6 and 8. Purified water has a pH of 7.

Exelon was required to obtain permission from the DRBS before it could have water pumped into the East Norwegian Creek, a tributary of the Schuylkill River, to increase the river's flow.

A five-member board of the DRBC is reviewing the results to decide if it should be continued, Benson said.

"What we've been doing for five years is a demonstration project; we've been testing and collecting data and monitoring water quality and we're in the process right now of working with various agencies to have that continue," Benson said.

O'Hara said the data, which has been compiled so far on the use of water from the mine pool, indicates the water source is "operationally reliable and environmentally suitable" to augment the

Not True

Schuylkill River flow.

*Exelon* "So far, there's been no glaring problems," she said.

The DRBC reports on the Exelon/ Wadesville project can be found at their Web site at [www.state.nj.us/drbc/](http://www.state.nj.us/drbc/).

Benson said as part of the agreement with the DRBC, Exelon has also agreed to create a Schuylkill River Restoration fund, which would disburse grants to various agencies committed to improving water quality in the Schuylkill River.

The fund is monitored by the Schuylkill River Heritage Area in Berks County. The restoration fund monies are to be used solely for the purpose of supporting projects in the Schuylkill River basin that are consistent with restoration and water management goals for the Schuylkill River, she said.

DRBC officials must also approve funds being committed to a particular project.

According to Tim Fenchel, grants program coordinator for the Schuylkill River Heritage Area, Exelon's annual contribution to the fund is based on the amount of water that is not required to be pumped from the Delaware River for cooling purposes at the Limerick plant.

The restoration grants can be used to support projects that involve storm water management, agricultural runoff mitigation, and acid mine drainage, Fenchel said.

Kurt D. Zwikl, Executive Director of the Schuylkill River Heritage Area, said the fund has had a positive impact on the quality of the watershed.

"There are even plans to expand contributors to this fund so that there will be more money for more projects to improve the watershed," Zwikl said

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# Limerick Generating Station's Water Diversion Project helps Schuylkill

In 2003, Exelon Nuclear implemented a water supply demonstration project at Limerick Generating Station, in Montgomery County. The project demonstrated the benefits of lessening the withdrawal of water from the Delaware River and utilizing various other sources for the station's cooling water needs.

The demonstration project has been going on for the past five years, and now Limerick has applied to the Delaware River Basin Commission (DRBC) if it can continue the project for the long-term. The DRBC is expected to make a decision in the next few months.

## How Does It Work

Like all industrial facilities, Limerick uses a lot of water for cooling purpose. The station pumps more than 30 million gallons of water each day for normal plant operations. Most of this water is pumped back into the Schuylkill River, but approximately seven million gallons of water evaporates up through the cooling towers daily. Water is available from either the Delaware River or the Schuylkill River. The Delaware River is more than 40 miles away and its use requires the station manage a complex series of pumps, reservoir, natural creek flows and underground piping to bring water from the Delaware to the station.

For the last 20 years, the station has mainly used the Delaware River for its operation because of a conservative environmental provision written in the 1980s

(See EXELON on Page 18)

(EXELON from Page 4)

projecting certain uses and conditions of the Schuylkill River than have not been borne out.

Working with Delaware River Basin Commission (DRBC), Limerick engineers and environmental experts spearheaded a comprehensive plan to demonstrate that modifying the temperature limit and augmenting the river flow during low river flow periods would not adversely affect the Schuylkill River watershed. The project proposed monitoring the environmental effects for five years before coming to a long-term decision.

The demonstration project allowed Limerick to pump water from the Wadesville Mine and Still Creek reservoir when the temperature or flow limits preclude the use of the Schuylkill River for supplying the plant's cooling water.

From project development through implementation, the effort has received input and feedback from the DRBC, Pennsylvania Department of Environmental Project, the Fish and Boat Commission, the Environmental Protection Agency, Schuylkill River Greenway Association, the Delaware Riverkeeper Network, water purveyors and other interested parties. Also, the project is under the purview of the DRBC.

This innovative demonstration project has allowed Limerick another opportunity to give back to the community. To read more about this, please see "Limerick Generating Station Helps Improve Our Community's Environment."

## Limerick Generating Station Helps Improve Our Community's Environment

Limerick Generating Station overlooks the Schuylkill River, and it uses a small portion of the river's water in

SCHUYLKILL RIVER FESTIVAL

October 8, 2008

# Limerick Generating Station's Water Diversion Project helps improve Schuylkill River

water that is not required to be pumped from the Delaware River to support Limerick's cooling water needs. In just three years, Exelon has contributed approximately \$600,000 to the Fund.

Schuylkill River Heritage Area oversees the fund, distributing money annual to non-profit organizations and government agencies. Exelon's annual contribution to the Fund is based on the amount of the Schuylkill River watershed. The program supports projects that enhance the quality of water in the Schuylkill River and its tributaries. The Schuylkill River Heritage Area to create the Schuylkill River Restoration Fund. The program supports projects that enhance the quality of water in the Schuylkill River and its tributaries. The Schuylkill River Heritage Area oversees the fund, distributing money annual to non-profit organizations and government agencies. Exelon's annual contribution to the Fund is based on the amount of the Schuylkill River watershed. The program supports projects that enhance the quality of water in the Schuylkill River and its tributaries.

Not True →

Not True →

56.7 mgd

35.4 mgd

November, 2008

Evaluation Prepared By The Alliance For A Clean Environment (ACE) (610) 326-6433

## **ACE Is Requesting An Investigation**

# **QUESTIONS**

### **How Many Years Has Exelon Potentially Underreported Water Use and Underpaid DRBC?**

#### **Evidence Suggests (See Attachment), Exelon May Have For 2007:**

- **UNDERREPORTED Water Withdrawal And Water Use**
- **UNDERPAID DRBC For Schuylkill River Water Withdrawal**

#### **Is The Delaware River Basin Commission Really Providing Oversight?**

#### **The Following Questions Need Answers:**

1. How much water does Limerick Nuclear Power Plant really use? Exelon, the company with a vested interest in the outcome, is the only one reporting use. Independent tracking is essential.
2. How long has Schuylkill River water use possibly been underreported and underpaid?
3. How much does Exelon owe in back payments covering past years?
4. Who will be charged with taking action to recover losses and to provide oversight in the future that is apparently not being provided by DRBC?

#### **Plus - What Damage Was Done Since Exelon's Demonstration Project Started in 2003?**

##### **DRBC could soon decide to allow more Schuylkill River contamination with less safeguards.**

A comprehensive independent investigation is needed. Exelon's "Demonstration Project" started in 2003 and resulted in billions of gallons of unfiltered contaminated mine water being pumped into the Schuylkill River. Exelon controls all the data on damage done to date. Now Exelon wants to add the contaminated water from even more mines, while reducing low-flow restrictions and eliminating temperature restrictions.

##### **An Independent Investigation Is Crucial, Before DRBC Decides To Increase Threats.**

An independent public interest scientist is needed to design a comprehensive protocol to investigate all current harms from Exelon's "Demonstration Project". Absent that, it is impossible to determine future harms from decades of pumping billions more gallons of mine water into the Schuylkill River.

##### **2008 Payments Plus Back Payments Could Provide Funding To More Determine Future Harms.**

DRBC collected \$632,475.49 from Exelon for Limerick's 2007 water withdrawal. (See Attachment) DRBC could use part of Exelon's 2008 water withdrawal payment to provide funding for an independent investigation (not by DRBC) to accurately determine Limerick's water use and Exelon's payments. Back payments could then be used to complete the investigation into harms.

##### **Prevention Is Key!**

Exelon payments for Schuylkill River water withdrawal could lead to prevention of unnecessary long-term irreparable harms.

## **Our Past Efforts**

Since January, 2006 ACE has been investigating Exelon's Demonstration Project and the impacts of Limerick Nuclear Power Plant's extraordinary water withdrawal and radioactive releases on the Schuylkill River.

We sent numerous letters and e-mails to Carol Collier, DRBC director, reporting our findings and asking for responses. Unfortunately, she appears to have little interest in dealing with the reality of our concerns, even though it appears that regulatory agencies, including DRBC, had many of our same water quantity and quality concerns 30 years ago during licensing approval for Limerick Nuclear Power Plant.

March, 2008, Mr. William Muszynski from DRBC finally agreed to meet with ACE. We summarized our findings with supporting documentation for major concern. ACE asked DRBC to provide funding to hire an independent expert to design a comprehensive protocol for independent testing to determine current and future harms from Exelon's "Demonstration Project". We were told the public would have to prove harm in order for DRBC to deny Exelon's requests to increase contamination while reducing safeguards.

July, 2008, we sent a FOIA request to DRBC for specific information associated with current and previous Limerick Nuclear Power Plant Dockets, some of which Mr. Muszynski failed to provide after our meeting. In October, 3 months later and after repeated requests, we finally received some of the information.

Information from our FOIA request uncovered even more discrepancies and led to more questions which clearly need to be fully addressed with an independent investigation, including those about Exelon's Schuylkill River water withdrawal and payments for Limerick Nuclear Power Plant.

## **See Attachments**

## **For Questions, Detailed Documentation, Or Help With The Investigation**

**Contact ACE**

**(610) 326-2387**

**aceactivists@comcast.net**

# DISCREPANCIES IN WATER WITHDRAWAL, USE, AND PAYMENT

## **For Limerick Nuclear Power Plant's 2007 Schuylkill River Water Withdrawal and Use Numbers Used By Exelon To Determine 2007 Payment To DRBC CONFLICT With Current Docket Requests And Previous Exelon Claims**

### **Exelon Required Payments to DRBC for Water Use**

Exelon is subject to the same surface water withdrawal rates as other facilities.

\$60/million gallons (MG) for Water Used Consumptively (NOT Returned to the Basin – Becomes Limerick Steam)

\$0.60/million gallons (MG) for Water Returned to the River (Non-Consumptive Use)

### How Much Water Is Withdrawn And Used For Limerick Nuclear Power Plant? How Much Should Be Paid To DRBC?

	<u>Consumptive Use - \$60 MG</u>	<u>Non-Consumptive Use - \$.60 MG</u>	<u>Total Yearly Withdrawal</u>	<u>Water Costs</u>
(10-21-08 DRBC Letter to ACE) 2007 Data	26.6 MG Day / 9,708.571 (MG) Year \$582,269	8.0 MG Day / 2,925.581 (MG) Year \$1,755	12,634,152,000 Gallons Year	\$584,269.61
Exelon Claims (Multiple Times) From 1970 to 2008	35 MG Day / 12,775 (MG) Year \$766,500	10.5 MG Day / 3,833 (MG) Year \$2,300	16,608,000,000 Gallons Year	\$768,800.00
2008 Docket Request Maximum Usage	42 MG Day / 15,330 (MG) Year \$919,800	14.2 MG Day / 5,183 (MG) Year \$3,110	20,513,000,000 Gallons Year	\$922,910.00

### Same Amount Requested In 1983

### Based On Exelon's 2008 Docket Request and Other Evidence

➤ Evidence Suggests (See Next Page) Exelon May Have Underreported 2007 Schuylkill River Water Withdrawal And Use Limerick Nuclear Plant Likely Withdrew About 7,879,000,000 Gallons More Than Exelon Reported To DRBC in 2007

➤ This Equates To A Potential Underpayment for 2007 of \$338,641.00

	<u>Total Withdrawn</u>	<u>Consumptive Use</u>	<u>Non-Consumptive Use</u>
<u>Exelon's 2008 Docket Requests</u>	<u>20,513,000,000 Gallons 2008</u>	<u>15,330,000,000 Gallons 2008</u>	<u>5,183,000,000 Gallons 2008</u>
<u>Exelon's 2007 Claims</u>	<u>12,634,152,000 Gallons 2007</u>	<u>9,708,571,000 Gallons 2007</u>	<u>2,925,581,000 Gallons 2007</u>

# INCONSISTENT CONSUMPTIVE WATER USE

## Below Are Inconsistent Exelon Claims For Limerick Nuclear Power Plant's Consumptive Water Use

- **35,000,000 Gallons Per Day** – Evaporated To Atmosphere - **July 1970**, Original PECO Request
- **38,059,065 to 40,723,200 Gallons Per Day** **1995 - EPA Environmental - Impact** PECO; Limerick Unit 1 Federal Register 1/6/95 – Licensee Indicated Existing Consumptive Flow Will Conservatively INCREASE from 38,059,065 to 40,723,200 Gallons Per Day
  - ✓ **NOTE – Consumptive Use Numbers Were Higher Than 35 Million Already in 2005**
- **35,000,000 Gallons Per Day** - **January, 2006** - Mercury Article (Limerick Nuclear Plant Uses **On Average**)
- **35,000,000 Gallons Per Day Over Six Months - June 17, 2008** – Exelon's Power Point For Pottstown Water Authority
  - ✓ Exelon says the Docket restricts consumptive use withdrawals from the Schuylkill River - Provision requires an average water augmentation of 35,000,000 Gallons Per Day
- **17,500,000 Gallons Per Day Average Cooling Use - July 22, 2008** – Republican Herald Article - Exelon Spokesperson, Rachele Benson Said: Cooling Towers Require Combined Average 24,300 Gallons PER MINUTE – Maximum – 29,200 GPM
- **7,000,000 Gallons Per Day Evaporate Up Through Cooling Towers October 8, 2008** - Mercury Special On Schuylkill River
  - It appears Exelon may have made other inaccurate claims in that article:
    1. Use of only “30 Million Gallons Per Day” – Exelon is currently requesting use of 42 Million Gallons Per Day
    2. “Most Water Is Pumped Back” – Not True, only about ¼ the amount Limerick withdraws is returned to the Schuylkill
- **42,000,000 Gallons Per Day – Consumptive Use - Exelon 2008 - Notice Of Application Request to DRBC**
- **26,600,000 Gallons Per Day - 2007 Consumptive Use Number Used by Exelon for Payment to DRBC**

## CONFLICTING CLAIMS FOR WATER WITHDRAWAL

<b>1970</b>	<b>- 25,185,000,000 (Billion) Gallons Per Year (69 Million Gallons Per Day)</b>	Original Estimate For Withdrawal by Exelon (PECO)
<b>2008</b>	<b>- 20,513,000,000 (Billion) Gallons Per Year (56.2 Million Gallons Per Day)</b>	Exelon's Current 2008 Request to DRBC
<b>2007</b>	<b>- 12,634,192,000 (Billion) Gallons Per YEAR (34.6 Million Gallons Per DAY)</b>	Exelon's 2007 Report to DRBC for Payment

**How Could Exelon's Water Withdrawal And Use Claims For 2007 Be Accurate?**

**Why Was Limerick Nuclear Plant's Water Withdrawal So Much LESS In 2007 Than Currently Requested In 2008, 1 Year Later?**

**Why Would Exelon Underreport Water Withdrawal And Use?**

➤ **Exelon May Have Underpaid As Much As \$338,640.39**

<u>Exelon Claim For 2007</u>	<u>Consumptive Use</u>	<u>Non-Consumptive Use</u>	<u>Total 2007 Withdrawal</u>	<u>Total Paid</u>
Limerick Generating Station	9,708,571 (MG) Year Limerick Steam	2,925,581 (MG) Year Returned to the River	12,634,152 MG Year From Schuylkill River	\$584,269.61
2008 Docket Request On-Going Usage	15,330 (MG) Year \$919,800	5,183 (MG) Year \$3,110	20,513,000,000 MG Year	\$922,910.00

**How Many Years Has This Occurred?**

**There Is Justification For The Requested Independent Investigation**

1. To determine Exelon's underreporting and underpayment for Limerick Nuclear Power Plant's Schuylkill River water withdrawal and use over the past 20 years would be impossible without an independent investigation and audit of all Exelon's past water use and payments.
  - ✓ Only Exelon, with a vested financial interest in the outcome, is in total control of measuring and estimating all water withdrawal and use, as well as all monitoring, testing, and reporting on all harmful impacts to the Schuylkill River.
  - ✓ DRBC failed to identify major discrepancies. DRBC cannot be considered independent or reliable in such an investigation.
2. Exelon's current 2008 requests for about 20.5 Billion Gallons per year is likely closer to Limerick's water withdrawal and use in 2007.
  - ✓ Similar nuclear plants claim similar water withdrawal to Exelon's current 2008 Docket request. For example June, 2007 water withdrawal from the Susquehanna River for 2 similar nuclear reactors was reported as 58 Million Gallons Per Day June, 2007 - Exelon's 2008 request is 56.2 Million Gallons Per Day.
  - ✓ Exelon requested 69 million gallons per day in 1970 - In reality, water withdrawal and use could even be higher than current 2008 docket requests

***ACE Will Gladly Help With An Investigation - To Discuss Documentation And Other Information  
Call ACE (610) 326-2387***

**Alliance For A Clean Environment Concerns, Comments, and Questions  
10-26-11**

**NRC Needs To Independently Evaluate  
Limerick Nuclear Plant's  
Toxic Assault On The Schuylkill River**

**RE: Issues From Limerick Nuclear Plant's NPDES Permit Renewal Application**

**ENOUGH UNSUBSTANTIATED BIASED ASSUMPTIONS!**

**NRC NEEDS TO PROVIDE INDEPENDENTLY RESEARCHED ANSWERS  
IN LIMERICK NUCLEAR PLANT'S UPDATED EIS.**

**To NRC: ACE is asking NRC to respond to specific issues related to the reality of harms that are obviously significant, but not fully or accurately disclosed. Specific issues on long-term harms and threats need to be independently evaluated and addressed, not with biased industry assumptions yet again, but with independent comprehensive year-long monitoring and testing.**

- **Almost two million people need and deserve a reliable comprehensive and independent EIS that will honestly and accurately determine the future of their vital drinking water source by 2029, and then another 20 years to 2049.**
- **NRC needs to respond to issues we raised with DRBC and DEP in January, 2011 (attached) correspondence.**
- **With inevitable river depletion, toxic concentrations, and an overheated river, NRC needs to address the following in Limerick's UPDATED EIS:**
  1. **How can a river that already had record low flows in 1999, continue to sustain more extraordinary water use due to uprates and extended years of operation?**
  2. **Significant inevitable depletion will occur each year, even after supplementation. This will concentrate radionuclides discharged 24/7, including long-lived radionuclides. Will NRC require continuous filtration? Where will the filters that become highly radioactive be stored? Over 5 billion gallons of radioactive, heated wastewater are discharged each year.**
  3. **What are the long-term consequences of heavy metal and TDS contamination from unfiltered mine water pumping into the river for supplementation to operate Limerick?**
  4. **What happens to the river and public drinking water for almost two million people if massive amounts of water become necessary to attempt to prevent a meltdown or explosions in the fuel pools such as we witnessed in Japan? We don't have an endless ocean to try to contain such an event or to attempt to dilute the deadly radioactive run-off, but Limerick is 3rd on the earthquake risk list.**

**VERY CONCERNING:** The first EIS was based on meaningless self-serving "ASSUMPTIONS" made by PECO, the owner, before Limerick ever started to operate. How will NRC accurately determine all the future long-term harms to the Schuylkill River, in relation to relicensing from 2029 to 2049, when past and present harms are based largely on biased "assumptions" by the owner from before Limerick started operating and biased self-serving data and reporting ever since Limerick started operating?

NRC does not actually know the full and accurate extent of harms over the past 25 years. How can harms be accurately predicted from now until 2029 when Limerick's license expires, much less 20 years more?

Since 2006, ACE has been requesting DRBC to do independent monitoring, testing, and reporting before approving Exelon's destructive docket requests which will allow drastic increases in harms and threats.

Over 350 billion gallons of extremely hazardous effluent have been discharged into the Schuylkill River, yet there is:

1. NO study on the additive, cumulative, and synergistic harms.
2. NO independent comprehensive long-term monitoring, testing, and reporting to determine actual harms.

This is UNACCEPTABLE! Harms are obvious, yet never comprehensively measured and evaluated.

- **If there is no money to do what is necessary to independently determine all actual harms to date, to more accurately predict the future, then the PRECAUTIONARY PRINCIPLE should be used and Limerick should NOT be relicensed.**

### **ACE IS ASKING NRC TO COMMENT ON EACH ISSUE BELOW:**

**By 10-26-11 - Neither DEP nor DRBC has responded to issues in the January, 2011 ACE correspondence to DEP and DRBC below:**

BEFORE Limerick ever started operating in 1985, PECO make self-serving "**assumptions**", that have NEVER been independently verified by anyone, then or now.

PECO's 1984 ASSUMPTIONS regarding waste water effluent, have been submitted to PA DEP for this 2011 NPDES Permit Renewal. ASSUMPTIONS prior to starting Limerick Nuclear Power Plant operations cannot be used as verifiable evidence of harms to the Schuylkill River today in 2011, 25 years after operation.

- Effluent flow rates, dilution factors, and temperature rises for the discharge plume are based on assumptions prior to operation, and not on actual continuous data related to actual discharges over the past 25 years. Assumptions about monthly cooling towers: slowdown temperatures cannot be used to accurately determine exceedances of limits. Monthly averages ignore both spikes plus additive and cumulative harmful impacts over time.
- Exelon's application for Limerick's 2011 NPDES permit renewal illogically includes a 27 year old document produced prior to Limerick even operating. Pages from the 1984 document below, included with Exelon's NPDES permit application, are not relevant to conditions in 2011. Unsubstantiated and even meaningless conclusions in the pages included from PECO's 27 year old document are unreliable to assess harms from both thermal and toxic chemical harmful impacts to the Schuylkill River over the past 25 years.

**April 1984**

8404170288 840430 PDR ADOCK 05000352

**Final Environmental Statement**

**Related to the Operation of Limerick Generating Station - Units 1 and 2**

Docket Nos. 50-352 and 50-353 - Philadelphia Electric Company

U.S. NRC - Office of nuclear Reactor Regulations

BEFORE Limerick ever started operating in 1985, PECO make self-serving "assumptions", that have NEVER been independently verified by anyone, then or now.

1. Blowdown Rate - PECO said, "*The blowdown flow rate has been determined to vary.... One-half to one-third of the river flow will pass over the diffuser. It has been ... ASSUMED that the effluent will have become diluted in one-third of the river flow.*"

**ACE Questions and Request:**

- A. How can DEP rely on PECO's assumption from 1984? Limerick depleted the river flow. Wouldn't the ratio and harmful impacts from the discharge change?
- B. After 25 years of Limerick's operation depleting the river while continuing to poison it with long-lived radionuclides and other toxic contamination, the public needs an independent study, evaluation, and explanation.
2. Biological Effects of the Heat Dissipation - was based primarily on guesswork by PECO's consultant, not actual operations. DEP permitting should be based on current scientific independent monitoring and data, not outdated biased conclusions by PECO, from before Limerick Nuclear Plant started operating.

**ACE Comments, Question, and Request**

- A. After 25 years of operation, the public needs and deserves an independent study to determine actual biological effects from heat dissipation. Unless there is independent monitoring during heat and drought conditions, actual biological effects of heat dissipation related to Limerick discharges cannot be accurately determined. It is irresponsible for PA DEP to rely on PECO's 1984 assumptions of dilution to determine conclusions about biological effects from heat dissipation.
- ACE requests PA DEP to withhold Limerick's NPDES permit until after the summer of 2011. We urge DEP to obtain funding from DRBC's collection of money Exelon pays for use of the Schuylkill River, to hire truly independent river water scientists, to evaluate biological effects during extreme heat and drought periods over the summer of 2011.
- B. Over the past 25 years of Limerick operation, has DEP or any other agency ever done an independent scientific study on the actual biological effects of heat dissipation over time from Limerick Nuclear Plant's discharges?
  - ✓ PECO's 1984 assumptions about temperature are based on river flow over the diffuser which changed over 25 years.
  - ✓ Exelon is bragging about far higher production rates, which should be expected to be producing more discharges. Actual operations with increased discharges with lower flows in the river should significantly change 1984 assumptions.

- ✓ There is no verifiable or justifiable proof related to PECO's 1984 document conclusions:
- *"The river flow is relatively shallow at and immediately below the discharge so that rapid mixing would be EXPECTED. The predicted temperature rise values are below DRBC surface temperature excess for all but the severe case."*  
**Extreme heat and drought conditions since Limerick started operating (including last summer), along with significant depletion caused by Limerick since 1985, could have created the conditions for many severe cases when Limerick violated permit limits, but DEP has no way to prove when or how long permit violations are occurring.**
- *"The Limerick discharge is EXPECTED to be in compliance with the applicable limitations because the river channel widens downstream of the discharge and is available for mixing." Even if PECO's expectations on limitations were close to being accurate, the same mixing ratio are in 1984, clearly no longer exists now in 2011, after hundreds of billions of gallons of depletion.*

**C. MIXING ZONE - DER did not specify a mixing zone condition for Limerick in the Water Use Approval D-69-210 CP (Final).**

- **Without actual independent verification after Limerick operations started or since, DEP should not be using DRBC's unsubstantiated conclusion that Limerick's wastewater discharge is not increasing the natural temperature (during the 1961-66 period) by more than 5 degrees F., nor that Limerick's discharges are not increasing the stream temperature above 87 degrees F, except within the assigned heat dissipation area (consisting of 1/2 the stream width and 3500 feet downstream from the discharge point.**
- **Evidence suggests that conditions have changed significantly. Decades old conclusions based on assumptions prior to operation should not be used for current permitting decisions. Is it DEP's position that Limerick's heated discharges have no impact on Schuylkill River water temperatures downstream?**
  - **We urge DEP to take a closer look at potential consequences of simply ignoring what is clearly an increasing threat, especially during heat and drought conditions.**
  - **For example, June 2010 Schuylkill River water temperature was deemed too hot for safely holding a swimming event, in Philadelphia, just over 20 miles downstream, One student died swimming in the Schuylkill River. DEP's decisions about Limerick's thermal discharges can have severe consequences in the future, on public health and ecosystems.**
- **The Schuylkill River water temperature became so hot last summer that Limerick cut power on many days. Check NRC's website for details.**
  - **What are the implications of Limerick's yearly billions of gallons of heated waste water discharges into a continuing depleted water source, year after year for decades more?**
  - **Will heated discharges increase due to Limerick's Upates?**
- **DER has no independent proof of what is happening as a result of Limerick's thermal discharges.**
- ✓ Without actual independent verification at any time after Limerick operations started, DEP has used DRBC's unsubstantiated conclusion that Limerick's heated wastewater discharges would

not increase the natural temperature (during the 1961-66 period) by more than 5 degrees F., nor increase the stream temperature above 87 degrees F, except within the assigned heat dissipation area (consisting of 1/2 the stream width and 3500 feet downstream from the discharge point).

✓ For this permit renewal, we request that DEP independently validate such assumptions.

- 5.1.1.2 Effluent Limitations - EPA recommended thermal effluent limitations for steam electric sources such as Limerick. However, limitations are based on complicated exceptions and requirements that clearly are not independently verified by DEP nor EPA.

✓ We suspect DEP has no idea whether Limerick's thermal effluent is actually within the limit specified. If that is incorrect, please explain how DEP actually verifies the limit is not exceeded.

3. Schuylkill River - In 1984, prior to Limerick starting operations, PECO claimed "***only minor impact is EXPECTED*** on all biotic components as a result of intake operation and thermal discharge."

**ACE Comment and Questions:**

A. Public hearing comments, prior to Limerick being built, suggest many others did not "EXPECT" Limerick's extraordinary Schuylkill River water intake to have only minor impacts to the Schuylkill River flow. In fact, there was great concern that the Schuylkill River could not continue to sustain the extraordinary water needs of Limerick Nuclear Power Plant. Evidence suggests the river cannot continue to safely sustain such yearly depletion. We suspect this is one reason PA DEP and others are irresponsibly condoning unfiltered contaminated mine water pumping into the river for supplementation to operate Limerick.

B. Limerick withdraws over 20 billion gallons of Schuylkill River water each year and only returns 5 billion. Supplementation each year seems to have been 3 billion gallons or less. That amounts to hundreds of billions of gallons of Schuylkill River depletion over 25 years.

✓ Does DEP consider that MINOR impact to the Schuylkill River flow?

✓ When issuing an NPDES Permit does DEP factor in:

- More water use for Limerick Uprates?

- How many more years the Schuylkill River can sustain this kind of depletion and still provide public water for all other business and residents from Pottstown to Philadelphia?

**4. CHEMICAL EFFLUENT EFFECTS 5.3**

**5.2.1 Physical effects**

- **Extremely Dangerous Toxics are Discharged into the Schuylkill River Through the Diffuser, Including Radiation and Other Toxic Chemicals from the Following Sources All Mixed Together:**

- ✓ Cooling Tower Blowdown

- ✓ Spray Pond Ovefflow

- ✓ Treated Radwaste

- ✓ Treated 'Sanitary' Waste

- ✓ Holding Pond Effluent

- This document states cooling tower blowdown accounts for more than 99 percent of the flow rate and heat content of the total discharge.

- **PECO claimed the diffuser would cause rapid dilution of the effluent in the Schuylkill River. An ESTIMATE was used to claim the effluent would become fully mixed in the portion of the river which passes over the diffuser and was based only on a laboratory MODEL study of submerged diffusers in shallow water.**
  - **It was determined in an average flow, the initial mixing zone for all these hazardous chemicals would be about:**
    - ✓ 150 feet wide (1/2 a football field)
    - ✓ 30 feet long (10 yards of a football field).
  - **River flow initial mixing zone**
    - ✓ Average flow - About .1 Acre
    - ✓ High flow - About .5 acre
  - **In a high river flow, dilution of the effluent was estimated to be much greater, but the mixing zone would extend downstream 150 feet.**

# Scientists Are Worried About WATER MONITORING CUTBACKS

From Evan's Brandt's Pottstown Mercury story 3/16/08

**"The feds don't have the money, the states don't have the money,  
and so we're flying blind without any data."**

John K. Jackson Stroud Water Research Center scientist

Exelon's requests to DRBC will have further harmful impacts to the Schuylkill River water quality and quantity, its ecosystems, wildlife, and public health. The only question is how much.

Without scientific independent evaluation now before further contamination is permitted by DRBC, we will never identify the extent of the harms in the future. There is no money or requirement for independent testing, monitoring, or reporting.

It is imperative to provide comprehensive, independent monitoring, testing, and reporting now on all aspects of Exelon's application, prior to DRBC's approval for any of Exelon's requests.

If Exelon's recent application to the Delaware River Basin Commission DRBC (D-69-21 CP-13) is approved, the Schuylkill River's health and flow will be further jeopardized.

Exelon requests related to Limerick Nuclear Power Plant's water intake and output include:

- Withdrawal of 56.2 Million gallons per day - 20,513,000,000 gallons per year
- Continued discharge of over 1 billion gallons yearly of contaminated and UNFILTERED Wadesville Mine Water.
- Added contaminated and UNFILTERED water from additional mine pools
- Reduced Low-Flow Restrictions
- Eliminated Temperature Restrictions
- Modified Monitoring Requirements
- Continued discharge of radioactive and heated water - 14.2 Million Gallons Per Day  
5,183,000,000 Gallons Per Year

To date, Exelon, the company with a vested interest in the outcome has done most, if not all the monitoring, testing, and reporting, with little, if any independent oversight. We can't trust Exelon. Elsewhere, Exelon nuclear plants' radioactive water contamination was called by some, "Exelon's Radioactive Watergate". Notice, Exelon even requested to modify their own monitoring requirements.

With so much at stake, before DRBC permits this disaster in the making, the public needs and deserves independent comprehensive monitoring, testing, calculating, and reporting.



unday, March 16, 2008

**"The feds don't have the money, the states don't have the money and so we're flying blind without any data."**

— John K. Jackson. Stroud Water Research Center scientist

# An absence of data before the deluge

## Scientist worried about water monitoring cutbacks

(WATERSHED CONGRESS from A1)

Pennsylvania, is currently involved in a long-term effort monitoring water quality in the Schuylkill River Watershed.

He spoke at the 11th "Congressional" gathering and the fifth one held here at the college campus in Pottstown — which has become a popular site both because it is located near the center of the river's 109-mile course and has a facility that can handle numerous workshops in the same building.

Each year the congress attracts about 200 enthusiastic participants, said Chari Towne, who runs the Schuylkill Watershed program of the Delaware Riverkeeper and is the congress' primary organizer.

If you doubt the characterization of those who come as "enthusiastic," a brief look through the day's workshops should be enough to convince you otherwise.

Only the most enthusiastic among us would pay \$50 to sit through lectures on such obscure topics as "StormwaterPA: A Multimedia Blueprint for Success," "Emerging Priorities in Urban Stream Restoration" or "Join the Pennsylvania Zebra and Quagga Monitoring Network."

"I love it when people come up to me during the Congress, and it happens every year, and tell me this is the best they go to all year,"

said Towne.

In this context, it's probably safe to say that Jackson would have had a hard time finding an audience more receptive to what he had to say about Pennsylvania's streams, and those in the Schuylkill Watershed in particular.

And what he had to say is that the "good news" about Pennsylvania's streams gets worse once you scratch the surface.

Dividing the Commonwealth's waters into a "yes" or "no category of "impaired or unimpaired" does them a disservice, he said.

Not only is that label overly broad, it is often based on data that is no longer accurate, said Jackson, who hailed the pending implementation of a state system that will rank a stream's biological health on a scale of 0 to 100, giving a more accurate picture.

However that picture is getting fuzzier because less data is being collected just when streams are coming under more stress from development and agriculture, Jackson warned.

"The feds don't have the money, the states don't have the money and so we're flying blind without any data," said Jackson.

River and stream monitoring stations are beginning to disappear, or, more accurately, no longer being maintained. Locally, a United States Geologic Survey monitoring station along Manatawny Creek in Colebrookdale no longer appears on the USGS monitoring map of Pennsylvania.

Streams rated as being in "fair" health need to be monitored constantly to sound the alert when they begin to degrade, but the absence of monitoring means "they're falling between the cracks," Jackson said. "they're off the stream management radar."

"Good planning requires more than good data every once in a while," Jackson said.

And planning becomes increasingly necessary when the health of streams is involved, because "streams degrade gradually."

Jackson said in the streams he and his team have been monitoring in the Schuylkill Watershed "the big difference between impaired and unimpaired streams was a significant increase in the amount of development."

He added "the impaired streams in this region, means agricultural and suburban and urban issues."

The best way to keep streams clean, Jackson said, is to preserve as much forest in its watershed as possible, particularly upstream in the headwaters, and to maintain wooded and vegetative riparian buffers along the banks.

Preserving these features is ultimately more cost effective than trying to return the stream, which is often part of a public water source as is ultimately true of the Schuylkill, to a healthy state, said Jackson.

"Prevention is always easier, and cheaper, than correction," he said.

# An absence of data before the deluge

By Evan Brandt  
ebrandt@pottsmmerc.com

## Scientist worried about water monitoring cutbacks

POTTSTOWN — With the exception of Alaska, Pennsylvania has more stream miles than any other state in the union.

The good news is that about 82 percent of those streams are considered “unimpaired” by pollution or development according to state standards.

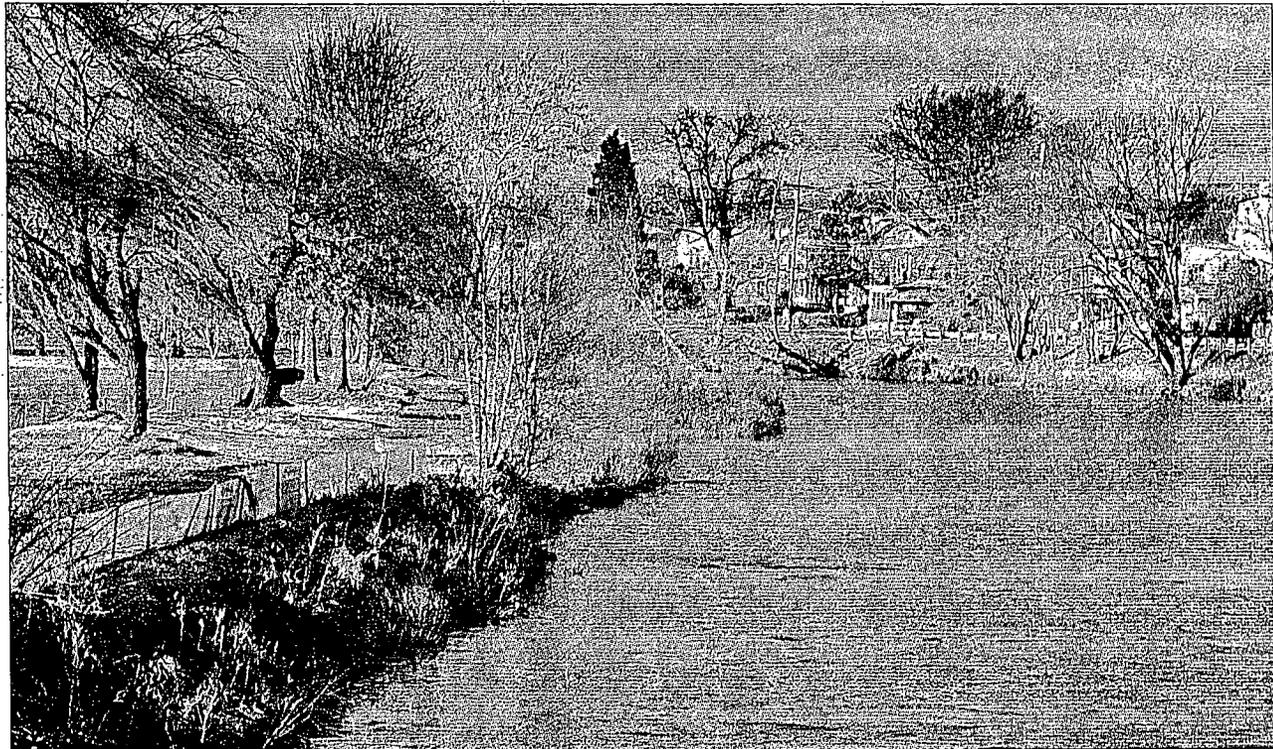
The bad news is that 83,602 miles is a lot of stream to monitor — and it's only getting harder as budgets tighten and development pressure mounts, resulting in more streams in need of monitoring just as monitoring efforts are being choked off.

Just ask John K. Jackson.

A senior research scientist with the Stroud Water Research Center, Jackson was the keynote speaker at the Schuylkill Watershed Congress held earlier this month at the Montgomery County Community College campus in Pottstown.

Jackson, who is also an adjunct professor at the University of Delaware and at the University of

(See WATERSHED CONGRESS on A3)



Daniel P. Creighton  
The Mercury

# **Limerick Nuclear Power Plant Water Needs Are Depleting The Schuylkill River Flow**

## **➤ Exelon Is Asking DRBC To Reduce Low-Flow Restrictions.**

## **➤ What could that mean over time?**

- ✓ There's no truly independent public interest study to determine long-term impacts from reducing low-flow restrictions.
- ✓ Logically, the lower the flow in the river, the more concentrated that toxic discharges to the river will become, and the harder it will be for water treatment plants to meet standards.
- ✓ The Schuylkill River ranked 11<sup>th</sup> in the nation in receiving toxic chemicals in 1997, even before Exelon's Demonstration Project pumped billions of gallons of contaminated mine water into the river.

## **What Is Obvious Is**

# **Limerick's Enormous Threat To The Region's Water Supply Has Been Going On For Over 20 Years**

- There is no question that Limerick Nuclear Power Plant's enormous daily withdrawal and use of Schuylkill River water is a major factor in low flows in the Schuylkill River.
  - ✓ Exelon first asked to withdraw 69 Million Gallons Every Day for Limerick Nuclear Plant.
  - ✓ Exelon's current request is 56.2 Million Gallons Per Day Withdrawal.
  - ✓ Limerick only returns about ¼ of the amount of water it withdraws each day.
  - ✓ At least 35 Million Gallons of water withdrawn every day is emitted into the air as steam.
  - ✓ Even with supplementation, there is an enormous depletion factor.

## **Math Proves Enormous Yearly Schuylkill River Depletion - Even With Supplementation**

### **Exelon's Current Requests:**

Limerick Withdraws **56.2 Million Gallons Per Day – 20 ½ Billion Gallons Per Year**

Limerick Returns **14.2 Million Gallons Per Day – Over 5 Billion Gallons Per Year**

### **➤ 14 to 15 Billion Gallons Are Not Returned To The River Each Year**

#### **Exelon's Maximum Potential Supplementation**

- ✓ 1 Billion Gallons Per Year – Contaminated Wadesville Mine Water
  - ✓ 1 Billion Gallons Per Year – Tamaqua Reservoir
  - ✓ 1 Billion Gallons Per Year – Delaware River Diversion
- **11 to 12 Billion Gallons Are Depleted From The River Every Year**  
Even using all supplementation sources for the Schuylkill River flows,

## **Limerick's Water Use Has Logically Been A Major Factor In Already Alarming Low Flows In The Schuylkill River. Now, Exelon Even Wants To Reduce Safeguards.**

- Repeated and serious droughts in recent years have heightened awareness of extremely low flows in the Schuylkill River.
- For over 2 years many residents expressed concern about low levels of water in the Schuylkill River. Areas once covered with water are dry. People are walking in the river where they once needed a boat.
- Some residents are expressing concern over significantly depleted Schuylkill River tributaries. They fear these streams and creeks may soon dry up completely.

**For More Information On Nuclear Power Plant Water Threats See  
Union of Concerned Scientists [www.ucsusa.org](http://www.ucsusa.org)  
"Got Water? Nuclear power plant cooling water needs (PDF)"**

## **Got Water?**

### **Nuclear power plant cooling water needs**

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in this section

[Got Water? Nuclear power plant cooling water needs \(PDF\)](#)

For every three units of energy produced by the reactor core of a U.S. nuclear power plant, two units are discharged to the environment as waste heat.

Nuclear plants are built on the shores of lakes, rivers, and oceans because these bodies provide the large quantities of cooling water needed to handle the waste heat discharge.

*Got Water?* explains the cooling water needs of nuclear power plants and describes the various methods used to meet those needs.

In addition, this 14-page illustrated backgrounder summarizes some of the problems nuclear power plants have encountered when the insatiable cooling water needs were unmet.

For additional details, view the PDF version of this backgrounder by clicking on the link above.

### **The Question Is:**

**How Much Contaminated Unfiltered Mine Water  
Should Exelon Be Allowed To Pump Into The Schuylkill River,  
A Vital Drinking Water Source For Almost 2 Million People,  
To Supply Limerick Nuclear Power Plant Water Needs?**

**Limerick Nuclear Power Plant's**  
**33 Year Old**  
**Environmental Impact Statement**

Filed in 1973 By Atomic Energy Commission (NRC)  
Finalized in 1975, After An Appeal Board Decision

**IS NO LONGER RELEVANT**

**Limerick's 1975 EIS Is Unacceptable  
To Determine Current and Future Threats  
To Water, Ecosystems, Environment, Wildlife, and Public Health**

- **Limerick's EIS, Was Finalized in 1975**  
**14 Years BEFORE Limerick Ever Opened**
- **The 1975 EIS Was Based On ASSUMPTIONS,**  
**ASSERTIONS, And ESTIMATES- NOT REALITY**

**A NEW Environmental Impact Statement**  
**IS ESSENTIAL PRIOR To DRBC's Decision**  
**Related To Schuylkill River**  
**Water Supply and Quality**

## **ACE Obtained 1985 Public Hearing Comments From DRBC's Public Hearing To Start Operating Limerick Nuclear Plant**

- **Attached Is A Summary Of Comments Suggesting It Was Reckless For DRBC To Originally Approve Limerick's License, Based On Important Concerns About Water And The Schuylkill River.**

### **Major Concerns Included:**

1. High temperature stress increases the sensitivity of aquatic organisms to disease and toxic pollutants.
  2. Many were concerned that Limerick's Consumptive Use Of Public Water Deprives Water Quantity and Quality Benefits To The Public. They worried that the result would be to place downstream water uses, including those reliant on the Camden and Philadelphia water supply systems, at substantially increased risk.
  3. In 1985 PECO (Exelon) made requests to DRBC for "Temporary Relief" of limitations. Now in 2011 Exelon Is Requesting "Permanent Relief" for the same limitations and safeguards.
- DRBC Findings Said, "**CONSTRAINTS are NECESSARY to PREVENT DISSOLVED SOLIDS VIOLATIONS and PROTECT WATER QUALITY AND QUANTITY.**"
  - Limerick had MAJOR TDS violations and is currently requesting double permit limit increases.
  - It appears DRBC may have already minimized / reduced some of those safeguards without the public hearing promised in Pottstown.

## Summary Issues

### **61 Comments - DRBC Public Hearing May 7, 1985**

PECO Application For Amendments April 24, 1985 To Docket D-69-210 CP (Final)

#### Purpose of 1985 PECO Application for Amendments

“Temporary relief” through 12/31/85 from 2 existing docket limitations to increase frequency water may be withdrawn from the Schuylkill River for evaporation of Limerick Unit No. 1.

#### ➤ 23 years later Exelon is still asking for the same thing

PECO (Exelon) made requests to DRBC for “Temporary Relief” in 1985 and now in 2008 Exelon Is Requesting “Permanent Relief” for the same following limitations:

1. NO water withdraw from the Schuylkill River for evaporative use at Limerick when the temperature rises above 59 Degrees F.
  - ✓ This reduces days PECO must replace evaporative losses at Limerick Unit 1.
2. Water for evaporative use may not be withdrawn from the Schuylkill River when the flow at the Pottstown gage falls now below 560 cfs.
3. They want to substitute Dissolved Oxygen (DO) monitoring for Temperature Restriction

#### Proposed Location Of Dissolved Oxygen Monitors

- ✓ PECO (Exelon) proposed change in location of 6 dissolved oxygen monitors in lieu of proposed temperature monitor at Pottstown.

#### DRBC Findings

- **“CONSTRAINTS are NECESSARY to PREVENT;**
  - ***Dissolved Solids VIOLATIONS***
  - ***EFFLUENT and WATER QUALITY***
- **CONSTRAINTS are NECESSARY to PROTECT**
  - ***WATER QUALITY and QUANTITY BELOW LIMERICK***

**Substitution of DO monitoring for temperature constraint allows Limerick to take water many more days.**

- ✓ PECO (Exelon) estimated impact under drought conditions such as 1966 – Under constraints water could be withdrawn for 122 days - Substituting DO standard for temperature would permit withdrawals 50 days more
- ✓ In a normal year such as 1968, water is available for Limerick on 177 days under temperature and flow constraints - Substitution of DO standards allows water withdrawal 41 more days.

#### Issues Raised By Concerned Agencies and Others At DRBC Hearings Regarding Adequacy and Accuracy of Dissolved Oxygen Monitoring

4. **Location and Specification of Monitoring:**
5. **Fish and Boat Commission Concerns:**  
**Accuracy of Monitors - Proper Calibration**  
**Specific Seasonal Need of Aquatic Life**
6. **Company v. Independent Monitoring:**  
**Witnesses criticized PECO monitoring calling it "conflict of interest",**  
**"letting the fox guard the chicken coop"**
7. **Dissolved Oxygen In River Water Varies (over the day) by a Fairly Wide Range**
8. **Lack of specificity, self-monitored DO, and proposed self-adjusting for plant operations makes PECO's proposal even more troublesome.**

**Witnesses Suggested More Restrictive Standards Were Needed**

- **To Protect Fish and Aquatic Life in the River.**
- 9. Philadelphia Suburban Water Company noted that **"high temperature stress increases the sensitivity of aquatic organisms to disease and toxic pollutants."**
- 10. Due to the number of hours required to shut down power plant operations if the DO criteria are triggered,
  - it is necessary to establish a buffer or "margin of safety".

**Public Comments Expressed That Limerick's Consumptive Use Of Public Water**

- **Deprives Water Quantity and Quality Benefits To The Public**

**The result would be to place downstream water uses, including those reliant on the Camden and Philadelphia water supply systems, at substantially increased risk.**

- ✓ **DRBC Comprehensive Plan Policy – PRIORITIES of water use during drought emergencies give first priority to those uses which sustain human life, health and safety.** (Water Code, Delaware River Basin, Section 2.5.2)

## **SUMMARY**

The objective of the 59 Degree temperature limitation contained in the original docket decision, was to prevent the Limerick Project from aggravating dissolved oxygen conditions in the Schuylkill River during critical periods.

DRBC denied PECO the temporary use of water from Blue Marsh for evaporation at Limerick, citing conflict with the Comprehensive Plan.

## **DECISIONS - By the Commission – DRBC Dated May 29, 1985**

### **“Findings”, “Sources of Water Supply”**

1. NO withdrawals for consumptive use shall be made from the Schuylkill River or the natural flow of its tributaries whenever dissolved oxygen in the Schuylkill River at or below Limerick at any of the monitoring locations:
  - ✓ Is less than 7.0 mg/l during 3/1 to 6/15 or
  - ✓ Is equal to or less than 5.1 or 4.2 mg/l during the remainder of the year.
  
2. The following conditions were added:
  - ✓ Accurate recording dissolved oxygen monitors shall be installed within 200 feet of each dam on the Schuylkill River below Limerick.
  
  - ✓ Installation, calibration, maintenance, and operation of all dissolved oxygen monitors and interim manual measurements of dissolved oxygen shall be under the supervision and control of the US Geological Survey.

The request that DRBC **release water from storage at Blue Marsh Reservoir or other facilities** whenever dissolved oxygen limitations or flow limitations would require PECO to replace all evaporative losses at the Limerick Nuclear Generating Station is hereby **DENIED**.

# **Environmental Impact Statement (EIS)**

## **Details on Submission, Appeal, and Approval**

PECO Application to DRBC – DOCKET NO. D-69-210 CP (Final) Included

### **Review Of Withdrawing Surface Water and Discharge Wastewater**

March 29, 1973 - DRBC Approved Limerick's Withdrawal of Surface Water  
Subject To Final Environmental Impact Statement

**In essence – DRBC Approved Limerick Water Withdrawal BEFORE EIS Was Completed**

**November, 1973 - AEC Filed Final Environmental Impact Statement**  
With Council on Environmental Quality (CEQ)

- **Environmental Impact Statement was APPEALED**  
by The Atomic Safety and Licensing Appeal Board.

**PECO Application Went Again Before DRBC For Final Decision**

### **MAJOR CONCERN**

### **SUBSTANTIAL EFFECT ON WATER RESOURCES**

**From Limerick's Water Intake and Wastewater Discharge**

- **Liquid Wastes Discharged Consist of Liquid Radioactive Wastes (Radwastes)**
- **LIQUID RADWASTES - Handled by 4 liquid collection and treatment subsystems and environment discharge subsystem**
- **Before release to Schuylkill River – RADWASTES supposedly diluted with cooling-tower blowdown.**
- **Chemical Additives - 324 Pounds PER DAY Added To Water At Limerick,**  
For control of fouling organisms on heat-exchanger and piping surfaces  
**Discharged To Schuylkill River Via Blowdown System.**
- **Other Radwastes Wastes – Solid and Gaseous Radioactive Waste (radwastes):**

#### **Solid Radwastes Include:**

- ✓ Spent Demineralizer Resins
- ✓ Evaporator Bottoms
- ✓ Waste Sludges
- ✓ Filter Elements
- ✓ Contaminated Equipment
- ✓ Paper, Rags, Plastic Sheeting
- ✓ Other Materials Used In Decontamination and Contamination Control

**Approved For Offsite Disposal To A Licensed Facility By DOT**

#### **Gaseous Radwastes**

**Of Concern to DRBC For Potential Of Contaminating Water Resources in the Basin**

- ✓ Stored Gases Are Released to the Atmosphere Via a Vent  
Located Approximately 200 Feet ABOVE Local Grade Elevation.
- ✓ Release of Radioactive Gases Add Dose Levels To Surrounding Population

## **FINDINGS**

### **March 29, 1975 – DRBC Affirmed Availability of Water Supply** **(Using Terms “EXPECTED” “SHOULD RESULT” “ESTIMATED DOSE” “CALCULATED”)**

#### **Summary of Environmental Impacts from Final Environmental Impact Statement**

Prepared by Atomic Energy Commission (now NRC) filed with the Council on Environmental Quality

- a) Limerick Generating Station would occupy 85 of 587 acres.
- b) Two cooling towers will result in Consumptive Use of Water by Evaporation - Drift at a maximum rate of 65 cubic feet per second (cfs).
- c) Chemicals discharged as cooling tower blowdown or vapor drift from the cooling towers – “EXPECTED” to be insignificant.
- d) Chlorination system “SHOULD RESULT” in a chlorine concentration of 0.2 ppm in the cooling tower blowdown
- e) Normal operational radioactive releases - no ‘significant’ environmental impacts are “EXPECTED” within a 50-mile radius. DOSE is ESTIMATED
- f) “CALCULATED RADIATION DOSE” to the “THYROID of a child” from radioactive iodine via the atmosphere – pasture – cow-milk pathway  
Within AEC guidelines  
As low as “practicable” radioactivity emissions from nuclear power plants.  
➤ ***In essence – Any level is acceptable if someone determines it's practical.***
- g) Discharge is To Meet Effluent Requirements and Stream Quality Objectives in DRBC Water Quality Standards.

#### **Appeal Board Decision Led To All Approvals - May 23, 1975**

- ✓ AEC (NRC) decided Exelon could proceed to Limerick construction.
- ✓ Limerick Nuclear Power Plant was scheduled to begin operation April, 1981
- ✓ DRBC concluded all NEPA requirements were satisfied and approved the Application

## **DECISION**

- I. Project is approved subject to NRC and PA DER conditions imposed
  1. DRBC determined that PECO shall operate Limerick only at such % of full load as available water supply allows
  2. DRBC's Sole discretion, would determine adequacy of existing water storage.
  3. PECO will pay DRBC for metered quantities of water withdrawn
  4. Radioactive wastewater discharges shall not increase Schuylkill River temperature by more than 5 Degrees
- ***ACE Found NO Evidence Permit Conditions Were Independently Verified After Limerick Nuclear Power Plant Started Actual Operations In 1984.***
- ***NO Agency Has Done Independent Testing or Reporting To Determine The Full Extent Of The Consequences Of These Decisions.***

**At Least 60 Days  
PRIOR To NRC's Next Public Hearing  
On Limerick's Updated EIS DRAFT,**

**The Public Needs and Deserves Answers  
To The Attached ACE Correspondence  
To DRBC and DEP**

- **Most Issues, Concerns, and Questions  
In This Correspondence Remain Unanswered,  
And Are Directly Relevant And Require Consideration  
For NRC's Updated EIS For Limerick.**
- **This Is About Pending Requests From Exelon  
To Increase Limerick Nuclear Plant's  
Harms and Threats To The Schuylkill River**

**Answers will have direct impact on the viability of  
the vital public drinking water source for almost 2  
million people from Pottstown to Philadelphia.**

**NRC'S EIS for 20 more years of Limerick Nuclear  
Plant operations cannot be considered credible  
until these questions and concerns are answered  
and addressed to protect the public's water.**

Date: January 17, 2011

**To:** **PA DEP** Southeast Regional Office  
Jenifer Fields, Regional Water Manager  
2. East Main Street  
Norristown, PA 19401

**From:** **Alliance For A Clean Environment (ACE)**  
1189 Foxview Road  
Pottstown, PA 19465

**Re:** **Concerns, Questions, and Requests Related To**  
**Limerick Nuclear Power Plant's - NPDES Permit No. PA0051926**  
**National Pollutant Discharge Elimination System - Permit Renewal Application**  
Submitted By Exelon To PA DEP, September 2010

**ACE is asking DEP to respond to each question and concern in the attached document, PRIOR to issuing Exelon's NPDES Permit Renewal. We request answers BEFORE this permit is finalized, with 60 days for us to review and respond to DEP's answers to our concerns, questions, and requests, PRIOR to issuance of Limerick's final NPDES permit.**

Based on the potential for extremely harmful consequences to public water, public health, ecosystems, and additional public costs at water treatment systems, related to DEP decisions for Limerick Nuclear Power Plant's NPDES permit, we believe our requests for full and accurate disclosure, as well as prevention and precaution, are justified.

It is important for the public to have a better understanding of the big picture and long term consequences from radiation and other toxics Limerick Nuclear Power Plant is actually discharging, especially into the Schuylkill River, a source of drinking water for almost two million people from Pottstown to Philadelphia.

- To protect the public's water, health, and financial interests, we urge DEP to carefully consider issues we are raising as well as our recommendations for ways to reduce contamination in massive discharges into public waterways, instead of simply issuing this permit renewal with increases.

Of major concern are links which go unaddressed between this NPDES permit and Limerick's other permits and requests, including:

1. Limerick's Title V Air Pollution Permit Issued by DEP
2. Limerick's Radiological Discharges Reported to NRC, but NOT in this NPDES Permit
3. Exelon's Docket Requests to DRBC Related To The Schuylkill River
4. Exelon's TWO "Upgrades" to Run Limerick Harder Logically Leading to Increased Water Intake and Increased Toxic Discharges Into the Schuylkill River and Other Discharge Points.

We need to understand how the issues listed above impact Limerick Nuclear Plant's NPDES Permit.

Changes requested by Exelon for Limerick's NPDES Permit are not simple changes as Exelon claims. DEP decisions could drastically increase threats to our region's air, water quality, and health, and increase public costs for water. Without a doubt, if Exelon requests are approved as requested, Limerick Nuclear Plant would be polluting the Schuylkill River, other discharge points, and the region's air even more. We need a clear understanding of how and why DEP decisions for this NPDES permit are being made, what is and is not actually included and why, and a clear understanding of the consequences of DEP decisions related to Exelon's other permits and requests.

Exelon's conclusion that their requested changes below are "not substantial", appears to be both self-serving and out of touch with reality:

- 1) TDS Permit Limits - INCREASED from 1,000 to 2,000 mg/l.
- 2) TRO Time Limits for Toxic Additives - INCREASED from 1 hour to 2 hours per day - 365 days a year.
- 3) Elimination of Temperature Restrictions
- 4) Elimination of Monitoring for Temperature

Increasing pollution, and eliminating temperature restrictions and monitoring for an increasingly depleted river, is a recipe for disaster. Yet, Exelon is asking both DEP and DRBC to do just that. There is no clear understanding of who is in charge. Ironically, DEP and DRBC have temperature restrictions that are miles apart

Limerick's heated discharges into the Schuylkill River raise serious questions. Irrationally, Exelon is asking to eliminate Schuylkill River temperature restrictions based on outdated and meaningless ESTIMATES from a 1984 Environmental Study, completed before Limerick even started operating.

Exelon's 2010 testing for Total Dissolved Solids (TDS) suggests that Limerick had serious TDS permit violations, with NO DEP enforcement action or requirement for filtration to reduce TDS discharges and PM-10 air pollution. Exelon's TDS data for 2010 suggests that at times Limerick would still be violating even the doubled TDS limit currently requested by Exelon for this permit. This is alarming, given the fact that in addition to costly TDS discharges into public waterways, the doubled increase in TDS limits would cause serious increases in PM-10 air pollution from the cooling towers.

Clearly, Limerick Nuclear Power Plant's discharges of a broad range of radionuclides 24 hours a day, 365 days a year, into the public drinking water source for almost two million people is a serious threat. Over 5 billion gallons of radioactive water are discharged into the Schuylkill River every year. Over 1.3 Million Gallons of highly Radioactive Wastewater are stored in 18 tanks at the Limerick site.

Radionuclides may also be discharged from other Limerick discharge points into nearby waterways. Limerick Nuclear Plant contaminated groundwater with radiation. We need a better understanding of how that could potentially impact discharge points covered by this NPDES Permitting.

It was shocking to learn that well over 94,000 to over 192,000 pounds of toxic chemicals are used at Limerick PER DAY. Those toxics either end up in our air or Limerick's wastewater discharges. They don't disappear. DEP seems to have failed to issue permit limits or require actual monitoring for most of those chemicals. DEP simply allows Exelon to CALCULATE the amount of many dangerous toxics discharged from Limerick into the Schuylkill River.

The extraordinary amounts of toxic chemicals used at Limerick have significant implications related to the alarming number of wastewater discharge points from the site. Limerick wastewater is discharged from NINE discharge points into the Schuylkill River, FOURTEEN discharge points into Possum Hollow Run, and ONE discharge into Sanatoga Creek. It is not clear if any of these bodies of water or their sediment have ever been tested independently for all the massive numbers of toxic chemicals used every day at Limerick or for radiation. We have no idea how much damage has already been done over the past 25 years.

Continuous increasing depletion of the Schuylkill River due to Limerick operations intensifies all the toxic threats from Limerick's waste water discharges. We do not believe this was considered in the current NPDES Permit. It seems the only way to minimize damage is to require filtration. That can't happen without DEP requiring full and accurate disclosure.

Because we realize there are constraints on DEP resources, we will not be requesting a public on-the-record hearing. However, because these issues are of critical importance to almost two million people, we do request timely answers to our questions, concerns, and requests PRIOR to issuance of the final permit with time to respond before that permit is issued.

Respectfully,

Dr. Lewis Cuthbert  
ACE President

Date: January 17, 2011

**To:** **PA DEP** Southeast Regional Office  
Jenifer Fields, Regional Water Manager  
2. East Main Street  
Norristown, PA 19401

**From:** **Alliance For A Clean Environment (ACE)**  
1189 Foxview Road  
Pottstown, PA 19465

**Re:** **Concerns, Questions, and Requests Related To  
Limerick Nuclear Power Plant's - NPDES Permit No. PA0051926  
National Pollutant Discharge Elimination System - Permit Renewal Application  
Submitted By Exelon To PA DEP, September 2010**

ACE is asking DEP to respond to each question and concern in this document, PRIOR to issuing Exelon's NPDES Permit Renewal.

- We request answers 60 days BEFORE this permit is finalized, to have time to review and respond to DEP's answers to our concerns, questions, and requests, and in time for ACE to respond, PRIOR to issuance of the final permit.

Based on the potential for extremely harmful consequences to public water, public health, ecosystems, and additional public costs at water treatment systems, related to DEP decisions for Limerick Nuclear Power Plant's NPDES permit, we believe our requests for full and accurate disclosure, as well as prevention and precaution, are justified. It is important for the public to have a better understanding of the big picture and long term consequences from radiation and other toxics Limerick Nuclear Power Plant is actually discharging, especially into the Schuylkill River, a source of drinking water for almost two million people from Pottstown to Philadelphia.

- To protect the public's water, health, and financial interests, we urge DEP to carefully consider issues we are raising as well as our recommendations for ways to reduce contamination in massive discharges into public waterways, instead of simply issuing this permit renewal with increases.

Of major concern are the links which go unaddressed between this NPDES permit and Limerick's other permits and requests, including:

1. **Limerick's Title V Air Pollution Permit Issued by DEP**  
Link between huge TDS requested increase limits and PM-10 air pollution
2. **Limerick's Radiological Discharges Reported to NRC, but NOT in this NPDES Permit**  
A broad range of radionuclides discharged into the Schuylkill River are the most threatening discharge from Limerick, yet not clearly nor comprehensively addressed in this NPDES permit, even though DEP has a radiation department which deals with low-level radioactive wastes and this is about wastewater into the river. Radioactive water is likely in some of Limerick's other discharge points, but that is unclear.
3. **Exelon's Docket Requests to DRBC Related To The Schuylkill River**  
To Eliminate Temperature Restrictions, Lower Flow Restrictions, Reduce Safeguards, and Increase Mine Water Pumping into the River Increasing Toxic Metals and TDS in the Limerick Water Withdrawal.
4. **Exelon's Two "Uprates" to Run Limerick Harder, Logically Leading to Increased Water Intake and Toxic Discharges into the Schuylkill River and Other Limerick Discharge Points**  
Exelon's has plans for two uprate projects. Both could be completed during the time covered by this permit renewal. Has DEP discussed or pre-approved increases related to uprates in this permit renewal?

Changes requested by Exelon for Limerick's NPDES Permit are not simple changes as Exelon claims. DEP decisions could drastically increase threats to our region's air, water quality, health, and increase public costs for water. Without a doubt, if Exelon requests are approved as requested, Limerick Nuclear Plant would be polluting the Schuylkill River, other discharge points, and the region's air even more. We need a clear understanding of how and why DEP decisions for this NPDES permit are being made, what is and is not actually included and why, and a clear understanding of the consequences of DEP decisions related to Exelon's other permits and requests.

### **Total Dissolved Solids Limits and PM-10 Emissions.**

Our greatest concern is Exelon's request to double Limerick Nuclear Plant's Total Dissolved Solids (TDS) limit and the additional dangerous air pollution that would result from such a drastic increased limit.

DEP acknowledged that Limerick's NPDES Permit Renewal will increase air pollution from Limerick's cooling towers (DEP's Comment Response Document for Limerick's Title V Permit Renewal). DEP admitted Limerick's cooling towers are an effluent stream from the river to the sky.

Exelon acknowledged cooling towers produce too much air pollution when using air pollution as the excuse to refuse NJ DEP's request to construct cooling towers at their nuclear plant in New Jersey.

Why would PA DEP even consider approving Exelon's request to double Limerick's TDS limits knowing that will lead to huge increases in already dangerous air pollution from Limerick's cooling towers? Exelon's requests for double TDS limits for Limerick Nuclear Plant could lead to what appears to be the potential for an 8 times higher increase in dangerous Particulate Matter (PM-10) emissions.

Exelon's request for double TDS increases is NOT acceptable, especially when FILTRATION for Limerick's water withdrawal could eliminate the need for TDS permit increases, and therefore minimize PM-10 emissions from Limerick's cooling towers and other sources.

- ✓ PM-10 is regulated under Clean Air Act health based standards because it harms health. We remind DEP, PM-10 not only causes serious respiratory problems, it is also linked to heart attacks and strokes. PM-10 causes increased hospitalizations, etc., increasing health care costs to the public.
- ✓ PM-10 emissions from Limerick's cooling towers and Limerick's other three sources of PM-10 are not accurately measured and added. DEP allows Exelon to calculate PM-10 emissions from the cooling towers based on TDS. It would be beyond irresponsible to allow TDS limits to double current limits, knowing that will lead to increased PM-10 from the cooling towers and likely other Limerick sources, in a region where PM-10 emissions are already too high.
- **We urge DEP to carefully review ACE comments and requests below on Exelon's Requested TDS Limits and respond to each.**

## **Total Dissolved Solids (TDS) Limits**

**Attachment To Application Form (Section 12)**

**ACE is Strenuously OPPOSED to the Drastic Increases In Total Dissolved Solids Limits Requested by Exelon in this Permit Application.**

**DEP Should NOT APPROVE Exelon's 2000 mg/l TDS Permit Limit Request.**

**Exelon is requesting Limerick TDS limit to be raised to - 2,000 mg/l**

**Limerick's Current Permit TDS Permit Limit is - 1,000 mg/l**

**Safe Drinking Water Act Standards for TDS are - 500 mg/l**

**We remind DEP that Limerick's Total Dissolved Solids limit is for discharges into a public drinking water source for almost 2 million people.**

- **How could DEP possibly justify a TDS limit that is 4 times the limit of Safe Drinking Water Standards for this vital source of public drinking water?**
- **The current limit is double Safe Drinking Water Standards for a drinking water source. Why was that limit permitted in the first place instead of requiring filtration?**
  - ✓ When was the 1000 mg/l TDS permit limit first determined by PA DEP?
  - ✓ Did DEP consider the volume of TDS discharged - that TDS is discharged with over 5 billion gallons of radioactive water every year?
  - ✓ Did DEP allow a TDS discharge limit double Safe Drinking Water Standards based on dilution?
- **If Limerick's current TDS permit limit of 1,000 was largely based on a decades-old estimate using dilution, shouldn't TDS permit limits be REDUCED now based on lower river flows - NOT INCREASED?**
  - ✓ Schuylkill River flows are lower every year due to Limerick Nuclear Plant operations. Limerick significantly depleted the river flow since it started operating in 1985. Over 25 years more than 300 billion gallons of river water were never returned to the river. Tens of billions of gallons were instead emitted into the sky from the cooling towers containing PM-10.
- **In a depleting water source, wouldn't Limerick's continuous and massive TDS discharges be far more concentrated, especially in times of heat and drought?**
  - ✓ Limerick will continue to deplete the river as long as Limerick continues to operate.
  - ✓ The depletion threat could grow as a result of Limerick Upgrades.
  - ✓ As depletion continues, the threats from concentration will increase.
  - ✓ How could DEP possibly consider a permit limit for TDS discharge 4 times higher?
- **Concentration of TDS levels in the Schuylkill River should be of concern to DEP due to the increased costs for all public drinking water systems to try to remove TDS in their treatment.** These costs will be passed off to the public. Many families are already struggling to pay bills and can't afford to pay unnecessary increases in their water bills due to Exelon being permitted to massively increase TDS discharges into the Schuylkill River instead of filtering discharges.

# **LIMERICK VIOLATED NPDES PERMIT LIMITS FOR TDS**

## **✓ Exelon Should Be Fined, Not Getting Increased Permit Limits**

**Exelon's Assertion That Limerick's TDS Violations Are An Excuse To Demand Increased TDS Permit Limits Is Both Outrageous and Unacceptable.**

- **Limerick Nuclear Plant's TDS VIOLATIONS Should NOT Be Justification To INCREASE Limerick's NPDES Permit Limit Into A Public Water Source Where Water Treatment Companies Must Meet the 500 mg/l Drinking Water Standard.**

**Limerick's NPDES Permit Violations Are Documented In Exelon's Permit Application. Exelon's Own 2009 Data For Limerick's NPDES Permit Application Shows Many Violations, (Even With Exelon Using Diluted Composite Samples).**

- **Limerick Nuclear Plant Violated Its NPDES Permit Limit for TDS:  
13 of 16 Samples Violated Permit Limits (2009 - 2010)  
Violations Were Up To 5 Times Safe Drinking Water Standards**
- **TDS sampling shows at times Limerick would violate even the newly requested permit limit of 2000 mg/l, especially in the hottest, lowest flow seasons of the year.**

**One Example of Exelon's TDS sampling data shows why filtration is imperative: Limerick's Daily Volume of TDS into the Schuylkill River from just one sample from one discharge pipe (Outfall 001) reached 2,419 mg/l**

- That's 5 TIMES Safe Drinking Water Standards.
- In heat and drought conditions wouldn't DEP expect even the new limit of 2,000 mg/l to be violated?
- How much will drinking water companies have to pay to treat that water to reach the 500 mg/l TDS limit for the water they sell their customers?
- How much more will customers pay for their water because of DEP increasing TDS limits at Limerick?
- Exelon admitted Limerick's current 1,000 mg/l TDS limit is not being met and that at times blowdown contains greater than 2,000 mg/l TDS.

**When Exelon admits that in the hottest, lowest flow months, Limerick could violate even its newly requested permit increase of 2,000 mg/l, why shouldn't Exelon be required to pay for TDS filtration and avoid violations and costs to the public? Because Limerick Can't Meet Its TDS Permit Limit Into The Schuylkill River,**

- **Exelon Should be Required to Filter Its Waste Water Discharges for TDS.**
- **The only solution to prevent unnecessary harm and costs to the public from massive TDS discharges from Limerick, is to require FILTRATION for TDS discharges into the Schuylkill River.**

1. If Exelon Refuses To Provide Filtration, DEP Should Levy Significant Fines For All Past, Current, and Future Violations.
2. Fines and Interest for Non-Payment Should Continue Until Exelon Agrees To Provide Filters to Meet Current NPDES Limits for TDS. Even Current Limits Already Double Safe Drinking Water Standards.
3. Limerick's excessive TDS discharges obviously contribute to increased costs for treatment and removal at water treatment systems. Exelon either pays for filtration of their TDS waste water discharges as a cost of doing their business, or the public pays in the end.
4. DEP should examine all past sampling data to determine the extent of past TDS Permit Limit Violations, then FINE Exelon for each and every NPDES permit violation for TDS, according to the extent of the violation. Fines from past violations could pay for split sample testing.
5. To justify the requirement for filtration, ACE urges DEP to do split sampling during June, July, August, and September of 2011, when TDS levels could be the highest. We believe this is the only way to have reliable, trustworthy data to determine actual TDS discharges from Limerick nuclear Plant.

**Exelon made what appear to be inaccurate claims.** Exelon claims Limerick's additions to TDS discharges should be well below the 1,000 mg/l limit. That appears to be inaccurate.

- Exelon claims the majority of Limerick's TDS permit violations are attributable to TDS in Limerick's Schuylkill River water intake. That appears to be disputed by data in Exelon's own permit application data.

Exelon's own data suggests Limerick's additions to TDS are over 2,000 mg/l.

**Exelon's Analysis Results Table - Pollutant Group 1 - Module 4**

Limerick Outfall 001	Maximum Daily TDS	-	Concentration 2,419	-	Mass 286,458
Schuylkill River Intake	Maximum Daily TDS	-	Concentration 403	-	Mass 188,976

Exelon admits Limerick Nuclear Plant adds to TDS levels in discharge waters, stating it is mostly through addition of sulfuric acid in cooling tower basins.

- ✓ What other practices at Limerick contribute to increased TDS concentrations?

**Wouldn't TDS produced at Limerick hold and concentrate radionuclides and other toxics associated with Limerick's operations?**

That could increase health threats as well as costs to water treatment plant customers beyond Limerick, as well as all who use the river for recreation. **Harmful Long-Term Consequences From TDS Violations and Future Increases Need To Be Fully Understood and Disclosed PRIOR to issuance of this NPDES permit.**

1. Do Limerick's other toxics concentrate in Total Dissolved Solids, including the wide range of long-lived radionuclides discharged from various underground radioactive liquid discharge pipes at Limerick?
2. If so, is that a consideration if TDS permit limits were dramatically increased?
3. Has DEP considered all the actual health, environmental, and financial costs to the public from the synergistic, additive, and cumulative toxic impacts from Limerick's TDS discharges over 25 years? Or what the impacts could be to the public if increased TDS limits were approved?

## **Who is in charge of these important decisions? DEP or DRBC?**

Item 8 of Permit Reference Page 33 suggests to us that Exelon has attempted to manipulate DEP into allowing DRBC to make NPDES decisions. Exelon is attempting to have DRBC regulate NPDES limits, instead of DEP.

- June 14, 2010 DEP/Exelon had a pre-application meeting. Are there minutes from that meeting?

## **Exelon's Mine Water Pumping For Limerick Increases Schuylkill River TDS Levels.**

Scientific studies pinpoint mine drainage as a major source of total dissolved solids. Exelon's massive mine water pumping into the Schuylkill River since 2003, to supplement the river flow for Limerick operations, has contributed to higher levels of TDS in the Schuylkill River.

1. **Exelon is trying to get approval to pump more and more mine water into the Schuylkill River to operate Limerick. Over time, won't that increase total dissolved solids problems at Limerick's intake, as well as problems and costs for every water treatment plant from Pottstown to Philadelphia?**
  2. **What were the TDS levels in Limerick Nuclear Plant's withdrawals from the Schuylkill River BEFORE mine water pumping started in 2003?**
  3. **Since mine water pumping started, we understand TDS levels increased at the Pottstown WWTP.**
  4. **Has DEP compared TDS intake at Limerick, before and after 2003?**
- **Independent data is needed, to compare TDS levels prior to 2003 with 2011 TDS data over June, July, August, September, and October. DEP should fine Exelon for Limerick's 2010 TDS violations at Limerick to pay for split sampling.**

## **Clearly, Doubling Limerick's Current TDS Limits Would Not Only Be Negligent Related To Increased Public Health Threats From Increased Air Pollution, It Would Also Be Negligent Related to Increased Costs to All Public Drinking Water Systems Beyond Limerick.**

In summary, the ACE Rationale for DEP to DENY Exelon's Request to Raise TDS Limits in Limerick's NPDES Permit and for DEP to INSTEAD REQUIRE Exelon to Filter both intake and discharges for TDS is based on two major points.

1. **INCREASED AIR POLLUTION**  
In essence, DEP admitted that raising TDS limits will result in INCREASED PM-10 emissions from Limerick's cooling towers. Without a doubt this will cause INCREASED THREATS TO PUBLIC HEALTH.  
➤ **To protect public health DEP should be requiring reductions in PM-10 emissions through TDS filtration, not allowing circumstances that lead to potentially an 8 times higher increase in PM-10 emissions.**
2. **INCREASED COSTS TO PUBLIC WATER TREATMENT SYSTEMS, AND ULTIMATELY THE PUBLIC.**  
Higher TDS limits for discharges into the Schuylkill River from Limerick will eventually result in increased costs to water treatment systems from Limerick to Philadelphia.  
➤ **Public water costs will increase for customers. In these hard economic times, that is unacceptable. Either Exelon pays to filter out TDS from Limerick's discharges, or public water customers pay later.**

- **DEP must stop shifting the burden for the astronomical costs of pollution onto the public, especially in such hard economic times.**

Exelon makes billions of dollars in profits each year. Its CEO makes millions. Exelon can afford to filter Limerick's intake and discharges for TDS out of enormous profits and bonuses.

## **THERMAL DISCHARGE**

### **DEP Should NOT Accept 1984 Estimates For 2011 Decisions.**

- ✓ **Limerick Didn't even Start Operating Until After 1984**

#### **APPENDIX F - Historical Information**

As evidence of Limerick Nuclear Plant's thermal discharge impacts to the Schuylkill river, Exelon included a 1984 Environmental Statement from before Limerick started operating, for this 2011 NPDES permit.

Why would DEP allow Exelon to determine Limerick Nuclear Plant's thermal (heated) discharge threat to the Schuylkill River based on "estimated" conclusions from an outdated 1984 Environmental Statement produced before Limerick even started operating?

- The 1984 conclusions were based on ESTIMATES of dilution and river flows from BEFORE operations, and should have no bearing on current conditions for 2011 permitting, 25 years later.
  - 1984 estimates were based on rapid dilution and typical river flows, which likely changed significantly over the past 25 years, largely due to depletion as a result of Limerick operations.
    - For 25 years, each year, possibly 15 billion gallons of river water intake were never returned to the river.
    - Only about 1 billion gallons per year were supplemented from the Delaware River (1985 to 2003).
    - Another 2 billion were supplemented each year from Tamaqua and the Wadesville Mine pit (2003 to 2009).
    - That means each year, 12 to 14 billion gallons of water were depleted from the Schuylkill River.
  - NO independent study has been done to accurately determine harms already done from Limerick's current thermal discharge requirement.
- ✓ **DEP and the public need to know actual thermal discharge impacts to the Schuylkill River and its ecosystems, based on actual current flow rates during heat and drought, NOT on ESTIMATES from before Limerick started operating.**

#### **Thermal Discharge - Exelon's Request and Rationale** Item 5, Page 30

Exelon wants DEP to delete the thermal permit requirement, "No rise above 87 degrees F, and instead allow Exelon to do a study".

Temperature restrictions are an important safeguard for the Schuylkill River and its Ecosystems. This Exelon request to eliminate a thermal permit requirement is irresponsible. ACE strenuously objects to DEP eliminating temperature restrictions to accommodate Exelon's bottom line. This can obviously further jeopardize a vital public water source, the Schuylkill River, and its ecosystems.

- ✓ **How could DEP possibly defend eliminating temperature restrictions? How could DEP possibly trust a study controlled by Exelon? It is clearly NOT in the best interests of the public, for DEP to make permitting decisions based on the outcome of a study designed and paid for by Exelon, the company with a vested interest in the outcome.**

We believe Exelon's study will say whatever Exelon wants it to say, based on Exelon's history of deception, summarized at the end of this document.

- **Given the potential for harm, why would DEP trust a study controlled by the company with a vested interest in the outcome that has shown it can't be trusted?**

DRBC permitted Limerick Nuclear Plant to operate in relation to the Schuylkill River, based on a 59 Degree temperature restriction originally decided based on the concerns of water experts, which is still in place.

- **Explain how DRBC's 59 Degree Docket Limit for the Schuylkill River, relates to DEP's 87 Degree Temperature Restriction for Limerick Discharges into the Schuylkill River.**

- A. **What year did Limerick Nuclear Plant receive its original NPDES permit?**
- B. **What were the average winter and summer temperature of the Schuylkill River before Limerick received its first NPDES permit?**
- C. **Why did DEP's permit allow an 87 Degree Limit for Schuylkill River discharges when DRBC's Docket had a 59 Degree Temperature Restriction?**
- D. **Through FOIA, ACE obtained the original public hearing comments on Limerick Nuclear Plant. Clearly, many people and groups were most alarmed about Limerick Nuclear Power Plant's long-term impacts on the Schuylkill River water supply, water quality, and its ecosystems. Protective temperature restrictions were deemed critical.**
  - a. **Why did DEP allow an 87 degrees F limit in the first place, when DRBC's temperature restriction is 59 degrees?**

**Consequences from an overheated river can be serious and go beyond the ecosystem.**

For example, in June, 2010, the Schuylkill River reached 89 degrees in Philadelphia. A triathlon swimmer died in the Schuylkill River and the rest of the event was cancelled.

- **DEP permitting allows Limerick discharges to raise temperatures by 2 degrees per hour and Exelon admits Limerick does raise temperatures by 2 degrees per hour. Look what can happen.**

Exelon says they would be forced to shut down Limerick when the river water temperature naturally reaches and exceeds 87 degrees, since discharge from 001 would cause a rise of the ambient temperature above 87 degrees.

- ✓ **To protect the river's ecosystem and public health, it seems clear that Limerick should be shut down when temperatures in the river reach 87 degrees or higher, to prevent Limerick from causing even higher temperatures.**

Exelon claims Limerick discharges do not increase river temperature by more than 2 degrees per hour, but is asking for no monitoring requirements to prove that.

- ✓ **We urge DEP to say NO to Exelon's request for "NO Monitoring of river temperatures" related to Limerick's thermal discharges.**

Exelon makes the unsubstantiated claim that the chances of Limerick thermal discharges raising temperatures by more than 2 degrees per hour is "highly unlikely".

- ✓ **There is NO INDEPENDENT PROOF to substantiate Exelon's claim that Limerick's thermal discharges are not raising Schuylkill River temperatures by more than 2 degrees. We believe Exelon's "highly unlikely" claim is illogical. Limerick depleted the river more and more every year of operation. Isn't it possible that Limerick's many millions of gallons every day of heated waste water discharges could be heating the river substantially more than 2 degrees in a depleting river?**

Exelon says the "likelihood" of cold shock of fish in the mixing zone is "very small".

- A. **Did DEP ever attempt to verify the actual size of Limerick's mixing zone?**
- B. **Do fish get cold shock even in 87 degree temperatures?**
- C. **Do fish get impacted by heat shock? How hot can water be for various fish to survive?**
- D. **How many fish are estimated to reside in the mixing zone? Is this located immediately after Limerick sucks up so many fish into its water withdrawal screens?**
- E. **What specific types of fish resided in the river before Limerick started to operate? Are they all still found in the river? What kinds of fish are in the river now? What are the estimated numbers for each kind of fish before and after? Where does this information come from?**

Exelon refers to the outdated 1984 Environmental Report to NRC to conclude that a drop in temperature by more than 2 degrees per hour will not occur outside the area of initial dilution under a sudden stop of blowdown flow in combination with extreme low river flow conditions.

**Why does DEP depend on conclusions based on a 1984 report, from before Limerick ever started operating, to make permitting decisions in 2011?**

Exelon claims the in-river discharge diffuser limits the size of the mixing zone via effective heat dissipation.

**Please explain how this limits transport of heat downriver as Exelon claims.**

Exelon says Limerick's thermal discharge is "EXPECTED" to be in compliance with applicable limitations.

**There is no proof that Limerick is in compliance with limitations.**

Exelon again refers to the outdated 1984 Environmental Statement, in which, prior to Limerick's operations, NRC made the completely unsubstantiated claim that Limerick can be operated with "MINIMAL" environmental impact.

**This 1984 claim is completely unsubstantiated and should not be used as justification for any reason in this 2011 permit. It is ridiculous to claim impact is "MINIMAL". That acknowledges there are harmful impacts, but justifies any amount since MINIMAL could be defined by interpretation.**

### **Discharge Time For Total Residual Oxidants (TROs) - INCREASE Permitted by DEP - From 2 to 3 Hours Per Day**

Total Residual Oxidants (TRO) - Item 7 Page 33

2/29/08 PA DEP approved Exelon's request that Limerick's TRO discharge from Outfall 001 be increased from two to three hours per day.

- ✓ **In spite of the potential for additional harms to public water, air, health, and ecosystems, why did DEP approve Exelon's request?**

TRO Limits Control Toxic Chemical Addition

- ✓ How did DEP verify that it was safe to approve the change that allowed this increased threat to public water, health, and ecosystems?
- ✓ Did DEP consider the consequences of added threats to air, as well as water?

**Exelon claimed this was necessary to continue Limerick operations. We disagree.**

- ✓ **There was another solution - FILTRATION prior to discharge.** If Limerick cannot operate without increasing threats from their dangerous discharges, then Limerick should stop operating.

**The health and financial consequences to the environment and people in the region need to be valued more than Exelon's bottom line.**

## Exelon Correspondence with DEP - APPENDIX E

Correspondence included by Exelon suggests a pattern of Exelon making requests to pollute more through their NPDES permit, and getting approval from DEP without independent investigation, testing, or reporting to protect the Schuylkill River, a vital public water source.

September 24, 2010 - Letter from Edward Callan, Limerick Manager To Jenifer Fields, PA DEP Regional Water Management

### **1. PA DEP had a Pre-Application Meeting with Exelon June 14, 2010**

Nothing is included in the permit related to the discussion of that meeting. Are there minutes from that meeting? Item 8 of Permit Reference Page 33 states clearly that in this meeting Exelon tried to manipulate DEP into drastically raising the Total Dissolved Solids (TDS) Limits from both cooling towers. Exelon wants DEP to allow DRBC to regulate limits.

- Is DEP planning to allow DRBC to regulate these limits?

### **2. Exelon made changes to chemical additives used at Limerick Nuclear Plant.**

**Chemical additives information in Module 1 is identical to submittal to DEP 7/30/10**

- Module 1 fails to make clear whether any of the original chemicals are still used. Are original chemicals still used?
- How much of each chemical is used per year?

### **3. Exelon made specific requests identified after Section 12 of the Application Form with rationale for each with relevant past correspondence.**

### **4. July 9, 2007 EPA suspended the Phase II regulations and directed that until new regulations are issued, permits should include conditions developed on a Best Professional Judgment (BPJ) basis.**

- Who is in charge of securing the professional making judgment? Exelon or DEP?

### **5. Exelon's request suggests the previous application is not being changed substantially, related to Limerick's description and classification and its source waters, Clean Water Act for cooling water intake structures (CWIS), and cooling water system.**

- **What is substantial?** It seems to us that "NOT Substantial" is a deceptive term being used by Exelon to try to verbally minimize obvious threats to get DEP to approve all the changes Exelon wants, regardless of the consequences to the river, ecosystems, public water, and even air.
- **Does DEP consider Exelon's changes substantial or not? If not, why not?**

Please provide a response about whether DEP considers each of the requested changes listed below substantial or not. Exelon's subjective conclusions that these are "not substantial changes" appear to be self serving and out of touch with reality:

- 1) TDS Permit Limits - INCREASED from 1,000 to 2,000 mg/l.
  - 2) TRO Time Limits for Toxic Additives - INCREASED from 1 hour to 2 hours per day - 365 days a year.
  - 3) Elimination of Temperature Restrictions
  - 4) Elimination of Monitoring for Temperature
6. Exelon claims Limerick's cooling towers with closed cycle cooling and an in-river diffuser is the Best Technology Available.
- This waste water is highly radioactive. Does Exelon mean "best" is the cheapest technology or the safest technology?
  - Has DEP ever investigated if there is technology that could better reduce radioactive threats to the Schuylkill River?

February 29, 2008 - DEP to Edward Callan, Exelon Plant Manager Request to INCREASE (TRO) Discharge Duration

Exelon asked to INCREASE the maximum allowable discharge duration from TWO hours per day to THREE hours per day for - TOTAL RESIDUAL OXIDANT (TRO) DISCHARGE - into the Schuylkill River from Outfall 001.

- It appears DEP approved the request based on Exelon's claim that they could not operate with a two hour per day limit.
- **Did DEP even attempt to get Exelon to prevent the excess discharge? If not, why not, given the harmful impacts, especially in a depleting river?**

May 19, 1998 - DEP response letter to PECO Engineer, regarding changes for monitoring and sampling requirements for Limerick's NPDES permit

1. PECO requested monitoring and sampling changes for Total Suspended Solids (TSS), phosphorus, copper, and zinc at Outfall 001. DEP approved PECO's request allowing PECO to use a representative composite sample while using DTS in the cooling towers with a net limit of 30mg/l as an average monthly, 60 mg/l maximum daily and 75 mg/l as instantaneous maximum at Outfall 001. (Effective June 1, 1998).
  - Representative composite samples and varying limits don't represent impacts of spikes and true threats to the river. They are dilution tactics.
  - What is the DTS that Exelon uses in the cooling towers? The letter does not explain.
2. PECO wanted to use representative sampling at Outfall 001 for phosphorus, copper and zinc. DEP said NO. It does not give information on the total concentration of individual pollutants in the sample - that the total concentration of the individual pollutant can vary. But DEP allowed PECO to conduct a study to demonstrate the long term relationship.
  - **Has Exelon since been permitted to use representative sampling at Outfall 001, instead of actual testing for all pollutants in the sample to determine actual concentrations of each varying pollutant?**

## **Sources of Wastewater – Module 3**

Over 100 different radionuclides are associated with producing nuclear power. It does not seem there is testing for all the different kinds of radionuclides that could be in Limerick's radioactive waste water discharges.

### **Limerick Discharges Radioactive Wastewater into the Schuylkill River 24 hours a day, 7 days a week, 365 days a year.**

Radioactive wastewater produced at Limerick is discharged into the river from Outfall 001. It appears Radioactive Wastewater discharged through Outfall 1 comes from SIX different radioactive sources at the site. Is that correct?

Radioactive Wastewater Sources Discharged From Outfall 001 Include:

- ✓ Cooling Towers
- ✓ Spray Pond
- ✓ Holding Pond
- ✓ Closed Cooling Water Loops
- ✓ Treated Radwaste
- ✓ Laundry Drains

**DEP has a radiation department and should know and be responsible for all radionuclides discharged into the river. These radionuclides have synergistic, additive, and cumulative harmful impacts to each other as well as with all the other toxics permitted in this NPDES permit and discharged into the Schuylkill River.**

- **ACE requests DEP to verify what levels of each radionuclide from each of SIX sources are discharged into the river and to require reporting of those in this NPDES Permit.**

## **Industrial Wastewater Types Discharged From Limerick**

### Module 1

#### **Outfall 1**

Only **THREE samples** are required for the NPDES Permit Application for Outfall 1, which contains extremely hazardous chemicals, in addition to a broad range of RADIONUCLIDES.

#### **RADIOACTIVE Sources Discharging From Outfall 001 Include:**

1. Cooling Towers
  2. Spray Pond
  3. Holding Pond
  4. Closed Cooling Water Loops
  5. Treated Radwaste
- **THREE samples from Outfall 001 are woefully inadequate to determine risk to the Schuylkill River for this NPDES permit. How could radioactive risks to the Schuylkill River and its users accurately be determined with just THREE samples that may or may not include all radionuclides?**

- **How does DEP justify only THREE samples considering;**
  - ✓ Radioactive Discharges occur 24 hours a day, 7 days a week, 365 days a year.
  - ✓ Any or all of over 100 radionuclides could be in the waste water at varying levels from Outfall 001.
  - ✓ 14.1 Million Gallons of Limerick's Radioactive Waste Water are permitted to be discharged EVERY DAY. That's over 5 billion gallons per year.
- **Are all radionuclides that could be associated with Limerick's operations included in the THREE samples? If not, why not?**
- **Has DEP ever taken independent or split samples from 001? If so, when and how many? If not, why not?**

### **Outfall 3 and 5**

Only ONE Sample is required for Drainage Area 003 and 005 via Holding Pond even though Storm water runoff from surface areas associated with industrial activity at the nuclear plant would logically would contain radionuclides.

- A. **Couldn't Outfall 3 and 5 discharges contain radionuclides?**
- B. **Can DEP prove they do not contain radionuclides? Is there any testing for radionuclides from Outfalls 3 and 5 ?**
- C. **Why is only one sample required?**
- D. **What other toxics are sampled?**

### **NO Samples From Condenser Water Box Drain Down**

Exelon took NO samples from Units 1 and 2 Condenser Water Box Drain Down, even though Exelon says the water is the same quality as cooling tower blowdown.

- ✓ Exelon claims this should be exempt from sampling because refueling occurs infrequently.
  - A. **Why not, radioactive levels could be extremely high during refueling.**
  - B. **Avoiding this sampling ignores spikes and drives down averages.**

**No sampling during refueling fails to identify potentially huge spikes and true threats.**

- **Potentially huge spikes during refueling must be evaluated. It seems clear that DEP should require sampling from this source during refueling and add it to discharge averages.**

### **Materials and Waste Inventory**

The long list of tanks storing massive amounts of extremely hazardous chemicals at Limerick Nuclear Plant is both shocking and alarming. The permit fails

Examples of storage tank inventory at Limerick listed below suggest there should be independent sampling for those chemicals massively stored at Limerick:

- |                         |                  |                |                                   |
|-------------------------|------------------|----------------|-----------------------------------|
| • <b>Radionuclides</b>  | <b>1,312,320</b> | <b>Gallons</b> | - <b>Stored In 18 Tanks</b>       |
| • <b>Acid Chemicals</b> | <b>68,600</b>    | <b>Gallons</b> | - <b>Stored In About 20 Tanks</b> |
| • <b>Sulfuric Acid</b>  | <b>22,000</b>    | <b>Gallons</b> | - <b>Stored In 2 Tanks</b>        |
| • <b>Diesel</b>         | <b>334,000</b>   | <b>Gallons</b> | - <b>Stored In 16 Tanks</b>       |

**These dangerous chemicals don't disappear, they end up in water discharges and air emissions from Limerick.**

➤ **To Protect The Environment and Public Health DEP Should;**

- 1. Require the most protective filtration PRIOR TO DISCHARGES into the Schuylkill River.**
- 2. Require far more sampling of discharges, into water and air, for all toxic chemicals massively stored in tanks at Limerick.**
- 3. Take periodic independent and split samples.**

## **Wastewater Treatment Technologies**

This section suggests that NO ACTUAL FILTRATION is required prior to discharge from any of Limerick's discharge points, including the most dangerous, Outfall 001.

### **Treatment is NOT Filtration!**

**It Appears NO FILTRATION Is Required To Prevent Unnecessary Air, Water, and Soil Contamination.**

- 1. Are there any actual filtration technologies that could reduce radiation and toxics from Limerick Nuclear Plant discharges?**
- 2. Is there any actual FILTRATION used on any of Limerick's wastewater discharges? If so, what kind of filtration is used for which discharge pipes? What do they filter out? Where are the filters disposed?**

### **Questions About Wastewater 'Treatment' Technologies:**

- Discharging Heat By Evaporation To Atmosphere.
  - A. Does This Mean Radioactive Decay?
  - B. If not, what does it mean? How does this work?
- Ion Exchange – Processing and Offsite Disposal of Spent Resins
  - A. What does processing mean?
  - B. Is this radioactive?
  - C. Is there testing? If so, where can test results be found? If not, why not?
  - D. Where are spent resins disposed?
- Sediment Removal by Licensed Contractor for Offsite Disposal – From raw water treatment system blowdown and sedimentation from settling basin receiving drainage backwash.
  - A. Is blowdown radioactive?
  - B. Is sedimentation radioactive?
  - C. Are these tested for all radionuclide levels at time of disposal?
  - D. Where are they disposed?
  - E. How much is disposed each year?
- Oil Removal by Licensed Contractor for Offsite Disposal - Separators receive wastewater from settling basin and plant drains.
  - A. Is this oil radioactive? Where is it disposed? Who is the licensed contractor?

- Clearly, wastewater technologies have much to do with radiation at a nuclear power plant, yet that is not clear in this permit.
- Throughout Limerick's NPDES permit, many issues deal with radioactive wastewater and waste, yet the permit rarely mentions radiation. That is both deceptive and confusing for those trying to have a better understanding of actual potential for threats and harms.

## **Limerick Nuclear Plant's Discharge Points - 24 or 30?**

1. Exelon Discharge Diagram Shows 24 Discharge Points, numbers 1 to 23, then 1 numbered 30. What happened to the other six - 24 to 29? Were they not listed or don't they exist? Why were they numbered this way?
2. Exelon's 2009 Radiological Monitoring Report shows Limerick contaminated groundwater with radiation through leaks and spills over many years.
  - What are the implications of that related to discharge pipes?
3. Has DEP ever done independent sampling for all radionuclides or the other toxic additives from all 24 or 30 discharge points, including those identified as storm water run-off?
4. Has DEP ever taken split samples for radionuclides or other toxics sampled by Exelon?
5. How does DEP verify the toxic discharges that Exelon doesn't measure, but instead calculates?

### **From Permit to Discharge Industrial Wastewater Section 8 - Outfall Locations**

#### **9 Limerick Nuclear Plant Industrial Waste Water Pipes Discharge Into the Schuylkill River?**

- How many of them carry radioactive wastewater?
- While the permit suggests Outfall 001 is clearly the major threat to the Schuylkill River both from radionuclides and other toxics in Limerick's wastewater, numbers 10, 11, and 12 are also shown to be in the middle of the Schuylkill River. What do they carry?
- Has DEP ever tested any of them to verify Exelon's claims about contents of discharge pipes and levels, especially Outfall 001? Taken split samples?
- Has DEP ever tested the Schuylkill River water and sediment directly from Limerick's discharge pipes for all radionuclides and other toxics listed in this permit and associated with Limerick's operations? Has there been testing by any agency?
- David Allard, head of DEP's radiation department, did radiation testing of the Schuylkill River a few years ago in relation to the nuclear laundry. Did he include testing of Limerick's radioactive discharge pipes, a far greater radioactive threat? If not, why not? If so, where are the results located and has this department reviewed them? If not, why not?

#### **14 Limerick Nuclear Plant Industrial Wastewater Pipes Discharge Into Possum Hollow Run.**

- How many could be carrying radioactive wastewater?
- Is there any proof of what is actually in the discharges from all 14?
- Has there ever been independent testing of Hollow Run for all radionuclides or other toxics associated with Limerick's operations?

#### **1 Discharge Pipe goes into Sanatoga Creek.**

- What toxics are in that discharge?

## **Pollutants, in Addition to Radionuclides, Discharged Into The Schuylkill River From Limerick Nuclear Plant.**

It is important to remember that Limerick Nuclear Plant discharges over 5 Billion Gallons of contaminated waste water into the Schuylkill River every year. Dangerous pollutants listed below are contained in the massive amounts of waste water discharged 365 days a year into the Schuylkill River, a public drinking water source.

The following dangerous pollutants were detected in Limerick's discharges into the Schuylkill River, but not in sampling on Limerick's intake from the Schuylkill River:

### **Outfall 001 - Group 2 - Module 5 - Detected Pollutants**

- ✓ Arsenic
- ✓ Chromium III
- ✓ Copper
- ✓ Lead
- ✓ Nickel
- ✓ Selenium
- ✓ Silver

The nuclear plant site is obviously causing this contamination since these toxics are not reported to be in water Limerick is withdrawing from the Schuylkill River.

1. How are each of these toxics used at the Limerick site?
2. Were any of the 3 samples required to be taken in July, August, or September when flows are lowest and temperatures are highest?
3. When only 3 samples were required for toxics detected above, why were 53 samples taken only for Cadmium, a pollutant that doesn't appear to be a problem at Limerick? What is the justification for this disproportionate sampling?
4. Levels reported cannot be considered reliable if based on only 3 discharge samples for this permit. Sampling is woefully inadequate to determine actual threats.

## **More Pollutants Discharged From Limerick Nuclear Plant.**

Detected and Reported By Exelon from Only ONE Sample Taken For This Permit

### **Group 1**

- ✓ Chlorine
- ✓ Sulfates
- ✓ Surfactants
- ✓ Barium
- ✓ Iron (Total and Dissolved)
- ✓ Manganese
- ✓ Magnesium
- ✓ Molybdenum
- ✓ Titanium

### **Group 2**

- ✓ Zinc
- ✓ Cyanide
- ✓ Phenols

- **Did DEP ever take split samples from any of these groups of chemicals to verify results? If not, why not?**
- **How does DEP estimate the total threat from years of constant massive discharges from Limerick?**

**In reality, levels of each become far less significant, considering these toxics are synergistic, additive, and cumulative to all the long-lived radionuclides continuously discharged into the Schuylkill River from Limerick.**

- **Wouldn't filtration prevent unnecessary eventual cost increases for all the water treatment companies from Limerick to Philadelphia, attempting to meet Safe Drinking Water Standards from water withdrawn from the Schuylkill River? Many of these toxics could and should be removed by Exelon with filtration at all Limerick's discharge points.**

## **Toxic, Corrosive Chemical Threats**

Massive Amounts of TOXIC and CORROSIVE chemicals that are stored and used at Limerick do NOT disappear. Eventually they are discharged into our air, water and soil. Their contribution to synergistic, additive, and cumulative discharge threats from Limerick are not adequately evaluated or addressed.

To highlight our concern, below we summarize and identify where they are used, what they are used for, and how much of which chemicals are used per day.

### **Toxic / Corrosive Chemical Additives Are Used In:**

- ✓ Cooling Towers
- ✓ Spray Pond - Raw Water
- ✓ Reverse Osmosis System

### **Toxic / Corrosive Chemical Additives Are Used For:**

- ✓ Corrosion Inhibitors
- ✓ Dispersants
- ✓ Scale Inhibitors
- ✓ Surfactants
- ✓ Biocides
- ✓ Microbio/algicides
- ✓ Coagulants
- ✓ Anti-Scalants
- ✓ Scale Removers

<u>Chemical Substance or Trade Name</u>	<u>Average / Maximum Per DAY</u>	<u>Effluent</u>	<u>Detection</u>
• Sulfuric Acid	40,000 to 60,000 lbs Per Day	6 to 9 PH Units	.01 Standard PH
• Sodium Hypochlorite	16,000 to 58,000 lbs Per DAY	TRO Limits	50 as TRO
• Sodium Bromide	1,600 to 2,800 lbs Per DAY	TRO Limits	50 as TRO
• Foamtrol AF1441	450 to 900 lbs Per DAY	2-4 mg/l	CALCULATED
• AB Aquashade	450 to 900 lbs Per DAY	.02- .03 mg/l	20
• Inhibitor AZ8104	1,000 to 2,000 lbs Per DAY	8 -19 mg/l	CALCULATED
• Flogard MS6210	450 to 1,000 lbs Per DAY	3 -9 mg/l	CALCULATED
• Depositrol BL5400	160 to 320 lbs Per DAY	1-3 mg/l	CALCULATED
• Depositrol PY5204	2,000 to 3,000 lbs Per DAY	16 to 26 mg/l	CALCULATED
• Spectrus CT1300	1,200 to 2,000 lbs Per DAY	.20 mg/l	.052 mg/l
• Polyfloc AP1120	1.5 to 3 lbs Per DAY	.01 mg/l	CALCULATED
• Klaraid CDP1346	120 to 200 lbs Per DAY	.34 -56	CALCULATED
• Depositrol BL5307	1,000 to 3,000 lbs Per DAY	.005 - .009	1000
• Continuum AEC3120	8 to 16 lbs Per DAY	.1 - .2	CALCULATED
• Spectrus DT 1400	4,690 to 9,520 lbs Per DAY	TSS Limit	200 at TSS
• Spectrus NX1100	1 to 2 lbs Per DAY	< 1 by dilution	CALCULATED
• Spectrus BD1500	1,000 to 1,500 lbs Per DAY	11-17 mg/l	CALCULATED
• Spectrus NX1103	20 to 120 lbs Per DAY	.01 mg/l	CALCULATED
• SURE-COOL 1393	240 to 321 lbs Per DAY	2-4 mg/l	organic phosphate test
• C-9	937 to 1,000 lbs Per DAY	4-9 mg/l	zinc test, .01 mg/l
• 3D TRASAR 3DT197	1,000 to 2,200 lbs Per DAY	3-19 mg/l	tolyltriazole test. .01 mg/l
• 3D TRASAR 3DT 121	2,000 to 3,000 lbs Per DAY	11-25 mg/l	active polymer test.6 mg/l
• 3D TRASAR 3DT 138	1,000 to 4,000 lbs Per DAY	.013 -.025 mg/l	same as above
• H-550	300 to 1,000 lbs Per DAY	.02-.05 mg/l	Gluteraldehyde test, 20ppm
• NALCO 7469	450 to 900 lbs Per DAY	4-8 mg/l	CALCULATED
• NALCO H150M	1,200 to 2,000 lbs Per DAY	3-5 mg/l	Active quat test .020 mg/l
• NALCO 1315	14,370 to 28,560 lbs Per DAY	TSS Limit	Feed based on detox from H150M
• NALCO 8136	120 to 200 lbs Per DAY	.03-.06 mg.l	CALCULATED
• NALCO 73310	126 to 252 lbs Per DAY	1.4-2.8 mg/l	Nitrite test, 2 mg/l
• NALCO 73551	1,500 to 3,000 lbs Per DAY	10-20 mg/l	CALCULATED
• Ferroquest LP7200	600 to 600 lbs Per DAY	6.7 mg/l	CALCULATED
• Ferroquest LP7202	300 to 300 lbs Per DAY	3.4 mg/l	CALCULATED

While incomplete (Almost 20 more toxics are listed in the permit but not listed here). This partial list shows:

**Over 94,293 to 192,614 LBS**  
**Of Toxic Chemicals Used at Limerick Nuclear Plant PER DAY**

- **These toxic threats could be minimized to protect the public's health and financial interests by requiring Exelon to filter Limerick's discharge points into the Schuylkill River and elsewhere.**
- **How much of each of the massive list of toxic chemicals used each day at Limerick are dumped into Limerick's cooling towers?**

## Detection Limit Questions

1. **It appears DEP failed to establish a large number of effluent limits and/or monitoring requirements in the final NPDES permit.** At the bottom of sampling data pages, DEP states that showing lowest levels of detection limits possible will minimize the need for DEP to require Exelon to do additional analysis or for DEP to potentially have to establish a large number of effluent limits and/or monitoring requirements in the final NPDES permit. **This is NOT protective. DEP avoided setting effluent limits and/or monitoring requirements instead of trying to actually determine risk. This helps Exelon, but jeopardizes public interests.**
2. **There are no limits. DEP didn't even establish limit values for individual toxics in effluent for this NPDES permit. How can DEP determine Limerick's violations of limits for individual toxics or risks from them, if there are none?** If safe limits or reliable monitoring requirements have NOT been determined by DEP for each of the massive numbers of pollutants discharged 365 days a year from Limerick Nuclear Plant, how can DEP assure the public that their drinking water from the Schuylkill River can be filtered adequately or even treated to be safe?
3. **Without specific limits established for each toxic known to be associated with Limerick operations, how did DEP possibly determine it was safe to allow limits for these Toxic Additives to be INCREASED from 1 to 2 hours per day, every day for 365 days a year.** Without effluent limits or reliable monitoring requirements, on what criteria did DEP base the determination that it was still safe to allow toxic additives (TROs) to be discharged for 2 hours a day every day, 365 days a year?
4. **Which toxics are actually regulated in this NPDES permit? Why are there no established levels for regulated pollutants into public drinking water sources?**
5. **Radioactive discharges, for example, are only partially addressed in this NPDES permit. Fractured permitting between DEP and NRC allows serious radioactive threats to public water to go unaddressed as pollutant discharges into public waterways, in this NPDES wastewater permitting.** Radionuclides, signature toxics for this nuclear plant site's discharges, and the most dangerous, being only partially addressed in this NPDES permit is a huge loophole that allows Exelon to avoid critical scrutiny on dangerous radioactive wastewater. Who is responsible to review the damage done by Limerick's radioactive discharges into all Limerick's many discharge points?

### **Parameter NOT Measured**

- ✓ Mass is Calculated as Concentration Based on  $\text{mg/l} \times 42 \text{ MDG} \times 8.3453 \text{ lb/gallon}$ .  
It is unclear how one sample determines reliable numbers
  - Please explain why DEP believes a reliable number can be determined with only one sample.

## **DILUTION - AVERAGES FAIL TO IDENTIFY SPIKES and ACTUAL RISKS**

- ✓ AVERAGES DILUTE DATA. DEP allowed Exelon to use averages of just 3 samples over a year to be used for this permit for many dangerous toxics.
- ✓ Averages fail to determine spikes and actual threats.
- ✓ Far higher levels and spikes can go undetected for long periods of time when taking only 3 samples over 365 days.

## **COMPOSITE SAMPLES DILUTE REALITY of RISKS**

- ✓ Throughout the permit it is clear that DEP has permitted Exelon to use composite samples. That allows deceptive diluted results.

## **Coefficient of Effluent Variability (CV)**

- ✓ What does this mean and why is the entire column left blank?

## **The column "Believed Absent" has been LEFT BLANK in Pollutant Group Reports.**

- ✓ Does that mean Exelon admits all the listed toxics are IN SAMPLES, even when Exelon claims some are NON-DETECT?
- ✓ Couldn't a toxic be in the sample, but lower than an arbitrary "detection limit", allowing Exelon to claim that toxic is Non-Detect?
- ✓ Who decides which detection limits will be used for each chemical? DEP or Exelon?

## **TESTING DATES FOR 2011 NPDES PERMIT RENEWAL**

Other than 2009-10 TDS data, dates for other data used by Exelon for this permitting are unclear.

For example: Module 4, 5, Pollutant Groups Sampling Data Upper left corner states -

### ➤ **Rev. MARCH, 2006**

1. **What were dates of samples used for this permit?** Outfall 001? All others?  
Instructions at the bottom of each data page state: "Average of Analysis - Determine the average of all samples taken within the past year."
  - Define Past Year. Were all samples for this permit taken in 2009- 2010?
2. **Is it possible Exelon used sampling data taken prior to March 2006 for this permit application?**
  - If so, why would over 5-year old sampling data be allowed to be used for 2011 NPDES permitting? Shouldn't newer data be required for a 5 year renewal?
  - Is Exelon using old data because it is lower?
  - Is Exelon using old data to get around effluent limits and monitoring requirements for final permit?
  - Are there more recent samples? If not, why not? If so, why aren't they used?

## **Other Issues:**

### **Acid/Chlorination of Cooling Water and Service Water**

Listed in - Description of Facility - Page 3 of 4 - On-Site Activities

The acid/chlorination of cooling water has serious environmental and health consequences for our region, both from emissions into air, and discharges into waterways.

Enormous quantities of acids and chlorine chemicals are added to cooling tower waters which are turned into up to 42 million gallons of steam every day. Some of this acid/chlorinated water is discharged into the river.

Chlorine in air is a serious health threat to our region. WHO has a limit for chlorine in air.

- Has DEP ever tested chlorine levels in the air related to Limerick's steam to see if it meets safe standards?

What chlorine levels are permitted into the Schuylkill River or other waterways?

- a. How are these levels measured?
- b. If measured by Exelon, does DEP have any verification of reported levels?

Acids in the air can be devastating to the lungs and skin. There are extraordinary numbers of people with lung diseases and cancer, as well as skin rashes and other unexplained skin problems around Limerick. For years, people have been reporting serious corrosion damage to outdoor furniture and cars.

- Has DEP ever tested for acids or acid conversion chemical levels from Limerick's steam?

What levels of acidic waters are permitted into the Schuylkill River and other waterways?

- a. Are all acids tested in discharge waters from all discharge pipes?
- b. If Exelon does testing, does DEP have any way to verify results?

## **Waste Derived Liquid Fuels Burning**

Listed in - Description of Facility - On-Site Activities - Page 3 of 4 - Revised 10/07

DEP's recent Comment Response Document for Limerick's Title V Permit Renewal stated waste fuels are no longer being burned in boilers at Limerick. This is no longer going on and there is no plan for it in the future.

- a. Why is "Waste Derived Liquid Fuel Burning" still included in the description of the site?
- b. Does this mean they are still allowed to do it?

## **Dredge Spoils**

- a. Where did they come from?
- b. What toxics are in them?
- c. If there is NO sample, how can anyone be sure what is in them?

## **ACE Summary Conclusions:**

Data, Estimates, Reports, Studies, and Conclusions for this NPDES permit renewal are from Exelon, the company with a vested interest in the outcome, a company that has shown it can't be trusted.

ACE compiled a list below showing why DEP can't trust Exelon's data, estimates, reports, studies, or conclusions.

## **EXELON DECEPTION About Limerick's Water Intake and Consumption Is Highlighted by Exelon's Own Conflicting Claims**

## **Exelon's inconsistent claims about Limerick Nuclear Plant's water intake and consumptive use are a glaring example of why it's impossible to trust Exelon.**

- Exelon's Various Claims About Water Withdrawal:
  - **69** million gallons per day in 1970
  - **30** million gallons per day in the news reported October 8, 2008
  - **56.2** million gallons per day in previous and current DRBC dockets
- Exelon's Unbelievable Conflicting Claims About Water Emitted From Limerick's Cooling Towers:
  - **35** million gallons per day in 1970
  - **38,059,065 to 40,723,200** Gallons Per Day  
(1/6/95 to EPA - Licensee Indicated Conservative Consumptive Flow Increase)
  - **42** million gallons per day in current DRBC docket
  - **35** million gallons per day - 1/06 Mercury and 6/17/08 to Pottstown
  - **17.5** million gallons per day average use July 22, 2008 – Republican Herald
  - **7** million gallons per day - October 8, 2008 – Mercury Special On Schuylkill River

## **Exelon failed to provide full, accurate, and timely disclosure of leaking pipes and radioactive contaminated groundwater.**

- Exelon failed to take immediate action when problems were found. Even when radioactive groundwater contamination could no longer be denied, Exelon didn't replace pipes immediately.
- Exelon failed to report radiation leaks into water from their nuclear reactors for many years. Numerous repeated radioactive leaks went unaddressed over almost ten years at Exelon's Braidwood nuclear plant. Exelon also had radioactive leaks at their Dresden and Byron nuclear plants in Illinois. **Some called it Exelon's "Radioactive Watergate".**

### **Braidwood, Illinois**

#### **One shameful example of Exelon's deception and inaction that led to unnecessary health risks and diminished property value concerns.**

- 22 recurring uncontrolled radioactive spills from the same buried pipe went inadequately addressed and not fully disclosed from 1996 to 2005.
- Exelon supplied 600 people with bottled water for more than four years.
- For many years there was no bottled water and even after the bottled water was supplied people were still forced to shower, cook, brush their teeth, etc. with radioactive contaminated water.
- Clean-up of so much radioactive contamination in the ground is a farce.
- Exposure increases the risk of developing cancer, according to legal papers. Ironically, while illogically claiming there was no public health threat, March 13, 2010 it was reported Exelon paid a court settlement.
- A resident said, "It's scary to live here, but who in their right minds would buy homes here?"
- Some people questioned whether or not a \$1 million settlement to spend on some environmental projects makes up for damage caused by numerous radiation leaks discovered on and around nuclear power plants reported through the years.
- A mother of a teen battling cancer said, "If the cancer is in the air we breathe or the water we drank, I don't think there is enough money to go around. I know they admitted to the mistakes but how do you put a price tag on the environment?"
- Exelon is also paying \$11.5 million to bring in a water system. Exelon is footing the bill for Godley residents to enjoy bottled water until the construction is complete.

## Oyster Creek, New Jersey

**Exelon failed to disclose radioactive leaks until 7 days after the Oyster Creek nuclear reactor was relicensed by NRC.** In 2009 Exelon disclosed radioactive water leaking from buried pipes 7 days after NRC re-licensed this oldest nuclear plant in the U.S. Either NRC was duped by Exelon or NRC was complicit. Either is unacceptable.

- **This seriously damages trust in Exelon and NRC's credibility in its reviews for re-licensing.**
- **Radioactive water reached a major New Jersey aquifer (southern Jersey's main drinking water source), at concentrations 50 times higher than those allowed by law.**
- First reported April 9, 2009, the radioactive groundwater contamination is gradually moving toward wells in the area at 1 to 3 feet a day.
- Corrosion caused the reactor's crucial safety liner to rust and thin. How long were there undetected / unreported leaks? Is this happening at Limerick?
- NJDEP is taking aggressive action to safeguard water and hold Exelon accountable for this leaky 40 year old plant.
- The wait and see approach in response to another 'trust us' from Exelon resulted in exactly what some feared, contamination of one of the most significant aquifers in the region.
- NRC has failed to suspend or withdraw Oyster Creek's license renewal.

### **Unaddressed Limerick Leak - Reported by Whistleblower.**

Exelon denied an unaddressed Limerick leak, even when ACE identified the fact that the information came from a document from Exelon's own files. Exelon's document proved the leak at Limerick went unaddressed for many years, yet both Exelon and NRC first denied it ever existed. A year later, ACE was told by NRC that the leak had been fixed.

### **2007 Exelon Records For Limerick Nuclear Plant's Water Withdrawal and Payments Suggest Exelon May Have Underreported and Underpaid DRBC for Schuylkill River Water.**

ACE based concerns and conclusions of potential Exelon underreporting and underpayment on data for Limerick water use and payments that we received from DRBC through FOIA. Exelon's potential underreporting and payments for Limerick's Schuylkill River water use could have been going on since Limerick was purchased by Exelon. If conditions were that potential underpayments could have been verified, back payments and fines could have paid for an independent comprehensive study to determine actual damage to the Schuylkill River from Limerick operations since 1985 when Limerick started operating to date. Only then could we have a better idea of Limerick's true threat to the future water supply and quality for almost two million people who need the Schuylkill River for their vital public drinking water source.

**Examples above provide evidence of why we cannot and should not trust Exelon's monitoring, testing, reports, or claims.**

- **ACE views this NPDES permit to be the greatest threat to public drinking water of any permit we have reviewed to date. We urge DEP to independently verify all information provided by Exelon for this permit and to seriously consider more stringent requirements and our suggestions for filtration.**
- **We urge DEP to REJECT all Exelon's requests that will increase pollution while reducing safeguards. For example:**
  1. **TDS Permit Limits - INCREASED from 1000 to 2000 mg/l.**
  2. **TRO Time Limits for Toxic Additives - INCREASED from 1 hour to 2 hours per day - 365 days a year.**
  3. **Elimination of Temperature Restrictions**
  4. **Elimination of Monitoring for Temperature**

January 18, 2011

To: **Carol Collier, Executive Director DRBC**

From: The Alliance For Clean Environment (ACE)  
1189 Foxview Road  
Pottstown, PA 19465

**RE: REQUEST FOR REVIEW AND RESPONSE**

Ms. Collier,

As previously stated, ACE is extremely concerned about the long-term viability of the public water supply from Pottstown to Philadelphia. We view decisions now being made by DRBC and DEP as a matter of vital importance.

Since learning in 2006 about Exelon's "Demonstration Project" which allowed pumping of contaminated unfiltered mine water into the Schuylkill River we have been concerned. After learning that Exelon's Docket requests to DRBC included lowering flow restrictions, eliminating temperature restrictions, and minimizing monitoring requirements we became even more concerned. Later we learned that Exelon plans to pump more and more contaminated mine waters into the Schuylkill River. Since 2006 vast numbers of people signed our petitions opposing Exelon's requests. They agree that Exelon should be required to filter all mine water before massively pumping it into this source of drinking water to operate Limerick Nuclear Plant.

It is obvious that lower flows, more contamination, and less safeguards are a recipe for disaster. Limerick Nuclear Plant operations will continue to deplete the Schuylkill River likely by at least twelve billion gallons every year, even with supplementation.

However, we have become far more than concerned, even alarmed, after review of Limerick Nuclear Plant's NPDES Permit Renewal Application. Over the past 15 years we reviewed several NPDES permits, which all jeopardize the Schuylkill River, but Limerick Nuclear Plant's NPDES permit revealed Limerick's discharges are by far the worst threat of all. We prepared and submitted the attached comments, questions, and requests to PA DEP.

- **We urge you to carefully review the attached documents for a better understanding of unique and severe threats to the Schuylkill River from Limerick Nuclear Power Plant's radioactive and extremely toxic discharges, 24 hours a day, 365 days a year.**

Being responsible for water quality in the Schuylkill River, the source of drinking water for almost two million people from Pottstown to Philadelphia, we believe you should also be alarmed after review of the attached documents. Take a look at the extraordinary amounts and numbers of toxics (in addition to a broad range of radionuclides) used and discharged from Limerick Nuclear Plant into the Schuylkill River. There are nine discharge pipes into the Schuylkill River, with no independent monitoring, no set limits for most toxics in the wastewater, and lax oversight with requirements for only 1 to 3 samples for Limerick's NPDES permit. This is frightening. How could water treatment systems beyond Limerick possibly deal with this kind of threat?

Notice that Exelon is asking for a Total Dissolved Solids (TDS) limit that is four times Safe Drinking Water Standards. How much would it cost water treatment systems to try to deal with that over time? TDS should be of particular concern to you and DRBC's Docket Decisions. Total Dissolved Solids are discharged with massive amounts of mine water. A DRBC decision to allow unfiltered mine water

pumping could eventually become a huge financial burden to every water intake from the Schuylkill River headwaters to Philadelphia. Neither water treatment plants nor their customers can afford to deal with additional treatment costs to try to meet the Safe Drinking Water Standards of 500 mg/l, especially in this economy. Exelon should be required to pay for filtration before mine water is pumped into the river to avoid increased public costs for water.

Exelon's request to DEP asks to double the current TDS limit of 1000 mg/l to 2000 mg/l in their NPDES permit. That presents unacceptable air pollution threats from major increases of PM-10 emissions from Limerick's cooling towers, as well as increased costs to public water systems and their customers all the way to Philadelphia, only 20.7 miles Southeast of Limerick Nuclear Plant. The TDS issue is detailed in our comments.

There are other overlapping issues involving DRBC's eventual Docket Decisions and DEP's NPDES Permit Renewal.

- **We ask you to review our comments and respond to ACE about DRBC's views on those issues that overlap.**
- **We also ask you to investigate and respond to our concerns about the consequences of both of Exelon's planned Uprates, in terms of more Limerick water intake required from the Schuylkill River and increased toxic and radioactive discharges into the Schuylkill River, and how that relates to this increasingly depleted public drinking water source.**

Respectfully,

Dr. Lewis Cuthbert  
ACE President

Attachments

May 11, 2011

To: **Carol Collier, DRBC Executive Director**

From: Dr. Lewis Cuthbert  
Alliance For A Clean Environment  
1189 Foxview Road  
Pottstown, PA 19465

Subjects: DRBC Negligence and Attempt to Limit Public Participation

1. Your Failure to Respond To ACE's January 18, 2011 Request For Review and Response on Overlapping Issues With Exelon's NPDES Permit Renewal Request to PA DEP to Eliminate Temperature Restrictions in the Schuylkill River:
  - Specifically Our Concerns About Schuylkill River Temperatures Related to Limerick Nuclear Power Plant's Radioactive Heated Discharges and
  - How Increased Temperatures Due To Limerick Operations Could Be Causing More Harm Than Anticipated In The Environmental Impact Statement From 1985, Due To Massive Depletion of the River From Limerick Operations.
2. Exelon's Confusing DRAFT Docket and Untimely Notice of a Public Hearing.
3. Comments For Public Hearing DOCKET NO. D-2010-040 CP-1

Dear Ms. Collier,

First, we are dismayed that once again we cannot get answers to the important questions we raise concerning the drinking water source for almost two million people from Pottstown to Philadelphia. We remind you that we e-mailed you a cover letter (attached), our letter to PA DEP (attached), and an entire packet of information further explaining our concerns in the mail. To date, you failed to respond. This is no way to treat public concerns about drinking water.

Second, we did not attempt to rearrange our schedule to attend the public hearing in Trenton, New Jersey, planned for today for several reasons:

1. Exelon's Draft Docket fails to even mention Limerick Nuclear Power Plant. We are not sure what this is about.
2. If it is about Limerick's 5 billion gallons of heated radioactive discharges each year, there was not enough time to prepare comments, much less present them.
  - A. DRBC received this DRAFT Docket April 8, 2011, but failed to provide it to anyone for review until May 2, just six working days prior to DRBC's May 2 notice of a public hearing May 11.
  - B. Six working days is not nearly enough time for ACE to secure an expert to volunteer time to review the docket so that we could prepare comments for a public hearing.
3. DRBC's public hearing was scheduled for 19 issues in total. This was #18. Public comments were scheduled to begin until 1:00 P.M. Clearly, there was not much time scheduled for each issue. This is no way to treat issues of such importance.

We do have several important questions about Exelon's Docket Request:

- 1) Does this have anything to do with Limerick Nuclear Plant's heated radioactive discharges into the Schuylkill River? If so, why isn't Limerick mentioned?
- 2) Why would DRBC allow a docket with combined discharges from several facilities? That hides actual impacts from each. It makes it far more difficult for anyone to scrutinize effects of each, including DRBC.

**ACE opposes combined discharges. We request that DRBC require Exelon to separate and identify discharges from all facilities so that the public can better evaluate and understand harms from each.**

- 3) Why is there a 110 Degree F Temperature Discharge Limit? How can that be safe or healthy for the ecosystem of an ever depleting river?

**ACE requests that DRBC NOT grant Exelon any exception to maximum allowable temperature requirements for any discharge location on the Schuylkill River to attempt to protect the health of the river and its ecosystems.**

- 4) Why would DRBC rely on a MODELING STUDY, much less one that is done by the company responsible for the harms?

**It is reasonable to anticipate that Exelon's modeling is likely to say whatever Exelon wants it to say to get what they want, regardless of the harms caused by their operations.**

ACE encourages DRBC to more carefully and frequently independently inspect and scrutinize all records from Exelon, including monitoring data and payments for water use.

- **Please apply all comments on this communication to the public hearing record on Docket NO. D-2010-040 CP-1, submitted on the public hearing date, May 11, 2011.**

This DRAFT Docket has been prepared for the purposes of the scheduled public hearing and may be substantially modified as a result of the public hearing process prior to Commission action.

4/8/2011 4:56:00 PM

**DOCKET NO. D-2010-040 CP-1**

**DELAWARE RIVER BASIN COMMISSION**

**Exelon Generation Company, LLC  
Schuylkill Generating Station  
Non-Contact Cooling Water Discharge  
City of Philadelphia, Pennsylvania**

**PROCEEDINGS**

This docket is issued in response to an Application submitted to the Delaware River Basin Commission (DRBC or Commission) by Exelon Generation Company, LLC (Exelon or docket holder) on December 13, 2010 (Application), for review of an existing non-contact cooling water (NCCW) and traveling screen backwash discharge from the Schuylkill Generating Station (SGS), Tri-Gen Corporation Facility (Tri-Gen), and Grays Ferry Cogen Facility (GFCF). National Pollutant Discharge Elimination System (NPDES) Permit No. PA0011657 for this project was approved by the Pennsylvania Department of Environmental Protection (PADEP) on March 4, 2008, effective April 1, 2008.

The Application was reviewed for inclusion of the project in the Comprehensive Plan and approval under Section 3.8 of the *Delaware River Basin Compact*. The Philadelphia City Planning Commission has been notified of pending action. A public hearing on this project was held by the DRBC on May 11, 2011.

**A. DESCRIPTION**

1. **Purpose.** The purpose of this docket is to approve an existing combined discharge of up to 231.84 million gallons per day (mgd) of NCCW and traveling screen backwash from the SGS, Tri-Gen, and GFCF via Outfall No. 001.

2. **Location.** Outfall No. 001 discharges to the tidal portion of the Schuylkill River at River Mile 92.47 – 5.6 (Delaware River – Schuylkill River), in Water Quality Zone 4, and is located in the City of Philadelphia, Pennsylvania as follows:

<b>OUTFALL NO.</b>	<b>LATITUDE (N)</b>	<b>LONGITUDE (W)</b>
001	39° 56' 36"	75° 11' 28"

3. **Area Served.** Energy produced by the SGS, Tri-Gen, and GFCF supply the Pennsylvania-Jersey-Maryland (PJM) grid. Outfall No. 001 receives NCCW and traveling screen backwash from the SGS, Tri-Gen, and GFCF. For the purpose of defining Area Served, the Application is incorporated herein by reference consistent with conditions contained in the DECISION section of this docket.

4. **Physical Features.**

a. **Design Criteria.** NCCW from the power generating equipment at the GFCF and Tri-Gen is internally monitored at Outfall No. 301 prior to comingling with NCCW and traveling screen backwash from the SGS site. The three comingled streams ultimately discharge up to 360.4 mgd to the Schuylkill River via Outfall No. 001.

b. **Facilities.** The SGS is a 175 megawatt (MW) peaking electric power generation facility that produces electricity for the PJM grid using an oil-fired boiler that produces steam to operate a turbine. NCCW and traveling screen backwash from the SGS, GFCF, and Tri-Gen are collected and discharged to the tidal Schuylkill River in Water Quality Zone 4 via Outfall No. 001.

The GFCF, Tri-Gen, and SGS also receive process and/or potable water from the Philadelphia Water Department (PWD). That water stream is segregated from the water stream associated with Intake No. 1 and is discharged to the City of Philadelphia's collection system, which ultimately is discharged to the Schuylkill River via the PWD Southwest wastewater treatment plant (WWTP), approved via Docket No. D-70-53 CP.

The project facilities are located in the 100-year floodplain. The Commission's *Flood Plain Regulations (FPR)* do not apply to tidal sections of the basin and therefore the docket holder has not been required to conform with any requirements at this time.

c. **Water Withdrawals** The potable water supply in the project service area is supplied by the PWD. Process water is supplied by the PWD and the docket holder. The water withdrawal from the Schuylkill River supplied by the docket holder is described in detail in Docket No. D-1964-074 CP-2, which is also recommended for approval at the May 11, 2011 Commission Hearing.

d. **NPDES Permit / DRBC Docket.** NPDES Permit No. PA0011657 was approved by the PADEP on March 4, 2008 (effective April 1, 2008) and includes final effluent limitations for the project discharge of 360.4 mgd to surface waters classified by the PADEP as Warm Water/Migratory Fishery (WWF/MF). This docket restricts the discharge to up to 231.84 mgd since pumps associated with the withdrawal from Intake No. 1 that supply the NCCW to the three facilities can't withdrawal more than 231.84 mgd. The following average monthly effluent limits are among those listed in the NPDES Permit and meet or are more stringent than the effluent requirements of the DRBC.

EFFLUENT TABLE A-1: DRBC Parameters Included in NPDES Permit

OUTFALL 001 (NCCW Discharge)		
PARAMETER	LIMIT	MONITORING
pH (Standard Units)	6 to 9 at all times	As required by NPDES Permit
Total Suspended Solids	30 mg/l	As required by NPDES Permit
Temperature	110 ° F (Max)	As required by NPDES Permit
PCBs	Monitor & Report	As required by NPDES Permit

\* DRBC Requirement

EFFLUENT TABLE A-2: DRBC Parameters Not Included in NPDES Permit

OUTFALL 001 (NCCW Discharge)		
PARAMETER	LIMIT	MONITORING
Total Dissolved Solids*	1,000 mg/l *	Monthly **
COD (5-Day at 20° C)*	30 mg/l *	Monthly *
Ammonia Nitrogen*	35 mg/l *	Monthly *

\* DRBC Requirement

\*\* See Condition II.o.

e. **Cost.** There are no project costs associated with this existing discharge.

f. **Relationship to the Comprehensive Plan.** The SGS was originally constructed in the early 1900s. The SGS discharge shall be included in the Comprehensive Plan as part of this docket.

## B. FINDINGS

The purpose of this docket is to approve an existing combined discharge of up to 231.84 mgd of NCCW and traveling screen backwash from the SGS, Tri-Gen, and GFCF via Outfall No. 001.

### Heat Dissipation Area

Section 4.30.6.C. of the Commission's *Water Quality Regulations (WQR)* require that discharges to Zone 4 shall not result in an induced temperature increase of 5°F (2.8°C) above the average 24-hour temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F (30.0°C), whichever is less.

Section 4.30.6F.3. of the Commission's *WQR* allows for heat dissipation areas up to 3,500 feet in length, two-thirds the surface width, and a maximum cross section up to one-quarter of the cross-sectional area of the stream in Zone 4. The Schuylkill River is 400 feet wide at the point of discharge. Therefore, the maximum allowable heat dissipation area would be 3,500 feet x 269 feet.

If the docket holder were to discharge at the maximum allowable temperature (110°F) and flow (360.4mgd), during any month as defined in the NPDES Permit, they would violate the Commission's temperature criteria during Q<sub>7-10</sub> conditions (lowest seven consecutive day flow over a ten year period), which the Commission uses as a basis for determining whether a heat dissipation area is required.

The docket holder submitted effluent temperature data from Outfall No. 001 for 2009 and 2010 to the Commission on March 31, 2011. The preliminary review of the temperature data reinforces the Commission staff's position that the docket holder may violate the Commission's temperature criteria as outlined in Section 4.30.6C. of the Commission's *WQR* and requires a heat dissipation area as outlined in Section 4.30.6F.3. of the Commission's *WQR*.

DECISION Condition II.g. of this docket requires the docket holder to perform a Modeling Study of the effluent from Outfall No. 001 to show compliance with the Commission's effluent temperature criteria. The Modeling Study shall be performed at Q<sub>7-10</sub> conditions in the Schuylkill River, taking into consideration tidal fluctuations, and a maximum discharge from Outfall No. 001. The Modeling Study shall be submitted by March 31, 2012 (as part of the renewal application) to the Commission's Project Review Section at:

PO Box 7360  
25 State Police Drive  
West Trenton, NJ 08628-0360

Specific questions related to the model can be directed to the Commission's Modeling, Monitoring and Assessment Branch. Should a heat dissipation area be required as a result of the study, the renewal application should include the appropriate data supporting such an area. Commission staff recommend that the docket holder modify its permitted discharge flow with both the PADEP and the Commission to reflect current operating flows in order to ensure that the model accurately depicts a discharge typical of the facility.

Other

At the project discharge site, the Schuylkill River is tidal. Using the United States Geological Survey (USGS) Streamstats program, Commission staff estimate that the Q<sub>7-10</sub> flow of the Schuylkill River is 388 cubic feet per second (cfs) (250.8 mgd). The Q<sub>7-10</sub> flow is greater than the combined maximum proposed withdrawal rate for the SGS, GFCE, and Tri-Gen (231.84 mgd) as exhibited in Docket No. D-1964-074 CP-2 (which is also being considered for approval at the May 11, 2011 Commission Hearing). Commission staff recommend that the NPDES Permit be modified during the next permit cycle to reflect current operating conditions at the SGS, GFCE, and Tri-Gen as flows from Outfall No. 001 should not exceed 231.84 mgd.

There are no public water supply intakes downstream of the SGS.

The project does not conflict with the Comprehensive Plan and is designed to prevent substantial adverse impact on the water resources related environment, while sustaining the current and future water uses and development of the water resources of the Basin.

The limits in the NPDES Permit are in compliance with Commission effluent quality requirements, where applicable.

The project is designed to produce a discharge meeting the effluent requirements as set forth in the *Water Quality Regulations* of the DRBC.

### C. DECISION

I. Effective on the approval date for Docket No. D-2010-040 CP-1 below, the project and the appurtenant facilities described in Section A “Physical Features” of this docket shall be added to the Comprehensive Plan.

II. The project and appurtenant facilities as described in Section A “Physical Features” of this docket are approved pursuant to Section 3.8 of the *Compact*, subject to the following conditions:

a. Docket approval is subject to all conditions, requirements, and limitations imposed by the PADEP in its NPDES Permit, and such conditions, requirements, and limitations are incorporated herein, unless they are less stringent than the Commission’s.

b. The facility and operational records shall be available at all times for inspection by the DRBC.

c. The facility shall be operated at all times to comply with the requirements of the *Water Quality Regulations* of the DRBC.

d. The docket holder shall comply with the requirements contained in the Effluent Tables in Section A.4.d. of this docket. The docket holder shall submit DRBC required monitoring results directly to DRBC (Project Review Section). The monitoring results shall be submitted annually (by January 31) absent any observed limit violations. If a DRBC effluent limit is violated, the docket holder shall submit the results and provide a written explanation within 30 days of the violation the action(s) the docket holder has taken to correct the violation and protect against a future violation.

e. Except as otherwise authorized by this docket, if the docket holder seeks relief from any limitation based upon a DRBC water quality standard or minimum treatment requirement, the docket holder shall apply for approval from the Executive Director or for a

docket revision in accordance with Section 3.8 of the *Compact* and the *Rules of Practice and Procedure*.

f. Nothing herein shall be construed to exempt the docket holder from obtaining all necessary permits and/or approvals from other State, Federal or local government agencies having jurisdiction over this project.

g. The docket holder shall perform a Modeling Study of the effluent from Outfall No. 001 to show compliance with the Commission's effluent temperature criteria as described in the FINDINGS Section of this docket. The Modeling Study shall be performed using Q<sub>7-10</sub> flows in the Schuylkill River, taking into consideration tidal fluctuations, and a maximum discharge from Outfall No. 001. The Modeling Study must be submitted to the Commission's Project Review Section by March 31, 2012 (as part of the renewal application). A heat dissipation area that meets the Commission's requirements may be requested as part of the Modeling Study. Until the Modeling Study is reviewed and a new docket/permit is/are issued, the docket holder shall meet the effluent temperature requirements as defined in this docket and in the PADEP's NPDES Permit.

h. The docket holder is permitted to treat and discharge the categories of wastewaters defined in the "Area Served" section of this docket.

i. The docket holder shall make wastewater discharge in such a manner as to avoid injury or damage to fish or wildlife and shall avoid any injury to public or private property.

j. Nothing in this docket approval shall be construed as limiting the authority of DRBC to adopt and apply charges or other fees to this discharge or project.

k. The issuance of this docket approval shall not create any private or proprietary rights in the waters of the Basin, and the Commission reserves the right to amend, suspend or rescind the docket for cause, in order to ensure proper control, use and management of the water resources of the Basin.

l. A complete application for the renewal of this docket, or a notice of intent to cease the operations (withdrawal, discharge, etc.) approved by this docket by the expiration date, must be submitted to the DRBC at least 12 months prior to the expiration date below (unless permission has been granted by the DRBC for submission at a later date), using the appropriate DRBC application form. In the event that a timely and complete application for renewal has been submitted and the DRBC is unable, through no fault of the docket holder, to reissue the docket before the expiration date below, the terms and conditions of this docket will remain fully effective and enforceable against the docket holder pending the grant or denial of the application for docket approval.

m. The Executive Director may modify or suspend this approval or any condition thereof, or require mitigating measures pending additional review, if in the Executive

Director's judgment such modification or suspension is required to protect the water resources of the Basin.

n. The docket holder and any other person aggrieved by a reviewable action or decision taken by the Executive Director or Commission pursuant to this docket may seek an administrative hearing pursuant to Articles 5 and 6 of the Commission's *Rules of Practice and Procedure*, and after exhausting all administrative remedies may seek judicial review pursuant to Article 6, section 2.6.10 of the *Rules of Practice and Procedure* and section 15.1(p) of the Commission's *Compact*.

o. The docket holder may request of the Executive Director in writing the substitution of specific conductance for TDS. The request should include information that supports the effluent specific correlation between TDS and specific conductance. Upon review, the Executive Director may modify the docket to allow the substitution of specific conductance for TDS monitoring.

**BY THE COMMISSION**

**DATE APPROVED:**

**EXPIRATION DATE: March 31, 2013 (NPDES Expiration)**

DRAFT

August 12, 2011

**To: Carol Collier, DRBC Executive Director**

**From: Alliance For A Clean Environment  
Dr. Lewis Cuthbert, ACE President**

**Re: DRBC Decisions On Limerick Nuclear Plant's Water Use and  
Hazardous Discharges Could Result In Not Enough Safe Drinking Water  
For Almost Two Million People From Pottstown to Philadelphia**

Limerick Nuclear Plant operations present unparalleled harms to the Schuylkill River, a vital public drinking water source for almost two million people from Pottstown to Philadelphia.

Limerick cooling towers drastically depleted the Schuylkill River since the late 1980s after Limerick started operating full force, while at the same time Limerick continuously discharged radioactive and heated wastewater (loaded with many other dangerous toxics), into the river 24 hours a day, 365 days a year.

Before DRBC made the disastrous decision to approve Limerick Nuclear Plant construction, public hearing evidence shows many were alarmed about Limerick's heated and radioactive discharges and that the Schuylkill River could not continue to sustain Limerick's water depletion forever. Supplementation efforts have never been sufficient to replace the many billions of gallons lost in the cooling towers each year.

**DRBC's current decisions could compound Limerick's threats, making a bad situation far worse for almost two million people who desperately need the Schuylkill River to supply ample safe drinking water.**

- **How could DRBC possibly justify allowing Exelon to continue to massively pump contaminated unfiltered mine pit water into the Schuylkill River to supplement the flow for Limerick's operations, without requiring filtration of all mine water PRIOR to pumping it into the river?**
- **It would be unethical and even immoral for DRBC to approve Exelon's current requests to eliminate Schuylkill River temperature restrictions, lower flow restrictions, reduce monitoring, add more contaminated unfiltered mine waters, and eliminate public participation in the future. Current economic conditions and the push for deregulation will lead to less oversight with increased health and financial risks. Clean-up at water treatment plants will either cost the public more or result in less effective treatment.**
- **In our opinion it is unethical for DRBC to enable a grant program to be used by Exelon as a smokescreen to whitewash major growing irreversible and undeniable harms to the Schuylkill River from Limerick Nuclear Plant operations. Exelon's role in determining who gets funded buys them silence and support.**

**Exelon shamelessly plans more use and pollution of the Schuylkill River through Uprates and Relicensing. Exelon also wants Limerick's NPDES pollution discharge limits into the Schuylkill River to be raised to FOUR times Safe Drinking Water Standards, even though this is a vital source of drinking water.**

**What happens when there is not enough safe drinking water for all the people who need it from Pottstown to Philadelphia? It is crucial for DRBC to look at Limerick Nuclear Plant's serious collective threats to Schuylkill River drinking water, and take immediate action to minimize damage.**

- **We URGE You To Review and Respond In Writing, To Each Issued Raised In ACE 1-19-11 and 5-11-11 Correspondence (PLUS All Attachments). In the balance is irreparable harm to the Schuylkill River, its ecosystems, public drinking water, and public health.**

NPDES permit issues overlap with several of Exelon's current docket requests to DRBC. You failed to respond to our requested investigation of NPDES issues, including drastic increases in toxic threats to the Schuylkill River and higher river temperatures.

1-19-11 ACE requested that you provide written responses on issues overlapping with Limerick's NPDES permit for the Schuylkill River and Exelon's current docket requests. **You FAILED to respond (in almost 7 months).**

5-11-11 ACE contacted you about DRBC negligence in failing to respond, and DRBC's apparent attempt to limit public participation. We asked for clarification. **Again, you failed to respond (in 3 months).**

Since 2006, ACE raised important questions and concerns about Limerick Nuclear Plant's threats to the Schuylkill River. Your responses were consistently delayed, if addressed at all, and woefully inadequate.

Since 2006, ACE requested a comprehensive independent testing and monitoring protocol, to fully and accurately determine and disclose all harms to the river to date, after 25 years of Limerick's operations, to help determine consequences in the future. That never happened.

DRBC decisions impact the future viability of the Schuylkill River, yet DRBC continues to use biased data paid for by the company with a vested interest in the outcome that has shown elsewhere it can't be trusted.

**Since 2007, ACE has collected vast numbers of signatures on petitions opposing Exelon's self-serving requests to DRBC, which if approved, could eventually result in almost two million people no longer having enough safe, usable drinking water. That would constitute too great a price for the continued operation of the Limerick Nuclear Plant.**

**Copies: Federal Elected Officials of Impacted Communities  
State Elected Officials of Impacted Communities  
Philadelphia Inquirer  
Pottstown Mercury  
Norristown Times Herald**

August 26, 2010

To: DRBC

From: The Alliance For A Clean Environment  
Dr. Lewis Cuthbert

**RE: Failure to Respond Concerning:  
Limerick Nuclear Plant's Threats to the Schuylkill River**

We are frustrated with DRBC leadership, who appear to believe they have no obligation to answer public concerns. To date, Carol Collier made no attempt to respond to important concerns, e-mailed and faxed to her (copied to William Muszinski) on May 10 and July 22. This is the latest in a long list of NO RESPONSES. Time after time, it has been difficult to get answers and important information, even under the Freedom of Information Act. ACE has compiled a long list of DRBC's negligence and unresponsiveness, which we intend to put on a public hearing record when the public hearing that was promised is finally held in Pottstown, prior to approval of Exelon's current docket requests. This may be the only way for us to get responses with full disclosure.

We are perplexed as to why DRBC ignores the reality of Limerick Nuclear Plant's threats to water quality, water supply, and ecosystems in the Schuylkill River. DRBC invites us to meetings, but we doubt we would be given adequate time to discuss the many unresolved, unanswered, complicated issues from our 4 ½ year investigation. In fact, it appears those meetings largely deal with little more than reviewing testing and reports paid for by Exelon, the company with a vested interest in the outcome. That is even more suspect this year. Among other concerns, Exelon's contamination data will be deceptive for 2010. Exelon diluted the river with clean water from Tamaqua, while not pumping water into the river from Wadesville Mine.

- **We hope DRBC will take this into account related to the Iron and Manganese data from water treatment plants.**

In addition, another concern has recently been brought to our attention by a retired government agency official who questioned how the Wadesville Mine water ever got approved for discharge into the Schuylkill River. He was informed that testing was done on water from a spigot instead of the mine. When trying to get DEP to investigate, he was told DEP didn't care.

- **Does DEP or DRBC physically oversee the Wadesville Mine Water testing source?**

Exelon's record on full and accurate disclosure has become even more tarnished since we originally expressed concerns in 2007. As first stated to Mr. Muszinski at a meeting in our office in 2007, based on Exelon's "Radioactive Watergate" elsewhere, we have no confidence and little interest in reports paid for by Exelon. We provided Mr. Muszinski with extensive information showing cause for concern and the need for independent testing related to Exelon's "Demonstration Project". He claimed there was no money, but failed to admit DRBC is paid by Exelon for Limerick's consumptive and non-consumptive use of Schuylkill River water. In fact, we learned later that Exelon pays DRBC for water withdrawn and discharged. This revenue should be used for an independent testing protocol to look at all aspects of harms, before allowing more unfiltered contaminated mine waters to be massively pumped into the Schuylkill River.

Exelon's 2007 reporting and payments to DRBC, finally received by ACE through FOIA months after the first of four requests, appear to reveal that Exelon unreported and underpaid for Schuylkill River water. DRBC didn't even have the courtesy to respond to ACE's request for an investigation of Limerick's Schuylkill River water use compared to Exelon's request for water use, use at other nuclear plants, and payments for all years since Exelon took over in 2000. We believe that could lead to revealing many years of underpayments, likely more than ample for an independent and comprehensive testing protocol.

FOIA reveals many knew the water needs of Limerick Nuclear Plant from the Schuylkill River were unsustainable, yet DRBC made decisions that allowed this nuclear plant to be built anyway.

- **Due to DRBC's original irresponsible decisions, we now face the consequences of serious depletion of the Schuylkill River with ever increasing radioactive contamination from Limerick's discharges plus massive toxic metal contamination as a result of pumping unfiltered contaminated mine water into the river to supplement the flow due to the enormous shortfall of water from Limerick Nuclear Plant's consumptive use.**

DRBC should not compound its original bad decision to allow Limerick Nuclear Plant to be built knowing Schuylkill River water use was unsustainable, Don't allow increasing amounts of unfiltered, contaminated mine water to be pumped into the Schuylkill River, polluting the depleting river for Limerick's operations.

- Exelon is applying for Uprates which will require more water.
- Exelon is applying for Relicensing to operate until 2049, using extraordinary amounts of Schuylkill River water for another 35 years. With already frightening Schuylkill River depletion, how can the Schuylkill River sustain billions more water used each year than returned for another 35 years?
- **A DRBC decision to allow pumping more contaminated mine waters into the river will not only further contaminate the depleting Schuylkill River, it could allow Limerick's continued and increased unsustainable water use until 2049.**

To protect the public's water and financial interests,

1. **We urge DRBC to use money received from Exelon for use of Schuylkill River water to hire a truly independent scientist to set up an independent comprehensive protocol to determine all harmful impacts on the river since Limerick started to operate 25 years ago.**
2. **If DRBC will not do independent testing, DRBC should DENY Exelon's requests to pump unfiltered contaminated mine water into the Schuylkill River for Limerick's operations.**

In conclusion, ACE officers will NOT attend the September 2 meeting, but will attend a meeting if and when there is meaningful, comprehensive reliable data and reporting from an independent expert, not paid by Exelon.

For your convenience, we have attached the last two e-mails and faxes to which we never received responses.

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**Fwd: Request For Immediate Response**

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**From :** aceactivists@comcast.net Thu Jul 22 2010 8:18:02 AM  
**Subject :** Fwd: Request For Immediate Response  
**To :** Carol Collier <Carol.Collier@drbc.state.nj.us>  
**Cc :** Governor Rendell <governor@state.pa.us>, DRBC  
William Muszynski  
<William.Muszynski@drbc.state.nj.us>  
**Bcc :** ACE <aceactivists@comcast.net>

July 22, 2010

To: **Carol Collier, DRBC**

From: Dr. Lewis Cuthbert, ACE President

Subject: **Failure to answer questions from 5/10/10 and new questions and requests.**

May 10, 2010 we e-mailed and faxed you the request below for an immediate response. It is now July 22, 2010 and we still have NO RESPONSE from you.

We cannot believe that you are not responsible to answer the public's questions, when the issue is safe public drinking water for almost two million people from Pottstown to Philadelphia.

Since that time in June and July, we have had extended extreme heat. We now add other questions to our original questions.

People are expressing concerns to us about the depletion of the Schuylkill River and the concentration of toxics because of it.

1. Has Exelon resumed pumping Wadesville Mine water into the river?
2. Is Exelon pumping mine water from any other mines into the river?
3. Before DRBC approval of Exelon's requests, we are officially requesting independent testing, including for iron and manganese, at the end of the summer when the river is depleted to the full extent, to determine what will happen in the future in extreme heat and drought. We ask that the money be used that Exelon pays DRBC for public water from the Schuylkill River.

Based on reports to ACE, we believe the temperature issue from Exelon discharging millions of gallons of heated water per day needs to be investigated now. There was a triathlon event planned for the Schuylkill River in Philadelphia in early June where college students were told it was dangerous to swim because the river was too warm. They were told it was 89 degrees. People competed in the event anyway.

1. Has DRBC even checked the Schuylkill River temperature, below where Limerick Nuclear Plant continuously discharges heated water?
2. We urge DRBC to do temperature testing at various locations in the Schuylkill River, from Royersford to Philadelphia. Again we ask that the money that Exelon pays DRBC be used for independent testing to determine water temperature and risks to the public and aquatic life.

Evidence in Illinois and New Jersey shows Exelon's monitoring, testing, and reporting can't be trusted. Recent falsifying of water tests reported in the Mercury 7/2/10

shows once again (there have been others in PA) just how easy it is for a wealthy polluter to pay for the results they want.

We urge you to take this seriously and spend the money to get the truth told BEFORE any decisions are made on Exelon's requests to eliminate temperature restrictions.

Health, lives, and a major water source are at risk.

**PLEASE RESPOND AS SOON AS POSSIBLE TO QUESTIONS BELOW AND ABOVE!**

**If we do not receive answers to all our concerns within 30 days, we intend to contact our federal and state officials about this vitally important matter.**

----- Forwarded Message -----

From: aceactivists@comcast.net

To: "Carol Collier" <Carol.Collier@drbc.state.nj.us>

Cc: "DRBC William Muszynski" <William.Muszynski@drbc.state.nj.us>

Sent: Monday, May 10, 2010 10:32:24 AM

Subject: Request For Immediate Response

The Alliance For A Clean Environment  
1189 Foxview Road  
Pottstown, PA 19465

May 10, 2010

**REQUEST FOR IMMEDIATE RESPONSE**

Ms. Collier,

We just learned from Exelon employees that DRBC plans to finalize the Docket for Exelon's Demonstration Project soon. If true, we have major concerns about that.

1. We are concerned that last year's testing data is significantly skewed based on what we learned.
  - Exelon employees claimed that NO mine water was pumped by Exelon into the Schuylkill River last year (2009). Is that true?
  - They also claimed only clean water from the public reservoir was pumped into the river (2009). Is that true?

If both of Exelon's claims are true, 2009 Exelon data would NOT be representative of on-going and future contamination threats to the Schuylkill River, the public, wildlife, and water treatment systems from pumping massive amounts of contaminated, unfiltered mine water into the Schuylkill River.

- Using 2009 data would significantly dilute risks and clearly fail to provide a way to accurately estimate what would happen to the river and water treatment systems in times of drought. Any cumulative or averaged statistical data or reports that include 2009 data are not accurately representative of threats posed to the public and water treatment systems.
- **If claims of Exelon employees are true, ACE strenuously objects to DRBC's use of 2009 Exelon data on Exelon's Demonstration Project. Clearly, use of 2009 data (when no mine water was pumped into the river but only clean water was), does not reflect an accurate picture of mine water contamination of the Schuylkill River and iron and manganese threats to water systems in the future, but instead dilutes the reality of harms.**
- 2. If it is true that DRBC soon plans to issue the Docket being reviewed, we strenuously object. DRBC never responded to many of the issues we raised, including Exelon's apparent underreported and underpaid use of Schuylkill River water, and the relationship between mine water pumping and Exelon's request to significantly increase TDS permit limits at Limerick's intake. There are several others.
- **Does DRBC really plan to issue the Docket approval at this time, before answering the public's questions and after a year when mine water was not used? If so, we request a copy electronically, at the same time it is provided to Exelon.**

**Please respond as soon as possible.**

Thank You,

Dr. Lewis Cuthbert  
ACE President

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**The Alliance For A Clean Environment**

1189 Foxview Road Pottstown, PA 19465

September 1, 2010

**PA DEP**

Jenifer Fields, Regional Water Manager  
Southeast Regional Office  
2. East Main Street  
Norristown, PA 19401

Dear Ms. Fields,

We recently learned that Exelon intends to apply to PA DEP for renewal of Limerick Nuclear Power Plant's NPDES permit which expires March, 2011. This permit would renew approval for discharges of industrial waste water and stormwater from Limerick Nuclear Power Plant into the Schuylkill River.

We are alarmed.

- Exelon is in the process of planning Uprates at two different times at different percentages which will logically increase water discharges.
- Exelon is planning to apply to NRC for a 20-year license renewal which would result in the plant discharging into the Schuylkill River radioactive and otherwise contaminated waste water for another 35 years, until 2049.
- Exelon recently received a Title V Operating Permit Renewal in which air and water issues are tied together, with serious consequences to our region related to this NPDES permit.
- March, 2010 a report was released showing 102 of our nation's 104 nuclear power plants have leaked radiation into groundwater and into other bodies of public water from the 2 to 20 miles of degrading leaking underground pipes.

**There is no way that anyone can intelligently comment on Limerick Nuclear Plant's NPDES Permit Renewal unless they have a complete picture of all water at the plant. We are asking that, prior to DEP consideration of Limerick Nuclear Plant's NPDES Permit Application for Renewal, a document be submitted for public review providing the following:**

1. A detailed accounting of all water entering Limerick Nuclear Power Plant and the land owned by Exelon / PECO. This accounting must explain in detail the source of all water intake, the amount, the temperature, the pollutants in it, and show in words with simple clear diagrams where the water goes.
2. Describe in detail how all water exits from all Limerick Nuclear Plant operations and all property owned by Exelon; in steam, in blowdown, in leaks, as effluent, and / or other ways. The accounting of steam, blowdown, and effluent should include amounts, temperatures, and all toxic chemical pollutants, including the 324 pounds added daily to the cooling towers.
3. Describe how and where any water remains on the 600 acre site, such as in a retention pond, a pond for fire protection, or any other water storage areas (wastewater or otherwise) of which we are unaware.
4. Explain in detail what is added to the water including: all chemical additives (regulated or not) (including all radionuclides). Explain in detail where toxics are added in the system, where they go, and how they are eliminated.

5. Explain which agency (DEP, EPA, NRC) regulates every gallon of water intake and discharge and which agency regulates each radioactive isotope and pollutant – withdrawn from the river, produced by nuclear power production, or used or added by Exelon for Limerick Nuclear Plant operations.
6. Explain how each responsible agency provides verifiable oversight of water intake, consumptive and non-consumptive use, and radioactive and other toxic discharges into the river or other storage places on site,
7. Has there been any independent testing or split sampling by an agency official on site, for all radionuclides and all other toxics in Limerick's discharges into the Schuylkill River?
8. We realize Exelon does limited self-testing for some radionuclides, but has any agency ever independently comprehensively tested the water downstream (which is used for drinking water), ever been comprehensively tested for all Limerick's radionuclides and other toxic chemical discharges? If so:
  - ✓ Which agency did the testing – DEP, EPA, NRC?
  - ✓ Which of over 100 radionuclides associate with producing nuclear power at Limerick tested?
  - ✓ What toxic chemicals and metals associated with Limerick's wastewater discharges were tested?
  - ✓ How far downstream were samples taken?
  - ✓ What is the exact location samples were taken?
  - ✓ When were samples taken? How often?
  - ✓ Where are the results?
9. Has there been any independent metering of amounts of water discharged into the river? If so, by what agency? How many years was metering done? Where can results be found?
10. Has there been any testing by any agency or Exelon, of the riverbank make-up and river sediment within 3 miles of Limerick, for all radionuclides and/or other toxic chemicals discharged by Limerick?
  - a. Were any radioactive isotopes and/or chemical additives used at Limerick Nuclear Plant found in Schuylkill River sediment, streambanks, and the river itself? Please respond to each.
  - b. Was the dredge spoil removed from Vincent Dam tested for all radionuclides known to be discharged from Limerick? If so, where can the results be found?

Other issues need clarification.

- 1) All 600 acres of Limerick Nuclear Plant are in Montgomery County, yet the Mercury notice says wastewater is discharged into the Schuylkill River in Chester County. Exactly how far into the river is the pipe that diffuses Limerick's wastewater discharge that comes from the cooling tower blowdown? Is all the discharge from the site going through this pipe? If not, where are the other pipes into the Schuylkill River located? Are there pipes carrying radioactive water discharging wastewater into other bodies of water on site?
- 2) DEP needs to explain in detail how each percentage of each Uprate planned for Limerick will impact Limerick's NPDES permit? DEP's responses should include how their conclusions were determined.
- 3) DEP should explain in detail how Limerick's heated radioactive and otherwise contaminated discharges into the Schuylkill River will impact the river's ecosystems for the life of this NPDES permit renewal, and how they might impact the depleting river's health in the next 35 years if Limerick is relicensed.

- 4) DEP has a radiation department. DEP issues NPDES permits. Yet, fractured permitting for Limerick Nuclear Plant's radioactive discharges into the Schuylkill River involves NRC. This kind of fractured permitting allows huge loopholes, lax oversight, and questionable accountability. This is especially troublesome considering all Exelon's planned requests which will involve increased pollution and threats to water in our region.
- To best protect public's interests in these matters and to provide reliable accountability, we believe only one agency, DEP, should be responsible for all water issues and discharges into the Schuylkill River,

Certainly the NPDES permit must account for Limerick Uprates and plans for Limerick's license renewal until 2049.

- DEP needs to address the big picture before any NPDES permit renewal is issued so that the public can see how Uprates and Relicensing impact the NPDES permit renewal for Limerick Nuclear Plant.

Limerick's extraordinary water needs are part of the big picture related to the sustainability and health of the Schuylkill River. Everything is interconnected, as was evidenced in DEP's Comment Response document for Limerick's Title V Air Permit Renewal. There were issues DEP said would have to be addressed during the NPDES permitting process. That time has come with more complicated implications due to Exelon's requests for Uprates and Relicensing.

Schuylkill River depletion due to Limerick Nuclear Power Plant operations over the past 25 years is obviously resulting in concentrations of toxics discharged into the river. This needs full discussion and disclosure before the NPDES permit renewal is issued by DEP. As long as Limerick Nuclear Plant continues to operate the river will continue to be significantly depleted each year due to Limerick Nuclear Power Plant's extraordinary need for water released into the air as steam from Limerick's cooling towers.

- ✓ By PECO / Exelon's own Docket requests to DRBC, Limerick's consumptive use (steam discharges) could be from 35 to 42 million gallons per day or over 20 billion gallons per year.
- ✓ Supplementation to operate Limerick, as far as we can tell has never been more than 3 billion gallons in any year from combined supplementation sources.
- ✓ Docket requests suggest 14.2 million gallons are returned to the river each day (radiated and heated) or about 5 billion gallons of wastewater are discharged back to the Schuylkill River each year.
- ✓ That leaves approximately 12 billion gallons withdrawn each year that are not returned. This has been going on for about 25 years, and if relicensing is approved will go on for another 35 years.

We need DEP to address why the agency supports Exelon massively pumping mine pit water into the river unfiltered when DEP has called mine water the worst threat to groundwater in the state.

- Please don't use dilution as the excuse to support intentional massive contamination of the river with toxic mine water when increasing depletion will obviously eventually lead to concentrations. That is not only deceptive, it is negligent, especially considering this is an ever-depleting river where toxics will actually become increasingly concentrated.

Limerick's wastewater is actually discharged, both heated and radiated, as a result of Limerick Nuclear Plant's operations.

- We ask DEP to comment on what could happen after 35 more years of ever-increasing river depletion, ever-increasing toxic metal and total dissolved solids contamination from mine water, and the additive, cumulative, and synergistic contamination impacts from a broad range of radionuclides. We also ask DEP to provide studies or research on which DEP will base its comments on, including the dates of research, the authors, and who paid for the research.

We would also like to know if anyone from PA DEP has ever physically been on the Wadesville mine site during sampling, taking a split sample from the Wadesville Mine water. We understand DEP employees knew samples for testing Wadesville Mine discharge were actually not the mine water but water taken from a public water spigot instead. We ask DEP to investigate this allegation, by actually sampling the discharge water. Even though we suspect levels have declined since pumping started in 2003, we believe this is critical as Exelon plans to use other mine waters.

Based on our findings from 2007 data for Limerick's water use and Exelon payments, we believe Exelon may have underreported and underpaid for Schuylkill River water use and discharge. If this proves to be accurate, Limerick's water discharges and use could have been underreported and underpaid by Exelon for other years. This would not be surprising given Exelon's track record elsewhere, failing to provide full and accurate disclosure on radioactive water contamination. Significant fines for Exelon's failure to accurately report Limerick's water use and discharge could provide DEP with resources to develop a comprehensive protocol for baseline data to make important determinations to protect the public interests for all Exelon water requests going forward.

A public notice appeared in the Pottstown Mercury August 13, 2010, stating DEP would receive Limerick's NPDES Permit Renewal Request by September 17, 2010.

- **We ask that you forward ACE an electronic copy of Exelon's detailed permit renewal request (including any and all data) as soon as DEP receives it.**

We remind you that the Schuylkill River is the source of drinking water for almost 2 million people from Pottstown to Philadelphia. To prepare the most meaningful comments on behalf of all those depending on the Schuylkill River for drinking water and recreation we need full disclosure on all the issues and concerns in this letter.

- **ACE is requesting written responses to each issue in this letter within the next 30 to 60 days.**

**If DEP fails to answer each of these questions and concerns, we will be requesting a public on-the-record hearing at the end of the 60 day period.**

Thank you,

Dr. Lewis Cuthbert  
ACE President

Cc: Senator Rafferty  
Senator Dinniman  
Senator O'Pake  
Representative Quigley  
Representative Vereb  
Representative Hennessey  
Chester County Commissioners  
Montgomery County Commissioners  
Pottstown Council and Environmental Committee  
East Vincent Supervisors  
East Coventry Supervisors and Environmental Committee  
Limerick Supervisors  
DEP Secretary Hanger  
DEP Regional Director Feola  
EPA Region Administrator Garvin  
NRC Regional Krohn  
DRBC Director, Carol Collier

## **Limerick's Title V Permit Renewal - Issued 4 Years Late - WHY?**

Limerick's Title V Operating Permit was issued February 8, 2000. (Pg. 13)

- Limerick Nuclear Plant's Title V Permit Renewal should have been issued in 2005, according to the requirement for renewal every 5 years.
- DEP failed to provide an explanation of why Limerick's first Title V Permit Renewal was issued 4 years late. This should be a technical violation of Title V requirements for permit renewals.

### **Permit Based On Illusion - Smoke and Mirrors**

#### **REALITY - DEP has NO accurate idea**

- ✓ **How much air pollution is emitted from each source**
- ✓ **How much of each dangerous pollutant is emitted into our air**
- ✓ **How much dangerous air pollution in total is emitted from Limerick**

#### **DEP Confirms:**

- ✓ **No actual air monitoring**
- ✓ **No air testing for radiation**
- ✓ **NO actual stack testing**
- ✓ **Toxic pollutants are ignored from major sources such as cooling towers and emergency pond.**
- ✓ **Schuylkill River pollution goes from the river to the sky**
- ✓ **NO FILTRATION of Schuylkill River water intake** (20 ½ Billion Gallons Per Year)
- ✓ **NO FILTRATION for toxics from any of Limerick's 30 air pollution sources.**

#### **Meaningless Words are used such as:**

**"Short Half-life" - How long is short? Hours, Days, Months, Years?**

**"Ample Margin of Safety" - What is ample? To whom?**

**"Calculations" and "Estimates" - Not verified with monitoring, testing, or even oversight by DEP, EPA, or NRC**

**"Off speculation waste oil" - From where? Contaminated with what?**

#### **DEP actually states**

***"As more information is collected, DEP tries to improve efficiency - FOR FEES".***

- **DEP makes no attempt to improve efficiency to protect health.**

#### **DEP confirms - EXELON gets whatever it requests, regardless of consequences to our region:**

- **Almost 6 times higher increase in PM 10 from cooling towers**
- **Dropped requirement to measure hours of operation of emergency pond**

**DEP, EPA, NRC are in cahoots to avoid dealing with issues for protection.**

**None of these agencies are protecting us. They allow serious threats from air pollution to fall through regulatory cracks.**

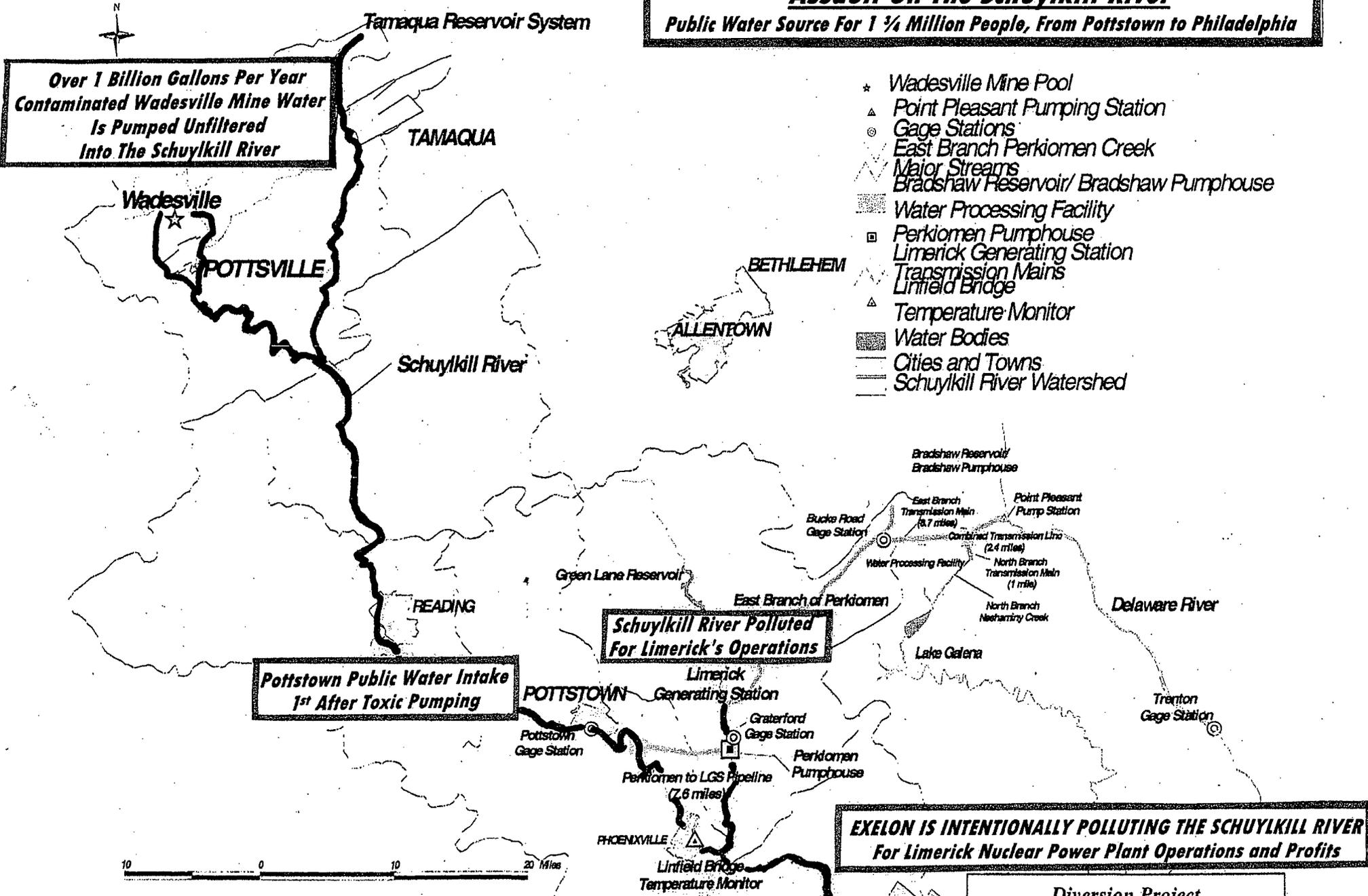
**(The Winner - Exelon's Bottom Line) (Losers - Our Region's Families)**

# Assault On The Schuylkill River

Public Water Source For 1 1/4 Million People, From Pottstown to Philadelphia

Over 1 Billion Gallons Per Year Contaminated Wadesville Mine Water Is Pumped Unfiltered Into The Schuylkill River

- \* Wadesville Mine Pool
- ▲ Point Pleasant Pumping Station
- ⊙ Gage Stations
- ⋈ East Branch Perkiomen Creek
- ⋈ Major Streams
- ▭ Bradshaw Reservoir/ Bradshaw Pumphouse
- ▭ Water Processing Facility
- ▭ Perkiomen Pumphouse
- ▭ Limerick Generating Station
- Transmission Mains
- Linfield Bridge
- ▲ Temperature Monitor
- ▭ Water Bodies
- Cities and Towns
- Schuylkill River Watershed



Schuylkill River Polluted For Limerick's Operations

Pottstown Public Water Intake 1st After Toxic Pumping

EXELON IS INTENTIONALLY POLLUTING THE SCHUYLKILL RIVER For Limerick Nuclear Power Plant Operations and Profits

Diversion Project

The Schuylkill River Is Already Impaired Without Political Intervention Now, It's About To Get Worse

## Manganese

**Current Drinking Water Standard**                      **0.05 mg/l**

**Wadesville Daily Maximum Permit Limit**                      **4.0**

➤ **80 Times Higher Than Safe Drinking Water Standards**

It appears PA DEP permitted maximum daily Manganese Discharges into the Schuylkill River from Wadesville Mine at 80 times higher than Safe Drinking Water Standards. It is not surprising that Exelon claims

- Wadesville NPDES Permit No. PA 0123293 – Reissuance 10/2/02 – Expiration 9/20/10

### Manganese Test Results

Wadesville Mine Water Testing	3.37	<b>67.40</b>	times higher than safe drinking water standards
2005 Pottstown Water Intake	0.205	<b>4.10</b>	times higher than safe drinking water standards
2008 Pottstown Water Intake	0.335	<b>6.70</b>	times higher than safe drinking water standards

## Iron

**Current Drinking Water Standard**                      **0.3 mg/l**

**Wadesville Daily Maximum Permit Limit**                      **6.0 mg/l**

➤ **20 Times Higher Than Safe Drinking Water Standards**

It appears PA DEP permitted maximum daily Iron Discharges into the Schuylkill River from Wadesville Mine at 20 times higher than Safe Drinking Water Standards

- Wadesville NPDES Permit No. PA 0123293 – Reissuance 10/2/02 – Expiration 9/20/10

### Iron Test Results

Wadesville Mine Water Testing	3.61	<b>12.03</b>	times higher than safe drinking water standards
2005 Pottstown Water Intake	0.44	<b>1.47</b>	times higher than safe drinking water standards
2008 Pottstown Water Intake	0.96	<b>3.20</b>	times higher than Safe Drinking Water Standard

Implications On The Reverse Side:

## **Issues Of Concern:**

1. Since 2003, almost 6 billion gallons of unfiltered Wadesville Mine water were pumped into the Schuylkill River, Pottstown's water source.
2. Wadesville Mine water contains Manganese and Iron at levels far above "Safe Drinking Water Standards". The NPDES permit allows levels pumped into the Schuylkill River to exceed "Safe Drinking Standards", as much as 80 times higher.
3. 23,300 gallons per minute of unfiltered mine water, contaminated with Manganese and Iron far above "Safe Drinking Water Standards" are pumped into the Schuylkill River over the lowest flow 6 months of the year – Over 1 Billion Gallons Per Year.
4. There's no independent continuous monitoring and reporting on levels of Manganese and Iron pumped into the Schuylkill River with the 23,300 gallons per minute.
5. Wadesville Mine water is not regularly monitored or tested for all toxics that could be contaminating the mine and therefore pumped into the Schuylkill River with extraordinary amounts of mine water. There's reason to believe many other potential hazardous substances, both from mining and groundwater recharge potentially contaminated with Philadelphia Sewage Sludge.
6. Additive, cumulative, and synergistic harmful impacts to date are unknown.
7. Additional mine water could be pumped into the Schuylkill River if DRBC approves Exelon's requests, without a comprehensive independent study to determine all potential harms to date and to predict future harms from that data, and without public participation.

## **Pottstown Testing and Reporting**

8. **Manganese and Iron levels are rising. If Exelon's requests are granted by DRBC, they will logically continue to increase.**
9. **Rising Manganese and iron levels present financial threats to Pottstown Water Treatment Plant and Pottstown's water customers.**
10. **Health threats associated with Manganese and Iron rise as the levels rise in the Schuylkill River. Toxic chemicals used to treat Pottstown's water for Manganese and Iron may be increased.**
11. **Spikes in Manganese and Iron levels could go undetected and untreated, possibly for extended periods of time. Pottstown is not required to do continuous monitoring for Manganese and Iron.** If DRBC approves Exelon's requests, Pottstown should continuously monitor and frequently report on Manganese and Iron levels, including spikes. Testing is only a snapshot in time.
12. Even though Exelon's Demonstration Project started in 2003 pumping massive amounts of Manganese and Iron contaminated water into the Schuylkill River, Pottstown's 2007 Annual Drinking Water Quality Report still did not include Manganese and Iron.
  - o If Exelon's "Demonstration Project" is made permanent to pump billions more gallons of Manganese and Iron contaminated water into the Schuylkill River and Exelon's other requests are approved, Pottstown should continuously monitor for Manganese and Iron, as well as Potassium Permanganate in Pottstown's water, and;
  - o Peak levels of Manganese and Iron should be included in Pottstown's annual water report.
  - o Manganese exposure at 0.05, previously believed to be safe by regulators, can result in permanent brain injury and nervous system damage as a result of breathing vaporized manganese 10 minutes a day in a shower over a 10 year period. (July, 2005 Research) Current standards can no longer be considered protective. Pottstown should strive for Manganese levels lower than 0.05 to protect Pottstown residents.
  - o Iron overexposure can result in damage to the liver, heart, and pancreas. Pottstown should also strive to reduce Iron levels even below accepted limits in Pottstown's water

# **Exelon's 2005 Interim Report For Wadesville Mine Pool Withdrawal And Streamflow Demonstration Project**

**Pottstown is the first drinking water intake from the Schuylkill River after the Wadesville Mine Pool Water is dumped into the river.**

**Below is Exelon's testing evaluation on Pottstown's Water which appears on Page 13 and Page 14 from Exelon's 2005 Report.**

## Pottstown Water Treatment Plant

The Borough of Pottstown's Water Treatment Plant is the first drinking water intake on the Schuylkill downstream of Pottsville and, therefore, the first intake potentially affected by water pumped from the Wadesville Mine Pool. Pottstown routinely measures the pH and specific conductance of the raw water withdrawn from the Schuylkill River. We utilized their data to supplement our own data collection efforts. The pH of the intake water is recorded at 2-hour intervals each day. The observed daily ranges are shown in Table 4.4-1. During the Demonstration, intake water pH ranged from 6.5 to 8.3 standard units. Although the daily range on most dates was 0.2 standard units or less, the greatest range observed was 1.3 standard units on May 12, prior to initiation of Wadesville Mine Pool pumping. This occurred during a period of low, stable, river flows which appeared to coincide with the onset of intense photosynthesis with its wide swings in DO and pH as shown by the data obtained simultaneously at the LGS intake.

The daily measurements of specific conductance ranged from 370 to 570  $\mu\text{mhos/cm}$ , with most readings in the 400s. This parameter was strongly negatively correlated with river discharge (Figure 4.4-1). Conductivity and pH values ranged higher in 2005 than in the 2004 Demonstration period, coincident with the lower flow regime observed in 2005.

Sampling of additional parameters, i.e., TDS, iron, manganese, total organic carbon (TOC), and sulfides was scheduled to take place at the Pottstown water intake when river flows at the USGS Pottstown gage decreased below 840 CFS. The purpose of this sampling was to assure that Borough personnel were informed about water quality trends that could result in increased treatment costs or potentially cause a violation of the drinking water quality limits applicable to the finished water. Daily average Schuylkill River flows fell below the trigger level and increased monitoring was performed on 17 days from June 17 to October 6 (Table 4.4-2). Maximum concentrations found during the 17 sampling events were: iron, 0.44 mg/l; manganese, 0.205 mg/l; sulfide, <2.0; copper, <0.01 mg/l; TOC, 2.8 mg/l; and TDS, 350 mg/l (Table 4.4-2). Pottstown was not required to make any changes to public water supply treatment as a result of

the implementation of the Demonstration Project in 2005. As noted previously in Section 4.2, the pumped flow from Wadesville represents only about 2% of the river flow at Pottstown under low flow conditions, i.e. with 10 CFS pumped and 500 CFS river flow at Pottstown.

Water Test at the Pottstown Water Treatment Plant

Date	Total Organic Compounds mg/l	Dissolved Solids mg/l	Iron mg/l	Manganese mg/l
8/1/07	2.5	320	0.09	0.058
8/3/07	2.3	318	0.23	0.12
8/16/07	3.2	328	0.09	0.055
8/16/07	2.7	336	0.08	0.05
8/29/07	3.2	296	0.017	0.05
8/31/07	3.1	294	0.14	0.038
9/20/07	2.6	285	0.17	0.089
9/20/07	2.5	300	0.09	0.133
9/1/07	2.1	324	0.09	0.064
9/27/07	2.4	309	0.14	0.08
9/28/07	2.4	317	0.26	0.107
10/10/07	2.5	341	0.22	0.117
10/17/07	2.6	351	0.2	0.112
8/1/07	2.5	320	0.09	0.058
5/22/08	2.5	218	0.96	0.335 ←

## Contamination Of Pottstown Public Water?

# **Iron and Manganese Are Associated With Mine Pool Contamination.**

- **Iron and Manganese in Wadesville mine pool water exceeded safe limits [1990s Testing] Since 2003, Exelon pumped 5 Billion Gallons of this contaminated water UNFILTERED into the Schuylkill River to operate Limerick Nuclear Plant.**
- **Pottstown is the first drinking water source using the Schuylkill River after pumping. Testing Showed Pottstown water contained levels of Iron and Manganese above Safe Drinking Water Standards (Exelon's 2005 Report)**

## Iron and Manganese Can Harm Health

### Iron - Overexposure can result in significant health threats, including Hemochromatosis

When too much iron builds up in a person's body they can get hemochromatosis, iron overload disease. The body has no natural way to eliminate extra iron. It stores in body tissues, especially the liver, heart and pancreas. Extra iron damages organs and can cause organ failure. In addition, just think what too much iron does to pipes over time.

### Manganese - Far more dangerous than first thought. Exposure at levels currently believed to be safe can result in permanent brain injury and nervous system damage.

A July, 2005 study said,

- Showering in manganese-contaminated water for a decade or more could have permanent effects on the nervous system.
- The study showed the potential for permanent brain damage from breathing vaporized manganese that would be absorbed by showering 10 minutes a day.
- Inhaling manganese is far more efficient at delivering manganese to the brain.
- Manganese is toxic to the central nervous system and can cause learning and coordination disabilities, behavioral changes and Parkinson's disease.
- Children, pregnant women, the elderly and patients with liver disease are at highest risk from manganese toxicity.
- Some groups developed manganese poisoning even at fairly low doses in their water supplies.
- The damage may occur even at levels of manganese considered safe by EPA, 0.05 as the upper limit advisable in water supplies.
- "...populations that experienced high levels of manganese in their water supplies over long periods of time suggest regulatory agencies may one day need to rethink existing drinking water standards for manganese.

In 2004, PA DEP Consumer Confidence Data PADWIS Sample Results PWSID 1460037 – e-FACTS – Site ID; 481617 showed Pottstown water had detections and problems with 5 Haloacetic Acids. An EIS should investigate if there is or could have been any connection with Wadesville Mine contamination of the Schuylkill River.

An EIS must include review of data on Pottstown public water and independent testing of Pottstown's water in October, 2008 to include all toxics identified with comprehensive independent testing over the next few months, in the Wadesville Mine pit.

A data average should be used for a period 5 years prior to the start of Exelon's "Demonstration Project" in 2003, and compared to current independent testing of Pottstown's public water for the EIS.

### Questions and Concerns To Be Addressed Related To Pottstown's Water Supply:

- 1) Have current Pottstown Borough water workers been advised to look for exceedances for specific toxics associated with mine pool water? If not, why not? If not, will DRBC insure this is done immediately to protect public health in the region served by Pottstown public water?
- 2) In the future, will the Borough be required to provide additional treatment to remove iron and manganese concentrations above Safe Drinking Water Standards?
- 3) There should be specific notification to Pottstown Water Treatment workers about all other toxics found in Wadesville Mine water through new independent comprehensive monitoring and testing.
- 4) Who will pay to treat the water to try to remove elevated levels of iron and manganese, and any other toxics found in Wadesville Mine water with EIS testing, to maintain Safe Drinking Water Standards for Pottstown's public water?
  - ✓ Will Pottstown, Exelon, or owners of Wadesville Mine pay for removal of toxics (shown to be elevated in the Wadesville Mine pit), from Pottstown's water and/or the damages caused by those toxics in Pottstown's water?

➤ **Pottstown public water must not be further contaminated. There is already a documented health crisis in the Greater Pottstown Area.**

➤ **Precaution is Imperative! To limit the risk to massive numbers of people relying on Pottstown public water, Exelon should be required to pay to filter Wadesville mine pool water prior to entering the Schuylkill River.**

# Water & Wastewater

NEWS

## Study: Manganese Inhaled From Shower Poses Public Health Threat ←

July 1, 2005

*Note: article has been corrected so that the following passage now reads "EPA has set 0.05 milligrams/liter as the upper limit of manganese advisable in water supplies" instead of "EPA has set 0.5 milligrams/liter as the upper limit of manganese advisable in water supplies".*

A new analysis based on animal studies suggests that showering in manganese-contaminated water for a decade or more could have permanent effects on the nervous system. The damage may occur even at levels of manganese considered safe by EPA, according to researchers from Wake Forest University School of Medicine.

"If our results are confirmed, they could have profound implications for the nation and the world," said John Spangler, M.D., an associate professor of family medicine. "Nearly 9 million people in the United States are exposed to manganese levels that our study shows may cause toxic effects."

According to the researchers, the study is the first to show the potential for permanent brain damage from breathing vaporized manganese during a shower. It was conducted by reviewing the medical literature and calculating, based on animal studies, the amount of manganese people would absorb by showering 10 minutes a day.

Because manganese is monitored in public water supplies, high levels of this naturally occurring metal are especially found in wells and private water supplies.

Spangler and Robert Elsner, Ph.D., published their findings in the current issue of *Medical Hypotheses*, a forum for medicine and related biomedical sciences.

Everyone is exposed to small levels of manganese, which is found in food and many types of rocks and enters the air, soil and water. But, at higher levels, manganese is toxic to the central nervous system and can cause learning and coordination disabilities, behavioral changes and a condition that is similar to Parkinson's disease, the researchers said.

Children, pregnant women, the elderly and patients with liver disease are at highest risk from manganese toxicity. Some of these groups have developed manganese poisoning even at fairly low doses in their water supplies, Spangler said.

EPA has set 0.05 milligrams/liter as the upper limit of manganese advisable in water supplies. The limit, however, is based on odor and taste of the water. The potential risk of manganese accumulating in the brain through showering has not been considered by EPA in setting this limit, the researchers said. In their analysis, Spangler and Elsner found that concentrations well below 0.5 milligrams might lead to brain injury.

"Inhaling manganese, rather than eating or drinking it, is far more efficient at delivering manganese to the brain," said Spangler. "The nerve cells involved in smell are a direct pathway for toxins to enter the brain. Once inside these small nerves, manganese can travel throughout the brain."

Elsner and Spangler extrapolated data from rodents to estimate human exposure to manganese during showering. They found that after 10 years of showering in manganese-contaminated water, children would be exposed to doses of manganese three times higher than doses that resulted in manganese deposits in the brains of rats. Adults would be exposed to doses 50 percent higher than the rodents.

The researchers said that while limitations to their calculations do exist, regulatory agencies have not considered this potential pathway when setting drinking water standards.

"Studies should be carried out among populations that have experienced high levels of manganese in their water supplies over long periods of time," Spangler said. "Regulatory agencies may one day need to rethink existing drinking water standards for manganese."

The addition of manganese to gasoline as an anti-knock agent may also be a threat, the researchers said.

"The manganese, as it settles from car exhaust onto streets and highways, may enter the water supply, increasing manganese levels in the water we drink and bathe in," said Spangler.

[Back to previous page](#)

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# IRON OVERLOAD DISEASE

## Hemochromatosis

URL of this page: <http://www.nlm.nih.gov/medlineplus/hemochromatosis.html>

Also called: Also called: Iron overload disease

Hemochromatosis is an inherited disease in which too much iron builds up in your body. It is one of the most common genetic diseases in the United States.

Iron is a mineral found in many foods. Your body normally absorbs about 10 percent of the iron in the food you eat. If you have hemochromatosis, you absorb more iron than you need. Your body has no natural way to get rid of the extra iron. It stores it in body tissues, especially the liver, heart and pancreas. The extra iron can damage your organs. Without treatment, it can cause your organs to fail.

The most common treatment is to remove some blood, just like when you donate blood. This is called therapeutic phlebotomy. Medicines may also help remove the extra iron. Your doctor might suggest some changes in your diet.

National Heart, Lung, and Blood Institute

### Start Here

- Genetics Home Reference: Hemochromatosis **NIH** (National Library of Medicine) - <http://ghr.nlm.nih.gov/condition=hemochromatosis>
- Hemochromatosis **NIH** (National Heart, Lung, and Blood Institute) - [http://www.nhlbi.nih.gov/health/dci/Diseases/hemo/hemo\\_what.html](http://www.nhlbi.nih.gov/health/dci/Diseases/hemo/hemo_what.html)
- Hereditary Hemochromatosis (American Academy of Family Physicians) - <http://familydoctor.org/online/famdocen/home/common/blood/758.printerview.html>  
Also available in Spanish  
<http://familydoctor.org/online/famdoces/home/common/blood/758.printerview.html>

### Overviews

- Hemochromatosis **NIH** (National Institute of Diabetes and Digestive and Kidney Diseases) - <http://digestive.niddk.nih.gov/ddiseases/pubs/hemochromatosis/index.htm>
- Hemochromatosis (Mayo Foundation for Medical Education and Research) - <http://www.mayoclinic.com/print/hemochromatosis/DS00455/DSECTION=all&METHOD=print>
- Iron Overload and Hemochromatosis (Centers for Disease Control and Prevention) - <http://www.cdc.gov/ncbddd/hemochromatosis/>
- Learning about Hereditary Hemochromatosis **NIH** (National Human Genome Research Institute) - <http://www.genome.gov/page.cfm?pageID=10001214>

### Diagnosis/Symptoms

- Ferritin Test (American Association for Clinical Chemistry) - <http://www.labtestsonline.org/understanding/analytes/ferritin/test.html>
- Serum Iron Test (American Association for Clinical Chemistry) - [http://www.labtestsonline.org/understanding/analytes/serum\\_iron/test.html](http://www.labtestsonline.org/understanding/analytes/serum_iron/test.html)
- TIBC (Total Iron-Binding Capacity) & Transferrin Test (American Association for Clinical Chemistry) - <http://www.labtestsonline.org/understanding/analytes/tibc/test.html>

### Treatment

- Phlebotomy Information for Patients with Hemochromatosis (Centers for Disease Control and Prevention) - Links to PDF - [http://www.cdc.gov/ncbddd/hemochromatosis/training/pdf/phlebotomy\\_info.pdf](http://www.cdc.gov/ncbddd/hemochromatosis/training/pdf/phlebotomy_info.pdf)

## Nutrition

- Diet for: People with Type 1 Hemochromatosis (Iron Disorders Institute) - Links to PDF - <http://www.irondisorders.org/Forms/diet.All.3.05.pdf>

## Specific Conditions

- Acquired Iron Overload (Iron Disorders Institute) - <http://www.irondisorders.org/Disorders/Acquired.asp>
- African Iron Overload (Siderosis) (Iron Disorders Institute) - <http://www.irondisorders.org/Disorders/Siderosis.asp>

## Related Issues

- About Iron (Iron Disorders Institute) - <http://www.irondisorders.org/Disorders/about.asp>

## Tutorials

- What Is Hemochromatosis? (Dolan DNA Learning Center) - Requires Flash Player - <http://www.yourgenesyourhealth.org/hc/whatisit.htm>

## Clinical Trials

- ClinicalTrials.gov: Hemochromatosis **NIH** (National Institutes of Health) - <http://clinicaltrials.gov/search/open/condition=%22Hemochromatosis%22>

## Genetics

- Genetics Home Reference: Hemochromatosis **NIH** (National Library of Medicine) - <http://ghr.nlm.nih.gov/condition=hemochromatosis>

## Journal Articles

### References and abstracts from MEDLINE/PubMed (National Library of Medicine)

- Article: Iron-overload-related disease in HFE hereditary hemochromatosis. - [http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list\\_uids=18199861&tool=MedlinePlus](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list_uids=18199861&tool=MedlinePlus)
- Article: Using evaluation to guide successful development of an online training... - [http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list\\_uids=18091043&tool=MedlinePlus](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list_uids=18091043&tool=MedlinePlus)
- Article: Synopsis of the Dutch multidisciplinary guideline for the diagnosis and... - [http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list\\_uids=18079569&tool=MedlinePlus](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=pubmed&dopt=AbstractPlus&list_uids=18079569&tool=MedlinePlus)
- Hemochromatosis -- see more articles - [http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=search&db=pubmed&term=hemochromatosis\[majr\]+AND+english\[la\]+AND+humans\[mh\]+NOT+\(letter\[pt\]+OR+editorial\[pt\]+OR+case+reports\[pt\]\)&doptcmdl=summary&cmd\\_current=Limits&pmfilter\\_EDatLimit=last+1+Year&tool=MedlinePlus](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=search&db=pubmed&term=hemochromatosis[majr]+AND+english[la]+AND+humans[mh]+NOT+(letter[pt]+OR+editorial[pt]+OR+case+reports[pt])&doptcmdl=summary&cmd_current=Limits&pmfilter_EDatLimit=last+1+Year&tool=MedlinePlus)

## Organizations

- Iron Disorders Institute - <http://www.irondisorders.org/>
- National Heart, Lung, and Blood Institute **NIH** - <http://www.nhlbi.nih.gov/>
- National Institute of Diabetes and Digestive and Kidney Diseases **NIH** - <http://www.niddk.nih.gov/>

## Newsletters/Print Publications

- IDI's Newsletter, id-in Touch (Iron Disorders Institute) - <http://www.irondisorders.org/Newsletter/>

## Children

- Hereditary Hemochromatosis (Nemours Foundation) - <http://kidshealth.org/parent/general/aches/hh.html>

# DRBC Docket Requirements

Exelon<sup>SM</sup>

- The Docket restricts consumptive use withdrawals from the Schuylkill River.
- Consumptive use makeup water is required when:
  - Water temperature is  $> 59^{\circ}\text{F}$  or
  - Schuylkill River flows at Pottstown are  $< 560$  CFS
- This provision requires an average water augmentation of 35 MGD (24,300 GPM) for about 6 mos./yr

WHAT IS wrong  
WITH diversion system  
35MGPD

The 2007 SAN Progress Report Shows  
**EXELON CAN FILTER**  
**Wadesville Mine Water**  
**Before Pumping It Into The Schuylkill River**

SAN Accomplishments 2006

→ Abandoned Mine Drainage (AMD)

SAN implemented projects to remove metals and acidity from mine discharges. SAN partners, including the Schuylkill Headwaters Association, PA Department of Environmental Protection, and the Schuylkill Conservation District, installed a treatment system that can remove 55% of aluminum, 35% of iron, 5% of manganese, and 10% of acidity from the Otto Mine Tunnel discharge to Muddy Branch. A similar system was installed to treat discharge from Reevesdale South Dip Tunnel. This project will improve water quality for fish in Wabash Creek.

**Exelon Made 1.59 Billion In Profit In 2006**

**A 73 % INCREASE Over 2005**

**Exelon Should Be Required To Pay For The Best Filtration Available, To Filter The Contaminated Mine Water Exelon Wants To Pump Into The Schuylkill River To Operate Limerick Nuclear Power Plant.**

June 17, 2008

To: **Pottstown Borough Authority**

From: **The Alliance For A Clean Environment (ACE)**

For More Detailed Documentation Contact: Dr. Lewis or Donna Cuthbert (610) 326-2387

Re: **Threats to Pottstown's Water Quality and Water Supply**

Attached summary information identifies the urgent need for an independent comprehensive review of all harmful consequences to the Schuylkill River and Pottstown's water, as a result of Exelon's "Demonstration Project" which intentionally allowed over 5 billion of gallons contaminated unfiltered mine water to be discharged into the Schuylkill River, and to identify increasing future threats.

**Evidence Included Shows:**

1. Costs to Pottstown citizens can eventually become astronomical from the additive, cumulative, and synergistic toxic impacts over 5, 10, 15, 20 or more years.
2. Why Pottstown officials urgently need to take precautionary action to protect Pottstown's interests in this intentional contamination and overuse of their public water supply.
3. Why Pottstown officials are urged by ACE and the Pennsylvania Environmental Network to support efforts to acquire funding to hire an independent expert to design a year-long comprehensive monitoring and testing protocol to provide full disclosure of past harms and potential future harms, prior to any DRBC decisions on this precedent setting threat to public water.
4. Why the Delaware River Basin Commission (DRBC) should not grant Exelon's requests (at the end of 2008) to continue discharge of 1 billion gallons per year of contaminated unfiltered Wadesville Mine Water without comprehensive independent proof of how much harm has already been done since 2003, and use of that data to estimate how much harm could accumulate in the next 5, 10, 15, or 20 years.
5. Why DRBC should not allow additional billions of gallons of contaminated mine water per year to be discharged from additional mines in the future – without independent proof of the potential extent of harm and without public scrutiny and input.
6. Why Exelon should not have requests granted that will reduce and eliminate current safeguards. Exelon wants DRBC's permission to:
  - ✓ Reduce Low-Flow Restrictions
  - ✓ Eliminate Temperature Restrictions
  - ✓ Reduce Monitoring Requirements
7. Why DRBC and PA Department of Environmental Protection (DEP) assertions and conclusions, that will be used for their permitting decisions, are largely based on illusion.
8. With so much at stake for Pottstown and its residents, precaution is clearly imperative. Pottstown is urged to request that DRBC delay a decision on all of Exelon's requests until the independent study can be completed with full and open disclosure to the public, followed in not less than 60 days, with an on-the-record public hearing, to be held in Pottstown.

## **Summary Presented by ACE June 17, 2008**

Supporting Detailed Information Available To Pottstown Officials In The ACE Office By Appointment

### **Exelon Discharging Contaminated Mine Water Into The Schuylkill River**

- Exelon is poisoning the Schuylkill River with billions of gallons of unfiltered contaminated mine water, five billion gallons were discharged into the Schuylkill River since 2003, to supplement the flow for the operations of Limerick Nuclear Power Plant. Another billion started in May, 2008.
- From May to October each year (the hottest, driest 6 months) 5,000 gallons per minute of contaminated mine water are discharged into the Schuylkill River from the Wadesville Mine.
- Dilution does not eliminate threats to Schuylkill River quality, ecosystems, wildlife, and public health. It is deceptive, short-sighted, and inaccurate to claim dilution is the solution to this massive deliberate contamination of the Schuylkill River.

### **Threats Will Continue and Increase If Exelon's Permit Is Granted At The End Of 2008**

- Billions more gallons each year of contaminated mine water would be discharged into the Schuylkill River increasing threats. Exelon has requested that the "Demonstration Project" using Wadesville mine water be made permanent and that additional mine waters be permitted to be discharged into the Schuylkill River without public scrutiny or input.

### **There Are Harms, But NO Independent Monitoring Or Testing**

- Without an independent comprehensive monitoring and testing protocol and a year of independent data, it's deceptive to claim to know how much harm accumulated since 2003.
- Future long term additive, cumulative, and synergistic impacts cannot be accurately determined unless there is independent analysis now of what has already happened.

### **DEP / DRBC Promoted This – Their Conclusions Are Unreliable**

- According to DEP, mine water is the worst threat to groundwater in PA, yet DEP is promoting massive discharge of this unfiltered contaminated mine water into the Schuylkill River, a major source of drinking water.
  - ✓ It is a dangerous and deceptive illusion to pretend dilution is the solution to this massive ever growing long-term threat.
- DEP and DRBC deceptively defend this project making the illogical conclusion that 5,000 gallons per minute of contaminated mine water discharged into the Schuylkill River is necessary to avoid occasional overflows at the mine.
  - ✓ This shows the extent of bias defending this project that clearly unnecessarily poisons the river.
- The oversight claimed by DEP is done by a company paid by Exelon. It is unacceptable to rely solely on monitoring and testing paid for by Exelon, the company with a vested interest in the outcome.
  - ✓ Exelon's track record in failing to provide timely full disclosure of its radioactive water contamination in Illinois is shameful. How can we trust Exelon with so much at stake?

### **Pottstown Residents Will Ultimately Pay The Highest Price**

- **Pottstown residents are being used as the canaries in the mine. They will ultimately pay the highest price, both physically and financially, for failure to get the truth told now.**
- **Costs for upgraded filtration to attempt to remove accumulating and spiking toxics from Pottstown's public water can be astronomical. Who will pay? It won't be Exelon, DEP, or DRBC. It will be Pottstown taxpayers. Will Pottstown be able to afford to protect its citizens? Even worse, will complete removal even be possible?**
  - ✓ Clearly, prevention and precaution are the keys.
- To attempt to protect the health and financial well being of Pottstown residents, this is the time to take precautionary action and demand a truly independent investigation of what has already happened since 2003, in order to predict what can happen in the future.

## **Contamination of Pottstown Public Water – Evidence Suggests Cause For Concern**

**Pottstown is the first to intake public drinking water after the Wadesville mine pool water is discharged into the Schuylkill River at the headwaters.**

- **Iron and Manganese far exceeded safe limits in Wadesville mine water testing.**
- **2005 - Iron and Manganese exceeded Safe Drinking Water Limits in Pottstown's drinking water.**
  - In 2005, daily average Schuylkill River flows fell below the trigger level and increased monitoring was performed on 17 days from June 17 to October 6. Exelon's own data showed:
    - ✓ Pottstown Water Testing showed above maximum concentrations for Safe Drinking Water for both **Iron and Manganese**, two of the toxics proven to be in Wadesville Mine water far above Safe Drinking Water levels.
    - ✓ Pottstown was not required to make any changes to the public water supply treatment.
- **2008 - Iron and Manganese Data - Show Significant Increases in Pottstown's water.**

Information above from DRBC Web-site <http://www.nj.gov/drbc/drbc.htm>

### **Are Residents At Risk?**

**Manganese Research Proves Cause For Concern** – A 2005 study shows exposure at standards currently believed to be safe can result in permanent brain injury and nervous system damage.

- Showering in manganese-contaminated water for a decade or more could have permanent effects on the nervous system.
- Damage may occur even at levels considered safe by EPA, 0.05 as upper limit advisable in water supplies.
- There is potential for permanent brain damage from breathing vaporized manganese absorbed by showering 10 minutes a day.
- Inhaling manganese is far more efficient at delivering manganese to the brain.
- Manganese is toxic to the central nervous system and can cause learning and coordination disabilities, behavioral changes and Parkinson's disease.
- Children, pregnant women, the elderly and patients with liver disease are at highest risk from manganese toxicity.
- Some groups developed manganese poisoning even at fairly low doses in their water supplies.
- Populations that experienced high levels of manganese in their water supplies over long periods of time suggest regulatory agencies may one day need to rethink existing drinking water standards for manganese.

### **Manganese Related Problems for Pottstown, Its Officials, and Its Residents**

- Current manganese standards do not protect public health.
- Pottstown's water has already exceeded current unprotective manganese standards
- Manganese levels in Pottstown's water will logically increase if billions more gallons of mine water are added each year to the Schuylkill River.
- Spikes in manganese levels may occur and go undetected for long periods of time based on lax and unprotective monitoring requirements and testing.
- Who will pay for damage?
- Who will pay to attempt to remove manganese from Pottstown's public water?
- Who will pay for violations of the Safe Drinking Water Act?

**Iron Overload Disease – A Potential Long-Term Threat To Pottstown Residents – Overexposure to Iron can result in significant health threats, including Hemochromatosis**

- When too much iron builds up in a person's body they can get hemochromatosis, iron overload disease. The body has no natural way to eliminate extra iron. It stores in body tissues, especially the liver, heart and pancreas.
- Extra iron damages organs and can cause organ failure.
- We need only look at what too much iron does to pipes over time.

**Iron Related Problems for Pottstown Are Similar To Those For Manganese**

## **By the Numbers**

### **Showing the need for an Independent Investigation - To Protect Pottstown's Interests**

- Manganese – Current Drinking Water Standard – 0.05 mg/l
  - ✓ Wadesville Mine Water 3.37
  - ✓ 2005 Pottstown Water 0.205
  - ✓ 2008 Pottstown Water 0.335 **6.7 Times Higher** Than Safe Drinking Water Standard
- Iron - Current Drinking Water Standard – 0.3 mg/l
  - ✓ Wadesville Mine Water 3.61
  - ✓ 2005 Pottstown Water 0.44
  - ✓ 2008 Pottstown Water 0.96 **3.2 Times Higher** Than Safe Drinking Water Standard
- 2005 Exelon testing suggests TOC, TDS may be above maximum concentrations

### **Many Questions and Concerns Must Be Answered and Addressed, Comprehensively and Independently, To Protect Pottstown's Interests**

- **But, NOT by Exelon, DEP, nor DRBC which all promoted this intentional contamination, and which have a biased interest in the outcome.**
- Testing is woefully inadequate to accurately determine health threats to Pottstown residents in a timely manner.
  - ✓ Residents could be overexposed to iron and manganese for long periods of time without being detected. Monitoring and testing are not done continuously, and would not detect spikes or increasing levels in a timely manner.
  - ✓ Not all toxics which could be increasing from massive discharges of contaminated mine water are even monitored or tested.
  - ✓ Exelon's claim that very periodic testing for dissolved oxygen at very few locations will indicate developing problems ignores major threats, especially from toxics.

### **Illusion and Deception by DRBC and DEP**

The claims by DEP and DRBC that project oversight fulfills regulatory requirements and natural resources management and restoration goals are ludicrous and indefensible.

- Why expect DRBC or DEP to seek the truth and full disclosure about the consequences of this intentional contamination, when they are as guilty as Exelon. Both DRBC and DEP promote, support and defend the intentional contamination resulting from Exelon's "Demonstration Project".
- DEP states they are developing an Integrated Water management Plan for the Schuylkill River Watershed. This is absurd when in reality DEP is supporting and defending increasing intentional contamination of the Schuylkill River. DEP's statements and plans are largely based on illusion.
- DRBC and DEP review of Exelon's biased data will not provide full disclosure nor prevent a permit from being issued at the end of 2008 which will continue to allow discharge of billions of gallons per year of contaminated unfiltered Wadesville Mine water, as well as additional mine waters. This will NOT protect public water or Pottstown's interests.
- Regulations which provide for intentional poisoning of the Schuylkill River clearly will not and cannot lead to restoration.
- There is no independent project oversight. DRBC states project oversight is being performed by Normandeau Associates, Exelon's contractor. They are hired and paid by Exelon, the company with a vested interest in the outcome.
- DEP claims Normandeau is professionally qualified, which ignores the real concern – that they are contracted by Exelon (not DEP or DRBC) and are not independent.
- DEP states they see nothing in the monitoring reports to indicate water quality violations, which is not surprising, given DEP's track record in this community. Data and reports are paid for by Exelon and based on data from testing locations determined by Exelon.

**Exelon's Additional Requests Need Independent Expert Evaluation With Full Public Scrutiny.**

In addition to continuing the discharge of 1 billion gallons of contaminated unfiltered water from Wadesville each year, and additional mine waters,

**Exelon asked DRBC to:**

**1. Withdraw 56.2 Million gallons per day from the Schuylkill River for Limerick Nuclear Power Plant operations.**

- Every year, 20,513,000,000 Billion Gallons will be withdrawn from the Schuylkill River, with only ¼ of that discharged back into the river.
- Limerick Nuclear Power Plant's insatiable need for water is impacting the public water supply.
  - ✓ Based on Exelon's initial withdrawal request in 1970, Limerick could have withdrawn up to 503,700,000,000 Trillion Gallons.
- Is there enough water to sustain that kind of withdrawal indefinitely?
  - ✓ How much contaminated mine water will be added to try to maintain adequate supplies?
  - ✓ If over 20 Billion Gallons per year are withdrawn, and only 5 are returned, does that mean Exelon could eventually try to discharge something close to the balance each year?
  - ✓ What would happen to Schuylkill River quality and ecosystems, not to mention Pottstown's public water, if 10 to 15 Billion Gallons of contaminated mine water is discharged into the Schuylkill River just to try to maintain an adequate water supply?
  - ✓ Levels of Iron and Manganese appear to have increased just with 5 billion gallons over 5 years.
- Whose water is it? Water use and water rights in PA should be reviewed, with a commitment to protecting the public's water supply.

**2. Reduce Low-Flow Restrictions.**

- Extremely low flows in the Schuylkill River have many people concerned, especially in times of drought. What will happen to Pottstown's public water supply in drought conditions in the next 5, 10, 15, 20 years?
- Clearly, reducing low flow restrictions is not protective of the public's interests.
- Low flow restrictions are what triggered the 2005 testing that found high levels of iron and manganese.
- This safeguard cannot be reduced if the public's interests are to be protected.

**3. Eliminated Temperature Restrictions**

- Temperature restrictions are a safeguard to the river and its ecosystems that cannot and should not be eliminated for the convenience and profits of Exelon.

**4. Modified Monitoring Requirements**

- Clearly Exelon would want monitoring requirements to be reduced to save money and to avoid detection of problems, all at the public's expense.
- Scientists are worried about water monitoring cutbacks, stating "The feds don't have money, the states don't have money, and so we're flying blind without any data."
  - ✓ We can't afford to reduce monitoring requirements for Exelon.
- While DRBC promotes this intentional contamination of the Schuylkill River, they have told ACE they do not have the resources to provide and independent investigation to include monitoring, testing, and reporting to determine the extent of toxic threats.

**5. Future Decisions About Additional Mine Water Made Only By Head Of DRBC**

- Pottstown will have no say over future decisions that will cost Pottstown money, damage their plant, and poison their people. This is an extremely dangerous.

# **ACE Disputes Exelon Information**

The Alliance For A Clean Environment August 19, 2007  
For More Detailed Information To Support ACE Conclusions - Call (610) 326-6433

Exelon's deceptive comments are italicized. They are taken from Exelon's June 17, 2008, Power Point Presentation to Pottstown Water Authority and ACE Video  
Each Exelon comment is followed by reasons ACE disputes Exelon's claims.

## **1. "Independent Monitoring Conducted by Normandeau Associates"**

- ✓ **Normandeau was hired and paid by Exelon. Normandeau works for Exelon. How can that be considered independent?**

Data and/or reporting can be manipulated to show what those paying for it want it to show. Testing can be done to avoid finding problems, such as testing in the wrong location, at the wrong depth, and the wrong time of the year. Companies can also put the best possible spin on report conclusions to reflect the wishes of those who pay them.

## **2. "Very Reviewed System - Oversight provided by PA DEP and DRBC"**

- ✓ **Hardly! There's NO independent monitoring or testing**
  - NO split samples
  - NO independent testing
  - NO audits to determine accuracy or fraud in Exelon's testing.
- Neither DRBC nor PA DEP have ever independently monitored or tested to compare Exelon's water monitoring, testing and reporting.
- DRBC and DEP review data and reports paid for by Exelon, a company whose record in Illinois suggests it shouldn't be trusted without verification.
- ✓ **Oversight by DRBC and PA DEP is NOT OBJECTIVE. They are biased.**

Both support and defend Exelon's "Demonstration Project". Neither provided careful scrutiny nor independent science to determine current and long-term harms.

**Both are guilty of harms done to date and cannot be relied upon for full disclosure of harms, or projected harms in the future.**

- DRBC allowed intentional contamination of the Schuylkill River for Exelon's profits. DRBC has repeatedly used false arguments to defend Exelon's "Demonstration Project". DRBC is just as responsible for harmful consequences as Exelon. How can they be considered objective?
- DEP permitted billions of gallons of Wadesville Mine water to be pumped into the Schuylkill River (Pottstown's drinking water source) with levels of Iron and Manganese as much as 80 times higher than "Safe Drinking Water" standards.
- ✓ **LAX OVERSIGHT VERIFIED - Look at differences between the gallons per minute of Wadesville Mine water permitted to be pumped into the Schuylkill River and gallons per minute Exelon admits to pumping:**

• DRBC Docket NO. D-69-210 CP (Final) Revision 12 Section DECISION Page 17	10,000 Gallons Per Minute
• PA DEP NPDES 7/27/06 Permit Part B - Permit NO. 54713002R4	15,000 Gallons Per Minute
• Exelon's power point to Pottstown 6/17/08 Approximately 6 Months Per Year	24,300 Gallons Per Minute

**Evidence above suggests Exelon is Violating DRBC and DEP gallons per minute permit limits, yet neither agency noticed. This is less than competent oversight.**

✓ **DRBC and DEP use dilution, a false argument to defend Exelon's intentional massive mine water contamination of the Schuylkill River.**

Determination of harms by these agencies is not based on independent science but instead on unsubstantiated claims of dilution reducing or eliminating risk.

- Dilution does not remove toxic metals. Toxic metals are still in the river. They don't disappear. Dilution is not a solution to pollution. In fact, attempting to justify intentional contamination with dilution defies logic.
- More pollution occurs when contaminated mine water is pumped in the 6 lowest flow months of the year, into a river where flows are continuously being depleted by Limerick Nuclear Power Plant and other factors.
- It is significant to consider continuous pumping takes place at 24,300 gallons per minute over the lowest 6 month flows of the year, into a drinking water source with levels of contamination far above "Safe Drinking Water Standards".

✓ **Huge Discrepancies In Consumptive Water Use By Limerick Nuclear Power Plant**

No one can know for certain, including DRBC, how much water Limerick evaporates to the atmosphere each day (called consumptive use) because Exelon controls all the data. Why such varied numbers? Another dispute to Exelon's claim that this is "a very reviewed system".

- Page 5 – "**DRBC ESTIMATES WITHDRAWAL results in consumptive use of 75% (42 Million Gallons) of total water use 56.24 gallons per day**"
- Page 2 – Exelon request approval for "**WITHDRAWALS NOT to EXCEED 24 Million Gallons Per Day of Limerick Consumptive Cooling Water Needs.**"
- A Mercury article 1/06 reported Limerick uses **35 million gallons of water per day, emitted as steam**, a number repeated many times by Exelon.
- July, 2008, a Republican Herald article quoted Rachelle Benson, an Exelon spokesperson claiming, "**Exelon uses an average of 17.5 million gallons of water a day, including water from the Delaware River, for its cooling process at Limerick.**"

✓ **FLOODING – Pumping Requirement Discrepancy - DRBC and Exelon.**

It could make a huge difference to properties and people impacted by Schuylkill River flooding. If mine water pumping continues during flooding, everything that gets flooded could get more contaminated and problems can only intensify for Pottstown Water Department.

- **March, 2008, the DRBC director told ACE that Exelon automatically stops pumping when flooding starts.**  
DRBC made this claim at a meeting in the ACE office, in response to our concerns about increased threats from massive continued pumping of contaminated mine water during flooding.
- **Exelon told Pottstown Authority June 17, 2008, that Exelon is required to continue to pump during flooding.**  
Exelon's claim defies common sense. Exelon failed to explain why pumping 24,300 gallons per minute of contaminated mine water into the Schuylkill River was defensible, or who required Exelon to keep on pumping in a flood.

- ✓ **DRBC and DEP make an ILLOGICAL, UNJUSTIFIED, and ABSURD COMPARISON to defend Exelon's Demonstration Project.**

These agencies assert that Exelon's Demonstration Project is good for the river because it prevents mine water drainage during flooding.

- In essence, they absurdly claim it is better to continuously pump contaminated mine water into the Schuylkill River at 24,300 per minute over six months, than to have the river subjected to occasional drainage into the river from infrequent flooding.
- ✓ **DEP gave DEFACTO APPROVAL, before any decisions were made.**
    - **Exelon admitted 6/17/08 that DEP told them to look for additional mine waters.** Exelon was already looking for additional mine waters before April, 2007, a fact admitted by Exelon and captured on video by ACE.

### 3. **"Exelon always meets NPDES limits"**

- ✓ **In reality, that doesn't mean it's safe.**
- ✓ **Wadesville's NPDES permit limits are so high it would be difficult to violate them.**
- ✓ **NPDES Permit Limits are up to 80 times higher than Safe Drinking Water Standards.**
- ✓ Permit limits into a drinking water source should not exceed "Safe Drinking Water Standards."
- ✓ Massive mine water discharges are intentionally pumped into a major drinking water source. Toxics should not be permitted to be discharged above "Safe Drinking Water Standards".
- ✓ **Exelon can and should filter out toxics prior to pumping.**

### 4. **"Follow All Regulations and Laws"**

- ✓ There is no independent proof Exelon does follow regulations and laws, but even if there was that does not mean the public interests are protected.
- ✓ There is a deceptive disconnect between regulations and reality. Meeting regulations and laws does not prevent harm.
- ✓ Regulations and Laws do not prevent pollution, they allow pollution. Every DEP permit is a permit to pollute.
- ✓ Wadesville's NPDES permit allowing discharge limits 80 times "Safe Drinking Water Standards" for a toxic that causes permanent brain and nervous system damage at or below standards is a perfect example. 2005 testing of Pottstown water showed both Iron and Manganese levels above "Safe Drinking Water Standards" at Pottstown's water intake, yet Pottstown was not required to make any changes due to this Demonstration Project.

### 5. **"There were no reported impacts"**

- ✓ **Failing to report "impacts" (HARMS) doesn't mean they don't exist, when those with a vested interest in the outcome control reporting.**
  - Exelon admitted in a 1/06 Mercury article that there were harms, but claimed there was "little harm".
- ✓ **6/17/08 Exelon admitted finding harms, but without providing any scientific evidence or proof, blamed them on other sources.** Example:

- Exelon found trouble below Wadesville Mine, but blamed them on other mines without documented proof.
- Exelon found “concerning” dissolved oxygen levels, blamed them on illegal dumping, then claimed they couldn’t find the source.

**6. “No Unexpected Observations”**

- ✓ **This is a clever tactic that deceives the public and avoids full disclosure of harms by simply asserting Exelon expected to find them.**
  - Claiming to expect problems, does not remove threats from them.
  - Failing to report problems based on Exelon’s expectations is deceptive.

**7. “Consumptive water use by Limerick Nuclear Plant 2005 – 2007 did not impact DO”.**

- ✓ **There is no independent verification.**
  - Therefore, this is an unverified claim by a company that has shown in Illinois that it should not be trusted without verification.
  - Places, times, and depths are critical in providing full and accurate disclosure on testing results for dissolved oxygen.
  - Testing can be done to avoid finding problems. Testing could have been done at locations and depths where DO problems could go undetected.

**8. “Docket restricts consumptive use withdrawals from the Schuylkill River, with a requirement to augment an average 35 Million Gallons Per Day.”**

- ✓ **Exelon’s FUZZY MATH on Limerick Nuclear Power Plant’s Water Intake and Radioactive Water Discharge is deceptive and confusing. There are 7 Million Gallons Each Day unaccounted for.**

Exelon’s current requests to DRBC for Limerick Nuclear Plant’s Intake and Output are:

- ✓ 56,200,000 Million Gallons Per Day Withdrawal
  - ✓ 35,000,000 Million Gallons Per Day Consumptive Use (Evaporated as STEAM)
  - ✓ 14,200,000 Million Gallons Per Day Returned to The Schuylkill River
- 7 Million Gallons Per Day Difference = 2.5 Billion Gallons Per Year**

**7 Million Gallons Per Day Unaccounted For Is A Huge Difference!**

- ✓ That’s 2 Million Gallons MORE Per Day than the 5 Million Gallons Per Day that Pottstown withdraws to serve 30,000 customers.

**Important to Note:**

- July 22, 2008 Exelon reported use of 17.5 million gallons of water a day (NOT 35 Million Gallons per day), including water from the Delaware, for Limerick’s cooling process (Republican Herald)
- NO ONE knows for sure how much water Limerick Nuclear Power Plant has withdrawn or discharged everyday from the Schuylkill River over the past 23 years. Exelon controls both the process and the data.
- We do know Exelon is only returning about ¼ of the water it withdraws each day to the river. Year after year, over decades, this obviously leads to water depletion.
- Exelon has withdrawn, used, and not returned about 12 billion gallons of water each year for 23 years

- **Exelon’s over use of public water for Limerick Nuclear Power Plant is a threat to the public water supply. Limerick’s water use over the past 23 years is clearly a major factor in Schuylkill River water depletion.**

- Exelon's current request to DRBC suggests Limerick Nuclear Plant withdraws:
- o 11 times more than Pottstown does to provide water for 30,000 residents.

**Limerick Nuclear Power Plant's Water Withdrawals:**

56.2 Million Gallons Per Day = 20½ Billion Gallons Per Year

**Pottstown Water Treatment Plant Withdraws for 30,000 Customers:**

5 Million Gallons Per Day = 1.8 Billion Gallons Per Year

Exelon withdraws 20 ½ Billion Gallons Each Year.

Exelon returns only about ¼ of its yearly withdrawals (heated and radiated)

Exelon could augment the river with about 3 billion gallons per year

(1 Billion Gallons from each - Wadesville, Tamaqua, and Delaware River)

Limerick depletes the Schuylkill River by about 12 Billion Gallons each year.

**9. "Restructuring of 59 degree restriction"**

- ✓ **In reality, Exelon wants the temperature restriction ELIMINATED.**  
Eliminating temperature restrictions could obviously have major impacts on the Schuylkill River, a fact confirmed by DRBC's own originally stated concerns.
  - 61 comments were entered into a public hearing record in 1985, many concerned about PECO's requested relief from temperature restrictions at that time.
  - We now have only Exelon's own DO testing and report claims to support their recent attempt to justify eliminating temperature restrictions.
- ✓ **Many harmful consequences could occur in the future as a result of eliminating temperature restrictions.**
  - As global temperatures rise, this risk cannot be taken, just to benefit Limerick Nuclear Power Plant operations and Exelon's profits.
- ✓ **Exelon's profits should not come at the expense of a vital public water source.**
  - It appears Exelon's request to eliminate temperature restrictions is largely about their profits.
  - As water temperatures rise, nuclear power plants have been forced to reduce generation.
  - Without enough water Exelon would have to cut power as has happened in the recent past. This is happening all over the world.

**10. "Monitor effects of mine water on Schuylkill River and drinking water intakes."**

- ✓ **In reality, Exelon is asking DRBC to reduce already lax monitoring requirements at the same time Exelon is looking to add more mine water.**
  - Monitoring and testing are already inadequate to accurately determine harms over the past 6 years.
  - There is no real independent oversight.
  - State and federal governments don't have adequate funds or the will to do continuous monitoring and testing, the only way to accurately determine harm.
  - The full extent of harms from Exelon's intentional contamination of the Schuylkill River with massive pumping of contaminated mine water into the river is not likely to be fully disclosed even if Exelon continues to monitor..
  - Instead of continued monitoring, Exelon should be required to filter the water at the mine, prior to pumping it into the Schuylkill River.

- ✓ **By DECEPTION through non-disclosure, Exelon focused the presentation to Pottstown on June 17, 2008, only on Dissolved Oxygen testing, which tells little about Iron and Manganese levels, a fact admitted by Exelon at their June 17 presentation.**
  - Exelon's presentation ignored the greatest threats to Pottstown Water Treatment Plant and Pottstown water customers, Iron and Manganese, even though their 2005 testing compared with Pottstown's 2008 testing suggest increasing numbers.
  - It is impossible to determine spikes and threats without continuous monitoring. In fact, Exelon has yet to continuously monitor for Iron, Manganese, and Sulfates in Wadesville Mine water, which are far above "Safe Drinking Water Standards".
  - Instead of monitoring more, Exelon wants to reduce monitoring requirements.
- ✓ **"A lot of monitoring"**
  - **Hardly!** Exelon only monitored at Pottstown during low flow times. Only 17 times over 12 months in 2005 - Only 13 times in the driest year, 2007
  - Exelon is currently asking DRBC to reduce even minimal unprotective monitoring requirements.
  - Pottstown is not even required to continuously monitor and regularly report spikes on toxics associated with Wadesville Mine water discharges.

**11. "Demonstration is beneficial to the Delaware River Basin"**

- ✓ **Exelon is willfully polluting the Schuylkill River for profit.**
  - How can that be beneficial to the river and the 1 ¾ million people who depend on the Schuylkill River as a vital water source?
  - How can that be beneficial to the Schuylkill River that in 1997 was already ranked 11<sup>th</sup> in the nation's waterways in receiving toxic chemicals, according to a report titled: *"Poisoning Our Water; How the Government Permits Pollution"*
- ✓ **Exelon's donations to a fund for clean-up of the river do not justify or eliminate the unprecedented harms caused to the Schuylkill River by Exelon pumping billions of gallons of unfiltered mine water contaminated with Iron and Manganese at levels far higher than "Safe Drinking Water Standards".**
- ✓ **Evaluate the reality of the consequences for what Exelon is requesting listed below. Clearly, these requests to DRBC threaten eventual unprecedented harm to the Schuylkill River and all who use it for their water source and recreation.**

**Exelon Requests Include:**

1. Water Withdrawal for Limerick Nuclear Power Plant Operations  
56.2 Million Gallons Per Day = 20,513,000,000 Gallons Per Year
2. Continued Pumping of Over 1 Billion Gallons Each Year Of Contaminated and UNFILTERED Wadesville Mine Water In the 6 Lowest Flow Months (May to October)
3. More Contaminated UNFILTERED Water Added From Other Mine Pools
4. Reduce Low-Flow Restrictions
5. Modify Monitoring Requirements
6. Eliminate Temperature Restrictions
7. Continued Discharge of Radioactive and Heated Water  
14.2 Million Gallons Per Day = 5,183,000,000 Gallons Per Year
8. Exelon also asked DRBC to eliminate all public participation in the future, as additional contaminated unfiltered mine waters are added to the Schuylkill River.

**Just One Example Of Lax Oversight!**

# **Major Discrepancies**

## **IN GALLONS PER MINUTE**

**CONTAMINATED WADESVILLE MINE WATER PUMPED INTO THE SCHUYLKILL RIVER**  
**During The 6 Lowest Flow Months Of Each Year**

## **Exelon Is Pumping Extraordinary Amounts** **Of Water Contaminated With Manganese and Iron Into The Schuylkill River**

**Look At Discrepancies In Gallons Per Minute:**

- 1. Exelon's June, 2008 Power Point Presentation to Pottstown**
- 2. PA DEP's NPDES 2006 Permit**
- 3. DRBC's 2004 Docket.**

## **DIFFERENCES PERMITTED AND REPORTED**

### **24,300 Gallons Per Minute**

- ✓ June 17, 2008 - Exelon's Power Point Presentation to Pottstown – Page 3 – DRBC Docket Requirements

### **15,000 Gallons Per Minute**

- ✓ July 27, 2006 – PA DEP NPDES Permit Part B – Permit NO. 54713002R4 - Special Conditions or Requirements #15

### **10,000 Gallons Per Minute**

- ✓ October 27, 2004 - DRBC Docket NO. D-69-210 CP (FINAL) Revision 12) Section DECISION Page 17 v. Utilization of up to 10,000 gpm (14.4 mgd)

**Isn't Exelon Violating Gallons Per Minute Permit Limits?**

**DRBC and DEP either didn't notice or don't care.**

September 2, 2008

To: **Pottstown Borough Water Authority**

From: **The Alliance For A Clean Environment**  
Dr. Lewis and Donna Cuthbert (610) 326-2387  
1189 Foxview Road Pottstown, PA 19465

Re: **BCM Report on Exelon's Demonstration Project**

We appreciated the opportunity to present a very brief summary of ACE's two-year investigation on Exelon's Demonstration Project and Limerick Nuclear Power Plant's threats to the Schuylkill River.

Since that meeting we obtained a copy of your engineer's report related to Exelon's Demonstration Project. Based on our 2-year investigation we find some of Mr. Weld's information misleading. We are concerned that his report could lead Authority members to ignore the potential for a serious long-term threat to Pottstown's water treatment plant and the health of Pottstown residents. We are concerned that report may lead Authority members to support Exelon's requests to DRBC without demanding the safeguards that are clearly in the public's best interests. It is unfortunate that we were not given ample opportunity to question your engineer about his comments at the meeting and that we cannot now question Mr. Weld without paying him.

ACE volunteers spent countless hours reviewing the Wadesville NPDES permit, the DRBC Docket, Exelon's power point to you, and many other related documents. We spent four entire days trying to summarize the issues to prepare packets to support the 10 minute presentation for you. As public interest non-profit volunteers, we do not believe we should have to pay Mr. Weld to challenge what appear to be contradictory and confusing comments. We therefore prepared this analysis of Mr. Weld's comments and ask Authority members to review this carefully then take action in the public's interests instead of supporting Exelon's requests.

Several facts are clear.

- ✓ Exelon is asking DRBC to reduce and eliminate safeguards while increasing contamination. Exelon is asking to reduce low flow restrictions, eliminate temperature restrictions, reduce monitoring, and eliminate public participation, all while increasing the amount of contaminated mine water that would be added to the Schuylkill River, Pottstown's water source.
  - Exelon's requests would eliminate important safeguards for a process that clearly threatens the Schuylkill River and Pottstown's Water Treatment Plant.
  - Damage to date has never been fully and independently studied. Absent that, future damage can not be independently projected and precautionary action is imperative.
- ✓ Exelon is choosing to pollute Pottstown's water source for profit.
- ✓ Exelon is asking to continue and even increase pollution of the Schuylkill River.
- ✓ There will be no future public participation after DRBC approves Exelon's requests, regardless of how many contaminated mines pools are pumped into the Schuylkill River or how toxic the river becomes. If Pottstown Authority doesn't take action now to protect the public's interests, it will be too late.
- ✓ Exelon's donations to a fund buy silence and support, but they don't negate unnecessary harms caused by Exelon pumping massive amounts of unfiltered contaminated mine water into the river.

Common sense suggests the more Exelon pumps massive amounts of contaminated mine water into the Schuylkill River the greater the threat to those who use it. Only a comprehensive public interest study could more accurately predict future damage.

Clearly, there is a lot at stake in the Authority's position. Given the potential for future harm to Pottstown's Water Treatment Plant and the health and cost to water customers, we urge you to consider the following ACE analysis of your engineer's written report.

1. Mr. Weld stated it was almost impossible to make a comparison between what he deceptively calls the Wadesville Mine "release" and Pottstown's water, yet he did.
  - Mr. Weld said, "*comparing the impact the Wadesville Mine release will have on the Pottstown Water Intake is almost impossible since there are many other factors*".
  - Yet, in spite of admitting it is almost impossible to know for sure, Mr. Weld draws this illogical conclusion, "*there does not appear to be a direct link between water quality at the Water Plant's intake and the Wadesville Mine releases*".
    - With so much at stake, so much unknown, and threats absolutely increasing over time, why wouldn't Pottstown Authority members take a public interest position to demand safeguards?
    - Why would the Authority support Exelon's requests to remove and reduce important safeguards to the Schuylkill River and Pottstown's water?
    - Given that there are so many unknowns, why wouldn't the Authority agree that Exelon should take the responsibility to filter water to the degree possible to avoid unnecessary contamination?
    - With many unknowns, why wouldn't the Authority demand a comprehensive independent study to predict future harms?
  
2. Mr. Weld makes an illogical unsubstantiated comparison between pumping 24,300 gallons per minute, 24 hours a day, over a six month period and releases to control water levels in the area of the mine. Logically, releases to control water levels would be far less a threat than pumping 24,300 gallons per minute continuously over a six month period.
  - According to DEP the mine has to recharge in the 6 months Exelon is not pumping. Exelon pumps a billion gallons out in 6 months each year. How could there be an overflow during the other six months?
  - Exelon is pumping at least 1 Billion Gallons Per Year into the river. Logic suggests that releases into the river from overflow couldn't begin to compare, a fact supported by the need to recharge each year.
  - Mr. Weld admitted there are no records to prove the amount of releases prior to 2003 when Exelon's Demonstration Project started, or during the six months Exelon is not pumping since 2003.
  - Mr. Weld also illogically stated that releases from the mine go on all year. That is not accurate according to DRBC and DEP comments stating the mine needs to refill during the six months Exelon is not pumping.
  - In fact, in 2007 Exelon said they actually ran the mine dry.
  
3. Mr. Weld made an irresponsible misleading conclusion that there does not "appear" to be a link between elevated levels of Iron and Manganese coming into Pottstown's water from the Schuylkill River and pumping 24,300 gallons per minute of Iron and Manganese contaminated mine water into the Schuylkill River prior to Pottstown's intake.
  - Given the numbers ACE compiled and presented to you related to Iron and Manganese, it is blatantly absurd to make such a conclusion without minimally a year of Iron and Manganese monitoring and testing by an independent expert in Iron and Manganese in surface waters and the Iron and Manganese expert's review of all existing data.

Concerning Facts:

- Manganese is permitted to be pumped into the river 80 times higher than "Safe Drinking Water Standards"
  - Iron is permitted to be pumped into the river 20 times higher than "Safe Drinking Water Standards"
  - There has never been independent continuous Iron and Manganese monitoring where the mine water enters the surface water or at Pottstown's intake.
  - An independent Iron and Manganese expert never evaluated the flow rate or paths of Iron and Manganese from the point of mine pumping to Pottstown's intake.
  - Mr. Weld admits there are many factors to be considered. No conclusion should be drawn by an engineer when data is inadequate and incomplete to support that conclusion.
  - Spikes at Pottstown's Water Treatment Plant should be expected when pumping billions of gallons of mine water highly contaminated with Iron and Manganese into Pottstown's water source. The contamination is not pumped in equal amounts. Flow rates, temperatures, travel patterns and many other things impact levels of Iron and Manganese coming into Pottstown's water intake from Wadesville Mine releases.
  - There should be long-term continuous monitoring of Iron and Manganese levels released from the mine. There must be an expert on Iron and Manganese to determine likely movement paths under the specific surface water movement patterns, temperatures, and flows of the river, related to the exact levels released, and more.
    - **It is unlikely there will ever be the funds or the will to conduct such a study.**
    - **Without the benefit of science to prove a link, the Wadesville Mine releases clearly have to be considered a major factor in Iron and Manganese levels coming into Pottstown's Water Plant.**
    - **Pottstown Authority should provide the diligence to err on the side of prevention and precaution by requesting that DRBC demand that Exelon filter the mine water for Iron, Manganese, and Sulfates (all in Wadesville Mine water at levels far higher than "Safe Drinking Water Standards", to follow "Safe Drinking Water Standards" to avoid costs to Pottstown.**
4. Mr. Weld made another illogical, scientifically unproven conclusion that defies logic, related to Iron and Manganese. Mr. Weld's conclusion is clearly not based in site-specific facts, as there is no data, independent or otherwise to support his conclusion.
- He illogically states, "*approximately the same amount of material [Iron and Manganese] would require treatment with or without the Exelon project since the Wadesville Mine has been releasing water to the Schuylkill River at unknown quantities since before 1948.*"
    - How could anyone make an assumption without science that there is little difference between Iron and Manganese threats from pumping 24,300 gallons per minute over the lowest six months of the year and occasional or even on-going overflow releases?
  - Exelon has pumped almost 6 billion gallons of contaminated water containing high levels of Iron and Manganese into the river since 2003. Common sense suggests that is clearly a greater concentrated threat than occasional or even on-going overflows into the river.
    - ACE has been asking for an independent expert in Iron and Manganese contamination, to design a protocol to determine how Iron and Manganese have moved in the Schuylkill River, what impacts there have been from adding concentrations as a result of

pumping 24,300 gallons per minute, how adding ever-increasing amounts of contaminated water could eventually impact the river water quality and its ecosystems, and how much more of a threat there could be to public water systems in the future.

- Why wouldn't Mr. Weld suggest such a study to provide site-specific science needed to more accurately determine harm, instead of drawing unsubstantiated conclusions?
5. Mr. Weld asserts that the Wadesville Mine has had an NPDES Permit since 1948. We understand the NPDES Permits were not in existence until the Clean Water Act was passed in 1972.
  6. Mr. Weld also suggested that no records were being kept by DEP or the mine owner. If not, why not?
    - How could DEP possibly know what impacts Wadesville Mine water releases were having on the Schuylkill River and its ecosystems over all these years without records?
    - How could DEP assess damage without even knowing how much Iron and Manganese were being released?
      - i. Why weren't records being kept after the mine received an NPDES permit?
  7. Mr. Weld made a statement in direct opposition to what you were told by Exelon June 17, related to flooding. Pumping 24,300 gallons per minute from the mine during flooding clearly increases the toxic threats and other flooding problems.
    - June 17 video shows that Exelon said they are, "*required to continue pumping during flooding*".
    - Exelon's comments are contradicted by Mr. Weld's statement to you and comments made to us by DRBC's Project Coordinator and Branch Head, in our office in March. Mr. Weld said, "*During flood conditions pumps can be shut off, otherwise the mine would discharge and add to the flood problem.*"
      - Your own engineer admits pumps should be shut off, to avoid added flood problems, yet he failed to challenge Exelon's statement that they were required to continue pumping or ask Exelon who requires continued pumping during flooding.
      - DRBC told us Exelon automatically shuts off pumping during flooding.
      - **This is just one example of dangerous contradictions that show public interests are not being protected.**
  8. Unfortunately, Mr. Weld is blindly buying DEP spin promoting and defending the transfer of this major liability from groundwater to the Schuylkill River, Pottstown's water source.
    - According to a conversation that Mr. Weld says he had with DEP he inaccurately asserts, "*a controlled release of water from the mine can be thought of as an advantage.*"
      - How could it possibly be an advantage to intentionally poison the Schuylkill River with billions of gallons of contaminated water?
    - There is no advantage to the Schuylkill River or Pottstown.
      - **The advantage goes to Exelon's bottom line, the mine owner who unloads a toxic liability, and Schuylkill River groups that accept Exelon donations and put on blinders.**
    - DEP calls mine water drainage one of the worst liabilities in PA, yet illogically promotes pumping 24,300 gallons per minute over six months each year into the source of drinking water for over 1 ¾ million people from Pottstown to Philadelphia.

- DEP inaccurately asserts that dilution eliminates toxic threats. The Iron and Manganese, as well as other toxics do not magically disappear. In fact, Exelon's Demonstration Project is concentrating contamination in the Schuylkill River.
- There has been harm, a fact even admitted by Exelon. Unfortunately, the damage from billions of gallons of contaminated water being pumped into the river has never been comprehensively or independently assessed.
- In reality, the Schuylkill River is being damaged to benefit the Delaware River.

There are far more questions than answers. Unfortunately, in reality it is highly unlikely there will ever be funding or the will to provide Pottstown with full and accurate disclosure of harms to date with a protocol designed by a public interest expert.

**Therefore, future harms have not and cannot be accurately determined.**

- **In lieu of complete, reliable, and totally independent accurate information, Pottstown should demand that DRBC require Exelon to filter the mine water for all toxics, especially Iron, Manganese, and Sulfates, prior to pumping it into the Schuylkill River, Pottstown's drinking water source.**

**We hope each Authority member will think about answers to these questions:**

- Why should the Authority give up its right to have a voice on future decisions that will impact the intentional contamination of its water source?
- Why shouldn't Exelon be responsible to filter out all toxics from the mine water it needs to operate Limerick Nuclear Power Plant, prior to pumping mine water into Pottstown's water source?
- Why wouldn't Pottstown Authority members speak out for precautionary action, when DEP has irresponsibly allowed NPDES limits to significantly exceed "Safe Drinking Water Standards" and DRBC has allowed over 1 billion gallons per year to be continuously pumped at 24,300 gallons per minute into Pottstown's water source at the lowest flow 6 months of the year?
- What will it cost Pottstown in the future for operational problems at the water treatment plant due to more and more Iron and Manganese pumped into the Schuylkill River? What could failure to deal with inevitable fluctuations cost Pottstown in fines for violations? If Manganese limits are lowered to be more protective to human health, as currently discussed based on new research, and levels keep increasing due to Exelon pumping mine water into the Schuylkill River, how much might this cost Pottstown in the future to continue to meet "Safe Drinking Water Standards"?

It is clear that both DRBC and DEP promote and defend Exelon's unfiltered pumping of unlimited amounts of mine water into the Schuylkill River. They have made false arguments to deceive the public and obviously have no will or incentive to protect the Schuylkill River or Pottstown's water. Not surprising. In a report titled: "*Poisoning Our Water; How the Government Permits Pollution*", the Schuylkill River was already ranked 11<sup>th</sup> in receiving toxic chemicals, out of the entire nation's waterways, even before Exelon starting pumping.

Why would the Authority ignore the reality of this threat, condoning a project that means more and more contamination? Clearly, if Pottstown does not speak up now for precaution and prevention there won't be another chance.

We again urge Pottstown Water Authority to protect the public's interests instead of Exelon's profits. **PLEASE oppose Exelon's requests that can lead to irreparable harm in the future, in spite of Mr. Weld's illogical, unsupported, and even contradictory conclusions.**

# **DANGEROUS DECEPTION**

- 1. Damage vs Restoration:** Exelon is clearly damaging the Schuylkill River by supplementing the flow to provide enough water for Limerick Nuclear Power Plant. The broad range of potential damage has never been independently or comprehensively monitored, tested, or projected.
  - Yet Exelon is taking credit for helping to restore the river through its donations to the Schuylkill River Heritage Foundation. Intentional polluting of the Schuylkill River for corporate profit likely far outweighs any other restoration through Exelon's donations.
- 2. Reality or Illusion:** Since 2003, Exelon's "Demonstration Project" pumped over 5 billion gallons of contaminated mine pool water into the Schuylkill River, clearly INCREASING SCHUYLKILL RIVER CONTAMINATION. (See Attachment For Details).
  - Yet Exelon claims there is "little harm" to the river or to the Pottstown Water Treatment Plant, the first public water intake downstream.
  - Words like "presuming" were used to describe "little harm". In reality, there is no independent proof of how much harm is being done.
- 3. Pumping 5,000 Gallons Per Minute From May to October = Occasional Overflow During Flooding:** In defending Exelon's "Demonstration Project", with no scientific justification, DRBC claimed there is little difference in contamination of the Schuylkill River and damage.
  - It is disingenuous, even illogical, for DRBC to attempt to equate damage done to the Schuylkill River from contaminated water overflow from the Wadesville mine during occasional flooding to Exelon's intentionally pumping 5,000 gallons per minute of the contaminated mine water into the river from May to October each year. That equals a total of over 1 billion gallons per year, and 5 billion gallons since 2003..
- 4. Filtration or Not:** The public was told it was impossible to filter out toxics from the contaminated mine water prior to pumping it into the Schuylkill River.
  - Yet, the Schuylkill Action Network's own 2007 Progress Report proves otherwise, listing as one of its 2006 accomplishments a treatment system installed to remove metals and acidity from mine drainage to improve water quality for fish.
  - The public was also deceptively told the levels of contamination are acceptable. (See Iron and Manganese Packet)
- 5. Liability or Asset:** DEP Deputy Secretary Myers called mine drainage one of the commonwealth's "great environmental liabilities", yet appears to believe contaminated mine water has magically been turned into an asset by pumping it into the Schuylkill River.
  - Moving pollution does not eliminate the threats from it. Pumping contaminated mine water from the mine to the river does not turn that toxic liability into an asset, but instead threatens the river, its ecosystems, wildlife, and public health.
- 6. Cost Prohibitive or Not:** After being confronted with the facts about the potential for filtration, supporters of Exelon's "Demonstration Project" then stated it is cost prohibitive.
  - Exelon's profits show they can and should eliminate an unnecessary threat they are causing to the Schuylkill River. Exelon made a \$1.59 Billion Dollar Profit in 2006, a 73% increase over 2005. Exelon should filter contaminated mine water or stop pumping it into the Schuylkill River for Limerick Nuclear Power Plant's use.
  - Considering astronomical potential costs to the public from intentionally contaminating the source of water for over 1 ½ million people, as well as the unnecessary damage to ecosystems, wildlife, and public health, the public can't afford Exelon to continue to pump contaminated unfiltered mine water into the Schuylkill River.

7. **Profit or Protection:** The Delaware River Basin Commission (DRBC) has the responsibility to protect the Schuylkill River and the authority to stop Exelon's "Demonstration Project", yet has no intention of doing either. This is about an oversight agency allowing Exelon to use and pollute the Schuylkill River for corporate profit
- Unfortunately, DRBC is failing to protect the Schuylkill River and its ecosystems. DRBC is abandoning the public's interests for corporate use of public water for profit at Limerick Nuclear Power Plant.
  - DRBC has no interest in providing the public with a public interest independent study of the harmful consequences from Exelon's "Demonstration Project". They plan to issue a permanent permit at the end of 2008 based only on Exelon's data.
  - March, 2008, DRBC told ACE they did not have resources to provide the Environmental Impact Study we requested prior to issuance of the permit and suggested that the public would have to provide the evidence.
  - DRBC rejected a suggestion to apply to EPA for a grant, similar to the one received by the Schuylkill Action Network in 2004 for \$1.15 Million for the watershed program.
  - EPA funding could be used to hire a public interest expert (one who never worked for Exelon or any of its subsidiaries). A comprehensive independent monitoring, testing, and reporting protocol and program could be developed to actually determine the full extent of all current harm and projected future harms from Exelon's "Demonstration Project", prior to the issuance of a permit to continue.
8. **Donations as Blinders:** Schuylkill River groups take money from Exelon. In return, they appear to overlook the reality of Limerick Nuclear Power Plant's serious threats to the Schuylkill River, including water contamination, water depletion, and destruction of the ecosystems as a result of Limerick Nuclear Power Plant operations.
- Limerick Nuclear Power Plant's enormous water intake and radioactive water output present unprecedented threats to the river and its ecosystems.
  - Nuclear Power Plants need extraordinary amounts of water and discharge radioactive and heated water back into the water source. (See Packet, Nuclear Power Plant Water Threats - Intake and Radioactive Output)
  - Restoration through donations by these groups pale by comparison to the serious threats posed by Limerick Nuclear Plant's threat to water.
9. **PRECAUTION NOW or WIDESPREAD THREATS TO PA WATERWAYS IN THE FUTURE**  
 Exelon's "Demonstration Project", if approved, will lead to additional unfiltered contaminated mine waters pumped into the Schuylkill River by Exelon for Limerick Nuclear Power Plant's use.
- Additive, cumulative, and synergistic harmful impacts over the past five years have never been comprehensively monitored, tested, or evaluated independently. Absent that, no one knows for certain the degree of damage already done.
  - Exelon, the company with a vested interest in the outcome, a company whose history shows it may not be trusted, is in complete control of all data. (See packet on Exelon's Radioactive Watergate)
  - A permit for this project could be used as a "General Use" permit which would allow additional unfiltered contaminated mine waters to be pumped into the Schuylkill River and in other bodies of water across the state for use.

## **The Whole Truth Now Can Lead To Prevention Of A Water Disaster!**

**Prior to issuance of a permit at the end of 2008, elected leaders are urged to request that DRBC provide the public with a comprehensive and independent**

### **Environmental Impact Study**

**Not Only On Exelon's "Demonstration Project",  
 But Also On All Limerick Nuclear Power Plant's Harmful Impacts To The Schuylkill River**

# Wadesville Mine Water Testing

## Note Levels

### Above Safe Drinking Water Standards

**Fe - Iron                      12 Times Higher**

**Mn Manganese              67 Times Higher**

*Coal Remining Statistical Support Document*

## Section 2.0      Characteristics of Coal Mine Drainage Discharges

*Coal Remining Statistical Support Document*

Site Name	Stratigraphic Interval	pH	Alkalinity mg/L	Acidity mg/L	Fe mg/L	Mn mg/L	SO <sub>4</sub> mg/L	Flow gpm	Comments
Wadesville	Llewellyn	6.7	414.0	0.0	3.61	3.37	1038.0	no data	Minepool, Anthracite Region

Note: Extreme values (>100 mg/L) are highlighted for emphasis

\* data from Schuek et al. (1996)

\*\* data from Dugas et al. (1993)

## See Reverse Side

## Wadesville NPDES Permit Levels

### Above Safe Drinking Water Standards

**Iron                              20 Times Higher**

**Manganese                  80 Times Higher**

**PART A**  
**COAL SURFACE MINING PERMIT NO. 54713002R4**  
**NPDES PERMIT NO. PA0123293**

PERMITTEE NAME Reading Anthracite Company ISSUANCE DATE September 20, 1985  
 AND ADDRESS 200 Mahantongo Street RENEWAL DATES 10/28/92; 1/10/97; 10/2/02 & 7/27/06  
PO Box 1200 REISSUANCE DATES October 2, 2002  
Pottsville, PA. 17901 TRANSFER DATE(S) \_\_\_\_\_  
 NAME OF OPERATION Wadesville P-33 Stripping EXPIRATION DATE September 20, 2010

LOCATION OF OPERATION:

MUNICIPALITY New Castle Township COUNTY Schuylkill

TYPE OF OPERATION  ANTHRACITE  BITUMINOUS  
 Surface Mine  Surface Mine (coal refuse reprocessing)  
 Auger Mine  Coal Refuse Disposal  
 Other \_\_\_\_\_  Coal Preparation/Processing Facility

DISCHARGE TO (RECEIVING WATERS) East Branch Norwegian Creek to East Branch Schuylkill River

**I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

**A. MINE DRAINAGE TREATMENT FACILITIES**

Outfall Numbers	Latitude			Longitude		
<u>001</u>	<u>40°</u>	<u>42'</u>	<u>52"</u>	<u>76°</u>	<u>12'</u>	<u>24"</u>
_____	_____°	_____'	_____"	_____°	_____'	_____"
_____	_____°	_____'	_____"	_____°	_____'	_____"
_____	_____°	_____'	_____"	_____°	_____'	_____"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or revisions, the following effluent limitations and monitoring requirements apply to the above listed outfall numbers.

DISCHARGE LIMITATIONS\*

Discharge Parameter	Average Monthly	Maximum Daily	Instantaneous Maximum
Total Iron	3.0	6.0	7.0
Total Manganese	2.0	4.0	5.0
Total Suspended Solids	35.0	70.0	90.0

MONITORING REQUIREMENTS

Measurement Frequency	Sample Type
Monthly	Grab
Monthly	Grab
Monthly	Grab

pH not less than 6.0 standard units nor greater than 9.0 standard units at all times.

Alkalinity must exceed acidity at all times.

\*Unless otherwise indicated, discharge limitations are concentrations and expressed in mg/l and the total (dissolved suspended fraction) is applicable for each parameter.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring specified above shall be taken during a discharge at the following location(s):

Subject to 25 PA Code 88.92 and 88.93 (Surface Mine) and 88.187 and 88.188 (Bank Removal)

# **Manganese**

**And**

# **Iron**

**Documented Harmful**

# **Health Impacts**

According to government research and the World Health Organization, (WHO) there are documented harmful health impacts from long term exposure to Manganese and Iron, at levels near or exceeding guideline values. Recent research suggests threats can be far worse, and at levels below standards. For example, 2006 research shows Manganese can cause permanent brain and nervous system damage at levels below current "Safe Drinking Water Standards".

- What could long-term harmful health consequences be to Pottstown's water customers if Exelon's requests are granted and billions more gallons of unfiltered mine water, contaminated with Iron and Manganese, at levels far above "Safe Drinking Water Standards", continue to be pumped into the Schuylkill River, Pottstown's water source?
- Health threats will increase as spikes continue to go undetected, and even if detected periodically, Pottstown is forced to increase use of other toxic chemicals to treat water for Iron and Manganese to try to meet "Safe Drinking Water Standards".

Manganese and Iron testing at Pottstown show Rising Levels (2005-2008). Yet, Pottstown was not required to make changes to Water Treatment. 2005 testing levels were already above "Safe Drinking Water Standards."

- There is already a documented health crisis. Pottstown water customers are already over exposed to toxic chemicals in their environment.

**See Following Health Impacts Summary From Government Sources**

# **MANGANESE Is Far More Dangerous Than First Thought**

**Long-term exposure to Manganese at current "Safe Drinking Water Standards", once believed safe, can result in permanent brain injury and nervous system damage.**

Summary Statements From Attached July, 2005 study:

- Showering in manganese-contaminated water for a decade or more could have permanent effects on the nervous system.
- The study showed the potential for permanent brain damage from breathing vaporized manganese that would be absorbed by showering 10 minutes a day.
- Inhaling manganese is far more efficient at delivering manganese to the brain.
- Manganese is toxic to the central nervous system and can cause learning and coordination disabilities, behavioral changes and Parkinson's disease.
- Children, pregnant women, the elderly and patients with liver disease are at highest risk from manganese toxicity.
- Some groups developed manganese poisoning even at fairly low doses in their water supplies.
- The damage may occur even at levels of manganese considered safe by EPA, 0.05 as the upper limit advisable in water supplies.
- "...populations that experienced high levels of manganese in their water supplies over long periods of time suggest regulatory agencies may one day need to rethink existing drinking water standards for manganese."

**This new research has serious financial implications for Pottstown's water treatment plant and Pottstown water customers, as well as increased harmful health threats.**

- ✓ Why would Wadesville's discharge permit allow Manganese to be pumped into the Schuylkill River 80 times higher than current "Safe Drinking Water Standards"? Almost 6 billion gallons of Manganese contaminated mine water were pumped at 23,300 gallons per minute over 6 years during the lowest 6 month flows of each year.
- ✓ How much will it cost Pottstown to protect water customers' health and as Exelon adds billions more gallons of unfiltered Manganese contaminated mine water to the Schuylkill River?
- ✓ Pottstown Water Treatment Plant could be forced to try to meet even more stringent drinking water standards to reflect updated research on Manganese.

## **Iron - Continuous Long-Term Exposure Can Result in Significant Health Threats, Including Hemochromatosis.**

**When too much iron builds up in a person's body, they can get:**

- **Hemochromatosis, Iron Overload Disease.** See Attachment

Iron builds up in the body.

The body has no natural way to eliminate extra Iron.

Iron stores in body tissues, especially the liver, heart and pancreas.

Extra iron damages organs and can cause organ failure.

When too much iron can damage pipes over time, harm to human organs logically can be serious.

# Wadesville Mine Water Testing Compared To

## "Safe Drinking Water Standards"

*Coal Remining Statistical Support Document*

### **Section 2.0 - Characteristics of Coal Mine Drainage Discharges**

*Table 2.0a - High Alkalinity Examples in PA Mine Discharges*

*Data from Schuck et al. (1996) Data from Dugas et al. (1993)*

## **Section 2.0 Characteristics of Coal Mine Drainage Discharges**

*Coal Remining Statistical Support Document*

Site Name	Stratigraphic Interval	pH	Alkalinity mg/L	Acidity mg/L	Fe mg/L	Mn mg/L	SO <sub>4</sub> mg/L	Flow gpm	Comments
Wadesville	Llewellyn	6.7	414.0	0.0	3.61	3.37	1038.0	no data	Minepool, Anthracite Region

Note: Extreme values (>100 mg/L) are highlighted for emphasis

\* data from Schuck et al. (1996) \*\* data from Dugas et al. (1993)

### **IRON Fe**

**12.03 Times Higher**

**Wadesville Mine Water Far Exceeds "Safe Drinking Water Limit"**

✓ IRON Level in Wadesville Mine Water

**3.61**

✓ IRON "Safe Drinking Water Standard"

**0.3 mg/l**

### **MANGANESE Mn**

**67.40 Times Higher**

**Wadesville Mine Water Far Exceeds "Safe Drinking Water Limit".**

✓ Manganese In Wadesville Mine Water

**3.37**

✓ Manganese "Safe Drinking Water Standard"

**0.05 mg/l**

### **SULFATES SO<sub>4</sub>**

**More Than DOUBLE**

**Wadesville Mine Water Far Exceeds "Safe Drinking Water Limit"**

✓ Sulfate in Wadesville Mine Water

**1038.0**

✓ Sulfate "Safe Drinking Water Standard"

**500 mg/L**

✓ Sulfates - 250 mg/l - Considered a laxative

# 2005 Compared To 2008 Testing Data Verifies Iron and Manganese Levels Increasing

## Rising Levels of Manganese and Iron Call For Prevention and Precaution

It is not surprising that Manganese and Iron levels are rising. Exelon has pumped almost 6 billion gallons of mine water contaminated with Manganese and Iron into the Schuylkill River.

- What will happen after billions more gallons are pumped into the Schuylkill River from Wadesville and other mines?
- How much more will it cost Pottstown for treatment to try to meet "Safe Drinking Water Standards"?
- How much could Pottstown pay in fines for violations in failing to meet safe standards? What if standards become more stringent as suggested currently for Manganese?

## Manganese

Pottstown Water (2005)                      0.205

**4.10** Times HIGHER Than Safe Drinking Water Standards

Pottstown Water (2008)                      0.335

**6.70** Times HIGHER Than Safe Drinking Water Standards

## Iron

Pottstown Water (2005)                      0.44

**1.47** Times HIGHER than Safe Drinking Water Standards

Pottstown Water (2008)                      0.96

**3.20** Times HIGHER than Safe Drinking Water Standards

2005 Data From:

Exelon's 2005 Testing Evaluation Report On Pottstown's Water – Page 13 / 14 (Opposite Side)

NOTE: 2005 Iron and Manganese Are Above "Safe Drinking Water Limits".

- Yet Pottstown wasn't required to make any changes to public water supply treatment. What potential harmful to Pottstown's water customers, especially those already sick and children?

**Exelon's 2005 Report On Pottstown's Water - Page 13 and 14**

Pottstown Water Treatment Plant

The Borough of Pottstown's Water Treatment Plant is the first drinking water intake on the Schuylkill downstream of Pottsville and, therefore, the first intake potentially affected by water pumped from the Wadesville Mine Pool. Pottstown routinely measures the pH and specific conductance of the raw water withdrawn from the Schuylkill River. We utilized their data to supplement our own data collection efforts. The pH of the intake water is recorded at 2-hour intervals each day. The observed daily ranges are shown in Table 4.4-1. During the Demonstration, intake water pH ranged from 6.5 to 8.3 standard units. Although the daily range on most dates was 0.2 standard units or less, the greatest range observed was 1.3 standard units on May 12, prior to initiation of Wadesville Mine Pool pumping. This occurred during a period of low, stable, river flows which appeared to coincide with the onset of intense photosynthesis with its wide swings in DO and pH as shown by the data obtained simultaneously at the LGS intake.

The daily measurements of specific conductance ranged from 370 to 570  $\mu\text{mhos/cm}$ , with most readings in the 400s. This parameter was strongly negatively correlated with river discharge (Figure 4.4-1). Conductivity and pH values ranged higher in 2005 than in the 2004 Demonstration period, coincident with the lower flow regime observed in 2005.

Sampling of additional parameters, i.e., TDS, iron, manganese, total organic carbon (TOC), and sulfides was scheduled to take place at the Pottstown water intake when river flows at the USGS Pottstown gage decreased below 840 CFS. The purpose of this sampling was to assure that Borough personnel were informed about water quality trends that could result in increased treatment costs or potentially cause a violation of the drinking water quality limits applicable to the finished water. Daily average Schuylkill River flows fell below the trigger level and increased monitoring was performed on 17 days from June 17 to October 6 (Table 4.4-2). Maximum concentrations found during the 17 sampling events were: iron, 0.44 mg/l; manganese, 0.205 mg/l; sulfide, <2.0; copper, <0.01 mg/l; TOC, 2.8 mg/l; and TDS, 350 mg/l (Table 4.4-2). Pottstown was not required to make any changes to public water supply treatment as a result of the implementation of the Demonstration Project in 2005. As noted previously in Section 4.2, the pumped flow from Wadesville represents only about 2% of the river flow at Pottstown under low flow conditions, i.e. with 10 CFS pumped and 500 CFS river flow at Pottstown.

**2008 Data Shows:**

**Water Testing At The Pottstown Water Treatment Plant**  
**Rising Levels - Above "Safe Drinking Water Levels"**

Water Test at the Pottstown Water Treatment Plant

Date	Total Organic Compounds mg/l	Dissolved Solids mg/l	Iron mg/l	Manganese mg/l
8/1/07	2.5	320	0.09	0.058
8/3/07	2.3	318	0.23	0.12
8/16/07	3.2	328	0.09	0.055
8/16/07	2.7	336	0.08	0.05
8/29/07	3.2	296	0.017	0.05
8/31/07	3.1	294	0.14	0.038
9/20/07	2.6	285	0.17	0.089
9/20/07	2.5	300	0.09	0.133
9/1/07	2.1	324	0.09	0.064
9/27/07	2.4	309	0.14	0.08
9/28/07	2.4	317	0.26	0.107
10/10/07	2.5	341	0.22	0.117
10/17/07	2.6	351	0.2	0.112
8/1/07	2.5	320	0.09	0.058
→ 5/22/08	2.5	218	0.96	0.335 ←

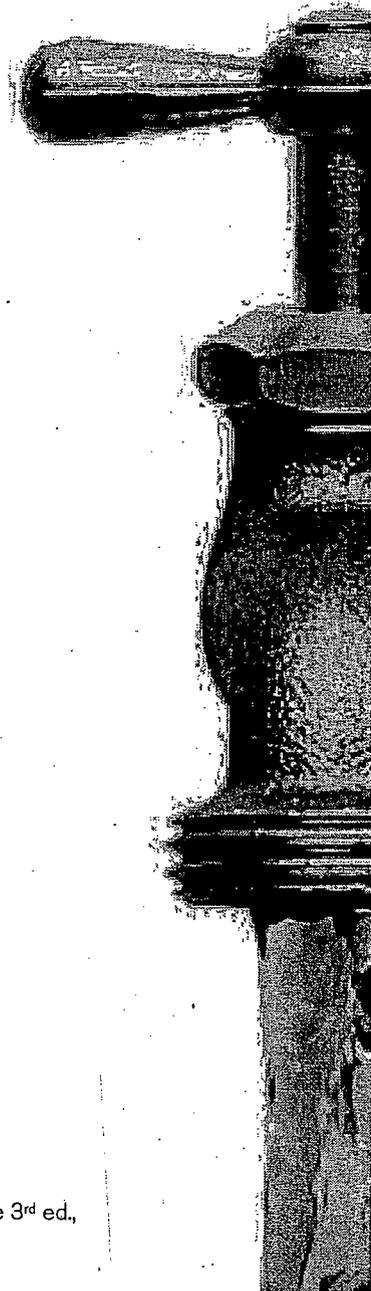
# Chemical safety of drinking-water: Assessing priorities for risk management



## References

WHO (2004). *Guidelines for Drinking-water Quality*, 3<sup>rd</sup> ed., Volume 1: Recommendations, World Health Organization, Geneva.

WHO (2006). *Guidelines for Drinking-water Quality*, 1<sup>st</sup> Addendum to the 3<sup>rd</sup> ed., Volume 1: Recommendations, World Health Organization, Geneva.



## Foreword

Contamination of drinking-water is a significant concern for public health throughout the world.

Microbial hazards make the largest contribution to waterborne disease in developed and developing countries. Nevertheless, chemicals in water supplies can cause serious health problems – whether the chemicals are naturally occurring or derive from sources of pollution. At a global scale, fluoride and arsenic are the most significant chemicals, each affecting perhaps millions of people. However, many other chemicals can be important contaminants of drinking-water under specific local conditions,

Often, identification and assessment of risks to health from drinking-water relies excessively on analysis of water samples. The limitations of this approach are well recognized, and contributed to the delay in recognizing arsenic in drinking-water as a significant health concern in Bangladesh and elsewhere. To overcome such limitations, the latest edition of the World Health Organization (WHO) *Guidelines for Drinking-water Quality* (WHO, 2004; WHO, 2006) emphasizes effective preventive management through a "framework for drinking-water safety" that incorporates "water safety plans"

Effective preventive management of chemicals in drinking-water requires simple tools for distinguishing the few chemicals of potential local or national concern from the unmanageably long list of chemicals of possible significance. The aim is to identify and prioritize the chemicals of concern, to overcome the limitations of direct analysis of water quality, and ensure that limited resources are allocated towards the monitoring, assessment and control of the chemicals that pose the greatest health risks.

Identifying and prioritizing chemical risks presents a challenge, especially in developing countries, because information on the presence of chemicals in water supplies is often lacking. This document provides guidance to help readers to meet that challenge. It shows how information on aspects such as geology and industrial and agricultural development, which is often readily available, can be used to identify potential chemical contaminants (and potential sources of chemicals), from catchment to consumer, and thus prioritize risks.

As a supporting document to the *Guidelines for Drinking-water Quality* (WHO, 2004; WHO, 2006), this publication is aimed at policy-makers, regulators, managers and public health practitioners at national and local level. It is divided into three parts:

Many experts worldwide contributed to this work over a period of several years, beginning with the *1<sup>st</sup> Meeting of Experts on Monitoring Chemicals in Drinking Water*, held in Bangkok, Thailand, in January 2001. This was followed by the *2<sup>nd</sup> Meeting of Experts on Monitoring Chemicals in Drinking Water*, also held in Bangkok, in December 2001. Both meetings were sponsored by WHO and hosted by the Department of Health, Ministry of Public Health, Thailand. The draft guidance document was subsequently tested in a series of field trials in 2002–2003 in Indonesia, Fiji, Nepal, Mongolia, the Philippines and Thailand. Lessons learnt through the field trials provided feedback that was valuable in revising and finalizing the document

2|1

## Principles for assigning priorities for risk management

The two main criteria for identifying specific chemicals of concern to public health in any particular setting are:

- high probability of consumer exposure from drinking-water
- significant hazard to health.

Chemicals judged to be more likely to occur and to be highly hazardous to human health should be given greater priority for risk management than those judged less likely to occur in the drinking-water and to have lower health hazards. The period of exposure should also be considered, because health effects caused by chemicals in drinking-water generally result from long-term exposure. Few chemicals in drinking-water have been shown to cause acute health problems in the short term, except through intentional or accidental contamination on a large scale. In such instances, the water frequently (but not always) becomes undrinkable due to unacceptable taste, odour or appearance (WHO, 2004; WHO, 2006).

Risk management strategies for chemicals in drinking-water should also take into account the broader context. For example, if drinking-water is not the main route of exposure for a chemical, then controlling levels in water supply systems may have little impact on public health. Thus, risk management strategies need to consider alternative routes of exposure (e.g. food) that equal or surpass the importance of exposure through drinking-water (WHO, 2004; WHO, 2006). The management strategies should also consider national and local disease surveillance data, and epidemiological studies (provided that these are available and reliable). Unusual prevalence of certain illnesses in the community (e.g. arsenicosis) may justify an investigation of specific chemicals in drinking-water. Often, disease surveillance data or relevant epidemiological studies are not available at community level; therefore, other approaches are needed. Section 2.2 (below) provides guidance on assigning priorities in situations where data are limited.

Where there are adequate data on drinking-water quality, it may be possible to establish priorities for managing risks due to chemicals simply by studying such data. However, in many locations these data too may be lacking, and limited resources may mean that it is impractical to attempt to conduct comprehensive field studies on a broad range of chemicals in drinking-water. In such situations, it is important to focus available resources on investigations of a limited number of chemicals that are likely to occur in drinking-water at concentrations near or exceeding guideline values. Similarly, any initiatives to build national or local capacity for sampling and analysis through equipment procurement or training should be targeted at chemicals that have been identified as priorities through a methodical desktop analysis.

Priority should also be assigned to chemicals in drinking-water that may significantly degrade aesthetic quality or cause significant problems for the operations and maintenance of water supply systems. While aesthetic considerations may not have a direct impact on public health, changes in taste, odour or appearance of drinking-water may prompt some consumers to turn to other sources of drinking-water that may be microbiologically unsafe. Similarly, chemicals that cause operational problems, such as corrosion or encrustation of distribution systems, may have an indirect impact on public health by compromising the ability to maintain the water supply.

→ Due to Exelon's Demonstration Project Manganese + Iron Are Priorities

### 2|4|3 Iron and manganese

Significant concentrations of iron and manganese occur throughout the world. Although these chemicals are not suspected of causing direct health effects through their presence in drinking-water, they can cause severe discolouration of water, which may lead to consumers turning to other, microbially unsafe sources of drinking-water. Iron and manganese also frequently cause operational problems.

## Implications For Pottstown's Water Treatment Plant From The World Health Organization (WHO) Report

Conclusions from the WHO report show that Exelon pumping billions of gallons of mine water contaminated with Iron and Manganese into the Schuylkill River, Pottstown's Drinking Water source, could cause operational problems at Pottstown's Treatment Plant and therefore increase costs and potential harmful health consequences to Pottstown's water customers.

### Conclusions From The World Health Organization (WHO) Report On Risk Management Priorities For Safe Drinking Water

- Iron and Manganese frequently cause operation problems and severe discoloration.
- Operational problems such as corrosion or encrustation of the distribution systems may have an indirect impact on public health by compromising the ability to maintain the water supply.
- Health effects generally result from long-term exposure to chemicals in drinking water. Important to focus on chemicals near or exceeding guideline values.
- Iron (Fe) - Above 0.3 mg/L can cause problems of dirty water. Coagulation is a problem.
- Manganese (Mn) – Can cause severe discoloration above .05 mg/L
- SO4 – Sulfate concentrations in excess of 500 mg/l may cause a noticeable taste.

*Sulfates (SO4) were found in Wadesville Mine water at 1,038 mg/L*  
*75% higher than Safe Drinking Water Standards (250 mg/L)*

From 2003 to October 2008, over 6 Billion Gallons of Wadesville Mine water, contaminated with high levels of Iron and Manganese, will have been pumped into the Schuylkill River at 23,300 Gallons Per Minute, over the lowest flow 6 months of the year (May to October).

2005 and 2008 testing shows Iron and Manganese levels have risen and that they are above "Safe Drinking Water Standards".

- ✓ Iron and Manganese do not magically disappear through dilution. Dilution does not remove them from the water.
- ✓ Iron and Manganese levels will logically increase as billions more gallons of Iron and Manganese contaminated mine water are pumped into the Schuylkill River.

Exelon plans to continue adding Wadesville Mine water and add more mine waters to the Schuylkill River if DRBC approves Exelon's requests.

- ✓ Logically, the more mine water contaminated with Iron and Manganese that Exelon pumps into the Schuylkill River, the more costs to Pottstown for treatment and equipment replacement, potentially health risks for Pottstown water customers and the more threats to taxpayers for equipment repair and replacement, as well as increased monitoring and reporting, etc.

**We urge Pottstown Water Authority to require Pottstown Water Treatment Plant to continuously monitor for Iron and Manganese until Exelon stops pumping unfiltered mine water into the Schuylkill River.**

**See Attached Iron and Manganese Harmful Health Impacts**

# **Pottstown Water Authority**

## **Can Avoid Unnecessary Threats to Pottstown**

**If DRBC approves Exelon's requests related to the "Demonstration Project", Pottstown's Water Treatment Plant would logically experience ever-increasing operational problems and costs. Consequently, Pottstown water customers would face increasing harmful health impacts.**

### **A WHO Report Concludes Iron And Manganese Can Cause Serious Problems For Water Treatment Plants Which Can Lead To Harmful Health Effects (Pages From The WHO Report Attached)**

Iron, Manganese, and Sulfates in Wadesville Mine water are permitted to be pumped from the Wadesville Mine into the Schuylkill River, Pottstown's water source, far above "Safe Drinking Water Standards". Year after year, adding billions of gallons of mine water into the Schuylkill River, far higher than "Safe Drinking Water Standards", will logically lead to ever-increasing operational problems and costs at Pottstown's Water Treatment Plant, a major future concern for Pottstown Water Authority.

- DEP's irresponsible NPDES permit for Wadesville Mine water allows discharges far above "Safe Drinking Water Standards" (i.e. Manganese 80 times higher).
- Exelon pumps 23,300 gallons per minute into the Schuylkill River from the Wadesville Mine, over the lowest 6 month flows of the year. Exelon will add contaminated water from additional mines if DRBC approves Exelon's requests.
- Additive, cumulative, and synergistic harmful impacts will increase as billions more gallons of Iron and Manganese contaminated mine water are pumped into the Schuylkill River, Pottstown's water source

Pottstown's Water Treatment Plant could experience increased operational problems and costs for equipment replacement, repairs, treatment, and possibly fines for violations of "Safe Drinking Water Standards", as Exelon pumps billions more gallons of Iron and Manganese contaminated mine water into the Schuylkill River. Problems can include:

- ✓ Discoloration
- ✓ Dirty water
- ✓ Coagulation in treatment
- ✓ Corrosion or encrustation of distribution systems

WHO states that water treatment plant operational problems could lead to harmful health effects related to Manganese and Iron, generally resulting from long-term exposure to chemicals in drinking water near or exceeding guideline values.

### **Pottstown Residents Should Not Be Forced To Pay With Their Pocketbooks And Their Health.**

#### **ACE Urges Pottstown Water Authority Officials To Take Precautionary Action and Contact DRBC:**

- Ask DRBC to protect the public's interests and deny Exelon's requests.
- OR ask DRBC to require Exelon to filter all mine water for Iron, Manganese, and Sulfates, prior to pumping it into the Schuylkill River, Pottstown's public water source. Exelon made 1.59 billion in profit in 2006, a 73% increase over 2005. They must pay to clean up the water needed to operate Limerick Nuclear Plant.
- Or ask DRBC to postpone any decision on Exelon's requests until a comprehensive, independent study can be completed and reported to the public on all current and long-term harms, followed by a public hearing in Pottstown.

## **Water Rates - Drastic Hikes Already**

- **How Can Public Water Customers Afford More In This Economy?**

Pottstown Example:

30% Hike in 2010 Water Rates

Water Base Rate - Jump 40% - Reported 11-10

### **Water Treatment Systems Don't Filter Water**

- ✓ **They Pay Huge Costs For Chemicals To Treat Water**

Example: 8-16-10 - Legal Notice Lists Chemicals Used For Bidding Purposes

- ✓ Potassium Permanganate - Just One Used at Pottstown to Treat Water for the kinds of toxics Exelon is pumping into the river with mine water.
- **The more Pottstown needs to use Potassium Permanganate, the more you pay for your water and the more health risk water customers face.**

For example: Higher levels of Potassium Permanganate can cause many serious health problems, including kidney damage, gastro-intestinal system problems with burns and edema, dermatitis, impaired nervous system, and even death.

Pottstown - 2009 Water Quality Report Shows -

**No Testing or Reporting On Mine Water Toxics**

Pottstown testing for iron and manganese from August 2007 to May 2008 show levels rising.

Mine water is allowed to be pumped into the Schuylkill River (24,300 gallons per minute) with iron and manganese levels far exceeding Safe Drinking Water Standards

World Health Organization 2006 Report for Water Treatment Systems Says

- Iron and Manganese frequently cause Operational Problems
- Chemicals that cause operational problems at water treatment plants, such as corrosion or encrustation of distribution systems, may have an indirect impact on public health by compromising the ability to maintain the water supply.

**INCREASED COSTS can be avoided for water treatment systems and their customers if Exelon filters Limerick discharges and mine water discharges.**

# **Potential Drinking Water Disaster From Limerick Nuclear Plant Operations**

It is crucial to look at Limerick Nuclear Plant's collective threats to drinking water, face reality, and take immediate action to minimize damage. Soon decisions will be made by PA Department of Environmental Protection (DEP), Delaware River Basin Commission (DRBC), and the Nuclear Regulatory Commission (NRC) that will have major impacts on the Schuylkill River, a vital drinking water source for almost two million people from Pottstown to Philadelphia. Their decisions are interrelated. Together, these decisions could result in irreparable harm to the river, its ecosystems, and drinking water.

Exelon's requests are a recipe for a drinking water disaster. If Exelon's requests are approved, eventually almost two million people may no longer have safe, usable drinking water. Affected water systems include Pottstown, Phoenixville, Aqua PA, American Water, and Philadelphia (only 20.7 miles away). Exelon requested to minimize and even eliminate important safeguards for the Schuylkill River, while requesting significant increases in pollution discharges from the nuclear plant, plus more unfiltered contaminated mine water pumping into the river to operate Limerick.

Limerick Nuclear Plant's extraordinary water use and toxic discharges are unsustainable. Limerick's cooling towers depleted the Schuylkill River by billions of gallons each year since Limerick started operating in 1985. By 1999, the Schuylkill River reached record low flows.

Low flows concentrate toxics, including the broad range of radionuclides discharged from Limerick Nuclear Plant 24 hours a day, 365 days a year. Limerick testing confirms radiation in surface water, fish, sediment, vegetation, air particulates, and milk.

Exelon's two planned uprates will use and pollute the river more. Exelon's plan for relicensing would result in using and polluting the river 20 years after its license expires in 2029. Every year Limerick operates, the river becomes more poisoned and depleted. Will there be enough safe usable drinking water in the Schuylkill River by 2029, much less by 2049?

Radiation could also be in drinking water wells near Limerick Nuclear Plant. Limerick had radioactive leaks and spills into groundwater over the years. Limerick's 2009 Radiological Monitoring report shows radiation in 15 of 15 monitoring wells. And it isn't just tritium.

Exelon's claims about being good for the environment not only defy common sense and logic, they are disputed by the facts. In fact, Exelon is using a 1984 Environmental Impact Statement (EIS) based on estimates from before Limerick started operating in 1985, for 2011 Limerick permitting.

DEP decisions could further jeopardize public health and increase costs for water systems and their customers. ACE reviewed Limerick's National Pollutant Discharge Elimination System (NPDES) Permit Renewal and Exelon's Radiological Monitoring Reports to NRC. Together, they're alarming. We sent DEP a 23-page document expressing concerns, asking questions, and making suggestions to minimize harms. We await written responses.

Limerick Nuclear Plant's extraordinary toxic threats to drinking water, increased costs for water, and public health risks could all be minimized. But that will take willingness to face the facts and courage to take action. ACE suggestions for actions needed:

1. DEP should DENY Exelon 's request for increases in pollution permit limits FOUR times higher than Safe Drinking Water Standards, and instead require Exelon to filter Limerick's discharges. This would avoid increased costs to water treatment systems and their customers.
2. DEP and DRBC should DENY Exelon's request to eliminate Schuylkill River temperature restrictions. This would avoid unnecessary permanent damage to Schuylkill River ecosystems and minimize threats to the public.
3. DRBC should say NO to pumping unfiltered contaminated mine water into the Schuylkill River. Exelon should pay to filter contaminated mine water before pumping it into a drinking water source.
4. DRBC should DENY Exelon's requests to reduce low flow restrictions and monitoring requirements. Low flows concentrate toxics discharged into the river.
5. NRC should say NO to relicensing Limerick Nuclear Plant for 20 more years, based on Limerick's unacceptable threats to drinking water for almost two million people.

Each year Limerick operates there is far less water in the Schuylkill River, far more hazardous discharges, and more risk for radioactive leaks into groundwater from the miles of buried pipeline under Limerick.

Only public outcry to require Exelon to filter all discharges and close Limerick in 2029 can save your water. Even though approvals of Exelon's requests would lead to a drinking water crisis, history suggests DEP, DRBC, and NRC will all protect Exelon's profits, not our drinking water.

Get informed and get involved now before it's too late. Get a free copy of the ACE Report or call ACE to set up a meeting (610) 326-2387.

Dr. Lewis Cuthbert  
ACE President

## Opinion

# Nuclear plant poses threat to drinking water

Published: Monday, February 14, 2011; Last Updated: Mon. Feb 14, 2011, 9:06am

It is crucial to look at the Limerick nuclear plant's collective threats to drinking water, face reality, and take immediate action to minimize damage. Soon decisions will be made by the Pennsylvania Department of Environmental Protection, Delaware River Basin Commission and the Nuclear Regulatory Commission that will have major impacts on the Schuylkill River, a vital drinking water source for almost 2 million people from Pottstown to Philadelphia. Their decisions are interrelated.

Together these decisions could result in irreparable harm to the river, its ecosystems and drinking water.

Exelon's requests are a recipe for a drinking water disaster. If Exelon's requests are approved, eventually almost 2 million people may no longer have safe, usable drinking water. Affected water systems include Pottstown, Phoenixville, Aqua PA, American Water and Philadelphia (only 20.7 miles away).

Exelon requested to minimize and even eliminate important safeguards for the Schuylkill River, while requesting significant increases in pollution discharges from the nuclear plant, plus more unfiltered contaminated mine water pumping into the river to operate Limerick.

Limerick Nuclear Plant's extraordinary water use and toxic discharges are unsustainable. Limerick's cooling towers depleted the Schuylkill River by billions of gallons each year since Limerick started operating in 1985. By 1999, the Schuylkill River reached record low flows.

Low flows concentrate toxics, including the broad range of radionuclides discharged from Limerick Nuclear Plant 24 hours a day, 365 days a year. Limerick testing confirms radiation in surface water, fish, sediment, vegetation, air particulates, and milk.

Exelon's two planned uprates will use and pollute the river more. Exelon's plan for relicensing would result in using and polluting the river 20 years after its license expires in 2029. Every year Limerick operates, the river becomes more poisoned and depleted. Will there be enough safe usable drinking water in the Schuylkill River by 2029, much less by 2049?

Radiation could also be in drinking water wells near Limerick Nuclear Plant. Limerick had radioactive leaks and spills into groundwater over the years. Limerick's 2009 Radiological Monitoring report shows radiation in 15 of 15 monitoring wells. And it isn't just tritium.

Exelon's claims about being good for the environment not only defy common sense and logic, they are disputed by the facts. In fact, Exelon is using a 1984 Environmental Impact Statement (EIS) based on estimates from before Limerick started operating in 1985, for 2011 Limerick permitting.

DEP decisions could further jeopardize public health and increase costs for water systems and their customers. ACE reviewed Limerick's National Pollutant Discharge Elimination System (NPDES) Permit Renewal and Exelon's Radiological Monitoring Reports to NRC. Together, they're alarming. We sent DEP a 23-page document expressing concerns, asking questions, and making suggestions to minimize harms. We await written responses.

## **Limerick Nuclear Power Plant's Threats To The Schuylkill River**

The Schuylkill River is the source of drinking water for over 1 ¾ million people from Pottstown to Philadelphia. Maintaining the health of the Schuylkill River and its ecosystems is vital to public health and wildlife.

For decades, to operate Limerick Nuclear Power Plant, Exelon used massive amounts of Schuylkill River water, while routinely poisoning the river with radioactive wastewater. Since 2003, Exelon has increased toxic metal pollution by adding contaminated mine water to supplement the Schuylkill River flow for Limerick. Exelon is now asking to add more mine waters and reduce important safeguards. Common sense suggests this is a recipe for disaster.

- Since 1985 when Limerick Nuclear Power Plant started operating it has been poisoning the Schuylkill River and its ecosystems with massive radioactive wastewater discharges.
- Since 2003, Exelon has been pumping unfiltered contaminated mine water into the Schuylkill River for Limerick Nuclear Plant operations.
- Currently, Exelon is asking to increase pumping of contaminated mine water, while at the same time asking to reduce and even eliminate important safeguards.

Limerick Nuclear Power Plant's insatiable need for water is impacting the public water supply. Exelon has consistently requested 56.2 million gallons per day. In contrast, Pottstown uses only 5 million gallons per day for all its customers. Withdrawals since 1985 is hundreds of billions of gallons. Only about ¼ the amount withdrawn by Limerick Nuclear Plant is discharged back to the river.

- Is there enough water to sustain that kind of withdrawal from the Schuylkill River indefinitely?
- Low Schuylkill River flows have had many people concerned, especially in times of drought.

Eventually, could Limerick Nuclear Power Plant operations irreparably harm Schuylkill River water quality and ecosystems, due to continuous radioactive discharges and deliberate contamination through supplementation by pumping massive amounts of contaminated mine water into the Schuylkill River?

- Limerick Nuclear Power Plant discharges at least 14.2 million gallons per day of heated and radioactive water into the Schuylkill River. In 24 years, what have over 100 billion gallons of heated radioactive water done to the ecosystem in the Schuylkill River? No one knows for sure, since Exelon, the company with a vested interest in the outcome, controls the entire monitoring, testing, and reporting process.
- Since 2003, Exelon added approximately 6 billion gallons of contaminated mine water (UNFILTERED) to the Schuylkill River to supplement the flow for Limerick Nuclear Power Plant. What damage has been done? No one knows for sure. All data and reporting are controlled by Exelon.

If Exelon's current application to the Delaware River Basin Commission DRBC (D-69-21 CP-13) is approved, the Schuylkill River will undoubtedly be further jeopardized.

Exelon requests related to Limerick Nuclear Power Plant's water intake and output include:

- Withdrawal of 56.2 Million gallons per day -20,513,000,000 gallons per year
- Continued discharge of over 1 billion gallons yearly of contaminated and UNFILTERED Wadesville Mine Water.
- Added contaminated and UNFILTERED water from additional mine pools
- Reduced Low-Flow Restrictions
- Eliminated Temperature Restrictions
- Reduced Monitoring Requirements
- Continued discharge of radioactive and heated water - 14.2 Million Gallons Per Day 5,183,000,000 Gallons Per Year
- Elimination of public participation in future decisions to add more mine waters, etc.

With so much at stake, before DRBC permits this disaster in the making, the public needs and deserves independent comprehensive monitoring, testing, calculating, and reporting. Exelon, the company with a vested interest in the outcome has done the monitoring, testing, and reporting, with little, if any independent oversight. Elsewhere, Exelon nuclear plants' radioactive water contamination was called by some, "Exelon's Radioactive Watergate" because Exelon failed to disclose unpermitted radioactive contamination and leaks. We need an independent comprehensive environmental impact study with full disclosure on damage already done by the nuclear plant, with estimates on future harms.

Minimally, Exelon should be required to filter the mine water. To attempt to protect the Schuylkill River for future generations, get the facts and attend the public hearing to be scheduled in Pottstown. Call Dr. Lewis Cuthbert, (610) 326-2387 for detailed information and documentation compiled through ACE's 4-year investigation.

## **Summary: Limerick Nuclear Power Plant's Threats To The Schuylkill River**

The Schuylkill River is the source of drinking water for over almost 2 million people from Pottstown to Philadelphia. Maintaining the health of the Schuylkill River and its ecosystems is vital to public health and wildlife.

To operate Limerick Nuclear Power Plant, Exelon is using massive amounts of Schuylkill River water, while routinely poisoning the river with radioactive wastewater. Since 2003, Exelon increased toxic metal pollution in the river by adding contaminated mine water to supplement the Schuylkill River flow for Limerick Nuclear Plant. Exelon is now asking to add more mine waters and reduce important safeguards.

### Common sense suggests this is a recipe for disaster.

- Since the mid 1980s when Limerick Nuclear Power Plant started operating it has been poisoning the Schuylkill River and its ecosystems with massive radioactive wastewater discharges.
- Since 2003, Exelon has been pumping unfiltered contaminated mine water into the Schuylkill River for Limerick Nuclear Plant operations.
- Currently, Exelon is asking to increase pumping of contaminated mine waters, while at the same time asking to reduce and even eliminate important safeguards.

### Limerick Nuclear Power Plant's insatiable need for water is impacting the Schuylkill River and the public water supply.

- Limerick Nuclear Plant WITHDRAWS at least 56.2 MILLION GALLONS PER DAY from the Schuylkill River (Pottstown withdraws only about 5 million gallons per day for all its customers). Is there enough water to sustain that kind of withdrawal from the Schuylkill River indefinitely, even with some supplementation? What happens in times of drought?
- 35 to 42 million gallons per day are released by the nuclear plant into the air as steam from the towers.
- Only about 14.2 million gallons per day are returned to the Schuylkill River as waste water, and that is radiated and heated.
- Even with Exelon's supplementation from the Delaware River and contaminated mine water from Wadesville Mine, there has been a major shortfall of water returned to the river. This obviously decreased the river flow (many believe it also explains shrinking tributaries) and increased toxic threats to the river from Limerick Nuclear Plant.

### Exelon wants to further increase contamination while reducing safeguards. Exelon's current application to the Delaware River Basin Commission (DRBC) (D-69-21 CP-13) includes the following requests related to the Schuylkill River:

- Continued pumping of billions of gallons of contaminated and UNFILTERED Wadesville Mine Water.
- More contaminated and UNFILTERED mine water pumping into the Schuylkill River from additional mine pools
- Elimination of public participation in future decisions to add more mine waters
- Reduced Low-Flow Restrictions
- Eliminated Temperature Restrictions
- Reduced Monitoring Requirements
- Continued withdrawal of 56.2 Million gallons per day - 20,513,000,000 gallons per year
- Continued discharge of radioactive and heated water - 14.2 Million Gallons Per Day 5,183,000,000 Gallons Per Year

### Minimally, Exelon should be required to pay for filtration of all mine water pumped into the Schuylkill River for prevention and precaution. Mine water filtration has already been done by others.

- Exelon is making enormous profits from using public water to operate Limerick Nuclear Power Plant.
- Exelon makes billions and should be held accountable to filter all toxic mine water pumped into the Schuylkill River.
- What can happen, especially in a drought, in 5, 10, 15, 20 years as the contamination increases and the river shrinks?
- Will the water become so contaminated that it will be impossible (either from cost or process) for water companies to make it safe to drink?
- Will there be enough water to adequately supply Limerick Nuclear Plant and the public, especially in a drought?

There has been no truly independent comprehensive environmental impact study with full disclosure on damage already done by the nuclear plant, with estimates on future harms. Exelon, with a vested interest in the outcome, is in control of monitoring, testing, calculating, and reporting.

With so much at stake, before DRBC permits this disaster in the making, the public needs and deserves independent comprehensive monitoring, testing, calculating, and reporting.

Attempt to protect the Schuylkill River for future generations. Sign the petition and attend the public hearing to be scheduled in Pottstown. For more detailed information and documentation compiled through ACE's 4 year investigation, call (610) 326-2387 for an appointment to visit our office.



## ANOTHER VIEW

### Nuclear plant is a threat to Schuylkill River

The Schuylkill River is the source of drinking water for more than 1 million people from Pottstown to Philadelphia. Maintaining the health of the Schuylkill River and its ecosystems is vital to public health and wildlife.

Since 1985 when Limerick Nuclear Power Plant started operating, it has been damaging the Schuylkill River and its ecosystems. For 23 years, Exelon used and polluted the Schuylkill River for profit.

Limerick Nuclear Power Plant's insatiable need for water is impacting the public water supply. Exelon first requested 69 million gallons of water intake per day. Withdrawals since 1985 could be up to 503,700,000,000 gallons.

Only about one-quarter is discharged back to the river. Is there enough water to sustain that kind of withdrawal indefinitely? Extremely low flows in the Schuylkill River have many people concerned, especially in times of drought.

Could Limerick Nuclear Power Plant operations eventually lead to irreparable harm to Schuylkill River water quality and ecosystems due to the slow radioactive poisoning of the river and deliberate contamination through supplementation of contaminated mine water?

Limerick Nuclear Power Plant discharges at least 14.2 million gallons per day of heated and radioactive water into the Schuylkill River. In 23 years, what have 103,660,000,000 gallons of heated radioactive water done to the ecosystems in the Schuylkill River?

Since 2003, Exelon added over 5 billion gallons of contaminated mine water (unfiltered) to the Schuylkill River to supplement the flow for Limerick Nuclear Power Plant. What damage has been done?

If Exelon's recent application to the Delaware River Basin Commission DRBC (D-69-21 CP-13) is approved, the Schuylkill River's health and flow will be further jeopardized.

Exelon requests related to Limerick Nuclear Power Plant's water intake and output include:

- Withdrawal of 56.2 Million gallons per day – 20,513,000,000 gallons per year
- Continued discharge of over 1 billion gallons yearly of contaminated and unfiltered Wadesville Mine Water.
- Added contaminated and unfiltered water from additional mine pools
- Reduced Low-Flow Restrictions
- Eliminated Temperature Restrictions
- Modified Monitoring Requirements
- Continued discharge of radioactive and heated water – 14.2 Million Gallons Per Day 5,183,000,000 Gallons Per Year

With so much at stake, before DRBC permits this disaster in the making, the public needs and deserves independent comprehensive monitoring, testing, calculating, and reporting. Exelon, the company with a vested interest in the outcome has done the monitoring, testing, and reporting, with little, if any independent oversight. Elsewhere, Exelon nuclear plants' radioactive water contamination was called by some, "Exelon's Radioactive Watergate."

There's an opportunity for a public hearing. We urge you to add your name to a list of people who want DRBC to provide a comprehensive independent environmental impact study with full public disclosure on damage already done, and estimates on future damage, followed by a public hearing held in Pottstown. Call ACE 610-326-6433.

**DR. LEWIS CUTHBERT**  
ACE President

Guest  
Columnist

# The Phoenix

PhoenixvilleNews.com

## LETTERS TO THE EDITOR

### Limerick power plant a threat to Schuylkill River

The Schuylkill River is the source of drinking water for over a million people from Pottstown to Philadelphia. Maintaining the health of the Schuylkill River and its ecosystems is vital to public health and wildlife.

Since 1985, when Limerick Nuclear Power Plant started operating, it has been damaging the Schuylkill River and its ecosystems. For 23 years, Exelon used and polluted the Schuylkill River for profit.

Limerick Nuclear Power Plant's insatiable need for water is impacting the public water supply. Exelon first requested 69 million gallons of water intake per day. Withdrawals since 1985 could be up to 503,700,000,000 gallons. Only about one quarter of that is discharged back to the river. Is there enough water to sustain that kind of withdrawal indefinitely? Extremely low flows in the Schuylkill River have many people concerned, especially in times of drought.

Could Limerick Nuclear Power Plant operations eventually lead to irreparable harm to Schuylkill River water quality and ecosystems due to the slow radioactive poisoning of the river and contamination through supplementation of contaminated mine water? Consider:

- Limerick Nuclear Power Plant discharges at least 14.2 million gallons per day of heated and radioactive water into the Schuylkill River. In 23 years, what have 103,660,000,000 gallons of heated and/or radioactive water done to the ecosystems in the Schuylkill River?

- Since 2003, Exelon added over five billion gallons of contaminated mine water (UNFILTERED) to the Schuylkill River to supplement the flow for Limerick Nuclear Power Plant. What damage has been done?

If Exelon's recent application to the Delaware River Basin Commission DRBC (D-69-21 CP-13) is approved, the Schuylkill River's health and flow will be further jeopardized.

With so much at stake, before DRBC permits this disaster in the making, the public needs and deserves independent comprehensive monitoring, testing, calculating and reporting.

There's an opportunity for a public hearing. We urge you to add your name to a list of people who want DRBC to provide a comprehensive, independent environmental impact study with full public disclosure on damage already done, and estimates on future damage, followed by a public hearing held in Pottstown. Call ACE at 610-326-6433.

**DR. LEWIS CUTHBERT**  
ACE President

October 17, 2008

**Dear Colleagues,**

In the past, the physicians in this region have had a major impact in prevention of unnecessary pollution and helping to stop increases of the associated environmentally linked diseases and disabilities.

Your voices through signing petitions have helped stop landfill expansion, a dangerous explosive hazardous landfill gas pipeline to Occidental ½ mile from our hospital, and most recently helped to prevent a dangerous polluting ethanol plant to be built less than 2 miles from our hospital.

Now there is another opportunity for our combined voices to make a difference related to the permitted contamination of public water.

Before the end of 2008, the Delaware River Basin Commission (DRBC) will be making a decision that could have long-term major harmful impacts on the water quality of the Schuylkill River, the source of drinking water for 1-¾ million people from Pottstown to Philadelphia.

Exelon is asking to continue to pollute the Schuylkill River with extraordinary amounts of mine water contaminated with toxic metals and sulfates to operate Limerick Nuclear Power Plant. Exelon is not only asking to increase pollution, but also to reduce and eliminate safeguards, as well as eliminate future public participation.

The mine water is contaminated with levels of toxic metals permitted to be pumped into the river at levels far higher than safe drinking water standards. Just one of these metals, Manganese, has been permitted by DEP to be continuously pumped into this source of drinking water with 1 billion gallons of water each year over six months at 24,300 gallons per minute of mine water, at 80 times "Safe Drinking Water Standards". A 2005 study shows that even below current "Safe Drinking Water Standards", that long-term exposure to vapors from showering can cause permanent brain and nervous system damage.

The Alliance For A Clean Environment (ACE) launched a 2 ½ year investigation on this threat to water, collecting the needed documentation and meeting with agency and elected officials. Their efforts have led to the DRBC agreeing to hold a public hearing which will be scheduled in the next few weeks.

The goal is for DRBC to require Exelon to filter the mine water to the degree possible or secure funding to hire an independent public interest expert to design a comprehensive independent protocol for determining damage done to date in order to project future damage.

Attached is a summary of issues. To review more detailed information and research that has been compiled, the NPDES Permit, or DRBC Docket, please call me at (610) 326-7354.

**While I recognize that you are far too busy to attend a public hearing, I am hoping you will support this effort for prevention and protection.**

- 1. Please sign the petition on the opposite side and return it to my hospital mailbox as soon as possible.**
- 2. I am also hopeful you will share this information with others in your office and offer them an opportunity to sign this petition for precaution.**

Thank you,



Fred S. Winter, M.D.



# THE MERCURY OPINION

*Awarded the Pulitzer Prize for spot news photography in 1979 and editorial writing in 1990*

## READERS' VIEWS

A8 / Wednesday, December 9, 2009

### Exelon should pay for filtration of water pumped into the Schuylkill

For almost four years, the Alliance For A Clean Environment (ACE) investigated what we now believe are unprecedented threats to the Schuylkill River, as a result of Exelon operating Limerick Nuclear Power Plant. We feel compelled to respond to Kurt Zwikl's Nov. 7 letter praising Exelon.

Zwikl, director of the Schuylkill River Heritage Area, is turning a blind eye to Exelon's Limerick Nuclear Power Plant's obvious and serious long-term threats and harms to the Schuylkill River, as well as the diversionary funding tactic which is effectively buying Exelon silence and support.

Exelon is harming the river while getting praised for restoring it. It's shocking that Zwikl claims Exelon is making a commitment to better water quality in the Schuylkill River when the opposite is true. Rather than pay to transport Delaware River water, Exelon is poisoning the Schuylkill River with unfiltered, contaminated mine water. Money saved by Exelon is used to fund the Schuylkill River Restoration Fund. This fund could be detrimental to the sustainability and health of the river. The Schuylkill is being damaged and sacrificed for Exelon's profits, but funding recipients and hopefuls don't seem to mind.

Funded restoration projects pale by comparison to serious Schuylkill River threats as a result of Exelon operating Limerick Nuclear Power Plant. The extent of damage is unknown after decades of Limerick operations. There's no comprehensive, independent river monitoring, testing, or reporting. Exelon, with a vested interest in the outcome, pays for and controls all river monitoring, testing, and reporting.

Harms to the Schuylkill River from Exelon operating Limerick Nuclear Plant include:

1. Water Depletion
2. Water Contamination
3. Threats to public health, ecosystems, fish and wildlife
4. Increased public costs for damage to public water systems from pumping massive amounts of contaminated mine waters into the river to operate Limerick.

Limerick's extraordinary water needs are clearly unsustainable, a fact recognized by many, even before this nuke plant was built. Even with supplementation, there was a possible 12 billion gallon yearly shortfall for decades, between water withdrawn from the Schuylkill River and returned.

- 20½ billion gallons yearly withdrawal
- 5 billion gallons yearly return — radiated and heated

• 3 billion gallons (or less) supplemented, including — unfiltered Wadesville Mine Water  
Reduced river flow plus continued radioactive contamination plus increased mine water

contamination plus reduced safeguards equals disaster. Exelon is currently requesting approval from DRBC to:

- Reduce low-flow restrictions
- Eliminate temperature restrictions
- Add more contaminated unfiltered mine water from other mines
- Reduce monitoring requirements
- Eliminate future public participation

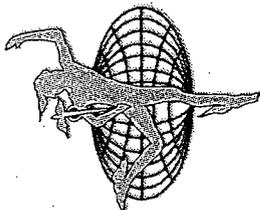
An ounce of prevention is worth a pound of cure. Exelon should be required to pay to filter all contaminated mine water pumped into the Schuylkill River to operate Limerick Nuclear Plant. Filtration should be a cost of operating Limerick, paid from Exelon's record profits.

The Schuylkill River is a vital public drinking water source for almost two million people from Pottstown to Philadelphia. We urge those blinded by funding to face reality and work to make Exelon pay for filtration of all mine water pumped into the Schuylkill River to operate Limerick Nuclear Plant. For a summary presentation of Limerick Nuclear Plant threats to the Schuylkill River call ACE at 610-326-2387.

# The Mercury

PottsMerc.com

Sunday



September 14, 2008

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## Officials to put release of mine water under more scrutiny

By Evan Brandt  
[ebrandt@pottsmmerc.com](mailto:ebrandt@pottsmmerc.com)

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Exelon Corp.'s request to allow coal mine water to regularly be added to the Schuylkill River to supplement the operation of its Limerick Nuclear Generating Plant will be the subject of a public hearing "somewhere in the Pottstown area," it was confirmed last week.

Katharine O'Hara, a spokeswoman for the Delaware River Basin Commission, the quasi-federal oversight agency which must approve the request, said no date or place for the hearing has been set yet.

Earlier this year, the agency had expected the project to be ready for a decision this month, "but it's just not ready yet, the staff is still working on it," she said.

"But we are definitely going to have a public hearing somewhere in the Pottstown area this fall," she said.

Pottstown has become a focal point for scrutiny of this project for two reasons.

Primarily, Pottstown's Water Treatment Plant in Stowe is the first place along the Schuylkill's journey to the Delaware River that draws out of the river for a public water supply.

As such, it is considered likely to be the first place that any impacts from the addition of the mine water 70 miles upstream would be noticed or felt.

(See COAL MINE WATER on A4)

# Officials to put release of mine water under more scrutiny

(COAL MINE WATER from A1)

Which raises the second reason Pottstown has become a focus.

Exelon has asked the Pottstown Borough Authority, which owns the water treatment plant, to endorse the project and the Alliance for a Clean Environment, in a presentation last month to the authority's board, has countered that Exelon's request should be cautiously considered.

ACE has also lobbied DRBC for a public hearing in the Pottstown area, a request which, it now seems, will be honored.

ACE's "two major points of concern" with the project have to do with the high levels of iron and manganese in the water that is pumped into the river out of the Reading Anthracite Company's Wadesville mine in Schuylkill County, ACE President Lewis Cuthbert told the authority at its Aug. 19 meeting.

ACE's presentation followed by one month a presentation made to the same board by Exelon officials.

Craig B. Wyler, an Exelon representative, was present during ACE's Aug. 19 presentation but did not address the board regarding ACE's objections.

"There are too many unanswered questions to just step back and let this happen," Cuthbert said of Exelon's project, which has been ongoing as a "demonstration project" for five years.

"A lot of people depend on the water coming out of this river and this project will put iron and manganese into the river at levels above safe drinking water standards," he said. "The time to speak is now."

In addition to seeking permission from the DRBC to release the mine water into the river, an amount Cuthbert said amounts to one billion gallons per year, Exelon is also seeking permission to downgrade restrictions which prohibit withdrawing water from the

Schuylkill when it is at low levels as well as eliminate restrictions that prevent withdrawals when the river's water temperature is high.

These requests "deserve careful scrutiny," Cuthbert said.

Testing of the water pumped from the mine showed manganese levels 80 times the safe drinking water standard and 20 times the safe water standard for iron, according to data ACE culled from information included in the 2002 reissuance of a state permit.

And in 2005, water at the intake to the Pottstown water plant was tested 17 times between June and October and found on some occasions to have manganese levels more than four times higher than safe drinking water standards and iron levels 1.5 times higher than the safety standard.

Although the treatment process at the Pottstown water plant ensures these metals will be removed to safe levels by the time customers turn on their taps, Cuthbert said the higher levels have a potential to cause higher maintenance costs in the system.

Also, treating the water to remove additional iron and manganese requires the plant operators to increase the amount of another chemical, potassium permanganate, which also has potential health impacts.

"Treating one harmful contaminant with another chemical has consequences," Cuthbert warned.

The costs for extra chemicals and extra maintenance will be borne not by the companies putting those metals into the river, but by the customers of the authority, he said.

Further, said Cuthbert, both the Pennsylvania Department of Environmental Protection and the DRBC have allowed the project to go on. "Both agencies have supported and defended this project and they have a vested interest in

it," said Cuthbert.

Approving this project would create a model by which the DEP could count as resolved any number of abandoned mines whose water is not too acidic to allow it to be released without being treated, Cuthbert said.

Exelon has already stated it is looking for additional mines with the right water chemistry to duplicate this project, Cuthbert said. And their refusal to filter the water before pumping it into the river, just passes those costs on to the public, he said, a kind of public subsidy for Exelon's bottom line.

"Exelon's claim that filtering can't be done because it's too expensive, I would respectfully suggest, could use another look," Cuthbert said, noting that in 2006 Exelon booked a \$1.59 billion profit, a 73 percent increase over the previous year.

And Exelon's description of the project as "beneficial," made in reference to the ability to add water to the river during drought periods, "is disingenuous at best," Cuthbert said.

The fact that Exelon controls the water monitoring in the river that serves as the basis of their claim that the project does not harm the health of the river makes that data suspect, Cuthbert argued. "We've seen this model before and the honor system doesn't work," he said.

The authority also heard from Tom Weld of BCM Engineers, the authority's engineering firm, who said the firm had done a "preliminary evaluation" of data taken at the plant's water intake.

Although he confirmed that some data showed spikes of iron and manganese levels, "there is no direct correlation we could make to indicate we saw spikes during the time they were pumping out of the mine," he said.

Seeing as Pottstown's intake is

70 miles from the mine, it will be hard to link the two, he said. "In that 70 miles, there are a lot of variable issues we can't address," Weld said.

According to a report Weld prepared for the authority, he estimated "the mine would release 55,000 pounds per year of iron and 50,000 pounds per year of manganese" in the river.

Weld estimated that the water treatment plant would treat about one-third of a pound of iron and about the same of manganese each day that "would be attributable to the Wadesville Mine release."

That works out to requiring the plant to treat an additional 135 pounds of iron and 120 pounds of manganese annually as a result of the mine water being in the river.

"However, approximately this amount of material would require treatment with or without the Exelon project since the Wadesville Mine has been releasing water to the Schuylkill at unknown quantities since before 1948," Weld's report noted.

Weld told the authority, "I don't think there is a significant impact on our intake" from the mine release.

He also noted that DRBC sent a letter Aug. 7 "asking all purveyors for data by Sept. 1."

The results of DRBC's analysis will not be available until October and he recommended the authority not take a position on Exelon's request until that information is available.

Authority board member Don Read said the operative question that should guide the authority's response should be "Is this any benefit to us? Is it a benefit to our ratepayers and is it a benefit to the watershed, what is the tangible benefit?"

To which Weld responded, "We're really not able to come up with one."

PottsMerc<sup>o</sup>com

# OPINION

The Mercury

A4 / Monday, July 21, 2008



## READERS' VIEWS

### Nuclear plants pose a threat to the health of our children

After a German study confirmed young children living near nuclear power plants have a significantly higher risk of developing leukemia and other forms of cancer, Germany is planning to prematurely shut down all of its nuclear power plants by the early 2020s.

Tragically, Pennsylvania Cancer Registry data since the late 1990s have revealed alarming childhood cancer rates, including leukemia, near Limerick Nuclear Power Plant, far higher than the national average. In fact, since Limerick Nuclear Power Plant went on line in the mid 1980s, many other cancers increased dramatically, including thyroid, breast, multiple myeloma, Hodgkins and more.

The Radiation and Public Health Project also tracked higher childhood cancer around other U.S. nuclear plants. Why are George Bush, John McCain and other U.S. politicians ignoring evidence of harm and planning to add over 40 new nuclear power plants in the U.S.? We don't need and can't afford more dangerous, costly nuclear power plants, which routinely release radiation into our air, water and soil and get into our food and the bodies of our children.

A recent Department of Energy study shows solar power alone can provide 55 times the entire nation's energy needs. Massive amounts of solar power can be operating for years before the first new nuclear reactor can be built, and at far less cost to taxpayers.

As a mother who lives near Limerick Nuclear

Power Plant who already lost a child to leukemia, I urge everyone to contact your state and federal officials and candidates today. Ask them to provide leadership in exercising precaution to prevent unnecessary harm to our most valuable resources, our children. Ask all elected officials and candidates to say no to new nuclear power plants.

Let's hope they will not be misled by nuclear industry lobbyists whose deceptive advertising and tactics are shameful. Nuclear power is not safe and not clean, as advertised. In fact, it appears nuclear power won't solve the global warming crisis either, as nuclear power in its production cycle is the fifth largest producer of greenhouse gases.

It's time to stop using taxpayer dollars to subsidize nuclear power. It's long past time to value our children's future and choose instead to subsidize truly clean and safe energy like solar and wind.

**BILLIE MILLER**  
Schwenksville

# The Mercury

A12 / Friday, June 27, 2008



## READERS' VIEWS

### People need to be aware of contamination in the Schuylkill

Gone are the days of rope swinging into the river. My personal experience suggests the Schuylkill River has long been polluted. I became very ill for a long period of time in the early 1990s after swimming in the Schuylkill River. I never went near it again. Most of the other people who swam in the river that summer became chronically ill and died before the age of 50. The Montgomery County Health Department knew there was too much bacteria in the water but never said anything.

People must be warned. Signs should be posted saying, "Contaminated water, no fishing, no swimming." The truth should be told to families whose drinking water comes from the Schuylkill River. Water treatment plants aren't filtering out all the contamination. I sure wouldn't want Schuylkill River water in baby's formula and wouldn't think of washing kids in it or letting pets drink unfiltered tap water.

Instead of trying to clean up the Schuylkill River or keep it from getting worse, our government officials continue to ignore reality and common sense. Very dangerous poisons are dumped into the Schuylkill River from major industrial facilities and sewage treatment plants. Water treatment plants only test periodically, don't test for all of them, and certainly don't remove all of them. Radiation from the power plant can mutate organisms, bacteria and viruses. Agencies deceptively claim levels for some pollutants are safe, ignore others and dismiss harmful impacts from all of them together and blame each other.

I find it difficult to believe that government agencies actually allowed Schuylkill River contamination to get worse through Exelon poisoning the river with heavy metals in contaminated mine water. Even more shocking is the plan to allow this

to continue, with more mines, just to supplement the flow of the river for Limerick Nuclear Power Plant. Exelon must be required to filter the contaminated mine water before dumping it into the Schuylkill River. They have plenty of money to do it. Why was Exelon allowed to run the river dry in the first place to operate Limerick Nuclear Power Plant? Is there a real threat of a meltdown if we have a drought this summer? And will we be warned ahead of time?

The Schuylkill River is destroyed, possibly beyond restoration, with the blessing of our government agencies. What is wrong with our elected officials? Why aren't they speaking up to stop this intentional contamination? Why aren't they demanding independent testing for all kinds of pollution to determine the extent of damage already done for themselves to see? Why aren't they warning the public? Why aren't they demanding updated and improved filtration methods at water treatment plants along the Schuylkill River?

Wake up everyone and smell the river. Look at the amount of pollution and radiation that's dumped into the river. Ignore deceptive claims that it's safe. Protect your family. Don't let them get deathly sick like me and others. Keep them out of the Schuylkill River and other contaminated waterways. And if your water comes from the Schuylkill River, at least use water filters for drinking, cooking and bathing.

I'd like to see Gov. Rendell and the Exelon officials with their families taking a dip in the river below the power plant for a public photo shoot. Then we can all believe what they say.

Any takers?

**ROBIN GANE**  
Gilbertsville



# The Mercury

PottsMerc.com

Tuesday, June 17, 2008

## Pollution top worry of Exelon plan opponents

By Evan Brandt  
[ebrandt@pottsmmerc.com](mailto:ebrandt@pottsmmerc.com)

POTTSTOWN — If comments made recently at a Borough Council meeting are any indication, opposition may be growing to Exelon Nuclear's request to make permanent a demonstration project in which water from a Schuylkill County coal mine is being added to the Schuylkill River.

**Pottstown Water Authority member Don Read said concentrations of manganese and iron, two heavy metals often associated with coal mine drainage, did see some spikes.**

The additional water is meant to compensate for the water the company wants to take out of the river downstream to

use for cooling at its Limerick Nuclear Generating Station. Currently, the company is limited by the Delaware River Basin Commission to withdrawing 56.2 million gallons per day, much more than the plant needs.

Exelon is also prevented from withdrawing from the Schuylkill when the water temperature is more than 59 degrees, presumably because the river is low.

Exelon is seeking the commission's permission to remove that restriction, allowing water to be withdrawn on days it currently could not be.

On June 9, borough resident Helen Mackiewicz warned the council that the project "will make the Schuylkill more polluted than it already is." She said Pottstown's water plant "is the first in

(See EXELON PLAN on A5)

## Pollution a concern for opponents of Exelon's plan for the Schuylkill

(EXELON PLAN from A1)

line for intake and our drinking water and body washing water already leaves much to be desired," Mackiewicz said.

She urged the council to "take steps to make sure the river water is not more permanently polluted than it already is."

David Petersen, a spokesman for Exelon, told The Mercury for a recent article that the energy company has hired a firm to conduct tests of the river water, primarily measuring the level of dissolved oxygen which he said is a lead indicator of any developing problems with the river's ability to support wildlife.

Another place Schuylkill River water is tested is at the Pottstown Water Treatment Plant. According to data assembled by Pottstown Water Authority member Don Read, concentrations of total organic compounds and dissolved solids, while fluctuating during much of 2007, do not seem to have any major increases. However, the concentrations of manganese and iron, two heavy metals often associated with coal mine drainage, did see some spikes, according to Read's data.

Read also spoke to Borough Council June 9, telling them that the Schuylkill River "is part of our heritage and our watershed,

which (Pennsylvania Department of Environmental Protection) keeps telling us we need to protect."

Exelon's request, Read said, "should be looked into more closely before it gets too far along. We need to get good data and we need to protect our drinking water."

Phil Thees, a former Pottstown School Board member, agreed. He told the council that "back at the turn of the century, my family lived down there on what was then Water Street, and the Schuylkill was a clear, aqua blue color. Then in 1916, 1920, they flushed the coal mines with it and that was the end of a clear blue Schuylkill River."

Thees said the game commission regularly issues warnings about eating too much fish caught in the Schuylkill.

After hearing Read's comments, Thees said, "I'm glad to hear we're not going to approve any more stuff going into the toxic martini we already have coming down the river."

The next meeting of the Pottstown Borough Authority is tonight at 7 in borough hall. Petersen is tentatively scheduled to give a presentation to the authority on Exelon's request.

The meeting is open to the public.



# The Mercury

Monday, June 2, 2008

PottsMerc.com

## Exelon wants permanent addition of mine water to Schuylkill

By Evan Brandt  
ebrandt@pottsmmerc.com

LIMERICK — Exelon Nuclear wants to make permanent a five-year old experiment in which water from a former coal mine in Schuylkill County is added to the Schuylkill River.

The addition of this water is designed to increase flow in the river and thus allow the company to use more Schuylkill River water for its Limerick Generating Station.

However the company is not requesting an increase in its 56.2 mil-

lion-gallons-per-day limit. Rather, it wants permission to withdraw water when the river's flows are lower in the summer, arguing that the additional water added in the headwaters compensates during low-flow periods.

The company has filed the request with the Delaware River Basin Commission, a four-state quasi-federal entity which oversees the 13,539-square-mile Delaware River Watershed — of which the Schuylkill is the largest tributary.

For five years Exelon has been adding water to the river from the Wades-

ville Mine pool and the Still Creek Reservoir, owned by the Schuylkill County Borough of Tamaqua in an attempt to convince authorities that an equal amount of the additional water can then be safely taken from the Schuylkill for use in the company's nuclear power plant.

The project is unusual in that mostly, officials work hard to keep untreated water that comes from coal mines out of Pennsylvania's 45,000 miles of streams and rivers.

That's because in most cases, water

from coal mines is extremely acidic as a result of the water's contact with the mineral pyrite, which then forms sulfuric acid and iron hydroxide when it comes into contact with air or water.

It is the most common form of water pollution in Pennsylvania and about half of the coal mine discharges in the state have some level of acidity. The vast majority of that pollution is in western Pennsylvania.

The pH level in this discharge is often toxic to fish and the insects that

(See MINE WATER on A5)

Monday, June 2, 2008 / A5

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# Exelon wants to make addition of mine water to Schuylkill River permanent

mine pool water to the West Branch of the Schuylkill River.”

The report noted that several years ago, the Pennsylvania Department of Environmental Protection began seeking “funding partnerships” to pay for abandoned treatment plants that remove the acid from abandoned coal mines.

Treatment of this water requires years of commitment and some coal companies no longer in business are no longer maintaining the treatment plants. They ultimately become the responsibility of the state, which does not have enough money to maintain them.

The idea was described in the report as forming partnerships with state agencies and industry “to market recycling and reuse of mine pool water” - primarily to

nearby power plants and industrial users.

Wadesville was identified as one of two projects that “demonstrate the reuse of mine pools that highlight PADEP’s marketing approach.”

The Alliance for a Clean Environment has protested this project on the grounds that the monitoring of the river’s health is inadequate and controlled by Exelon and that money is holding too much sway over decisions about a source of public water.

They argue that the company’s 73 percent increase in profit from 2005 to 2006 - \$1.59 billion in earnings - demonstrates it has adequate financial resources to filter the Wadesville Mine water before discharging it into the river.

The group also charges that advocacy groups, such as the

Schuylkill Action Network, are being influenced by Exelon donations and not looking objectively at the project to determine if it could pose a threat to water quality in the Schuylkill, a source of drinking water for millions of Americans.

“Exelon donations to the Schuylkill Action Network appear to have led to SAN leaders and some elected officials putting on blinders to reality,” ACE materials state.

The group contests that inadequate independent testing has been done on the mine water, particularly for heavy metals such as iron, manganese and aluminum typically found in mine water and which they say are found at levels above the national safe drinking water levels in the Wadesville Mine water.



## **READERS' VIEWS**

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### **Water discharge is a bad idea**

In the June 2 article in The Mercury by Evan Brandt on mine water releases into the Schuylkill River, we noted much to applaud.

However we want to add to the saga of this deplorable idea of dedicating the Schuylkill river and Schuylkill County's groundwater to the generation of nuclear energy.

The Pennsylvania Environmental Network has been working with ACE for a long time on this demonstration project.

The Pennsylvania Environmental Network is a statewide volunteer grassroots group organized in 1988. We are also asking that there be an environmental assessment by a fully independent consultant and a public hearing, not less than 60 days after the consultant's report is released, to be held in Pottstown.

The Delaware River Basin Commission that is entertaining the applications from Exelon is composed of members from Pennsylvania, Delaware, New Jersey and New York. One wonders how much influence and control our state has in this forum.

This is a precedent setting deplorable project that will have serious long term impacts on health, water and air in a large area of our state.

**TINA DALY**  
Phoenixville

# Exelon's 2009 Groundwater Monitoring Report For Limerick Nuclear Plant

**Proof:**

## Groundwater Is Radioactive At Limerick Nuclear Plant

**Evidence Shows: IT'S NOT JUST TRITIUM** (Page 10)

➤ **12 Radionuclides Were Reported in Groundwater and Surface Water.**

### A. Groundwater Test Results

Exelon's 2009 Radiological Report to NRC - For Limerick Nuclear Power Plant

**Gross Alpha, Gross Beta, Gamma, Uranium All Detected In Groundwater**

- ✓ **Gross Alpha (dissolved) Detected - In 9 of 15 Groundwater locations**
- ✓ **Gross Alpha (suspended) Detected - In 5 of 15 Groundwater locations**
- ✓ **Gross Beta (dissolved) Detected - In ALL 15 Groundwater locations**
- ✓ **Gross Beta (suspended) Detected - In 3 of 15 Groundwater locations**

**Gamma Emitters Detected**  
**Uranium 233/234 Detected**

**In 3 of 15 Groundwater locations**  
**In 4 of 5 Groundwater monitoring locations**

**IT'S NOT JUST TRITIUM - As Deceptively Claimed By Exelon And NRC**

**Exelon's 2009 RADIOACTIVE GROUNDWATER RESULTS For Limerick  
Limerick Nuclear Power Plant's 12 Radionuclides Identified In Drinking Water / Well Testing  
Reported By Exelon - "Above Background"**

	Radionuclides	½ Life
1.	Iodine I-131	8 Days
2.	Cesium Cs-134	30 Years
3.	Cesium Cs-137	30 Years
4.	Manganese Mn-54	314 Days
5.	Zinc Zn-65	250 Days
6.	Cobalt Co-58	70 Days
7.	Cobalt Co-60	70 Days
8.	Zirconium Zr-95	65 Days
9.	Iron Fe-59	46.6 Days
10.	Niobium Nb-95	35 Days
11.	Barium Ba-140	13 Days
12.	Lanthanum La-140	40 Hours

Note: The Hazardous Life of a Radioactive Isotope is Ten to Twenty Times its Half-Life  
Reality: Synergistic, Additive, and Cumulative Harmful Impacts Are Obviously Significant  
Problems: Many Radionuclides go Unreported and Unmonitored  
Exelon, a Company that Can't Be Trusted, Controls the Process

### Radionuclides Detected In Limerick Groundwater

In 1<sup>st</sup> and/or Successive Generations After Exposure Can Cause:

- ✓ Cancer
- ✓ Birth Defects
- ✓ Mutations
- ✓ Miscarriages

### Health Harms Of Different Types Of BETA RADIATION

Beta / Gamma Emitters	Harmful Health Impacts - All Can Cause Cancer
Iodine - 131	Thyroid Ovaries
Cobalt - 60	Liver Ovaries
Zinc - 65	Bone Ovaries
Cesium - 137	Muscles Ovaries
Strontium-90	Bone, Immune, Hormonal, Central Nervous Systems

**NOTE:** Synergistic, Additive, and Cumulative Harmful Health Impacts Are Not Evaluated

- All Radioactive Isotopes Emitting Gamma Radiation Attack Reproductive Organs
- BEIR VII Report Says There Is NO SAFE LEVEL of EXPOSURE to RADIATION
- POISONED RIVERS FROM NUKES 4/08 Report Big Increase in Leukemia and Other Cancers - Reported by Three EPA Illinois Professionals

**Exelon claims there is no drinking water pathway**

- **But Exelon's claim appears to be disputed by their own facts on Page12**

Page 12

### **DRINKING WATER**

#### **Well Survey Around Limerick Nuclear Plant (2009)**

#### **Within 1-Mile (Radius From Center Of Limerick)**

- ✓ 46 Domestic Withdrawal Wells
- ✓ 2 Industrial Wells
- ✓ 2 Commercial Wells
- ✓ 1 Institutional Well
- ✓ Limerick has 1 Potable Water Supply Well - 175 FEET from Reactor Building  
Limerick Station has 1 Fire Water Well - 500 Feet from cooling towers

# **Groundwater Contamination And Drinking Water Threats Increase As Long As Limerick Operates**

## **There Are Countless Opportunities for Breakdowns and Leaks Under Limerick Nuclear Plant**

**An Exelon Diagram (attached) identifies the complicated miles of pipelines under Limerick Nuclear Plant.** Many carry highly radioactive, corrosive, and otherwise toxic liquids.

**Limerick's miles of 26 years old underground pipes are deteriorating.** They corrode and become brittle. They can leak undetected for long periods of time. Leaks in the miles of underground buried pipes are hard to detect.

**Earthquakes can cause shaking and breaking.**

- ✓ Limerick Nuclear Plant's aging underground pipes could be leaking now as a result of shaking and breaking from the August, 2011 earthquake as far away as Virginia.
- ✓ There are two earthquakes fault lines very close to Limerick - 9 miles away and 17 miles away.

**A monitoring diagram (attached) show only 15 monitoring wells on 600 acres**

Diagram from Exelon's 2009 Radiological Monitoring Report On Limerick Figure 1 Graphic - A-2.

**Exelon's Radioactive Groundwater Monitoring Is Woefully Inadequate At Limerick Nuclear Plant**

According to a body of evidence collected by ACE.

- **Groundwater is confirmed to be radioactive under the 600 acre Limerick site. This radioactive contaminated groundwater could have been spreading long periods of time, in any direction, in this fractured bedrock aquifer.**
  - ✓ Radioactive groundwater contamination may have already moved off the Limerick site, undetected or unreported by Exelon.
  - ✓ Once groundwater becomes radioactive it is difficult, if not impossible to clean up. Exelon never tried, either here or at its other nuclear plants with radioactive water.
  - ✓ Radiation levels found on a specific radionuclide are not the important factor, since there is no research on synergistic harmful impacts over time. and any level poses a potential risk for cancer, immune damage, and other health threats. It is difficult and very costly to try to remove radiation from drinking water. Some water filtration companies claim it is impossible.
- **Radioactive leaks in miles of Limerick's aging underground pipes can go undetected and unreported for decades, if not forever.**
  - ✓ 102 of 104 of our nation's nuclear plants contaminated groundwater with radiation.
  - ✓ Exelon failed to fully disclose and address radioactive water contamination at some of its other nuclear plants. It appears the same thing may be going on at Limerick,. jeopardizing public drinking water and public health.
- **The Extent Of Limerick's Radioactive Groundwater Contamination Cannot Be Accurately Determined With 15 Monitoring Wells In This Type of Aquifer.**
  - ✓ Limerick Nuclear Plant is located in a fractured bedrock aquifer (Brunswick Formation). Research on this kind of aquifer and statements from scientists during other ACE groundwater contamination investigations, said to accurately identify the extent of contamination off site, wells would need to be placed about 1 foot apart and stacked.

- **Questionable Placement By Exelon, the company with a vested interest in the outcome** Exelon's diagram Reveals:
  - ✓ NO Monitoring Well SSE
  - ✓ Only 1 close to the site S
  - ✓ Only 1 close to the site SE

## **Radiation In Groundwater Could Contaminate Off-Site Wells.**

### **Radioactive leaks from Limerick could impact region's residents, now or in the future.**

- **Limerick operated since 1985. Limerick's 26 year old buried pipes, carrying highly radioactive and corrosive chemicals are vulnerable to leaks.**
- **A 20-year license extension to operate until 2049 would allow 36 years more years of transport (60 years total) of highly radioactive and corrosive chemicals. Think what happens to pipes in older homes that aren't even exposed to that kind of risk.**

**It's virtually impossible to detect all leaks in miles of pipes tangled beneath the plant. Monitoring can easily fail to detect leaks.** Under Limerick is a fractured bedrock aquifer where radioactive contamination can travel in any direction, at any depth, and fail to ever be detected.

- Reliable monitoring would be prohibitively costly. The only way to minimize future drinking water threats from Limerick's radioactive groundwater is to close Limerick.

## **Prevention is the only cure.**

### **There's no way to clean it up from the ground.**

- Once the groundwater becomes radioactive, it is virtually impossible to completely clean up.
- There are countless residents whose properties could become virtually worthless due to radioactive contaminated groundwater caused by leaks and spills at Limerick.
- Filtering is cost prohibitive for many residents. History shows Exelon won't pay to filter. It may be virtually impossible to filter out from sinks and showers, all of the 100 to 200 radionuclides that are associated with producing nuclear power.

## **Limerick should be closed to avoid further radioactive groundwater contamination.**

**There's cause for concern, precaution, and prevention now, before Exelon is permitted to operate Limerick Nuclear Plant for a total of 60 years.**

None of the 102 nukes that leaked operated more than 41 years.

**For detailed information on issues discussed above contact ACE**

# **Radioactive Contaminated Groundwater Under Limerick Was Clearly Caused By Limerick Nuclear Plant**

**April 27, 2010 Letter From Exelon to NRC**

**RE: Limerick Nuclear Plant's  
2009 Annual Radiological Environmental Operating Report**

## **➤ Exelon Admits Radiation From Limerick Nuclear Plant Was Found In Groundwater and Soil**

1. Exelon admits Cesium-137 was found in sediment and attributable to Limerick Nuclear Plant "liquid releases".
2. Exelon admits Tritium was found in 3 of 15 groundwater monitoring locations.

### **Issues Regarding Exelon's "Admission"**

#### **Of Radioactive Contamination of Groundwater and Soil at Limerick:**

- A. It is ludicrous to claim Tritium and Cesium-137 are the only radionuclides in the groundwater and soil resulting from Limerick Nuclear Plant leaks. A broad range of radionuclides are associated with nuclear plant operations. Many other radionuclides should be in groundwater and soil due to radioactive leaks.
- B. Exelon, the company with a vested interest in the outcome controls the monitoring protocol, testing, and reporting. We can't trust Exelon, a company that failed miserably in providing full and timely disclosure about radioactive water contamination due to other nuclear plants they owned in Illinois and New Jersey.
- C. Miles of pipeline are under Limerick carrying highly radioactive and potentially corrosive liquids.
  - ✓ After 25 years of operation, underground radioactive leaks into groundwater could go undetected for long periods of time, possibly forever, and spread off site into residential wells. That may have already happened. We have only Exelon's unreliable claim that verified contamination of groundwater has not spread.
  - ✓ The Limerick Nuclear Plant site is over 600 acres.
  - ✓ There are only 15 monitoring wells - approximately 1 for every 40 acres.
  - ✓ Hundreds of stacked monitoring wells would be needed to detect all potential groundwater contamination from miles of underground pipes, especially in this fractured bedrock aquifer.
- D. Exelon has failed to completely clean up radioactive contamination of water due to their other plants elsewhere. About radioactive contamination at Limerick, Exelon says, "There are no commitments in this letter".
- E. Radioactive contamination of groundwater can't really be cleaned up or completely filtered out. Vast numbers of residential wells in the region could eventually become contaminated, as radioactive groundwater contamination spreads.

NRC Documents  
Prove Limerick Had Radioactive Leaks and Spills  
And That The Ground Water Is Radioactive.

## **The List That ACE Knows About Of Leaks and Spills At Limerick Nuclear Plant**

### **Exelon Admitted To: 4 Radioactive Leaks Over 20 years (1986 to 2006)**

October 2, 2006 Mercury article by Evan Brandt also suggests Limerick leaked. Exelon's final results of a study, said, "**Limerick is not "actively" leaking radioactive tritium into groundwater or surface water.**"

- ✓ Tritium was found in 6 water samples taken from on-site wells at Limerick and in 1 surface water sample.
- ✓ Exelon said the higher levels are the result of "historic releases".

Exelon spokeswoman Rapczynski described the "historic releases" as

**4 "unplanned liquid releases" of tritium that took place "over the past 20 years."**

She said "spills occurred "in isolated area on the plant property where you don't normally find tritium," and claimed they were all reported to NRC and DEP.

Rapczynski said Limerick releases "highly diluted" tritiated water into the Schuylkill River. Both NRC and Exelon downplayed the levels of tritium found, dismissing a 2005 study by the National Academy of Sciences concluding that even low-levels of ionizing radiation, including tritium, pose a health risk if exposure occurs over a long period of time.

From Industry Groundwater Protection Initiative Voluntary Data Collection Questionnaire Sent to NRC from Exelon about Limerick.

➤ **March 2002, a Limerick Nuclear Plant steam evaporator leak discharged through the blow-down panel on the north side of the Turbine Building.**

- ✓ Exelon admits this radioactive liquid release had the potential to reach groundwater.
- ✓ As a result of the steam seal evaporator leak in March of 2002, 6 inches of gravel over an area of approximately 100 square feet was shipped to a licensed offsite radioactive waste disposal facility.

## From Limerick 2009 Groundwater Protection Program Report

Page 12

E. Leaks, Spills, and Releases

### **2-13-09 a LEAK from exterior walls of both U1 and U2 condenser bays was observed.**

- 1) Condensation from condenser bays was observed DRIPPING DIRECTLY TO OPEN GROUND AND ASPHALT.
- 2) Release to ground occurred for SIX DAYS - until catch containments were installed.
- 3) Radiation released was estimated.
- 4) Groundwater sampling identified Tritium in 1 down gradient well, MW-LM-9 at a concentration of 1750 pCi/L.
- 5) All data on the leaks along the condenser bay joints was added to Limerick's decommissioning file - 10 CFR 50.75(g).
- 6) 4-3-09 the radioactive water from the catch containments was released to Limerick's holding pond, which releases through the liquid effluent release point at outfall 001.
- 7) The catch containment water contained approximately 747 uCi of tritium.

### **This Radioactive Spill Continued For Six Days**

- **NO ACTIONS were required to recover or reverse groundwater plumes.**
- **NO investigations are on-going.**

**No Wonder Groundwater Under Limerick Is Radioactive**

**How Far Has Radioactive Groundwater Traveled Over 20 Years?**

**How Many Went Undetected and Unreported?**

## **Why Exelon's Groundwater Monitoring Can't Be Trusted**

At other Exelon nuclear plants, Exelon failed to provide full, accurate, and timely disclosure of leaking pipes and radioactive contaminated groundwater. Exelon failed to take immediate action when problems were found. Even when radioactive groundwater contamination could no longer be denied, Exelon didn't replace pipes immediately.

Exelon failed to report radiation leaks into water from their nuclear reactors for many years. Numerous repeated radioactive leaks went unaddressed over almost ten years at Exelon's Braidwood nuclear plant. Exelon also had radioactive leaks at their Dresden and Byron nuclear plants in Illinois. Some called it Exelon's "Radioactive Watergate".

### **Braidwood, Illinois**

**One shameful example of Exelon's deception and inaction that led to unnecessary health risks and diminished property value concerns.**

- 22 recurring uncontrolled radioactive spills from the same buried pipe went inadequately addressed and not fully disclosed from 1996 to 2005.
- Exelon supplied 600 people with bottled water for more than four years.
- For many years there was no bottled water and even after the bottled water was supplied people are still forced to shower, cook, brush their teeth, etc. with radioactive contaminated water.
- Clean-up of so much radioactive contamination in the ground is a farce.
- Exposure increases the risk of developing cancer, according to legal papers. Ironically, while illogically claiming there was no public health threat, March 13, 2010 it was reported Exelon paid a court settlement.
- A resident said, "it's scary to live here, but who in their right minds would buy homes here?"
- Some people questioned whether or not a \$1 million settlement to spend on some environmental projects makes up for damage caused by numerous radiation leaks discovered on and around nuclear power plants reported through the years.
- A mother of a teen battling cancer said, "If the cancer is in the air we breathe or the water we drank, I don't think there is enough money to go around. I know they admitted to the mistakes but how do you put a price tag on the environments."
- Exelon is also paying \$11.5 million to bring in a water system. Exelon is footing the bill for Godley residents to enjoy bottled water until the construction is complete.

### **Oyster Creek, New Jersey**

**Exelon failed to disclose radioactive leaks until 7 days after the Oyster Creek nuclear reactor was relicensed by NRC.** In 2009 Exelon disclosed radioactive water leaking from buried pipes 7 days after NRC re-licensed this oldest nuclear plant in the U.S. Either NRC was duped by Exelon or NRC was complicit. Either is unacceptable.

➤ **This seriously damages trust in Exelon and NRC's credibility in its reviews for re-licensing.**

- **Radioactive water reached a major New Jersey aquifer (southern Jersey's main drinking water source), at concentrations 50 times higher than those allowed by law.**
- First reported April 9, 2009, the radioactive groundwater contamination is gradually moving toward wells in the area at 1 to 3 feet a day.
- Corrosion caused the reactor's crucial safety liner to rust and thin. How long were there undetected / unreported leaks? Is this happening at Limerick?
- NJDEP is taking aggressive action to safeguard water and hold Exelon accountable for this leaky 40 year old plant.
- The wait and see approach in response to another 'trust us' from Exelon resulted in exactly what some feared, contamination of one of the most significant aquifers in the region.
- NRC has failed to suspend or withdraw Oyster Creek's license renewal.

## **Unaddressed Limerick Leak - Reported by Whistleblower.**

Exelon denied an unaddressed Limerick leak, even when ACE identified the fact that the information came from a document from Exelon's own files.

Exelon's document proved the leak at Limerick went unaddressed for many years, yet both Exelon and NRC first denied it ever existed.

A year later, ACE was told by NRC that the leak had been fixed.

Why We Can't Trust Exelon Monitoring, Testing, and Reporting

## **Elected Officials and Residents Expressed Their Concerns to ACE Officers - Regarding The Spread Of Limerick's Radioactive Groundwater Contamination.**

## **Many Wonder Why Exelon Bought Hundreds More Acres Of Land Bordering Limerick Nuclear Plant In Recent Years!**

## **Most Believe It Could Be Tied To Spreading Groundwater Contamination. This Tactic Has Been Used To Hide Groundwater Contamination At Other Sites.**

- **It Is Imperative For NRC To Do An Independent Evaluation Of Exelon's Groundwater Monitoring Placement and To Require An Independent Protocol For Groundwater Monitoring With Comprehensive Independent Testing For The EIS.**

**If there is no funding for that,**

- **Precaution Is Imperative. Limerick Should Be Closed To Avoid Spread Of Radioactive Groundwater.**

## **Exelon has been trying to unload property in East Coventry, bordering the site, across the river.**

**Homes originally ordered to be evacuated before Limerick was constructed, are now being unloaded on East Coventry.**

**ACE was asked by an East Coventry Supervisor to attend the meeting and provide a summary of our investigation.**

**Below is the ACE summary prepared for that meeting.**

January 10, 2011

**To: East Coventry Supervisors**

**From: The Alliance For A Clean Environment (ACE) (610) 326-2387**

**Re: Beware: Fricks Lock Lease, Purchase, or Gift from Exelon**

**We urge East Coventry Supervisors to postpone voting on any agreement with Exelon concerning Fricks Lock until you do an intensive investigation on all issues and threats that could potentially result in substantial legal and liability costs to East Coventry Supervisors, especially related to radioactive contamination of the site, both now and in the future.**

ACE compiled a body of evidence from vast amounts of information gathered from file reviews, FOIA, and NRC responses to our requests. We reviewed permits, dockets, research, and other documents over the past 10 years that suggest leasing, buying, or getting Fricks Lock for free is not in the best interests of East Coventry residents. The property is far too close to Limerick Nuclear Power Plant, likely a reason PECO purchased the property originally and people were moved out.

**The Fricks Lock property could be a ticking time bomb, especially related to radioactive contamination of water, soil, vegetation, and river sediment.** The Fricks Lock property has to be contaminated with many radionuclides, due to its close proximity to Limerick Nuclear Plant's routine radiation emissions, discharges, and accidental releases into the air, water, soil, and vegetation over the past 25 years. Over 100 radionuclides are associated with producing nuclear power. Some have short half-lives. Many remain dangerous virtually forever. Exelon's \$30,000 one time donation could, in the future, potentially prove to be a tiny fraction of potential costs to East Coventry residents as a result of leasing or owning Fricks Lock.

**Limerick's radiation emissions don't magically stop at Limerick's one mile exclusion area or the Limerick Nuclear Plant border.** Additive, cumulative, and synergistic harmful impacts from what already happened over the past 25 years of Limerick operations are unknown. Limerick's radiation is getting into our bodies. The closer to the plant, the greater the risk according to a study on baby teeth. The study measured a certain type of radiation only produced by nuclear plant operations or bomb testing. It shows children in our area had some of the highest levels of radiation in their baby teeth even

compared to other nuclear plants in the U.S. That same radionuclide was reported to be detected in milk, water, soil, and vegetation in Exelon's 2009 Annual Monitoring Report by Exelon.

- **PRIOR to signing any agreement with Exelon, we strongly encourage East Coventry Supervisors to hire an independent radiation expert, to determine actual harmful radioactive impacts after 25 years of operation, from all radionuclides, from all routes of exposure.**
- **Exelon should pay all costs for comprehensive radiation testing in all routes of exposure, BUT Exelon should have no input in hiring an expert, or the testing protocol, and or the report and conclusions.**

Limerick's on-going routine radiation emissions will continue to further contaminate the air, water, soil, and vegetation with a broad range of radionuclides as long as Limerick operates. Radioactive threats at Fricks Lock will increase. Exelon is planning to run the plant harder through Limerick Uprates (for which they tried to get our tax dollars), and longer through Exelon's attempted relicensing, beyond 2029 to 2049.

Exposure to ionizing radiation increases the risk of damage to cells, tissues, and DNA, potentially causing mutations, cancer, birth defects, and reproductive, immune, cardiovascular and endocrine disorders. Radioactive hydrogen and carbon, produced in great quantities, can be incorporated into protein, carbohydrate and fat molecules throughout the body. Fetuses and children are especially susceptible to radiation injury because of the rapid and abundant cell division in their bodies during growth. According to the National Research Council's BEIR VII report ("Health Risks from Exposure to Low Levels of Ionizing Radiation," 2005), no level of radiation exposure is harmless.

You should not accept or believe Exelon's conclusions related to risks. Exelon uses a 1984 Environmental Impact Statement, based on "estimates", from before Limerick ever started operating, to support their unsubstantiated claims. Exelon included those 1984 baseless conclusions in their request for a Limerick NPDES permit renewal, to be decided by DEP in 2011.

- **Exelon Can't Be Trusted To Provide Timely, Accurate Disclosure Of Radioactive Contamination or Numbers In Reporting.**  
**For Details See Attachment: "Why We Can't Trust Exelon"**

Other issues to consider:

**We believe siting Limerick Nuclear Plant next door to Fricks Lock decades ago has eliminated any safe use of this site as a "historical jewel" and that it would be irresponsible to lure people to the site for several important reasons.**

### **Accidents or Terrorist Attacks - A Major Financial Concern for East Coventry Related to Fricks Lock.**

It is unwise to turn a site one mile away from Limerick Nuclear Plant into a tourist attraction, where any terrorist could get close enough to Limerick to potentially end up causing a disaster. Terrorists have targeted nuclear plants. Limerick is one of the most heavily populated, making it a prime terrorist target.

- ✓ In reality, the Fricks Lock site should be heavily guarded, not turned into a tourist attraction.
- ✓ Who should pay for such security? Exelon, NOT East Coventry.

It is doubtful Exelon would pay for any of the Astronomical Costs that could result from damage and destruction on the Frick's Lock property associated with an accident or attack at Limerick Nuclear Plant. Taxpayers would pay all but \$11 Billion for almost a trillion dollars in costs of an accident or terrorist attack at Limerick. An accident or attack at Limerick could release tremendous amounts of radioactivity. Evidence shows such an event is not out of the question.

- ✓ NRC records suggest there have already been 2 near misses at Limerick.
- ✓ The longer and harder Limerick operates, the more risks we face. Limerick is extremely complex, with thousands of pumps, valves, motors and miles of electrical circuits. Therefore, human error, design flaws, and equipment malfunctions are common. All nuclear-power-plant systems, structures, components, procedures, and personnel are potential sources of failures and

malfunctions. Problems can arise from operational, and maintenance errors; from explosions and fires; from excessive corrosion, vibration, stress, heating, cooling, radiation damage, and other physical phenomena; from deterioration due to component aging, and from externally initiated events such as floods, earthquakes, tornadoes, and sabotage.

- ✓ Fires can cause great damage and even meltdowns at nuclear plants. Exelon is still failing to follow the most protective original fire safety requirements at Limerick.

An average reactor contains the equivalent long-lived radioactivity of at least 1,000 Hiroshima bombs.

- ✓ An accident or attack can be catastrophic, causing the release of tremendous amounts of radioactivity.

### **A Growing Lethal Legacy of High-Level Radioactive Wastes Stored Next To Fricks Lock.**

- ✓ Limerick storage of deadly high-level radioactive wastes will continue to grow next door to Fricks Lock as long as Limerick continues to operate.
- ✓ Radioactive waste is dangerous not only now, but some remains dangerous *virtually forever*. EPA has a million-year health standard for storing this waste.
- ✓ Each type of radioactive isotope continues to give off rays and radioactive particles at a constant rate regardless of the temperature, pressure, or chemical environment, until it decays into a different radioactive or stable isotope. Nothing can alter or stop this rate.
- ✓ NRC wants this waste stored in our backyard on site at Limerick for more than a century. Containers are only guaranteed for 50 years. There is no guarantee this dangerous waste could be removed to change containers.

### **RADIOACTIVE GROUNDWATER CONTAMINATION VERIFIED AT LIMERICK**

The real potential exists for groundwater at the site to be radioactive, now, or in the future. BEFORE you sign any agreement for a Fricks Lock lease, purchase, or gift, we strongly encourage you to do your own testing for radiation.

Limerick Nuclear Plant's radioactive leaks and spills already caused radioactive water contamination, verified in Exelon's 2009 Radiological Report. Pages 10 to 12

#### **Leaks, Spills, and Releases - 2/13/09 - Page 12 E. Exelon's 2009 Radiological Report**

- The 2/13/09 spill identified at Limerick, continued for six days. NO ACTIONS were required to recover or reverse groundwater plumes. NO investigations are on-going.

#### **October 2, 2006 Mercury**

- Exelon admitted Limerick had FOUR Unplanned Radioactive Releases which were reported over 20 years (1986 to 2006). Exelon admitted the March 2002 leak had the potential to reach groundwater.

#### **A. Radioactive Groundwater Results For Limerick Nuclear Plant**

- ✓ Gross Alpha - Detected In 9 of 15 Groundwater Monitoring Locations (dissolved)
- ✓ Gross Alpha - Detected In 5 of 15 Groundwater Monitoring Locations (suspended)
- ✓ Gross Beta - Detected In ALL 15 Groundwater Monitoring Locations (dissolved)
- ✓ Gross Beta - Detected In 3 of 15 Groundwater Monitoring Locations (suspended)
- ✓ Gamma Emitters Detected In 3 of 15 Groundwater Monitoring Locations
- ✓ Uranium 233/234 Detected In 4 of 5 Groundwater Monitoring Locations
- ✓ Tritium Radiation was found in Well MW-LR-9 as high as 1,750 pCi/L

Exelon's unsubstantiated claim that there is no pathway to drinking water appears to be disputed by their own facts on Page12)

Drinking Water Wells Within 1-Mile (Radius From Center Of Limerick)  
Well Survey Around Limerick Nuclear Plant (2006) Page 12

- ✓ 46 Domestic Withdrawal Wells
- ✓ 2 Industrial Wells
- ✓ 2 Commercial Wells
- ✓ 1 Institutional Well

B. Radioactive Contamination Results for Surface Water

- ✓ Gross Alpha - Detected - In 1 of 7 Surface Water Locations
- ✓ Gross Beta - Detected - In 6 of 7 Surface Water Locations

**Radioactive Groundwater Contamination Can Spread Off Site Contaminating Fricks Lock.**

- ✓ Limerick groundwater may have been contaminated for many years from the multiple verified spills and leaks.
- ✓ Radioactive contamination could have already traveled under the Schuylkill River to Fricks Lock.
- ✓ It can go undetected and unreported for decades, if not forever, jeopardizing the health of unsuspecting people.

Monitoring wells at Limerick are woefully inadequate to fully and accurately determine the extent of groundwater contamination. Only 15 monitoring wells have been placed on the 600 acre Limerick Nuclear Power Plant site by Exelon. See Attached Diagram  
(By comparison, 7 wells were installed around Oxy Superfund site's 24 acres of landfills.)

Exelon failed to fully disclose or stop its radioactive water contamination at its Illinois nuclear plant from 1986 to 2005, and ended up buying bottled water for over 600 families, not making any attempt to clean up the radioactive groundwater contamination.

Exelon's nuclear plant in New Jersey, Oyster Creek, contaminated southern Jersey's main drinking water source at concentrations 50 times higher than those allowed by law, and failed to fully disclose information on that radioactive water contamination until 7 days after NRC relicensed Oyster Creek.

**The Following Numbers of Radionuclides Were Reported By Exelon To Be ABOVE BACKGROUND In Exelon's Own 2009 Annual Radiological Report to NRC:**

- |                                      |                               |
|--------------------------------------|-------------------------------|
| ✓ Surface and Drinking Water         | - 12 Radionuclides (reported) |
| ✓ Air Particulate                    | - 6 Radionuclides (reported)  |
| ✓ Fish                               | - 9 Radionuclides (reported)  |
| ✓ Sediment and Broad Leaf Vegetation | - 8 Radionuclides (reported)  |
| ✓ Milk                               | - 5 Radionuclides (reported)  |

**Radioactive Threats Could Be Worse Than Exelon's 2009 Radiological Report Suggests**

Exelon dilutes samples. Exelon manipulated data, calculations, and manipulation of data, Issues to Consider For An Independent Radioactive Testing Protocol

- ✓ All testing equipment should be calibrated to detect the lowest possible detection level of each radionuclide tested.
- ✓ All levels of all radionuclides detected should be reported, not just those above what Exelon deceptively claims is background.

Many other radionuclides are not reported because they've been determined to be below background levels.

- ✓ Levels actually found in Exelon's radiation testing are not reported. For reporting in annual radiological testing, Exelon first subtracts background levels.
- ✓ This is a deceptive tactic that fails to accurately inform the public about radiation threats.
- ✓ Logic suggests background levels have been artificially raised as a result of Limerick's routine radiation emissions into the air, water, soil, and vegetation over the past 25 years.

Other deceptive tactics include "calculations" by Exelon, instead of actual measurements, and a range of excuses to avoid reporting on some sampling data that may show high levels.

**Permissible Does Not Mean Safe.**

Exelon may claim radiation levels are safe because they are within limits. As suggested above there are many tactics used to attempt to make such a claim.

In reality, any radiation levels detected in the routes of exposure at Fricks Lock present risks of harm to human health.

1. The National Academy of Sciences Biological Effects on Ionizing Radiation Report (BEIR VII) in 2005, said there is no safe level of radiation exposure. Radiation exposure can damage human cells at any level.
2. Low-level exposure over time has been found to be just as harmful as one high-level dose.
3. There has never been an attempt by anyone to determine the additive, cumulative, and synergistic health threats from continued exposure to all the different kinds of radionuclides associated with nuclear power production.

### **Limerick Nuclear Power Plant is Considered a Major Air Polluter Under Clean Air Act Health Based Standards.**

These toxics are in an aerosol form, so they are sized to be taken into the very deepest part of the lungs.

These nasty aerosols can cause major damage to health. They not only impact the lungs, they can cause heart attacks and strokes. This kind of air pollution increases hospitalizations and is believed to cause many deaths every year.

### **Limerick's Cooling Towers Spew Out A Nasty Witches' Brew of Toxic Chemicals.**

- ✓ East Coventry and other nearby communities are at the greatest risk from this dangerous air pollution.
- ✓ The closer to the source the greater the risk.
- ✓ Exelon recently, in essence, admitted cooling towers create too much air pollution, when they refused the request by New Jersey officials to build cooling towers on one of their nuclear plants in New Jersey.

### **Exelon recently requested and received from PA DEP an 8-fold increase in total dissolved solids which will lead to increases in this air pollution called Particulate Matter, PM-10. See attachment.**

It is our conclusion that Exelon's public relations people, while congenial, are trying to unload an Exelon liability that could seriously jeopardize East Coventry residents. Sometimes it seems Exelon's public relations people are programmed to ignore even common sense realities. Nuclear plant owners have a habit of trying to unload toxic liabilities. Some are trying to sell their entire nuclear plants.

**We strongly discourage East Coventry Supervisors from signing any agreement with Exelon, now or in the future, regarding the lease, purchase, or even gifting of Fricks Lock property. Given the severe liability risks, it is clearly in the best interests of every East Coventry resident, for Supervisors to reject this offer.**

For detailed information on any issues discussed in this summary, we invite any interested Supervisor to visit our office. You are welcome to review the thousands of pages of research, permits, and other information we have gathered over the past 10 years on the potential threats and harms facing our entire region, but especially East Coventry, from Limerick Nuclear Plant. [aceactivists@comast.net](mailto:aceactivists@comast.net) (610) 326-2387

## **We Are Concerned NRC Will Ignore Its Oversight Responsibility To Protect Public Health and Safety**

### **FAILURE To Require Clean-Up of Limerick's Radioactive Groundwater -**

NRC's records confirm there were radioactive leaks and spills at Limerick.

- ✓ NRC should have required complete clean-up to avoid radioactive groundwater reaching public drinking water wells very close to Limerick.
- ✓ NRC ignored its oversight and its enforcement responsibilities.
- ✓ Not only did NRC's oversight fail to prevent leaks and spills at Limerick, NRC failed to require complete clean-up, jeopardizing near-by drinking water.

**NRC's "Leak First and Fix Later" Policy Is An Unacceptable Threat to Groundwater and Public Drinking Water.**

- **Attached is the 6-23-10 Letter to NRC Expressing Our Concern About An Unfolding Radioactive Groundwater Disaster From Limerick and Other Nuclear Plants And NRC's Capitulation to the Nuclear Industry.**

NRC allows the nuclear industry to:

- Deceive the agency
- Cut corners
- Make up their own regulations
- Stall corrective actions or even avoid them to save money.

### **NRC Knew About Radioactive Groundwater At Nuclear Plants For 20 Years But Ignored Oversight and Enforcement Responsibility.**

1. NRC fact sheets call leaks at 102 nuclear plants a few.
2. NRC falsely claims huge radioactive leaks into groundwater are "minor".  
Vermont Yankee - Up to 2.7 million picocuries per liter. NOT minor.  
Illinois - Exelon bought bottled water for 600 people for 4 years. NOT minor.  
Oyster Creek - South Jersey's drinking water was contaminated at concentrations 50 times higher than allowed by law. NOT MINOR.
3. NRC misleadingly suggests leaks contain only one kind of radiation, tritium.

Reactors involve 100 to 200 radioactive chemicals. Not just one is leaking into groundwater. Radionuclides like strontium, cesium, iodine, and plutonium are also transported in underground pipes leaking radioactive wastewater into groundwater. All can cause cancer.

**4. NRC's attempts to trivialize health impacts from tritium by misleadingly stating that "tritium is a mildly radioactive isotope".**

Scientific studies show exposure to tritium is linked with higher cancer rates in humans. Tritium should be securely stored for hundreds of years or it can enter the human body by breathing, eating, and drinking (mostly from drinking water).

**5. NRC absurdly claims monitoring programs confirm the leaks do not affect public health and safety and the environment.**

There's a logical and reasonable expectation that public health and safety are unnecessarily jeopardized. Monitoring is a farce.

➤ **ACE believes thousands of residents relying on well water in the region deserve full and truthful disclosure. They need to know to protect their family's health!**

**In 2002 Greenpeace called NRC's regulation of the nuclear industry a "FARCE". They urged shut down of US nukes to "AVOID a TRAGEDY".**

➤ **We agree and urge NRC to shut down Limerick to avoid a tragedy in our region.**

June 23, 2010 - **ACE to NRC Branch Chief**

**RE: NRC's Capitulation To The Nuclear Industry About**

➤ **Potential For An Unfolding Radioactive Groundwater Disaster From Leaking Nuclear Plants**

**NRC's "Leak First and Fix Later" Policy**

➤ **An Unacceptable Threat to Groundwater and Public Drinking Water.**

- 102 of 104 US nuclear reactors are leaking radioactive water into groundwater from underground leaking pipes.
- NRC's policy failed to prevent radioactive leaking. NRC's policies are NOT protective and NOT acceptable.
- NRC should not relicense another nuclear reactor without requiring replacement of pipes.

**Major Concerns with NRC Policies**

➤ **NRC allows the industry to deceive the agency, cut corners, make up their own regulations, and stall corrective actions or even avoid them to save money.**

1. Buried pipe systems *carrying* radioactive water under U.S. nuclear reactors remain inaccessible, and therefore, largely uninspected and unmaintained.
2. Radioactive leaks into groundwater are inevitable and can go undetected and uncontained for long periods of time. Once radioactive groundwater spreads, it's too late.
3. Radioactive contaminated groundwater is already proven in Illinois, New Jersey, Vermont and others.
4. It's difficult, costly, and likely even impossible, to completely clean up contamination or filter all radionuclides out of drinking water.
5. **NRC Ignored its Oversight and Enforcement Responsibility. NRC should be mandating compliance with established requirements for control and monitoring of buried pipe systems carrying radioactive effluent.**
6. **Instead, NRC is ceding its responsibility to voluntary industry initiatives that will add 3 years on to a decades old environmental and public health risk problem. NRC turned its regulatory authority over to an industry that now plans to stall corrective actions for 3 years, for a decades old radioactive contamination problem.**
  - ✓ **Despite NRC efforts initiated in 1979 to prevent uncontrolled radioactive releases to groundwater, NRC is capitulating to an industry decision to take almost three more years before announcing an action plan.**
  - **Nuclear industry stall tactics will allow radioactive contamination to spread further and result in relicensing of leaky nuclear reactors. Oyster Creek example.**

It's difficult to understand why NRC assists the nuclear industry in deceiving the public about the reality of the radioactive threats to groundwater from leaking pipes under nuclear plants.

Both NRC and the nuclear industry have avoided full and truthful disclosure of leaks and radioactive groundwater contamination, fail to immediately stop leaking, and downplay and trivialize health risks.

NRC and the nuclear industry downplay and trivialize health risks of prolonged exposure to radiation in water, a known carcinogen, which cancer, causes genetic mutations, and birth defects. NRC's fact sheet are downright deceptive.

- **NRC calls 102 a few.**
  - ✓ 102 leaks are documented from 1963 thru 2009, with 15 from March 2009 to April 2010.
- **NRC falsely claims radioactive leaks into groundwater are "minor".**
  - ✓ January, 2010 levels up to 2.7 million picocuries per liter were reported at Vermont Yankee. That shouldn't be called "minor" by anyone, much less NRC.
  - ✓ Exelon bought bottled water for 600 people for 4 years in Illinois. Does NRC expect the public to believe that was for "minor" contamination?
  - ✓ Oyster Creek's radioactive contamination of groundwater is a major threat to South Jersey's drinking water. Radioactive water at concentrations 50 times higher than those allowed by law has reached a major New Jersey aquifer, southern New Jersey's main source of drinking water. Reported April 9, 2009, radioactive groundwater is gradually moving toward area wells at 1 to 3 feet a day.
- **NRC misleadingly suggests leaks contain only one kind of radiation, tritium.**
  - ✓ Reactors involve 100 to 200 radioactive chemicals. Not just one is leaking into groundwater.

- ✓ Radionuclides like strontium, cesium, iodine, and plutonium are likely transported in underground pipes leaking into groundwater. All can cause cancer.
- **NRC's attempts to trivialize health impacts from tritium by misleadingly stating "*tritium is a mildly radioactive isotope*".**
  - ✓ **Scientific studies show exposure to tritium is linked with higher cancer rates in humans.**
  - ✓ **Tritium should be securely stored for hundreds of years or it can enter the human body by breathing, eating, and drinking (mostly from drinking water).**
- **NRC illogically and absurdly claims its monitoring programs to confirm the leaks do not affect public health and safety and the environment.**

With significant documented radioactive contamination of drinking water in Illinois, New Jersey, and Vermont there's a logical expectation that public health and safety were unnecessarily jeopardized by NRC's failed policies and inadequate protection. We don't want the same thing to happen at Limerick that NRC allowed to happen at Oyster Creek.

**NRC's Irresponsible Policies Must Change, Starting At Limerick Nuclear Plant. Exelon is asking NRC for Limerick license extensions when in Illinois and New Jersey Exelon showed it can't be trusted to provide full and accurate timely disclosure of radioactive leaks under its nuclear plants.**

**Alliance For A Clean Environment**  
1189 Foxview Road Pottstown, PA 19465

June 23, 2010

**Paul Krohn, NRC Branch Chief**

NRC, Region 1  
475 Allendale Road  
King of Prussia, PA 19406-1415

**RE: Potential For An Unfolding Radioactive Groundwater Disaster From  
Leaking Nuclear Plants And NRC's Capitulation To The Nuclear Industry**

Dear Mr. Krohn,

At NRC's 5/25/10 meeting in Limerick, we asked questions related to what we believe could be a **potential unfolding radioactive groundwater disaster, related to pipes under U.S. nuclear plants which are leaking radiation into groundwater**. Responses at that meeting and our subsequent review of NRC's fact sheet on "Buried Pipes at Nuclear Reactors" are concerning. We have even more concerns about what could be going on at Limerick Nuclear Power Plant, now and in the future.

**U.S. nuclear reactors are documented to be leaking radiation into groundwater from aging and deteriorating underground pipes.** NRC attempted to downplay and trivialize this serious threat to groundwater, both at the meeting and in NRC's fact sheet. Our conclusion is that the public's interests are not being properly weighed in NRC's current policies, attitude, and actions regarding leaking U.S. nuclear reactors.

**NRC's "Leak First and Fix Later" Policy is an Unacceptable Threat to Groundwater and Public Drinking Water.** Evidence shows NRC's policy failed to prevent radioactive groundwater contamination from leaking pipes under 102 of 104 U.S. nuclear reactors. NRC's policies are NOT protective and NOT acceptable. Radioactive contaminated groundwater and soil realistically can't be completely cleaned up. Prevention is imperative. NRC policies must change immediately. NRC should not relicense another nuclear plant without requiring replacement of pipes under every 40-year old nuclear reactor.

**Major cause for concern with NRC policies:**

1. Buried pipe systems carrying radioactive water under U.S. nuclear reactors remain inaccessible, and therefore, largely uninspected and unmaintained.
2. Radioactive leaks into groundwater are inevitable and can go undetected and uncontained for long periods of time. Once radioactive groundwater spreads, it's too late.
3. Once radioactive contaminated groundwater reaches private or public water systems, already proven in Illinois, New Jersey, Vermont and others, it is difficult, costly, and likely even impossible, to completely clean up contamination or filter all radionuclides out of drinking water.

**It seems clear that for decades NRC ignored its oversight and enforcement responsibility at our nation's increasingly leaky nuclear power plants.**

4. NRC is ceding its responsibility to voluntary industry initiatives that will add years on to a decades old environmental and public health risk problem, clearly not in the best public interests.
  - ✓ Despite NRC efforts initiated in 1979 to prevent uncontrolled radioactive releases to groundwater, NRC is capitulating to an industry decision to take almost three more years before announcing an action plan.
5. NRC has turned over its regulatory authority to an industry that now plans to stall corrective actions for years to come, for a decades old radioactive contamination problem.
  - a. 3-year nuclear industry stall tactics will allow radioactive contamination to spread further.
  - b. 3-year industry stall tactics will allow more leaking nukes to be re-licensed.
    - ✓ Example: NRC recently re-licensed Oyster Creek for another 20 years. Seven days later, Exelon disclosed radioactive water leaking from buried pipes.
    - ✓ This absolutely discredits NRC's oversight and re-licensing process. Either NRC knew and covered it up, or NRC didn't know and should have.
    - ✓ How can we now trust NRC's re-licensing process for Limerick?

6. NRC should be mandating compliance with established requirements for the control and monitoring of buried pipe systems carrying radioactive effluent.

**It is difficult to understand why NRC assists the nuclear industry in deceiving the public about the reality of the radioactive threats to groundwater from leaking pipes under nuclear plants.** We are very concerned that this is developing into a hidden radioactive groundwater disaster, while both NRC and the nuclear industry avoid full and truthful disclosure of leaks and radioactive groundwater contamination, fail to immediately stop leaking, and downplay and trivialize the health risks. It is shameful that NRC and the nuclear industry downplay and trivialize the health risks of prolonged exposure to radiation, a known carcinogen, which also causes genetic mutations and birth defects.

**NRC's fact sheet gives us even less confidence in NRC's oversight of leaking pipes under U.S. nuclear plants.**

1. NRC diminishes its credibility in the 1st sentence of the fact sheet, stating, "several" reactors are contaminating groundwater, when evidence suggests 102 of our nation's reactors have leaked.
  - a. 102 is far more than several. 102 of our nation's 104 reactor units are documented to have had radioactive leaks from underground pipes into groundwater from 1963 through February 2009.
  - b. 15 radioactive leaks from buried pipe systems at 13 different reactor sites were reported just from March 2009 through April 2010. That's also more than several.
2. In the first sentence, NRC's fact sheet also makes the unsubstantiated and even false claim that leaks of radioactive material into groundwater are "minor".
  - a. Evidence shows leaks at some reactors are definitely NOT minor. It's callous disregard for public health for NRC to downplay and trivialize the health risks of prolonged exposure to the leaking radiation, a known carcinogen which is shown to cause cancer, genetic mutations, and birth defects.
  - b. "Minor" is a deceptive term that should not be used when it comes to radioactive contamination of drinking water, especially when radionuclides are difficult and costly, if not impossible, to filter out.
  - c. What NRC considers "Minor" could be major to the unborn, infants, and those who already have cancer and other serious health problems. Additive and cumulative harmful impacts are completely ignored in NRC's claim of "minor".

Furthermore, owners of the reactors with a vested interest in the outcome control all the monitoring, testing, and reporting. NRC has no independent data to make any definitive claim about levels. Some owners have already shown they shouldn't be trusted. Exelon and the Vermont Yankee owner demonstrated they distort the truth as long as they can, while radioactive groundwater contamination threats continue and get worse.

- a. Levels up to 2.7 million picocuries per liter reported at Vermont Yankee should not be called "minor" by anyone, much less NRC.
  - b. Exelon bought bottled water for 600 people for 4 years in Illinois. Does NRC expect the public to believe that was for "minor" contamination?
3. NRC also attempts to minimize radioactive groundwater threats from leaking nuclear plant pipes by misleading the public into believing the pipes are leaking only one kind of radiation, tritium.
    - a. Radioactive groundwater contamination at our nation's 102 nuclear plants is not only about tritium. Reactors create 100 to 200 radioactive chemicals. How are we to believe only one is leaking into groundwater?
    - b. For example, radionuclides such as strontium, cesium, iodine, and plutonium are likely also to be transported in underground pipes at nuclear plants and leaking into groundwater.
    - c. All can cause cancer. NRC should require independent testing for all radionuclides that are associated with each nuclear reactor.

4. NRC's fact sheet also deceptively attempts to trivialize health impacts from tritium. NRC's misleading fact sheet claims "*tritium is a mildly radioactive isotope*".
  - a. Scientific studies show that exposure to tritium is linked with higher cancer rates in humans.
  - b. Tritium should be securely stored for hundreds of years or it can enter the human body by breathing, eating, and drinking (mostly from drinking water).
  - c. Tritium has been shown to be present in groundwater around nuclear plants at levels far above that legally permitted.
  - d. Many believe permitted levels fall far short of protecting children (the most sensitive to the harm caused by radiation exposure), especially when considering the additive, cumulative, and synergistic impacts with all the other radionuclides that could be released with the leaks at nuclear plants.

**It is deplorable that NRC and the industry deceive the public about all the unaddressed radionuclides in the groundwater from leaking pipes under U.S. nuclear reactors and about the potential harmful health impacts from long-term exposure through ingestion of radioactive contaminated groundwater.**

**Simple review of a self-serving monitoring program by an industry that can't be trusted is obviously useless.** NRC's fact sheet misleadingly states, "*NRC reviews affected plants' groundwater monitoring programs to confirm the leaks do not affect public health and safety and the environment.*"

**Examples below document serious radioactive threats to groundwater and public water as a result of industry deception and NRC's failed policies and inadequate protection. NRC's reviews of nuclear industry monitoring programs have obviously been grossly ineffective and have failed to protect public health, safety, and the environment:**

1. Braidwood, Illinois – 22 recurring uncontrolled radioactive spills from the same buried pipe went undisclosed from 1996 to 2005. 600 people have been supplied bottled water by Exelon, owner of Braidwood, for more than four years. NRC obviously failed to protect public health, safety, and the environment. Bottled water did not eliminate threats.
  - ✓ For many years of contamination there was no bottled water.
  - ✓ People still shower, cook, brush their teeth, etc. with radioactive contaminated water. There was no clean up of radioactive contamination in the ground.
2. Vermont Yankee – January 2010, readings identified radioactive groundwater contamination from 700 picocuries per liter to 2.7 million picocuries per liter. That is not minor. Industry officials falsely reported that there were no buried pipes carrying radioactive water under the reactor. Yet, it appears NRC is still considering a 20-year license extension.
  - ✓ How is that protecting the environment, or public health and safety?
3. Oyster Creek, New Jersey - NRC recently re-licensed this oldest nuclear plant in the U.S. Seven days later Exelon disclosed radioactive water leaking from buried pipes.
  - ✓ Either NRC was duped by Exelon or NRC was complicit. Either is unacceptable.
  - ✓ This seriously damages NRC's credibility in its reviews for re-licensing.

➤ **NRC's Irresponsible Policies Must Change, Starting At Limerick Nuclear Plant.** Exelon is asking NRC for license extension. Exelon has shown in Illinois and New Jersey that it can't be trusted to provide full and accurate timely disclosure of radioactive leaks under its nuclear plants. We don't want the same thing to happen at Limerick that NRC allowed to happen at Oyster Creek.

➤ **Prevention and Precaution Are Imperative!** Prior to even considering a 20-year Limerick license extension, we call on NRC to require Exelon to replace all Limerick's aging pipes carrying radioactive water, preferably placed above ground, to more immediately see corrosion and deterioration in the future.

## Why Prevention and Precaution Are Imperative At Limerick Nuclear Plant

1. Limerick Nuclear Plant is located in a fractured bedrock aquifer. Therefore, groundwater contamination can spread in any direction.
  - a. In a fractured bedrock aquifer, such as that at Limerick, to accurately and fully determine the extent of off-site groundwater contamination there would have to be STACKED monitoring wells about a foot apart, around the entire perimeter of the site.
  - b. To protect the public's water, NRC must prevent Limerick from contaminating groundwater in the first place.
    - 1) On Limerick's 600 acre site, radioactive groundwater contamination could go completely undetected forever without stacked monitoring wells, every foot around the perimeter (which could be cost prohibitive).
    - 2) Exelon, an untrustworthy company with a vested interest in the outcome, controls the entire protocol for monitoring, testing, and reporting. Exelon could purposefully place monitoring wells where they know no contamination would be detected.
2. Once the region's groundwater is contaminated with radiation, it is too late to protect public health, wildlife, or the environment.
  - a. It is difficult, if not impossible, to filter out all the different radionuclides associated with Limerick's power production if the radioactive groundwater reaches:
    - 1) Vast numbers of residential wells surrounding Limerick Nuclear Plant, or
    - 2) Nearby public water wells, one approximately only 2 miles away.
  - b. Wildlife near Limerick was already identified with huge tumors.
  - c. Once contaminated with radiation, even if it was possible to clean up the groundwater or surrounding soil, it would also be cost prohibitive.
3. We can't trust Exelon to provide full, accurate, and timely disclosure of leaking pipes and radioactive contaminated groundwater, or to take immediate action when problems are found. Even when radioactive groundwater contamination can no longer be denied, Exelon has shown opposition to spending the money to replace pipes immediately.
  - a. With miles of pipeline under Limerick Nuclear Power Plant, there is no realistic way for NRC to actually see corrosion of old pipes with visual inspection.
  - b. NRC doesn't actually provide the public with independent monitoring, testing, or reporting. Reviews of Exelon's reports have proven to be unreliable verification.
4. Oyster Creek Nuclear Plant in New Jersey shows what happens when NRC fails to require precaution and prevention, or even immediate full disclosure. How could NRC possibly have determined just last year (2009) that Oyster Creek could operate safely for another 20 years and give it a license extension, when 7 days later this severe contamination threat was disclosed? How did NRC let this happen? This must be avoided at Limerick.
  - a. Radioactive water at concentrations 50 times higher than those allowed by law has reached a major New Jersey aquifer, southern New Jersey's main source of drinking water. Oyster Creek Nuclear Plant is a major threat to South Jersey's drinking water.
  - b. First reported April 9, 2009, the radioactive groundwater contamination is gradually moving toward wells in the area at 1 to 3 feet a day.
  - c. Corrosion left the reactor's crucial safety liner rusted and thinned. Leaking could have been going on for a long time unreported. This could be happening at many sites without being detected by NRC or reported by Exelon.
  - d. NJDEP is taking aggressive action to safeguard water and hold Exelon accountable for this leaky 40 year old plant, while NRC does not appear to even be suspending or withdrawing the license renewal.
  - e. As stated earlier, NRC was either fooled or complicit. Either is shameful and unforgivable. The wait and see approach in response to another 'trust us' from Exelon resulted in exactly what some feared, contamination of one of the most significant aquifers in the region.

**How can the public have any confidence in NRC's integrity and competence when NRC's fact sheet illogically claims - "Groundwater Monitoring Programs Confirm Leaks Do Not Affect Public Health, Safety, and the Environment", when that claim is unsubstantiated and detached from reality?** Facts about actual threats listed in this letter suggest NRC's monitoring program is a dismal failure at protecting public health, safety, and the environment. It is unacceptable for NRC to make unsubstantiated claims proven illogical and even false by reality, especially when relying only on industry generated reports and claims.

1. In reality, NRC can't access underground pipes to actually inspect them. NRC has little or no actual proof about whether all two to 20 miles of underground pipeline at each of our nation's nuclear reactors are already leaking or breaking down to such a degree that they will surely leak in the future.
  - a. In reality, groundwater and public drinking water in entire regions surrounding our nation's 104 reactors are at risk from radioactive contamination due to old pipes breaking down from corrosion and leaking.
  - b. The nuclear industry has failed to safely maintain or replace 25 to 40 year old underground pipes, that will eventually leak radiation into groundwater.

**NRC has failed to require the nuclear industry to replace 25 to 40 year old pipes, even before relicensing the reactors to run for another 20 years.** When documented leaks can no longer be denied by the industry, instead of requiring immediate replacement of leaking pipes, NRC allows stall tactics to be used by the industry.

**NRC allows the industry to deceive the agency, cut corners, make up their own regulations, and stall, time after time** In fact, it appears to us that NRC's fact sheet is little more than a cover-up and excuse for the nuclear industry to continue to make up its own reality, regulations and safety requirements regarding buried, leaking pipes under nuclear plants. Only after 20 years has NRC even begun to openly discuss the growing catastrophe.

**It's long past time for NRC to actually protect the public interests instead of the profits of the nuclear industry. Once water is contaminated with radiation, it's too late.** 102 of 104 of our nation's nuclear reactors are documented to have already leaked radiation into groundwater from buried pipe systems carrying radioactive water. These pipes largely remain inaccessible. In reality, they go uninspected and unmaintained.

- **As a condition to even apply for relicensing, NRC should be requiring replacement of all underground pipes carrying radioactive water.**
- **Wherever possible, new pipes should be placed above ground or near the surface where they can be more easily inspected by NRC.**

**ACE Is Requesting NRC To Provide Specific and Detailed Responses About Leaks in Pipes at Limerick Nuclear Power Plant, including past and present information.**

5/25/10 we asked if Limerick Nuclear Plant was one of the 102 nuclear reactors that leaked. Oddly, NRC couldn't seem to answer that question. An Exelon PR person first denied Limerick leaked, but later claimed she wasn't saying Limerick never leaked.

**We ask NRC to provide ACE with full and accurate disclosure on Limerick Nuclear Plant's underground pipes and radioactive leaks.**

1. **Did Limerick Nuclear Power Plant ever have leaking underground pipes?**

If the answer is yes,

- a. When did NRC first learn of the leak?
- b. How long could the leak have been going on undetected?

- c. How long did it take Exelon to fix the leak after NRC was informed?
  - d. How did Exelon fix the leak?
  - e. How did Exelon clean up contamination?
2. **How many miles of pipeline carry radioactive water at Limerick Nuclear Power Plant? Please provide independent verification of all radioactive pipelines at Limerick.**
  3. **How many miles of Limerick's pipeline carrying radioactive water are buried underground?**
  4. **Please explain how NRC accesses the miles of pipeline under Limerick for inspection.**
  5. **Please explain in detail how NRC can guarantee the public that all the miles of Limerick's pipelines are properly maintained.**
  6. **Please provide ACE with proof of NRC inspections and the protocol for those inspections - include dates, data, and correspondence.**

ACE requests detailed responses to all our questions about Limerick Nuclear Power Plant. Please do not refer us to the website for answers. Interested citizens living around Limerick Nuclear Plant deserve full and truthful disclosure from NRC.

ACE urges NRC to consider the potentially disastrous realities from nuclear reactors leaking radiation into groundwater across our nation. Clearly, this requires precaution and the requirement of 25 to 40 year old pipes to be replaced BEFORE even one more reactor is relicensed.

We request that this letter be posted on NRC's website in its entirety

Thank you,

Dr. Lewis Cuthbert  
ACE President

CC: Senator Casey  
Senator Specter  
Congressman Sestak  
Congressman Gerlach  
Congressman Dent  
Governor Rendell  
PA Senator Rafferty  
PA Senator Dinniman  
Representative Quigley  
Representative Hennessey  
Representative Vereb

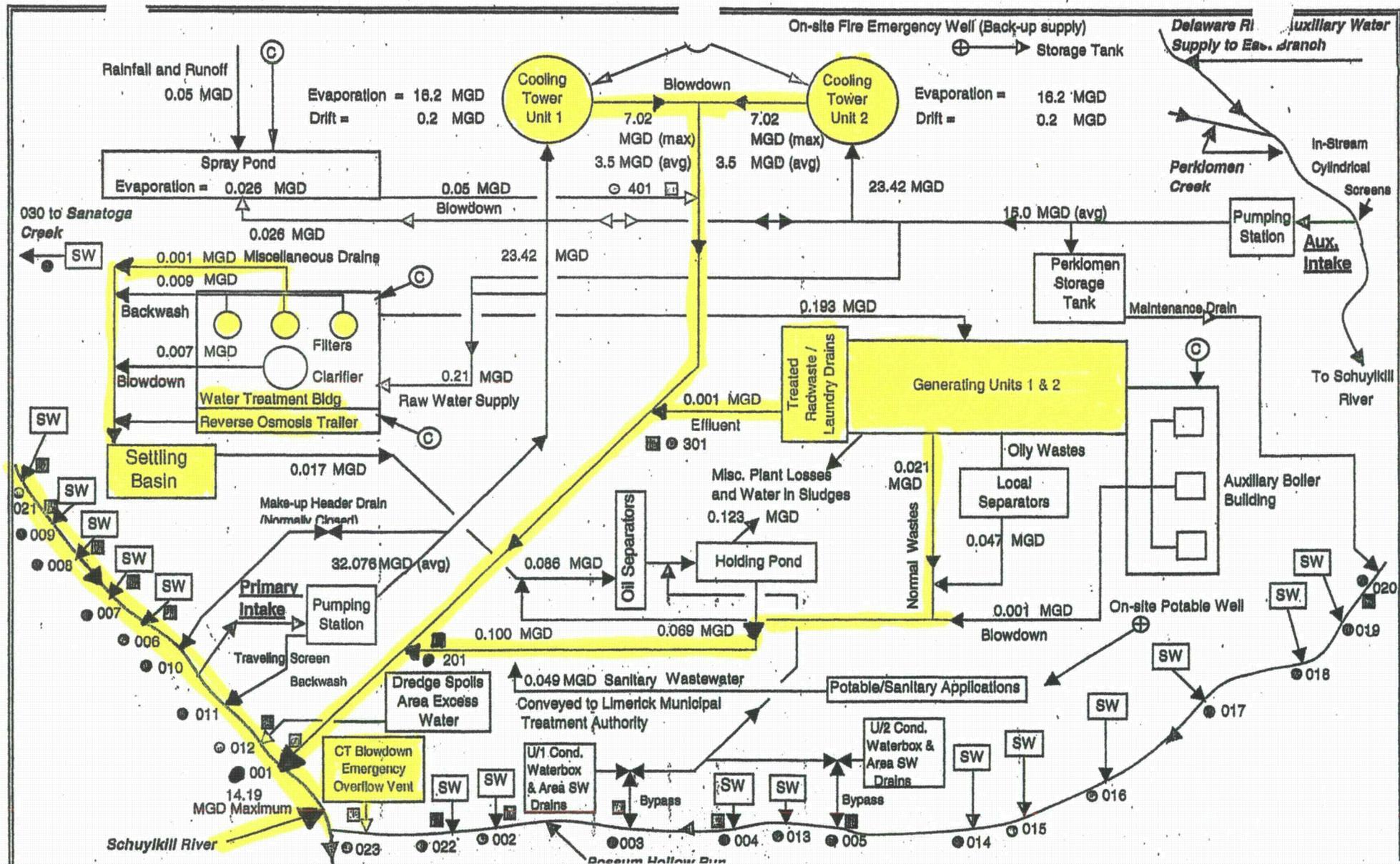
## **This Section Verifies Why Limerick Should Be Closed To Avoid A Potential Radioactive Groundwater Disaster:**

- 1. Countless Opportunities For Breakdowns and Radioactive Leaks Into Groundwater From Miles Of Buried Pipes Under Limerick.**
- 2. Groundwater Contamination From Limerick's Use of Over 92,000 to 192,000 Pounds PER DAY of Other Dangerous Toxic Chemicals.**
- 3. Radioactive and Other Hazardous Groundwater Contamination From Too Many Aging, Potential Eventual Leaking Storage Tanks.**
- 4. Domestic Water Wells Within 1 Mile Of The Center Of Limerick's Site.**
- 5. Homes, Gardens, and Milk Farms Too Close To Limerick.**
- 6. Evidence: Limerick Groundwater Contamination Is Not Just Tritium.**
- 7. Evidence: That Leaks Are Estimated And NOT Cleaned Up.**
- 8. Evidence: Limerick Contaminated Sediment With Cesium-137.**
- 9. Evidence: Limerick Leaks Had The Potential To Reach Groundwater.**
- 10. Why Exelon's 15 Groundwater Monitoring Wells Are Woefully Inadequate For 600 Acres In A Fractured Bedrock Aquifer.**
- 11. Evidence Shows Exelon's Monitoring Shouldn't Be Trusted To Verify Safe Drinking Water For Neighbors of Limerick Nuclear Plant.**

Exelon, Owner of Limerick Nuclear Plant, Controls All Groundwater Monitoring, Testing, and Reporting.

  - Exelon has a vested interest in the outcome.
  - Exelon failed to provide full and accurate disclosure about radioactive groundwater contamination from its nuclear plants elsewhere. Attachments explain in detail.

# Countless Opportunities For Breakdowns And Leaks Into Groundwater



# Over 94,293 to 192,614 Pounds Per Day Toxic Chemicals Used At Limerick Nuclear Plant

<u>Chemical Substance or Trade Name</u>	<u>Average / Maximum. Per DAY</u>	<u>Effluent</u>	<u>Detection</u>
• Sulfuric Acid	40,000 to 60,000 lbs Per Day	6 to 9 PH Units	.01 Standard PH
• Sodium Hypochlorite	16,000 to 58,000 lbs Per DAY	TRO Limits	50 as TRO
• Sodium Bromide	1,600 to 2,800 lbs Per DAY	TRO Limits	50 as TRO
• Foamtrol AF1441	450 to 900 lbs Per DAY	2-4 mg/l	CALCULATED
• AB Aquashade	450 to 900 lbs Per DAY	.02- .03 mg/l	20
• Inhibitor AZ8104	1,000 to 2,000 lbs Per DAY	8 -19 mg/l	CALCULATED
• Flogard MS6210	450 to 1,000 lbs Per DAY	3 -9 mg/l	CALCULATED
• Depositrol BL5400	160 to 320 lbs Per DAY	1-3 mg/l	CALCULATED
• Depositrol PY5204	2,000 to 3,000 lbs Per DAY	16 to 26 mg/l	CALCULATED
• Spectrus CT1300	1,200 to 2,000 lbs Per DAY	.20 mg/l	.052 mg/l
• Polyfloc AP1120	1.5 to 3 lbs Per DAY	.01 mg/l	CALCULATED
• Klaraid CDP1346	120 to 200 lbs Per DAY	.34 -.56	CALCULATED
• Depositrol BL5307	1,000 to 3,000 lbs Per DAY	.005 - .009	1000
• Continuum AEC3120	8 to 16 lbs Per DAY	.1 - .2	CALCULATED
• Spectrus DT 1400	4,690 to 9,520 lbs Per DAY	TSS Limit	200 at TSS
• Spectrus NX1100	1 to 2 lbs Per DAY	< 1 by dilution	CALCULATED
• Spectrus BD1500	1,000 to 1,500 lbs Per DAY	11-17 mg/l	CALCULATED
• Spectrus NX1103	20 to 120 lbs Per DAY	.01 mg/l	CALCULATED
• SURE-COOL 1393	240 to 321 lbs Per DAY	2-4 mg/l	organic phosphate test
• C-9	937 to 1,000 lbs Per DAY	4-9 mg/l	zinc test, .01 mg/l
• 3D TRASAR 3DT197	1,000 to 2,200 lbs Per DAY	3-19 mg/l	tolytriazole test, .01 mg/l
• 3D TRASAR 3DT 121	2,000 to 3,000 lbs Per DAY	11-25 mg/l	active polymer test, 6 mg/l
• 3D TRASAR 3DT 138	1,000 to 4,000 lbs Per DAY	.013 -.025 mg/l	same as above
• H-550	300 to 1,000 lbs Per DAY	.02-.05 mg/l	Gluteraldehyde test, 20ppm
• NALCO 7469	450 to 900 lbs Per DAY	4-8 mg/l	CALCULATED
• NALCO H150M	1,200 to 2,000 lbs Per DAY	3-5 mg/l	Active quat test, .020 mg/l
• NALCO 1315	14,370 to 28,560 lbs Per DAY	TSS Limit	Feed based on detox from H150M
• NALCO 8136	120 to 200 lbs Per DAY	.03-.06 mg.l	CALCULATED
• NALCO 73310	126 to 252 lbs Per DAY	1.4-2.8 mg/l	Nitrite test, 2 mg/l
• NALCO 73551	1,500 to 3,000 lbs Per DAY	10-20 mg/l	CALCULATED
• Ferroquest LP7200	600 to 600 lbs Per DAY	6.7 mg/l	CALCULATED
• Ferroquest LP7202	300 to 300 lbs Per DAY	3.4 mg/l	CALCULATED

# **RADIOACTIVE WASTEWATER AND CHEMICAL STORAGE**

## **AT LIMERICK NUCLEAR PLANT**

### **Just A Few Examples:**

- RADIONUCLIDES      1,312,320      Gallons      18      Tanks**
- ACID CHEMICALS      68,600      Gallons      20      Tanks**
- SULFURIC ACID      22,000      Gallons      2      Tanks**
- DIESEL      334,000      Gallons      16      Tanks**

# **Limerick's RADIOACTIVE Groundwater**

**From Leaks And Spills Over Decades (2009 Radiological Monitoring Report)**

## **WELLS WITHIN 1 MILE**

**From The Center Of The Limerick Nuclear Plant Site**

- 46** Domestic Withdrawal Wells
- 13** Residences LESS Than 1 Mile From Reactor Building
- 3** Homes 1 Mile From Reactor Building
- 2** Commercial Wells

**175 Feet From Reactor - 1 Potable Water Supply Well - Who Uses It?**

## **Is Radiation In Drinking Water?**

# **Distance**

## **From Limerick Reactor Building**

### **Homes**

- ✓ **13 Residences are LESS than 1 mile from Limerick's Reactor Building.**
- ✓ **3 Homes are 1 mile from Reactor Building.**

### **Gardens**

- ✓ **4 Gardens are LESS than 1 mile from Reactor**
- ✓ **8 Gardens are 1 to 2 Miles from the Reactor**
- ✓ **3 Gardens are Within 3 Miles from the Reactor**

### **Milk Farms**

- ✓ **3 Milk Farms are 2 to 3 Miles from the Reactor**
- ✓ **2 Milk Farms are 4 to 5 Miles from the Reactor**

distance and direction of all locations from the LGS reactor buildings were positioned using Global Positioning System (GPS) technology. There were no changes required to the LGS REMP, as a result of this survey. The results of this survey are summarized below.

Sector	Distance in miles from the LGS Reactor Buildings		
	Residence Miles	Garden Miles	Milk Farm Miles
1 N	0.6	1.8	4.7
2 NNE	0.5	1.8	-
3 NE	0.7	3.4	-
4 ENE	0.7	2.7	-
5 E	0.6	2.4	-
6 ESE	0.5	0.3	-
7 SE	0.7	0.2	-
8 SSE	1.0	1.3	-
9 S	1.0	1.2	4.2
10 SSW	0.8	1.0	2.0
11 SW	1.0	1.0	-
12 WSW	0.6	2.3	2.7
13 W	0.7	0.8	2.8
14 WNW	0.7	0.7	-
15 NW	0.7	1.6	-
16 NNW	0.7	1.3	-

**G. Summary of Results – Inter-laboratory Comparison Program**

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices for 18 and 14 analytes, respectively (Appendix E). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's MAPEP, were evaluated against the following pre-set acceptance criteria:

**1. Analytics Evaluation Criteria**

Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

**2. ERA Evaluation Criteria**

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, NELAC, state specific PT program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

# Limerick 2009 Groundwater Protection Program Report

***This Is Proof***

## **Groundwater Is Radioactive**

### **At Limerick Nuclear Plant**

Page 10

#### ➤ **12 Radionuclides Were Reported in Groundwater and Surface Water.**

##### **A. Groundwater Results**

Tritium - Groundwater From 15 locations - Well MW-LR-9 had the highest level -1,750 pCi/L

- ✓ Exelon claims there is no drinking water pathway  
*(But that claim appears to be disputed by their own facts on Page12)*

##### **Gross Alpha and Gross Beta were Found in Groundwater Surface Water Samples**

- ✓ **Gross Alpha (dissolved) Detected - In 9 of 15 Groundwater locations**
- ✓ **Gross Alpha (suspended) Detected - In 5 of 15 Groundwater locations**
- ✓ **Gross Beta (dissolved) Detected - In ALL 15 Groundwater locations**
- ✓ **Gross Beta (suspended) Detected - In 3 of 15 Groundwater locations**

**Gamma Emitters Detected In 3 of 15 Groundwater locations**

**Uranium 233/234 Detected In 4 of 5 Groundwater monitoring locations**

Page 12

#### **DRINKING WATER - Well Survey Around Limerick Nuclear Plant (2006)**

##### **Within 1-Mile (Radius From Center Of Limerick)**

- ✓ **46 Domestic Withdrawal Wells**
- ✓ **2 Industrial Wells**
- ✓ **2 Commercial Wells**
- ✓ **1 Institutional Well**
  
- ✓ **Limerick has 1 Potable Water Supply Well - 175 FEET from Reactor Building**  
**Limerick Station has 1 Fire Water Well - 500 Feet from cooling towers**

##### **B. Surface Water Results**

- ✓ **Gross Alpha (dissolved) Detected - In 1 of 7 surface water locations**
- ✓ **Gross Beta (dissolved) Detected - In 6 of 7 surface water locations**

From Exelon 2009 Radiological Report to NRC for Limerick Nuclear Plant

**Look What Happened From Just One Limerick Leak 2-19-09**

# **Limerick Radioactive Leak Tracking**

- **Radioactive Dripping Continued For SIX DAYS - Directly to Open Ground and Asphalt**
- **Radiation Releases Were ESTIMATED**
- **Groundwater Monitoring Well Sampling Found Tritium at 1750 pCi/L  
In A Down-Gradient Well - It is unclear if any other radionuclides were tested.**
- **NO ACTIONS Were REQUIRED To Recover or Reverse Groundwater Plumes**
- **4-3-09 - Radioactive Water Collected From The Catch Containments was Released  
Through the Liquid Effluent Release Point At Outfall 001.**
- **Data On Leaks Was Added To Limerick's Decommissioning File.**
- **NO Investigations Are On-Going  
The Extent Of Groundwater Contamination Is Unknown.**

**From Exelon to NRC - April 27, 2010 Letter  
Regarding Limerick Nuclear Plant's  
2009 Annual Radiological Environmental Operating Report**

➤ **Exelon Admits Radiation  
From Limerick Nuclear Plant  
Was Found In Groundwater and Soil**

- 1. Exelon admits Tritium was found in 3 of 15 groundwater monitoring locations.**
- 2. Exelon admits Cesium-137 was found in sediment and attributable to Limerick Nuclear Plant "liquid releases".**

**Issues Regarding Exelon's Admission of Radioactive Contamination of Groundwater and Soil at Limerick:**

- A. It is ludicrous to claim Tritium and Cesium-137 are the only radionuclides in the groundwater and soil resulting from Limerick Nuclear Plant leaks. A broad range of radionuclides are associated with nuclear plant operations. Many other radionuclides should be in groundwater and soil due to radioactive leaks.
- B. Exelon, the company with a vested interest in the outcome controls the monitoring protocol, testing, and reporting. We can't trust Exelon, a company that failed miserably in providing full and timely disclosure about radioactive water contamination due to other nuclear plants they owned in Illinois and New Jersey
- C. Miles of pipeline are under Limerick carrying highly radioactive and potentially corrosive liquids.
  - ✓ After 25 years of operation, underground radioactive leaks into groundwater could go undetected for long periods of time, possibly forever, and spread off site into residential wells. That may have already happened. We have only Exelon's unreliable claim that verified contamination of groundwater has not spread..
  - ✓ The Limerick Nuclear Plant site is over 600 acres.
  - ✓ There are only 15 monitoring wells - approximately 1 for every 40 acres.
  - ✓ Hundreds of stacked monitoring wells would be needed to detect all potential groundwater contamination from miles of underground pipes, especially in this fractured bedrock aquifer.
- D. Exelon has failed to completely clean up radioactive contamination of water due to their other plants elsewhere. About radioactive contamination at Limerick, Exelon says, "There are no commitments in this letter"
- E. Radioactive contamination of groundwater can't really be cleaned up or completely filtered out. Vast numbers of residential wells in the region could eventually become contaminated. as radioactive groundwater contamination spreads.

**Industry Groundwater Protection Initiative  
Voluntary Data Collection Questionnaire**

- o Dearator Feed Tank for tritium. Any identified tritium is reported using the corrective action program.

**2. Briefly describe the program and/or methods for monitoring onsite groundwater for the presence of radioactivity released from plant operations.**

- LGS has fifteen (15) onsite groundwater monitoring wells that will be periodically sampled and analyzed for radionuclides.
- The Lower Limits of Detection (LLDs) used during the fleet wide assessment were:

Nuclide	Typical MDA (pCi/l)
Tritium (H-3)	200
Total Strontium – 89/90	2
Manganese (MN-54)	15
Ferrous Citrate (FE-59)	30
Cobalt (CO-58)	15
Cobalt (CO-60)	15
Zinc (ZN-65)	30
Zirconium (ZR-95)	15
Niobium (NB-95)	15
Cesium (CS-134)	15
Cesium (CS-137)	18
Barium (BA-140)	60
Lanthanum (LA-140)	15

**3. If applicable, briefly summarize any occurrences of inadvertent releases of radioactive liquids that had the potential to reach groundwater and have been documented in accordance with 10 CFR 50.75(g).**

- • The Limerick Station records inadvertent release of radioactive liquids in accordance with 10 CFR 50.75(g). As part of the fleet wide assessment, a third party environmental engineering firm was contracted to evaluate historic releases, if any, and determine if a potential pathway to the environment existed. Those releases that were determined to have potentially impacted groundwater were subsequently investigated as part of the fleet wide assessment. Based on the results of the hydrogeologic investigation, the historical releases that may have impacted a current impact on the groundwater are:

- o A steam seal evaporator leak in March 2002 that discharged through the blow-down panel on the north side of the Turbine Building.

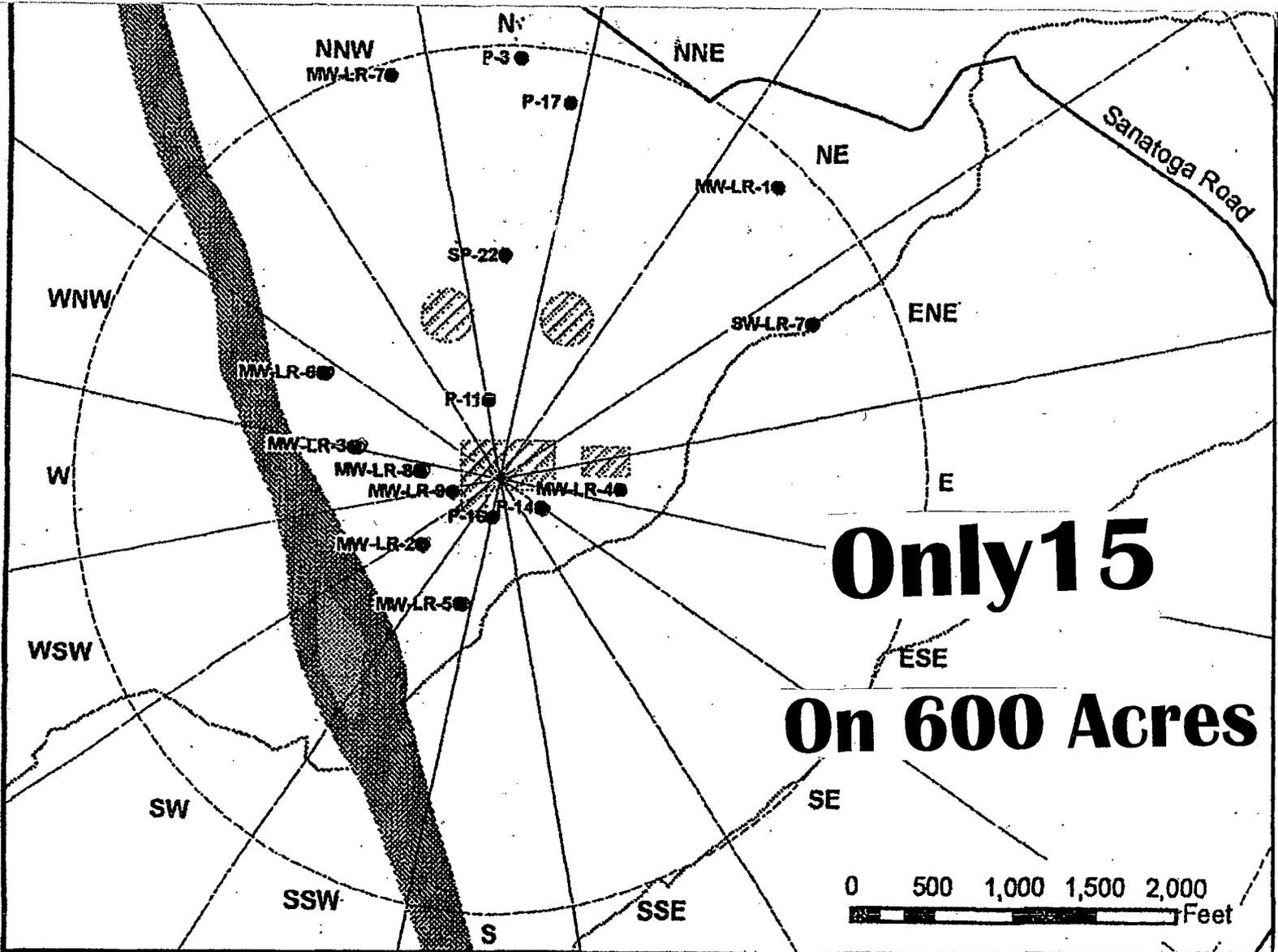
- A copy of the detailed Limerick hydrogeologic investigation report will be provided to the NRC.

**Industry Groundwater Protection Initiative  
Voluntary Data Collection Questionnaire  
Plant: Limerick Generating Station**

**1. Briefly describe the program and/or methods used for detection of leakage or spills from plant systems, structures, and components that have a potential for an inadvertent release of radioactivity from plant operations into groundwater.**

- As part of a fleet-wide systematic assessment, Limerick Station performed a technical review of each plant system and structure to determine if inadvertent releases from these systems could potentially impact the environment. Each system was evaluated and those system components that contain or could potentially contain radioactively contaminated liquids were identified and assessed to determine if a potential pathway to the environment existed. A cross-functional collegial team made up of personnel from Operations, Engineering, Chemistry, and Radiation Protection performed the technical review.
- The plant systems, structures, processes, and components that have a potential for an inadvertent release are routinely monitored to detect leakage or spills through an expansive radiation monitoring system (RMS), operator rounds and employee observations. Additionally, engineering control systems such as secondary containment, spill prevention, overflow detection and leak detection are used to detect and prevent releases from entering the environment.
- Examples of the surveillance programs and engineering controls employed at Limerick are provided below:
  - The LGS plant has a building foundation ground water collection system to collect ground water from around plant structures. Groundwater collected from this system is routed to a holding pond that is regularly sampled and analyzed for radionuclides.
  - The LGS plant has an operable Spent Fuel Leakage Detection system that is used to monitor for leakage from the spent fuel pools.
  - Operations personnel perform routine surveillance rounds each shift. These rounds include the requirement to identify and report leaks and spills. Leaks and spills are addressed through: immediate clean-up, notifying supervision for assistance, writing a work request or initiating a Corrective Action Report.
  - Engineers perform periodic walk downs of the systems for which they are responsible. These rounds include the requirement to identify and report leaks and spills. Leaks and spills are addressed through: immediate clean-up, notifying supervision for assistance, writing a work-request or initiating a Corrective Action Report.
  - Chemistry personnel routinely sample and analyze Condensate Storage Tank (CST) & Refueling Water Storage Tank (RWST) dikes, the Ultimate Heat Sink (Spray Pond), both units Cooling Towers and the Auxiliary Boiler.

# Limerick Nuclear Plant Radioactive Groundwater Monitoring Wells



## Limerick 2009 Groundwater Protection Program Report

The Figure 1 Graphic  
A-2

### ***ACE Believes This Diagram Highlights The Inadequacy and Questionable Placement of Exelon Monitoring Wells on the Limerick Nuclear Plant Property.***

Limerick is located in a fractured bedrock aquifer (Brunswick Formation), which some scientists have said is difficult to monitor to accurately identify contamination which can travel in any direction in this kind of aquifer.

Research on this kind of aquifer suggests that to identify the true extent of radioactive contamination, the monitoring wells would need to be stacked, and about one foot apart around the entire perimeter of the 600 acre site to accurately determine the extent of contamination.

While investigating other sites, the polluters' scientists claimed that the contamination would travel South, Southeast, which is also the direction of the flow of the Schuylkill River.

NOTE on Exelon's diagram of Limerick Monitoring:

- ✓ **NO Monitoring Well SSE**
- ✓ **Only 1 close to the site S**
- ✓ **Only 1 close to the site SE**

The attached diagram suggests it is ludicrous for anyone to believe we know the full extent of Radioactive Groundwater Contamination from Limerick Nuclear Plant's leaks, spills, releases, and routine operations.

## **Why Exelon's Groundwater Monitoring Can't Be Trusted**

At other Exelon nuclear plants, Exelon failed to provide full, accurate, and timely disclosure of leaking pipes and radioactive contaminated groundwater. Exelon failed to take immediate action when problems were found. Even when radioactive groundwater contamination could no longer be denied, Exelon didn't replace pipes immediately.

Exelon failed to report radiation leaks into water from their nuclear reactors for many years. Numerous repeated radioactive leaks went unaddressed over almost ten years at Exelon's Braidwood nuclear plant. Exelon also had radioactive leaks at their Dresden and Byron nuclear plants in Illinois. Some called it Exelon's "Radioactive Watergate".

### **Braidwood, Illinois**

**One shameful example of Exelon's deception and inaction that led to unnecessary health risks and diminished property value concerns.**

- 22 recurring uncontrolled radioactive spills from the same buried pipe went inadequately addressed and not fully disclosed from 1996 to 2005.
- Exelon supplied 600 people with bottled water for more than four years.
- For many years there was no bottled water and even after the bottled water was supplied people are still forced to shower, cook, brush their teeth, etc. with radioactive contaminated water.
- Clean-up of so much radioactive contamination in the ground is a farce.
- Exposure increases the risk of developing cancer, according to legal papers. Ironically, while illogically claiming there was no public health threat, March 13, 2010 it was reported Exelon paid a court settlement.
- A resident said, "it's scary to live here, but who in their right minds would buy homes here?"
- Some people questioned whether or not a \$1 million settlement to spend on some environmental projects makes up for damage caused by numerous radiation leaks discovered on and around nuclear power plants reported through the years.
- A mother of a teen battling cancer said, "If the cancer is in the air we breathe or the water we drank, I don't think there is enough money to go around. I know they admitted to the mistakes but how do you put a price tag on the environments."
- Exelon is also paying \$11.5 million to bring in a water system. Exelon is footing the bill for Godley residents to enjoy bottled water until the construction is complete.

### **Oyster Creek, New Jersey**

**Exelon failed to disclose radioactive leaks until 7 days after the Oyster Creek nuclear reactor was relicensed by NRC.** In 2009 Exelon disclosed radioactive water leaking from buried pipes 7 days after NRC re-licensed this oldest nuclear plant in the U.S. Either NRC was duped by Exelon or NRC was complicit. Either is unacceptable.

- **This seriously damages trust in Exelon and NRC's credibility in its reviews for re-licensing.**
- **Radioactive water reached a major New Jersey aquifer (southern Jersey's main drinking water source), at concentrations 50 times higher than those allowed by law.**
- First reported April 9, 2009, the radioactive groundwater contamination is gradually moving toward wells in the area at 1 to 3 feet a day.
- Corrosion caused the reactor's crucial safety liner to rust and thin. How long were there undetected / unreported leaks? Is this happening at Limerick?
- NJDEP is taking aggressive action to safeguard water and hold Exelon accountable for this leaky 40 year old plant.
- The wait and see approach in response to another 'trust us' from Exelon resulted in exactly what some feared, contamination of one of the most significant aquifers in the region.
- NRC has failed to suspend or withdraw Oyster Creek's license renewal.

## **Unaddressed Limerick Leak - Reported by Whistleblower.**

Exelon denied an unaddressed Limerick leak, even when ACE identified the fact that the information came from a document from Exelon's own files.

Exelon's document proved the leak at Limerick went unaddressed for many years, yet both Exelon and NRC first denied it ever existed.

A year later, ACE was told by NRC that the leak had been fixed.

# List of Radiation Leakers In What Some Call **"Exelon's Radioactive Watergate"**

A Chicago News Report stated:

**Years of radioactive waste water spills from Illinois nuclear power plants have fueled suspicions the industry covers up safety problems. US nuclear plant leaks fuel health concerns.**

Paul Gunther from NIRS says,

**"The way information is leaking out about Tritium Radiation Leaks from 5 of Exelon's Nuclear Power Plants is as disturbing as radiation leaks themselves. Disclosed leaks are just the tip of the iceberg."**

4 were found in Illinois, and 1 was identified in Arizona.

## To Prevent Unnecessary Harm To The Environment and Public Health.

### Exelon

#### Should Have Fully Disclosed Leaks And Spills Many Years Ago

1. Braidwood in Ill. – Tritiated water is diluted and released 2 to 3 times a week from into the Kankakee River.
  - Tritium weekly state river water testing began in 1994
  - Releases were not halted until November, 2005
  - Reported 2/23/06
  - Exelon is searching for ways to dispose of and discharge less tritium.
  - Meanwhile, Exelon is now storing tritium on site.
2. Wilmington Ill – Tritium in water supply from four spills between 1996 and 2003
  - Elevated levels of tritium in groundwater outside the plant boundaries.
  - Exelon failed to immediately disclose spills
  - Annual water bills note tritium often in Wilmington water
  - 1990 water in deep wells contained radium, a carcinogen that can be a breakdown product of uranium
3. Dresden Generating Station, Ill. – Tritium found in private off-site wells.
  - 650,000 gallons of water containing tritium leaked into the groundwater from underground pipes near the center of Exelon's 1, 782- acre site.
  - Leak discovered in the fall, 2004 is the second in recent years.
  - Tritium was measured in 3 off-site private wells south of the Dresden plant at levels higher than normal background after the 2004 leak
4. Byron Nuclear Generating Station, Ill. Tritium leak into vaults.
  - 5 of 6 vaults that house vacuum breakers along an underground pipe that runs about 3 miles from the nuclear plant to the Rock River, contained water with tritium.
5. Palo Verde, Arizona – Reported 3/3/06

Radioactive water was discovered near a maze of underground pipes.  
Tritium can be released into the air, according to the plant's permit.

- ✓ As listed on the opposite side; Exelon's nuclear power plants at 5 other locations were shown to be contaminating water sources with radiation.
- ✓ January, 2006, 23 organizations petitioned NRC to demand more information about Exelon's radioactive leaks.
- ✓ The problem was, NRC had Exelon, the company with the vested interest in the outcome, do its own testing.
- ✓ February, 2006, Exelon announced a Tritium Inspection Program at its 10 Nuclear Power Plants, including Limerick Nuclear Power Plant.
- ✓ With Exelon's history of covering up problems, how can anyone actually believe Exelon would do testing in such a way as to find and admit a problem, with so much at stake?
- ✓ While evidence shows a potential long-time problem at Limerick Nuclear Power Plant, Exelon's PR woman for Limerick deceptively stated, *"we do not have any issues at Limerick that were at the other plants."*
- ✓ Based on a history of covering up problems, how can we trust Exelon to tell the truth about radioactive water contaminated associated with Limerick Nuclear Plant?
- ✓ Independent testing for radioactive contaminated groundwater around Limerick and the Schuylkill River is imperative.

### **Whistle Blower Evidence Shows**

#### **There Was A Long Time Problem At Limerick Nuclear Power Plant**

(See Attachment)

- **Did This Result In Radioactive Contamination Of Groundwater and Residential Wells Around Limerick Nuclear Power Plant?**
- **While Exelon tested and denied contamination, evidence suggests we should not trust Exelon's claim?**

#### **Details show cause for concern.**

1. Official 2004 Report Proves **Crack In Moat At Limerick Nuclear Power Plant Was Officially Documented 1997.**
  - Report calls cracking "**substantial**"
  - States **crack could permit tritium to leach into the soil** beneath the asphalt.
  - That report cited Limerick with **Inadequate Strategy For Cracking Repair.**
  - **Radiation leaking into the soil can contaminate groundwater.**
  
2. **Could Limerick Nuclear Power Plant have been causing radioactive groundwater contamination for over a decade (since 1997)? In reality, we may never know since Exelon got to decide where monitoring wells were placed and controlled the data.**
  - In a fractured bedrock aquifer, radioactive groundwater contamination could have traveled in any direction at any depth and could easily go undetected.

Go Back

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## AR 00255982 Report

Aff Fac:	→ Limerick	AR Type:	CR	Status:	APPROVED
Aff Unit:	NA	Owed To:	ACAPALL	Due Date:	10/23/2004
Aff System:	102			Event Date:	09/22/2004
CR Level/Class:	/			Disc Date:	09/22/2004
How Discovered:	H03C			Orig Date:	09/23/2004

## Action Request Details

**Subject:** CST MOAT CRACKING - INADEQUATE STRATEGY FOR CRACKING REPAIR

**Description:** Originator: ROBERT J MCCALL Supv Contacted: Steven Minnick

## Condition Description:

ST-1-008-900-\*, CST Dike Inspections, are performed bi-annually to evaluate the condition of the CST / RWST dikes and to ensure compliance with regulatory requirements. NOS performed a review of the historical performance of this test for Unit 2, as well as a review of the ARs which were initiated to correct cracking identified in the bituminous covering of the moat during ST performance. NOS is concerned that degradation is progressively developing in this bituminous covering, which could result in structural degradation of the moat and the compacted soil beneath. At the time of the latest ST performance, an AR was documented on the ST coversheet to provide corrective actions to resolve the identified cracking, however, review of the AR and discussions with responsible personnel indicate that no maintenance is currently scheduled to resolve the degradation. With the extensive cracking that currently exists, NOS is unsure that the current condition of the bituminous surface meets the UFSAR (Section 2.5.5.5) description, which states: "The crest and the inside slopes of the dikes will be protected by a bituminous surface". An NOS walk down of the dikes identified that the cracking at the crest of the dikes reaches approximately four inches wide and three inches deep, while the cracking on the inside slopes are approximately one inch in width and as much as two inches deep. NOS does not believe that such substantial cracking is permitting the bituminous surface to protect the compacted soil as is required by the UFSAR, and could also permit tritium to leach into the soil beneath the asphalt.

## Background:

- When cracking was initially documented in 11/97, it had a maximum width of 1/8". AR A0983516 was written and provided a precaution that if not repaired, the cracking could lead to significant deterioration. Pages of detailed guidance were provided for the methodology to be used to repair the identified cracks. CM AR A1128952 was initiated to correct the deficiencies.
- This AR (A1128952) was rescheduled 14 times between 9/98 through 11/02. It was finally completed with the statement "No work required. The grating is in good shape". No mention of the cracks in the dike was made. This AR was taken to "History" with no work performed.
- In 9/01, AR A1336444 was generated following the identification of cracking in the dike during the performance of ST-1-008-900-2. The detailed information regarding the specific methodologies previously defined to resolve the cracking is not referenced, instead it is only

stated that the cracks should "be sealed to avoid further degradation". This AR is currently assigned to the facilities group, and has no work order or other planning associated to repair the cracking. The Facilities group is under the impression that any repairs to the bituminous covering would be for cosmetic purposes only.

- In 4/02, Chemistry initiated A1364547 during cleaning of the dike following tritium contamination. This AR provides a precaution against the possibility of tritium leakage through the bituminous cover due to the cracking. This AR was taken to history again with no repairs to the cracking being made - referring instead to the open AR (A1336444) to perform the repairs.

- The latest performance of the ST (in 9/03) again identified the cracking in the bituminous cover, which was then estimated to be 3/4" wide in locations. It again referred back to A1336444 to implement repairs to the cracking.

- An evaluation of the acceptability of the current cracking condition within the latest performance of ST-1-008-900-2 appears to be somewhat contradictory. It states that the identified cracks "are not structurally significant since the dikes and basin are constructed of compacted fill which is protected by the bituminous (asphalt) surface". However, since the bituminous covering has been noted as being significantly degraded, the ability of the surface to perform its design function in protecting the compacted soil is questionable.

Immediate actions taken:  
none

Operable Basis:

Reportable Basis:

**Assignments**

<b>Assign #:</b>	<u>01</u>	<b>Assigned To:</b>		<b>Status:</b>	AWAIT/C
<b>Aff Fac:</b>	Limerick	<b>Prim Grp:</b>	ACAPALL	<b>Due Date:</b>	09/28/2004
<b>Assign Type:</b>	TRKG	<b>Sec Grp:</b>		<b>Orig Date:</b>	
<b>Priority:</b>					
<b>Schedule Ref:</b>					
<b>Unit Condition:</b>					
<b>Subject/Description:</b>	Tracking Assignment for Issue				

# **Exelon**

## **Kept Leaks Quiet,**

### **Files Show**

By Hal Dardick  
Tribune staff reporter  
Published March 19, 2006

Exelon officials took several steps that for years kept the public in the dark about radioactive tritium spills at a Will County nuclear power plant and the groundwater contamination the spills caused, public records obtained by the Tribune show.

Recent company disclosures about four tritium spills between 1996 and 2003 at Braidwood Generating Station came only after the Illinois Environmental Protection Agency pressured Exelon Nuclear to test for contamination, following prodding from the plant's neighbors.

The disclosures of spills triggered lawsuits last week by the Will County state's attorney, the Illinois attorney general and neighbors of the plant accusing the company of not being forthcoming.

The public documents show Exelon Nuclear officials in 2001 and 2002 opposed public discussion of tritium and the release of documents about tritium spills. They also opposed legislation to mandate groundwater monitoring at nuclear plants and a permit review that led to discovery of the contamination, the records show.

"It's apparent that this all points to obfuscation of radioactive material releases at the Braidwood plant," said Paul Gunter, director of the Reactor Watchdog Project at the Nuclear Information and Resource Service, an anti-nuclear group that has obtained many of the records independently.

Thomas O'Neill, vice president of regulatory and legal affairs at Exelon Nuclear, chafed at such claims.

"When you are talking about extending the life of your plant and possibly building new nuclear plants and looking at the whole environment, it absolutely makes no

sense why anyone in this company, the company as a whole, would do anything but be open, honest, candid, forthright and in compliance with applicable laws and regulations," O'Neill said.

The chain of events that led to the belated disclosures started with plant neighbor Bob Keca. On Nov. 6, 2000, he noticed an expanding pool of water covering Exelon property that surrounds his home on three sides.

It had seeped under his fence and filled a ditch in front of his house, said Keca, who called the Illinois EPA and Exelon.

Exelon officials told Keca there was "nothing to be worried about from a health and safety perspective, but [the water] does have traces of radioactivity in it," plant spokesman Neal Miller said this month. Recent tests show Keca's well is not contaminated, he added.

But Keca, after learning specifics about the contamination in recent months, is fearful for the health of his family. He remembers hearing from Miller in 2000 that there was nothing to worry about.

"We drank the water," Keca recently told local officials, referring to water from the shallow well at his home. "We bathed in the water. We swam in the water. They never told us."

Tritium, a byproduct of nuclear generation, can enter the body through ingestion, absorption or inhalation. Exposure can increase the risk of cancer, birth defects and genetic damage. State health and regulatory agency officials have said the contamination near Braidwood poses no threat to public health, but some critics of federal tritium standards debate that.

Exelon estimated 3 million gallons of water containing tritium spilled in 2000. Exelon did quickly report the spill to the Illinois EPA and the U.S. Nuclear Regulatory Commission, and Exelon documents indicate the company also notified the Will County Emergency Services Disaster Agency director and Reed Township highway commissioner.

Like Keca, the local officials were told there was no health risk, despite traces of radioactivity, Miller said.

Exelon says most of the contamination in the water came from another 3 million-gallon spill in 1998, because nothing was done to clean up that spill. ComEd, which is now part of Exelon, built and ran the Braidwood plant until late 2000. Additional spills in 1996 and 2003 were smaller.

All the spills resulted from malfunctioning valves on an underground pipe, called a

blowdown line, that carries water with tritium to the Kankakee River, where it is legally dumped.

After a leak of thousands of gallons of diesel fuel at the plant, also in 2000, officials from the town of Godley requested an Illinois EPA hearing on Exelon's blowdown-line permit by objecting to its renewal.

In January 2001, Exelon Nuclear senior environmental analyst John Petro e-mailed to colleagues: "Our ultimate goal must be to get the village to [withdraw] their objection to the renewal of Braidwood's [blowdown-line permit]."

Illinois EPA officials held the hearing in early 2005. As part of its review, the agency learned about elevated tritium levels in a ditch between the plant and Godley. It told Exelon to determine the extent of groundwater contamination, which led to the recent spill disclosures.

Godley officials first pressed the Illinois EPA to test for tritium after they learned limited details about the 2000 tritium spill through a lawsuit the Godley Park District filed in April 2001 regarding the fuel spill.

"Without the diligence of Exelon's neighbors in Will County, these dangerous leaks might still be a secret," Atty. Gen. Lisa Madigan said.

As part of its suit, the Park District asked for detailed information about tritium spills at Braidwood, but Exelon won an order blocking the request. Meanwhile, then-state Rep. Mary K. O'Brien, a Coal City Democrat who is now an Illinois Appellate Court judge, in 2001 introduced a bill to force nuclear facilities to monitor groundwater for radioactive releases.

An Exelon lobbying document from the time stated: "The likelihood of groundwater contamination from ComEd/Exelon facilities is nil; the likelihood does not justify the millions of dollars of cost." Exelon's opposition killed the bill, O'Brien said.

Also in 2001, as Exelon prepared for a public forum in Godley on the fuel spill, Petro referred in an e-mail to an expected Illinois Department of Nuclear Safety presence there.

"They may be asked to talk about the blowdown line failure just east of the plant and the plant's discharge containing tritiated water and the relationship to the downstream City of Wilmington water intake," he wrote. "It is most important to stay away from these issues. I am confident that the Village of Godley knows little if anything about the blowdown line rupture."

He referred to an e-mail from a ComEd employee who said Illinois' director of nuclear safety "was told there are leaks in the tubes and that there are ways--and

possibly reasons to--test for radiological toxins as a result of this info."

"The e-mails and memos were an attempt to keep the discussion focused on the diesel spill and the station's [blowdown line] permit," Exelon Nuclear spokesman Craig Nesbit said.

He also said the tritium spills did not affect Godley residents. He noted Godley officials first learned of the 2000 tritium spill through documents turned over as part of the fuel-spill lawsuit, an indication the company was not hiding anything.

But State's Atty. James Glasgow, who sued Exelon with Madigan, sees it differently. "They have done everything in their power to keep this from being known," Glasgow said.

Exelon officials said that once the tritium contamination was detected last year, they independently initiated testing of private wells, issued press releases, met with homeowners and launched a Web site detailing developments.

The company is working with the Illinois EPA, which cited Exelon for groundwater contamination, on a cleanup plan.

"We want to continue to operate these plants and provide the safe, clean, reliable energy that we think we could provide well into the future, and goofing up things like this just adds to the public's concern about stuff like that," O'Neill said.

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**Opinion Pottstown Mercury**

## **Nuclear plants pose threat to groundwater**

Published: Saturday, July 24, 2010

A radioactive groundwater disaster could be unfolding around U.S. nuclear plants, according to a shocking documented report released in 2010, titled "Leak First, Fix Later" that can be found at [www.beyondnuclear.org](http://www.beyondnuclear.org).

102 of 104 U.S. nuclear reactors leaked radiation into groundwater from aging and deteriorating buried pipes under the reactors.

There are two to 20 miles of buried pipeline under each nuclear plant which obviously go largely uninspected and unmaintained.

Limerick Nuclear Plant's 25 year old underground pipes may have already leaked. It's virtually impossible to detect all leaks in miles of pipes tangled beneath the plant. Monitoring can easily fail to detect leaks.

This is a fractured bedrock aquifer where radioactive contamination can travel in any direction, at any depth, and fail to ever be detected. Reliable monitoring would be prohibitively costly.

Radioactive leaks from Limerick could impact any of the region's residents, now or in the future. There's cause for concern, precaution, and prevention now, before Exelon is permitted to operate Limerick Nuclear Plant for a total of 60 years. None of the 102 nukes that leaked operated more than 41 years.

Limerick operated since 1985 (25 years). Buried pipes carrying radioactive water are vulnerable to leaks.

A 20-year license extension to operate until 2049 would allow 35 more years of radioactive water transport (60 years total). Think what happens to pipes in older homes.

We can't trust Exelon to immediately detect or disclose leaks. NRC's oversight and enforcement are extremely lax.

Prevention is the only cure. What happens if groundwater becomes radioactive? There's no way to clean it up from the ground. Filtering is cost prohibitive for many, if not impossible. Over 100 to 200 radionuclides are associated with Limerick Nuclear plant.

Before NRC rubberstamps approval for a license extension until 2049, Exelon should be required to replace all pipes buried under Limerick which carry radioactive water.

Exelon, the company with a vested interest in the outcome, claimed there's no problem at

Limerick, based solely on their own monitoring and reporting. Evidence below at other Exelon nukes shows why we can't believe or trust Exelon.

Radioactive water contamination at Exelon's Braidwood Nuclear Plant in Illinois was called by some "Exelon's Radioactive Watergate." Exelon failed to disclose 22 recurring uncontrolled radioactive spills in buried pipelines from 1996 to 2005. Since then, numerous leaks over a 10-year span were revealed at two other Exelon nuclear plants in Illinois. Leaks were significant. Just two Braidwood releases totaled six million gallons of radioactive water. Exelon supplied bottled water to 600 people for more than four years, but groundwater was contaminated for 14 years. It still is. March 2010, a legal settlement was reached. Exelon will be supplying a water system. But groundwater and soil remain radioactive. The mother of a teen battling cancer said, "If the cancer is in the air we breathe or the water we drank, I don't think there's enough money to go around. I know they admitted to mistakes but how do you put a price tag on the environment?" Another resident said, "It's scary to live here, but who in their right minds would buy homes here?"

At Oyster Creek Nuclear Plant in New Jersey Exelon failed to report radioactive water leaking from buried pipes until 2009, just seven days after NRC issued its license renewal for another 20 years. This radioactive water reached a major New Jersey aquifer that supplies drinking water to much of southern New Jersey (Reported 5/10). New Jersey DEP said the leaked radiation (50 times higher than levels allowed by law) has reached southern New Jersey's main source of drinking water. Julia LaMense, Eastern Environmental Law Clinic, condemned NRC "for letting it come to this." She said, "It's a sad day when the 'wait and see' approach taken in response to yet another 'trust us' from Exelon results in contamination of one of the most significant aquifers in the region."

The Mercury story March 28 by Evan Brandt showed the region's residents are already subjected to too much carcinogenic groundwater contamination. It revealed that toxic plumes from two other industrial sites were contaminating groundwater in Limerick. Toxic, carcinogenic groundwater contamination will continue for decades, if not forever, at Pottstown Landfill and the Oxy Superfund site.

It's long past time for precaution and prevention. Exelon will apply for their 20-year Limerick Nuclear Plant license renewal soon. People who care about safe water for their families should get informed and get involved now. Call ACE at 610- 326-2387 and leave your name, phone, e-mail.

DR. LEWIS CUTHBERT

ACE President

## **Comments**

The following are comments from the readers. In no way do they represent the views of pottsmmerc.com or The Mercury.

# Questions raised over Frick's Lock lease plan

By Phil Ellingsworth Jr.  
pellingsworth@pottsmmerc.com

## EAST COVENTRY

**EAST COVENTRY**—A lease agreement with Exelon for Frick's Lock village was the main topic of discussion at Monday's supervisors meeting, as members could be voting on a final agreement as soon as February.

Exelon and township officials are looking to enter into a 10-year lease, with the company giving the township eight acres of land and four buildings, also completing restoration and landscaping work to the village.

Township Solicitor Mark A. Hosterman said the two parties are close to a final agreement, but some language in the document needs to be worked out.

One of the recommendations the township would like made in the agreement is if anything happens to the buildings during the term of the lease, neither

party would be responsible to rebuild them, Hosterman said. Another point of discussion raised during the meeting was what happens to the village if Limerick Generating Station is decommissioned or sold.

Exelon's legal counsel John C. Halderman said if the generating station is decommissioned, the company would still own Frick's Lock, but would sell, donate or transfer it to a qualified party to take care of it, such as the county, state or other entity.

If another company would buy the generating station, that company would own the village and be bound by the agreement, Hosterman said.

If East Coventry cannot find grants or the project is not beneficial, it may get out of its 10-year lease with Exelon at any time, Hosterman said.

If the township decides to terminate its lease, Joseph Szafran, communications manager for the Limerick Generating Station, said Exelon would continue to maintain the property and buildings and would provide tours of the property.

State Sen. Andy Dinniman (D-19th) said he worked on the Frick's Lock issue since the time he was a Chester County Commissioner, and it is finally coming into fruition. "You have a historical treasure in this township," Dinniman said.

He added that he thinks it is wonderful the two parties have gotten to this point and are possibly going to restore the site because it will teach people about the history of the area and allow them to access the Schuylkill River Trail.

Not everyone in attendance at the meeting was pleased about the lease agreement.

Lewis Cuthbert, president for the Alliance for a Clean Envi-

ronment, felt Exelon was not being upfront with the township about environmental dangers Frick's Lock may pose. Cuthbert alleged there is radioactive groundwater contamination at the village, resulting from leaks at the generating station.

"We advise you, give that some thought," he said. "Radioactive contamination is a serious issue."

If there is radioactive underground contamination, it would be a "large-scale problem," something stretching beyond Frick's Lock, Hosterman said.

The U.S. Environmental Protection Agency, Nuclear Regulatory Commission and other

agencies constantly monitor the generating station, so walking away from the agreement would not make the alleged contamination go away, Hosterman said.

"It's a huge issue, that is an EPA issue, a DEP issue," he said.

Szafran said the company has strict monitoring of their operations in place, and all documentation of what it does at the plant is made public through the DEP's website.

A resident also fired back at Cuthbert's allegations, asking why the township should stop a process from moving forward based on accusations.

"Why should they stop protecting a historical place because of an accusation?" Robert Preston asked.

The historic canal-era village, one of East Coventry's first settlements, has been abandoned since the late 1960s to early 1970s when the Limerick Generating Station was constructed. If the lease agreement is approved, the village would once again be opened to the public, schools and other organizations for tours to teach about the area's history.

The supervisors will meet again at 7 p.m. on Feb. 14 to possibly take action on the Frick's Lock lease agreement.

## Frick's Locks could end up a financial burden for taxpayers

I wish to commend and recognize East Coventry's historical commission on its work to preserve Frick's Locks. The group has worked hard over the years, and is sincere in their efforts. Unlike some of the other township supervisors, however, I don't believe this is a good enough reason to abandon prudent fiscal management and embrace a liability which is likely to cost East Coventry's taxpayers money. And for what return on investment? No cost-benefit analysis has been performed; instead, I keep hearing phrases such as, "This is a once in a lifetime opportunity?"

For whom? It's not a once in a lifetime opportunity for East Coventry. We've been involved with Exelon (PECO) over the years in different types of arrangements, none of which have benefited the township. "But this time it's different," I'm told. Why? Exelon is proposing to give us \$30,000.

And how long will that money last? No one can answer the question, again, because no cost-benefit analysis has been done. Rather, those who believe this is a good idea keep pushing it along telling us "it won't cost the township anything, you can get grant money." Never mind that most grant money requires some sort of match. Not to worry, "you can get another grant to match the match money you need."

Grants don't write themselves, of course. Our historical consultant who's paid \$75 per hour would write those grants, and unless we can get a grant for her to write grants, she gets paid from our tax dollars. And who would we compete with for grants? Manayunk, Mont Clare, Leesport, etc., readily accessible tourist destinations with watered locks, not just old buildings. I'm just not as optimistic as the person who would get paid \$75 per hour to write these grant requests.

The other question I have is why East Coventry Township? Why should we foot the bill? Why should we accept the liability? The answer's pretty

obvious: It's easier to dupe the local yokels than to deal with county, state and federal officials. You can't blame a giant corporation for doing what's in its best interests.

Likewise you can't blame an elected official for doing his level best to protect the interests of those he was elected to serve. I'm opposed to accepting Exelon's proposal because I believe it's not in the best interests of my constituents, and it may adversely affect them in the future. East Coventry is not the entity best equipped to produce a Frick's Locks renaissance. I'm concerned that unless you let your supervisors know how you feel, they will succumb to the pressures of Exelon and to other advisors who are determined, by hook or by crook, to force East Coventry Township to accept this deal. Please make your voices heard, before it's too late.

**MICHAEL ALBERT MOYER**  
East Coventry Township Supervisor

# **Health and Lives** **Are At Stake With Limerick Relicensing.** **Health Threats Would Increase!**

We Believe If NRC Relicenses Limerick, Far More People Will Needlessly Get Sick and Die From Limerick's Additive, Cumulative, and Synergistic Routine Radiation Releases.

**We Also Believe Limerick Relicensing Would Be A Violation of NRC's Mission To Protect Public Health Under the Energy Reorganization Act of 1974.**

## **Limerick's Routine Radiation Emissions Are NOT Safe**

### ➤ **RADIATION EXPOSURE LIMITS WERE IRRESPONSIBLY WEAKENED**

By The Bush Administration's EPA - An Action Sought By NRC And DOE

### **Drastic Hikes Were Permitted In Drinking Water, Air, and Soil**

January 15, 2009 - Right Before The Bush Administration Departed

<http://www.committeetobridgethegap.org/radiation.html>

## **Drinking Water - EPA Radically Increased Permissible Radiation Limits**

Safe Drinking Water Act - New Standards Would Permit Radionuclide Concentrations Up To 7 Million Times Higher Than In Current Radiation Standards

Examples: Increases In Permissible Radiation Concentrations In Water

Strontium-90 - Nearly 1000-Fold Increase .

Iodine-131 - 3000 to 100,000-Fold Increase

Nickel-63 - Nearly 25,000 Increased

## **What Does This Mean To Our Drinking Water?**

- 1) **Schuylkill River** - Limerick Nuclear Plant discharges radioactive wastewater into this major source of drinking water 24 hours a day, 365 days a year (over 5 billion gallons each year). Limerick's waste water contains a broad range of radionuclides. Astronomical permissible limits allow Exelon to irresponsibly assert there is no health threat because Limerick meets permissible limits.
- 2) **Radioactive Groundwater** - Limerick leaks into groundwater under the site have led to a broad range of radionuclides detected in 15 of 15 monitoring wells at the Limerick site. Many residential wells are within a short distance from Limerick. Radioactive levels can rise dramatically in residents' drinking water and still irresponsibly be called safe.

# **Dangerous Deception!**

## **Raising Background Limits**

### **To 620 Millirems Per Year - From 360 Millirems Per Year**

March 16, 2011

#### **Shortly After Japan's Nuclear Plants Started Releasing Massive Radiation Into The Air, Water, Soil, and Vegetation**

History of Radiation Dose Limits:

- ✓ Radiation Limits were raised after Chernobyl:  
From 80-100 Millirems Per Year to 360 Millirems Per Year.
- ✓ Natural Radiation - Originally 60-80 Millirems Per Year Increased to 80-100 Millirems Per Year in 1964  
(Secret Fallout by Ernest Sternglass - Pg. 213)

#### **Significance Related to Limerick Nuclear Plant's Yearly Radiological Monitoring Report:**

- ✓ In Essence, Limerick Received Approval for Major Increases in Routine Radiation Releases into Our Air, Water, Soil, Vegetation, Fish, and Milk. Radiation Levels Detected in These Routes of Exposure Will Not Be Reported if They are Under 620 Millirems Per Year.
- ✓ Limerick Nuclear Plant will only report on radionuclides determined to be "above background", now arbitrarily determined by NRC to be 620 Millirems Per Year, due to the Japan nuclear disaster.
- ✓ This allows residents to be further deceived about additive, cumulative, and synergistic radiation doses they are receiving from Limerick Nuclear Plant's emissions in many routes of exposure.
- **By 2009, Americans Were Receiving Radiation Doses Each Year That Doubled Yearly Radiation Dose Levels From The 1980s** (Reported May 5th, 2009)  
<http://nukefree.org/news/USRadiationDoseHasDoubled> Americans (on average) receive more than twice as much radiation each year as in 1980s, according to National Council on Radiation Protection and Measurements.
- **NO SAFE DOSE - The 2005 National Academy of Sciences BEIR VII STUDY, funded by the EPA, found that the smallest radiation dose has the potential to cause increased risk to humans.**

### **RADIATION Clean-Up Standards Were Drastically Weakened**

Radiation Clean-Up Standards Were Changed To Be Thousands Of Times More Lax Than Previous Radiation Clean-Up Standards. Public Health Was Overridden by Economic Considerations. Rather than specify clean-up standards to protect health, "benchmarks" were weakened to allow radiation doses so immensely high that:

- ✓ **1 in 4 People Can Get Cancer, On Top of Their Normal Cancer Risk.**  
Lax Unprotective Radiation Clean-Up Standards Allow Exelon to Avoid Safe, Comprehensive Clean Up From Limerick Nuclear Power Plant's Radioactive Emissions Into The Region's Water and Soil.
- ✓ **Vegetation, Food, Milk, and Fish Can Remain Contaminated, Further Jeopardizing Public Health In Our Region.**

# Gross NRC Misrepresentation

**Raising "Background" Levels Is Not A Protective Action, As Suggested In NRC'S 3-16-11 Press Release Below.**

**FACT: Announcing Higher Background Levels Does NOT Protect Anyone. ITS SHAMEFUL DECEPTION!**

- Instead of taking protective action to inform people of radiation risks after the Japan nuclear catastrophe and informing people about how they might reduce their risks, NRC legally sanctioned drastic increases in so-called "background" radiation levels, as if to assert that higher levels of radiation were now safe.
- That has serious consequences to residents in regions around nuclear plants. Exelon can now deceptively hide Limerick's radiation releases even more.

**NRC Illogically Dismissed The Obvious Role of Chernobyl and Japan Nuclear Disasters In DRASTIC INCREASES in so-called "BACKGROUND" RADIATION LEVELS After Nuclear Disasters.**

<b>Pre-Chernobyl:</b>	<b>80 to 100</b>	<b>Millirems Per Year</b>
<b>After Chernobyl:</b>	<b>360</b>	<b>Millirems Per Year</b>
<b>After Japan:</b>	<b>620</b>	<b>Millirems Per Year</b>

The role of these nuclear disasters in raising "background" levels is clear yet:

- 5-18-11 - At a meeting in Limerick, NRC's Paul Krohn asserted that nuclear disasters did not cause increases announced in background levels after those disasters. How can we believe anything NRC says?
  - ✓ Instead, Krohn said, *"a lot of that is ...cosmic rays. Background increased by living changes – add to what people receive each went to about 620 from about 300."*  
(Experts say - Terrestrial and cosmic Natural Radiation Is only about 60-80 mr/year - with variations)
- Only after being sharply challenged by residents, NRC's Richard Barkley responded,
  - ✓ *"NRC didn't assert it was safer. That's just reality."*

# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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Blog: <http://public-blog.nrc-gateway.gov>

No. 11-050

March 16, 2011

## NRC PROVIDES PROTECTIVE ACTION RECOMMENDATIONS - BASED ON U.S. GUIDELINES

Under the guidelines for public safety that would be used in the United States under similar circumstances, the NRC believes it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate.

Among other things, in the United States protective actions recommendations are implemented when projected doses could exceed 1 rem to the body or 5 rem to the thyroid. A rem is a measure of radiation dose. The average American is exposed to approximately 620 millirems, or 0.62 rem, of radiation each year from natural and manmade sources.

In making protective action recommendations, the NRC takes into account a variety of factors that include weather, wind direction and speed, and the status of the problem at the reactors.

Attached are the results of two sets of computer calculations used to support the NRC recommendations.

In response to nuclear emergencies, the NRC works with other U.S. agencies to monitor radioactive releases and predict their path. All the available information continues to indicate Hawaii, Alaska, the U.S. Territories and the U.S. West Coast are not expected to experience any harmful levels of radioactivity.

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## Just as deceptive and inaccurate were Lisa Regner's unsubstantiated claims 9-22-11 in Pottstown, that:

1. Radiation released at Limerick was at such low levels there were no harmful consequences.
    - ✓ First, there is no continuous comprehensive independent monitoring on all routes of exposure to know how high the levels are for each radionuclide released from Limerick.
    - ✓ Second, any level released can harm health, especially vulnerable populations, like fetuses, infants, children, and those already with cancer and other diseases and disabilities.
  2. Only low levels of tritium were in Limerick's continuous radioactive discharges into the Schuylkill River.
    - ✓ Exelon's own monitoring for Limerick Nuclear Plant disproves her claim that it's only tritium. Other radionuclides discharged are in water, fish, and sediment.
    - ✓ There is no proof of the levels of tritium since there is no continuous independent monitoring for tritium from the discharge pipe into the river.
  3. Regner claimed NRC did testing. After learning another NRC employee admitted NRC NEVER did testing at Limerick, she then tried to substantiate her unverified conclusions based on DEP testing.
    - ✓ ACE has caught DEP in dangerous deception about radiation since 1997. We have absolutely no respect for DEP or confidence in any testing. Examples of DEP statements proven to be inaccurate: DEP claimed radiation would not travel with landfill gas, that no radiation was emitted into the air, that strontium-90 could not be emitted into air.
    - ✓ 5-18-11 DEP actually claimed there were no changes in radiation levels of our environment since Limerick started operating.
- That's NOT CREDIBLE. Limerick continuously released radiation into our environment for 26 years. Some radionuclides have long half-lives. Additive and cumulative releases had to raise background.

## **NRC Is Involved In A Dangerous Cover-Up; A Dismissal and/or Distortion Of the Effects of Radioactivity From Nuclear Plants.**

NRC repeatedly deceptively asserts we should not worry about radiation if it is below background levels.

- **Background Radiation is NOT safe.**  
Radiation exposure still causes cancer, even when it is called "background radiation"
- **There are absolutely no safe levels of radiation.**  
Adding more radiation ADDS to health impacts.

Ms. Regner asserted radioactive wastewater discharges 24/7, 365 days a year were safe because they were permitted.

- **Permissible does NOT mean safe.**
- **Exposure to radionuclides increases risk of cancer.**  
Every effort must be taken to minimize exposure to radionuclides, whether in the water, air, soil, food, or fish.

**While NRC Is Charged With The Grave Responsibility Under The Energy Reorganization Act of 1974, To Protect Public Health and Safety Related To the Operation of Commercial Nuclear Reactors, The Agency Fails In That Mission.**

NRC officials must start to consider the vast body of independent research showing links between nuclear plant radiation releases, cancer, and other diseases and disabilities.

- NRC must stop remaining in denial of a body of documented independent research.
- NRC must stop using industry biased unsubstantiated conclusions to protect nuclear industry interests.
- NRC should stop making bogus comparisons between continuous nuclear plant radiation releases and exposure to gamma rays from x-rays and planes. That is deceptive for so many reasons.

To protect public health, NRC employees need to have the courage and integrity to acknowledge obvious harms from nuclear plant routine and accidental radiation releases and speak up.

- Getting the truth told can stop the unprecedented injustice of unnecessary radiation poisoning of our environment and us from nuclear power plants.

# **NRC HAS CONSISTENTLY IGNORED OR DENIED HEALTH RISKS POSED BY NUCLEAR REACTORS**

- 1. NRC has a conflict of interests in its decisions on nuclear plant threats and harms.**
  - Many NRC staff formerly worked at reactors they regulate, or will next work at a nuclear plant.
  - Many NRC officials after leaving NRC hope to land much higher-paying jobs working for the nuclear industry they regulate. Most won't do anything to jeopardize that.
  - 90% of its funds come from fees from the very companies NRC is supposed to regulate. "NRC is like a prep school for many of NRC officials, because they know they've got a good shot at landing much higher-paying work with the people they're supposed to be keeping in line," Mr. Mulley said. "They're not going to do anything to jeopardize that."
- 2. "NRC Lost All Credibility on Radiation, Cancer, and Nuclear Plants." See ACE Document**
  - Many cancer studies in the U.S. and Europe confirm increased cancers around nuclear plants, especially in children.
  - While still in complete denial of obvious links, in 2009 NRC called for a study of cancer near U.S. nuclear plants, obviously intended to dispute the body of studies already showing a link.
  - NRC's illogical and continued denial of documented harms biases NRC in any study they do.
  - Comments made by NRC in Limerick 5-14-11 (Documented with video), show NRC refuses to look for obvious links between nuclear plants and cancer, and instead denies them.
- 3. NRC has consistently denied actual routine radiation releases are harmful radiation releases, regardless of the National Academy of Sciences BEIR VII report saying there is "NO SAFE LEVEL of EXPOSURE."**
  - NRC has NO health or medical experts on its staff.
  - NRC's unsubstantiated conclusions not only ignore the BEIR VII report scientists, they are based on outdated, biased information from the nuclear industry that has a vested interest in the outcome.
- 4. NRC has no credibility in its denial of harms from routine radiation emissions from nuclear plants.**
  - NRC admitted it never did its own radiation monitoring, testing, or reporting to prove how much radiation is routinely emitted or accidentally released from Limerick (5-14-11 - Video).
  - NRC's unsubstantiated denials are based on industry biased, even potentially manipulated industry data, reports and conclusions.
- 5. NRC ignored or opposed any studies indicating health risks from reactors. For example, it included an 8-page critique of a study of Strontium-90 in 5,000 baby teeth near U.S. reactors, results of which were published in 5 medical journals.**
- 6. With no requirement of examining disease and death rates near reactors, since 1998, the NRC has approved 71 of 71 applications to extend licenses for 20 years.**
- 7. With no requirement to show local health hasn't been harmed, since 1993, the NRC has approved 123 of 123 applications to upgrade (expand) reactors.**
- 8. The NRC has never ordered a U.S. reactor shut, even the damaged Three Mile Island reactor (the company closed it voluntarily).**

**NRC Covers Up For The Nuclear Industry and Fails To Protect Public Health:**

- Denies Harms
- Ignores Risks
- Lowers Risk Estimates
- Weakens Regulations
- Delays Protective Action
- Makes Unsubstantiated Conclusions That Perpetuate and Increase Harms
- Provides Exemptions When Regulations and/or Standards Are Violated

**Why Raising Radiation "Background" Levels  
Hides Limerick Nuclear Plant's  
Actual Harmful Threats To Public Health Even More**

1. Raising Background Radiation Levels Avoids Full and Accurate Disclosure

**Exelon Is Only Required To Report On  
Radionuclides Detected "Above Background"**

2. That allows Exelon to deceive people about Limerick's actual threats to their family's health.
3. Independent scientists and physicians have done research showing there is NO SAFE LEVEL of Exposure.

Exelon **SHOULD REPORT** on all radionuclides detected  
- **ABOVE ZERO**

**Yet, Exelon's Radiological Monitoring Report** This Year  
Will Include Only Radionuclides Detected  
- **ABOVE 620 Millirems This Year**

It appears that previously, Exelon was reporting on levels detected above 360 Millirems level raised after Chernobyl.

**"Background" Levels Are Arbitrary And Inflated**

Being Raised March, 2011 to 620 Millirems Per Year, Helps The Nuclear Industry Avoid Full and Accurate Disclosure.

## **Radiation Monitoring Tactics By The Nuclear Industry Avoid Full and Accurate Disclosure. NRC Puts On Blinders**

- Radiation samples are only taken periodically. Limited samples avoid spikes from accidents.
- Radiation releases are too often estimated or calculated and can be easily manipulated.
- Data is averaged to dilute results.

### **It appears when nuclear plants don't like radiation data, they simply don't report it by claiming equipment failure.**

- **Limerick Nuclear Plant Radiation Monitoring Reports - Show repeated claims of equipment failure.**
- **TMI - During critical periods of time throughout the TMI event, radiation monitors were not functioning or their detection limits were being exceeded by an unknown amounts.** The monitors at TMI were wrecked, the stack monitors were saturated and went off scale.. one thermoluminescent dosimeter in the northwest quadrant, where the wind was blowing, showed very high readings. they discounted it by calling it the "northwest anomaly". So they have no idea how much radiation escaped at TMI. In federal court, the judge threw out the class action health damages suit, saying not enough radiation escaped to cause any health damage.
- **Turkey Point - During Hurricane Andrew in 1992, the Turkey Point rad monitors and meteorological monitoring equipment were destroyed. There was no way to prove or disprove rad leakage.**
- **Brown's Ferry Monitoring Data - Public document room records show EVERY time there were higher than normal readings, the diagnosis was always, MONITORS MALFUNCTIONED.**

#### **COINCIDENCE?**

**Probably Not. Industry and Governments' monitoring are Plagued by CONFLICTS of INTEREST.**

- **95% of Fukushima Radiation Detectors Stopped Working Three Hours After The Nuclear Disaster Started March 11.**
  - 22 out of the 23 monitors stopped sending data.
  - 3 months later, we learned radiation emissions were twice as bad as reported.

Following are the official U.S. government regulatory agency assessments:

### **U.S. Environmental Protection Agency**

"Based on current scientific evidence, any exposure to radiation can be harmful (or can increase the risk of cancer). .... In other words, it is assumed that no radiation exposure is completely risk free.<sup>3</sup>

"[T]here is no level below which we can say an exposure poses no risk. ... Radiation is a carcinogen. It may also cause other adverse health effects, including genetic defects in the children of exposed parents or mental retardation in the children of mothers exposed during pregnancy.<sup>4</sup>

"Current evidence suggests that any exposure to radiation poses some risk, i.e. there is no level below which we can say an exposure poses no risk."<sup>5</sup>

### **U.S. Department of Energy**

"[T]he effects of low levels of radiation are more difficult to determine because the major effect is a very slight increase in cancer risk. However, U.S. Government regulations assume that the effects of all radiation exposures are cumulative and should be limited as much as reasonably possible."<sup>6</sup>

### **U.S. Nuclear Regulatory Commission**

"[T]he radiation protection community conservatively assumes that any amount of radiation may pose some risk for causing cancer and hereditary effect, and that the risk is higher for higher radiation exposures. A linear no-threshold dose-response relationship is used to describe the relationship between radiation dose and the occurrence of cancer. ... any increase in dose, no matter how small, results in an incremental increase in risk."<sup>7</sup>

### **U.S. Department of Health and Human Services**

"Ionizing radiation is invisible, high-frequency radiation that can damage the DNA or genes inside the body.

"Some patients who receive radiation to treat cancer or other conditions may be at increased cancer risk. ... it is possible that there is a small risk associated with this exposure.

"... children whose mothers received diagnostic X-rays during pregnancy. ... were found to have increased risks of childhood leukemia and other types of cancer, which led to the current ban on diagnostic X-rays in pregnant women."<sup>8</sup>

### **National Academy of Sciences**

The National Academy of Sciences' 7<sup>th</sup> study on the effects of radiation exposure declared that any exposure, regardless of how small, may cause the induction of cancer. BEIR-VII also dismissed as baseless the industry-sponsored sham "hormesis" theory that some radiation exposure is good for you.<sup>9</sup> Committee Chair Richard Monson of Harvard's School of Public Health said, "The scientific research base shows that there is no threshold of exposure below which low levels of ionized radiation can be demonstrated to be harmless or beneficial."<sup>10</sup>

### **National Council on Radiation Protection**

"... every increment of radiation exposure produces an incremental increase in the risk of cancer."<sup>11</sup>

1. Philip Hiltz, "Higher Cancer Risk Found in Low-Level Radiation," *New York Times*, Dec. 20, 1989.
2. Ian Fairlie & Marvin Resnikoff, "No dose too low," *The Bulletin of the Atomic Scientists*, Nov/Dec 1997, p. 54
3. U.S. EPA, "Ionizing Radiation Series," No.2, Air & Radiation, 6601J, EPA 402-F-98-010, May 1998.
4. U.S. EPA, "Radiation: Risks & Realities," Air & Radiation, 6602J, EPA 402-K-92-004, Aug. 1993.
5. *Ibid.*
6. U.S. Dept. of Energy, DOE/NE-0074, "Understanding Radiation," p. 8 & 9.  
<<http://www.ne.doe.gov/pdfFiles/UNDERRAD.PDF>>.
7. U.S. NRC, "How Does Radiation Affect the Public?" [www.nrc.gov/what-we-do/radiation/affect.html](http://www.nrc.gov/what-we-do/radiation/affect.html).
8. U.S. Dept. of Health & Human Services, "Cancer and the Environment: Ionizing radiation," p. 10.  
<[www.cancer.gov/images/Documents/5d17e03e-b39f-4b40-a214-e9e9099c4220/Cancer%20and%20the%20Environment.pdf](http://www.cancer.gov/images/Documents/5d17e03e-b39f-4b40-a214-e9e9099c4220/Cancer%20and%20the%20Environment.pdf)>.
9. National Academy of Sciences, "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII, Phase 2," Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, National Research Council, June 29, 2005.
10. Associated Press, "Study: No Radiation Level Safe," June 29, 2005.
11. National Council on Radiation Protection, "Evaluation of the Linear-Non-threshold Dose-Response Model for Ionizing Radiation," NCRP report 136, Bethesda, MD, June 4, 2001, cited in *Science for Democratic Action*, IEER, June 2005.

**Nukewatch**, 740A Round Lake Road, Luck, WI 54853,  
(715) 472-4185 <<http://www.nukewatch.com/>><mailto:nukewatch1@lakeland.ws>

## **Evidence of Risk Above Makes Risks Clear. Yet, NRC has been part of the shameful effort to weaken even weak radiation protection standards.**

### **Some inside EPA have spoken up to protect public health.**

#### **RADIATION EXPOSURE DEBATE RAGES INSIDE EPA - Plan to Radically Hike Post-Accident Radiation in Food & Water Sparks Hot Dissent**

Washington, DC — A plan awaiting approval by the U.S. Environmental Protection Agency that would dramatically increase permissible radioactive releases in drinking water, food and soil after “radiological incidents” is drawing vigorous objections from agency experts, according to agency documents released today by Public Employees for Environmental Responsibility (PEER). At issue is the acceptable level of public health risk following a radiation release, whether an accidental spill or a “dirty bomb” attack.

The radiation arm of EPA, called the Office of Radiation and Indoor Air (ORIA), has prepared an update of the 1992 “Protective Action Guides” (PAG) governing radiation protection decisions for both short-term and long-term cleanup standards. Other divisions within EPA contend the ORIA plan geometrically raises allowable exposure to the public. For example, as Charles Openchowski of EPA’s Office of General Counsel wrote in a January 23, 2009 e-mail to ORIA:

“[T]his guidance would allow cleanup levels that exceed MCLs [Maximum Contamination Limits under the Safe Drinking Water Act] by a factor of 100, 1000, and in two instances 7 million and there is nothing to prevent those levels from being the final cleanup achieved (i.e., it’s not confined to immediate response of emergency phase).”

Another EPA official, Stuart Walker of the Office of Superfund Remediation and Technology Innovation, explains what the proposed new radiation limits in drinking water would mean:

“It also appears that drinking water at the PAG concentrations...may lead to subchronic (acute) effects following exposures of a day or a week. In a population, one should see some express acute effects...that is vomiting, fever, etc.”

“This critical debate is taking place entirely behind closed doors because this plan is ‘guidance’ and does not require public notice as a regulation would,” stated PEER Counsel Christine Erickson. Today, PEER sent EPA Administrator Lisa Jackson a letter calling for a more open and broader examination of the proposed radiation guidance. “We all deserve to know why some in the agency want to legitimize exposing the public to radiation at levels vastly higher than what EPA officially considers dangerous.”

The internal documents show that under the updated PAG a single glass of water could give a lifetime’s permissible exposure. In addition, it would allow long-term cleanup limits thousands of times more lax than anything EPA has ever before accepted. These new limits would cause a cancer in as much as every fourth person exposed.

PEER obtained the internal e-mails after filing a lawsuit this past fall under the Freedom of Information Act (FOIA) but the EPA has yet to turn over thousands more communications. “EPA touts its new transparency but when it comes to matters of controversy the agency still puts up a wall,” added Erickson, who filed the FOIA suit. “Besides the months of stonewalling, we are seeing them pull stunts such as ORIA giving us rebuttals to other EPA documents they have yet to release.”

**Public Employees for Environmental Responsibility News  
Release (www.peer.org) April 5, 2010**

03/21/11

## **NRC Increases Estimated "background" Doses to Radiation Again**

When Chernobyl happened NRC and the radiation establishment raised what they claimed is "background" radiation from 80-100 to 360 mr/year

Now as Fukushima continues melting...NRC is claiming it is 620 mr/year. (Terrestrial and cosmic Natural radiation IS only about 60-80 mr/year (with variations on altitude and geology))

09/11/11

## **Agencies Struggle To Craft Offsite Cleanup Plan For Nuclear Power Accidents** November 10, 2010

<http://insideepa.com/Inside-EPA-General/Inside-EPA-Public-Content/agencies-struggle-to-craft-offsite-cleanup-plan-for-nuclear-power-accidents/menu-id-565.html>

EPA, the Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) are struggling to determine which agency -- and with what money and legal authority -- would oversee cleanup in the event of a large-scale accident at a nuclear power plant that disperses radiation off the reactor site and into the surrounding area.

The effort, which the agencies have not acknowledged publicly, was sparked when NRC recently informed the other agencies that it does not plan to take the lead in overseeing such a cleanup and that money in an industry-funded insurance account for nuclear accidents would likely not be available, according to documents obtained by *Inside EPA* under the Freedom of Information Act (FOIA). ([Request Part 1](#), [Request Part 2](#))

In her response to *Inside EPA*, Pettaway did not include any of this information or acknowledge that the three agencies were actively studying the issue, however. Pettaway said only that questions regarding whether and how EPA would cleanup after a nuclear power plant incident were "based on hypothetical situations/scenarios" and that EPA could not "give an assessment on something that [was] hypothetical."

### **Determining Cleanup Standards**

Whether EPA can assert its Superfund authorities over a cleanup after a nuclear power plant accident is significant not just from the standpoint of securing funding for the cleanup, but also in determining what cleanup standards would apply to the situation.

Walker tells Southerland that if EPA appears to be endorsing non-Superfund cleanup approaches in discussions with the other agencies, policy concerns similar to those surrounding EPA's controversial draft guide for responding to all nuclear emergencies - known as the protective action guidance (PAG) for radiological incidents -- would arise. With the PAG, officials in EPA's Superfund, water and legal offices raised concerns that the document could set a negative precedent weakening the agency's cleanup and drinking water standards because it included guidelines dramatically less stringent than traditional EPA regulations.

- **While, no agency is taking responsibility for attempting to clean up after a nuclear disaster, all these agencies ignore or miss the fact that nuclear "accidents" NEVER end.**
- **Will they ever admit that a nuclear plant worst case scenarios is likely to be just too bad to clean up?**

## **The Alliance For A Clean Environment**

P.O. Box 3063 Stowe, PA 19464  
(610) 326-6433

January 29, 2007

### **REQUEST FOR IMMEDIATE ACTION**

June 2005, The National Academy of Science released a report called, The Biological Effects of Ionizing Radiation (BEIR VII), clearly stating there is no safe level of radiation exposure.

Yet to date, NRC failed to require more protective radiation standards for the radiation released every day into the air and water during routine operations at nuclear power plants.

Living near a nuclear power plant, such as Limerick Nuclear Power Plant, is an added risk for cancer and leukemia, immune system damage, infant mortality, and a broad range of other serious illnesses.

Current radiation standards are clearly unprotective, when the BEIR VII report confirms there are no safe levels. Current radiation standards, based on "Standard Man" (an average healthy adult man), clearly jeopardize more vulnerable populations.

Requiring more protective radiation standards would be a start, and a crucial precautionary step in protecting fetuses, children, women, the elderly, and those already sick, from the threat of the radiation released every day from nuclear power plants such as Limerick. Evidence shows low doses over time can be just as harmful as one high level dose.

Increasing cancer rates in Montgomery County, especially in children, and especially in communities near Limerick Nuclear Power Plant suggest more protective radiation standards are imperative. Information on rising cancers, etc., which ACE attached with our comments to NRC will arrive in the mail.

NRC was petitioned to require more protective radiation standards at older nuclear power plants. **Please take advantage of this opportunity to speak out to protect public health, especially for fetuses, children, women, the elderly, and those already with cancer and other illnesses. A detailed explanation is attached with ACE comments to NRC.**

#### **ACE urges you to comment to the Secretary of NRC**

Please include information below with your comments.

#### **More Protective Radiation Standards - PRM-51-11**

Federal Register Notice

<http://www.epa.gov/fedrgstr/EPA-IMPACT/2006/November/Day-20/i19568.htm>

Send To:

#### **Secretary, U.S. Nuclear Regulatory Commission**

Rulemakings and Adjudications Staff.

Washington, DC 20555-0001 ATTN:

SECY@nrc.gov.

Phone (301) 415-1966

Fax (301) 415-1101

Submit via website <http://ruleforum.llnl.gov>.

**Please copy ACE if you send comments.**

# Actual Levels Reported to NRC By Exelon Should Be Viewed With Skepticism

## Radiation Testing and Reporting Are Flawed

**Current Radiation Standards and Regulations Are Based On Illusion, Not Reality**

### 1. Testing and reporting are all done by Exelon;

- ✓ The company with a vested interest in the outcome
- ✓ A company that has shown elsewhere and at Limerick that it shouldn't be trusted to provide full and accurate disclosure.
- **SEE ATTACHMENTS (1) Why We Can't Trust Exelon (2) Exelon's Radioactive Watergate.**

### 2. Only a fraction of radionuclides are tracked in all routes of exposure.

- ✓ Only a fraction of radionuclides are monitored, tested, and reported. when over 100 radionuclides are associated with nuclear power production
- ✓ Without continuous independent monitoring, with frequent testing, and reporting, on all radionuclides in all routes of exposure, it is inaccurate to claim to know full and accurate actual risks.

### 3. There are major flaws in data interpretation and reporting.

- **Minimum Detectable Concentration (MDC) is an after the fact ESTIMATE**
- **Lower Limit Detection (LLD)** - LLD does not mean the actual level detected. Arbitrary limits are set, then only levels above that limit are reported. Levels are then defined as smallest concentration of radioactive material in a sample that would yield a net.
- **Net Activity is calculated by subtracting background from sample.** Background VARIES according to length of build-up.
- Gamma Spectroscopy **Means and Standard Deviations of Positive Results Were "CALCULATED"** Standard deviations represent variability of measured results for different samples rather than single analysis uncertainty.

## **Radiation Monitoring Tactics Avoid Full and Accurate Disclosure**

**Industry and Governments monitoring are Plagued by CONFLICTS of INTEREST.**

- Nuclear plants report radiation emitted and detected ONLY if it EXCEEDS an ARBITRARY INFLATED "Background Level".
- Emissions can be estimated.
- Data is averaged to dilute results.

It appears when nuclear plants don't like radiation data, they simply don't report it by claiming equipment failure.

- Limerick Nuclear Plant Radiation Monitoring Reports - Show repeated claims of equipment failure.

Other examples of tactics which can hide full and accurate disclosure:

- TMI - During critical periods of time throughout the TMI event, radiation monitors were not functioning or their detection limits were being exceeded by an unknown amount. The monitors at

TMI were wrecked. the stack monitors were saturated and went off scale.. one thermoluminescent dosimeter in the northwest quadrant, where the wind was blowing, showed very high readings. they discounted it by calling it the "northwest anomaly". so they have no idea how much radiation escaped at TMI. In federal court, the judge threw out the class action health damages suit, saying not enough radiation escaped to cause any health damage.

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- 95% of Fukushima Radiation Detectors Stopped Working Three Hours After The Nuclear Disaster Started March 11. COINCIDENCE? Probably Not.
  - 22 out of the 23 monitors stopped sending data.
  - 3 months later, we learned radiation emissions were twice as bad as reported.

Review and Evaluation of Limerick's 2007 Radiation Report  
to the Nuclear Regulatory Commissions  
Were Done By the Alliance For A Clean Environment

## EXAMPLES

### Radionuclides In Limerick Nuclear Plant's 2007 Radiation Report

#### They Need To Be Evaluated For Limerick's EIS

#### What Are The Health Harms From Additive, Cumulative, Synergistic Impacts Of Continuous Releases Of These Radionuclides?

#### Half-life Impacts Need To Be Evaluated When Exposures Are Continuous

- ✓ I-131 Iodine 131 Poisonous...half life 8 days
- ✓ Cs-134 Cesium 134: (half life 30 years)
- ✓ Cs-137 Cesium 137 (half life 30 years)
- ✓ Mn-54 Manganese 54: (1/2 life 314 days)...bad for liver
- ✓ Co-58 Cobalt 58: (1/2 life 70 days, each cobalt has a different half life)
- ✓ Fe-59 Iron 59: (1/2 life 46.6 days)
- ✓ Zn-65 Zinc 65: (1/2 life 250 days)
- ✓ Zr-95 Zirconium 95: (1/2 life 65 days)
- ✓ Nb-95 Niobium 95: (1/2 life 35 days)
- ✓ Ba-140 Barium 140: (half life 13 days)
- ✓ La-140 Lanthanum 140: (1/2 life 40 hours)
- ✓ Be-7 Beryllium 7: UNstable (1/2 life 53 days)
- ✓ K-40 Potassium 40: half life less than 1 day

## **ACE Comments on Radiation Reporting Tactics in Bold Italics**

Page 6 and 7

### C. Data Interpretation

Lower Limit of Detection (LLD) and Minimum Detectable Concentration (MDC)

- DEFINED as the smallest radioactive material in a sample ABOVE BACKGROUND  
**(NOT ACTUAL RADIATION LEVEL FOUND)**

Minimum Detectable Concentration (MDC)

- AFTER the fact ESTIMATE of the presence of radiation.

NET RADIATION for a sample was "CALCULATED" by SUBTRACTING BACKGROUND

**(Radionuclides are NOT reported as levels actually detected)**

Surface and Drinking Water	12 Radionuclides were reported.
Air Particulate	6 Radionuclides were reported
Fish	9 Radionuclides were reported
Sediment and Broad Leaf Vegetation	8 Radionuclides were reported
Milk	5 Radionuclides were reported

Means and standard deviations of positive results were CALCULATED  
(after CALCULATING ABOVE BACKGROUND)

Standard deviations represent VARIABILITY of measured results for different samples rather than single analysis uncertainty.

**(This allows dilution and manipulation of radionuclide data)**

Page 8

**A long list of excuses to avoid reporting radioactive findings of specific samples. We believe this could happen when results are too high. Excuses include:**

- Equipment failure and malfunction
- Loss of sample
- Not available
- False Positive Data Point

*(Surface water samples were composited quarterly - resulting in DILUTION)*

***(When levels are found too high, the sample is deemed a failure and unacceptable. Reanalysis takes place to change results for an "acceptable" number.)***

June 2009 Zn-65 in AP result of 137 pCi/L was **higher** than the known value of 101 pCi/L.

- **The detector was tagged out-of-service until a recalibration could be performed.**

4 other samples were discounted:

1. Cs-137 in water at 147.7 pCi/L exceeded lower control limit.
  - ✓ **Recounting in a different breaker gave an acceptable result.**
2. H-3 water result of 22,819 pCi/L exceeded the upper control limit of 22,300 pCi/L.
  - ✓ **Reanalysis results were acceptable at 19,170 pCi/L. No cause could be found for the failure.**
3. Sr-90 in AP result of 0.93 exceeded the upper control limit of 0.83.
  - ✓ **Reanalysis results were acceptable. No cause could be found for the failure.**
4. Sr-90 in soil result of 310.5 Bq/kg exceeded the lower control limit of 319 Bq/kg.
  - ✓ **Reanalysis results were acceptable. Incomplete separation of strontium from calcium could result in a higher recovery % and consequently lower reported activity.**

***(3 and 4 show Strontium-90 was found in high levels).***

5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required LGS detection limits for environmental sample analysis.

The minimum detectable concentration (MDC) was defined as above with the exception that the measurement is an after the fact estimate of the presence of activity.

## 2. Net Activity Calculation and Reporting of Results

Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower than the background activity affecting a negative number. An MDC was reported in all cases where positive activity was not detected.

If no positive activity was detected, then gamma spectroscopy MDC results for each type of sample were grouped as follows:

For surface and drinking water twelve nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140, and La-140 were reported.

For fish nine nuclides, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, I-131, Cs-134, and Cs-137 were reported.

For sediment and broad leaf vegetation eight nuclides, Be-7, K-40, Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137 were reported.

For air particulate six nuclides, Be-7, Mn-54, Co-58, Co-60, Cs-134, and Cs-137 were reported.

For milk five nuclides, K-40, Cs-134, Cs-137, Ba-140, and La-140 were reported.

*Dilution* → Means and standard deviations of positive results were calculated. The standard deviations represent the variability of measured results for different samples rather than single analysis uncertainty.

## D. Program Exceptions

For 2009 the LGS REMP had a sample recovery rate in excess of 99%. Exceptions are listed below:

1. Air sample from location 14S1 for the week 3/3/09 – 3/9/09

- was not available due to equipment malfunction (IR 00893287).
2. Air sample from location 11S2 for the week 4/20/09 – 4/27/09 was not available due to equipment malfunction (IR 00915359).
  3. Air sample from location 10S3 for the week 5/18/09 – 5/26/09 was not available due to equipment malfunction (IR 00925392).
  4. Air samples from location 11S1 for the week 7/6/09 – 7/13/09 and 07/20/09 – 07/27/09 were not available due to equipment malfunction (IR 00944071).
  5. Air sample results from location 11S2 for the week of 8/3/09 – 8/10/09 were not available due to the loss of sample during processing.
  6. Grab samples were taken for the composite surface water sampler at location 13B1 during the following periods due to equipment malfunction or frozen sample line:
    - 02/01/09 – 02/18/09
    - 03/01/09 – 03/14/09
    - 03/29/09 – 04/04/09
    - 05/17/09 – 05/23/09
    - 08/30/09 – 09/05/09
    - 10/11/09 – 10/17/09
  7. A grab sample was taken for the composite surface water sampler at location 24S1 during the week of 02/01/09 – 02/07/09 due to equipment malfunction.
  8. Grab samples were taken for the composite drinking water sampler at location 16C2 during the following periods due to equipment malfunction:
    - 03/22/09 – 03/28/09
    - 12/20/09 – 01/02/10
  9. Only two broad leaf vegetation samples were collected at Station 11S3 during the month of September. Collards were not available.
  10. Milk sample stations 23F1 and 25C1 showed positive I-131 activity on 11/03/09. The elevated activity can be attributed to a naturally occurring isotope that was not completely separated from the sample. The activity is considered to be a false positive data point (IR 01039780).

Each program exception was reviewed to understand the causes of the program exception. Sampling and maintenance errors were reviewed with

3. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values.

The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is  $\pm 20\%$  of the reference value. Performance is acceptable with warning when a mean result falls in the range from  $\pm 20\%$  to  $\pm 30\%$  of the reference value (i.e.,  $20\% < \text{bias} < 30\%$ ). If the bias is greater than 30%, the results are deemed not acceptable.

For the primary laboratory, 17 out of 18 analytes met the specified acceptance criteria. One sample did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's Analytics June 2009 Zn-65 in AP result of 137 pCi/L was higher than the known value of 101 pCi/L, resulting in a found to known ratio of 1.36. NCR 09-23 was initiated to investigate this failure. The failure appears to be a result of a slightly high bias on Detector 7. A recount on Detector 17 resulted in a Zn-65 result of 101 pCi/L. The detector has been tagged out-of-service until a recalibration can be performed. Detector 7 is not used for client samples.

For the secondary laboratory, Environmental, Inc., 11 out of 14 analytes met the specified acceptance criteria. Four samples did not meet the specified acceptance criteria for the following reason:

1. Environmental Inc.'s ERA April 2009 Cs-137 in water result of 147.7 pCi/L exceeded the lower control limit of 151.0 pCi/L. All gamma emitters showed a low bias. A large plastic burr found on the base of the Marinelli kept the beaker from sitting directly on the detector. Recounting in a different beaker gave an acceptable result of  $155.33 \pm 14.55$  pCi/L.
2. Environmental Inc.'s ERA April 2009 H-3 in water result of 22,819 pCi/L exceeded the upper control limit of 22,300 pCi/L. A recount of the original vials averaged 23,009 pCi/L. Reanalysis results were acceptable at 19,170 pCi/L. No cause could be found for the failure.

3. Environmental Inc.'s MAPEP January 2009 Sr-90 in AP result of 0.93 exceeded the upper control limit of 0.83. Reanalysis results were acceptable at  $0.54 \pm 0.12$  Bq/filter. No cause could be found for the failure.
4. Environmental Inc.'s MAPEP July 2009 Sr-90 in soil result of 310.5 Bq/kg exceeded the lower control limit of 319 Bq/kg. Reanalysis results were acceptable at 363.3 Bq/kg. Incomplete separation of strontium from calcium could result in a higher recovery percentage and consequently lower reported activity.

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

#### V. References

1. Environmental Report Operating License Stage, Limerick Generating Station, Units 1 and 2, Volumes 1-5 Philadelphia Electric Company.
2. Branch Technical Position Paper, Regulatory Guide 4.8, Revision 1, November 1979.
3. Pre-operational Radiological Environmental Monitoring Program Report, Limerick Generating Station Units 1 and 2, 1 January 1982 through 21 December 1984; Teledyne Isotopes and Radiation Management Corporation.

# **Radiation Monitoring Tactics**

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# EPA's Misleading Contradiction

## Why Does EPA Set A Standard Above ZERO?

# THERE IS NO SAFE DOSE

According To:  
National Academy of Sciences BEIR VII 2005 Report  
Physicians For Social Responsibility

### National Primary Drinking Water Regulations

Drinking Water Standards

Table 1 continued

Contaminants	MCLG <sup>1</sup> (mg/L) <sup>4</sup>	MCL <sup>2</sup> or TT <sup>3</sup> (Mg/L) <sup>4</sup>	Potential Health Effects from Ingestion of Water	Sources of Contaminant in Drinking Water	Treatment Technologies
<b>Radionuclides</b>					
Beta Particles and Photon Emitters	none <sup>5</sup>	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits, e.g.: Potassium 40, <sup>40</sup> K at 200 pCi/L Strontium 90, <sup>90</sup> Sr at 2,000 pCi/L Tritium, <sup>3</sup> H at 50,000 pCi/L Cesium 137, <sup>137</sup> Cs at 80 pCi/L	Treatment method depends on the specific radionuclide element (no water treatment method exists for tritium.)
Gross Alpha Particle Activity	none <sup>5</sup>	15 picocuries* per Liter (pCi/L) *1 pCi=2.2 atom disintegrations per minute	Increased risk of cancer	Erosion of natural deposits	Treatment method depends on the specific radionuclide— e.g., radium, radon, or uranium, see below.
Radium 226 plus Radium 228	none <sup>5</sup>	5 pCi/L	Increased risk of bone cancer	Erosion of natural deposits	Cation Exchange Reverse Osmosis Distillation Electrodialysis
Radon	zero (P)*	300-pCi/L (P)*	Increased risk of cancer	Natural deposits	Activated Carbon Air Stripping
Uranium	zero	0.03 milligrams per liter (mg/L) equivalent to 45 pCi/L (or 99 pCi/L for Uranium-238 at 0.33 pCi/μg)	Increased risk of cancer	Natural deposits	Coagulation/Filtration Submicron/Filtration Anion Exchange Activated Alumina Reverse Osmosis Distillation Electrodialysis

## Permissible Levels of Exposure

The US National Council on Radiation Protection and Measurement gave expression to the theoretical resolution of this human dilemma by articulating the implicit reasoning behind subsequent radiation protection standards development:[20]

1. A value judgment which reflects, as it were, a measure of psychological acceptability to an individual of bearing slightly more than a normal share of radiation-induced defective genes.
2. A value judgment representing society's acceptance of incremental damage to the population gene pool, when weighted by the total of occupationally exposed persons, or rather those of reproductive capacity as involved in Genetically Significant Dose calculation.
3. A value judgment derived from past experience of the somatic effects of occupational exposure, supplemented by such biomedical and biological experimentation and theory as has relevance.

This is now an internationally accepted approach to setting standards for toxic substances when no safe level of the substance exists.

In short, this elaborate philosophy recognises the fact that *there is no safe level of exposure to ionising radiation*, and the search for quantifying such a safe level is in vain. A *permissible* level, based on a series of value judgments, must then be set. This is essentially a trade-off of health for some 'benefit' -- the worker receives a livelihood, society receives the military 'protection' and electrical power is generated. Efforts to implement these permissible standards would then logically include convincing the individual and society that the 'permissible' health effects are acceptable. This has come to mean that the most undesirable health effects will be infrequent and in line with health effects caused by other socially acceptable industries. Frequently, however, the worker and/or public is given the impression that these 'worst' health effects are the only individual health effects. A second implication of the standards-based-on-value-judgments approach is that unwanted scientific research resulting in public scrutiny of these value judgments must be avoided.

The genetic effect considered by standard setters as most unacceptable is serious transmittable genetic disease in live-born offspring. These severely damaged children are usually a source of suffering for the family and an expense for society which must provide special institutions for the mentally and physically disabled. Severely handicapped people rarely have offspring; many die, are sterile or are institutionalised before they are able to bear children. Workers and the public are told that the probability of having such severely damaged offspring after radiation exposure within permissible levels is slight. By omission, a mildly damaged child or a miscarriage is implied to be 'acceptable'.

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From a column in the *Yomiuri Shinbun* (19 January 1965; evening edition)

A nineteen-year-old girl in Hiroshima committed suicide after leaving a note: 'I caused you too much trouble, so I will die as I planned before.' She had been exposed to the atomic bomb while yet in her mother's womb nineteen years ago. Her mother died three years after the bombing. The daughter suffered from radiation illness; her liver and eyes were affected from infancy. Moreover, her father left home after the mother died. At present there remain a grandmother, age seventy-five; an elder sister, age twenty-two; and a younger sister, age sixteen. The four women had eked out a living with their own hands. The three sisters were all forced to go to work when they completed junior high school. This girl had no time to get adequate treatment, although she had an A-bomb victim's health book.

As a certified A-bomb victim, she was eligible for certain medical allowances; but the [A-bomb victims' medical care] system provided no assistance with living expenses so that she could seek adequate care without excessive worry about making ends meet. This is a blind spot in present policies for aiding A-bomb victims. Burdened with pain and poverty, her young life had become too exhausted for her to go on . . . .

There is something beyond human expression in her words 'I will die as I planned before.'

Quoted in Kenzaburo Oe, *Hiroshima Notes*, YMCA Press Tokyo (English translator Toshi Yonezawa; English editor David L. Swain).

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Standard setters judge that the most severe damage done directly to the person exposed is a fatal radiation-induced cancer, and again, this is a rare occurrence when exposure is within permissible levels. All other direct damage is by omission considered 'acceptable'.

In its 1959 report recommending occupational standards for internal radiation doses (i.e. radioactive chemicals which are permitted to enter the body through air, water, food or an open wound), the International Commission on Radiological Protection (ICRP) formed the following definition:

*A permissible genetic dose* [to sperm and ovum], is that dose [of ionising radiation], which if it were received yearly by each person from conception to the average age of childbearing [taken as 30 years], would result in an *acceptable burden to the whole population*.<sup>[16]</sup> [Emphasis added.]

This might be paraphrased to say that the general public (governments) may be willing to accept the number of blind, deaf, congenitally deformed, mentally retarded and severely diseased children resulting from the permissible exposure level. Defined this way, the problem becomes primarily an economic one, since society needs to estimate the cost of providing services for the severely disabled. Once reduced to an economic problem, some nations may choose to promote early detection of foetal damage during pregnancy and induced abortion when serious handicap is suspected. When a foetus is aborted prior to sixteen weeks' gestation the event may not need to be reported and included in vital statistics. It becomes a non-happening, and the nation appears to be in 'good health', having reduced the number of defective births.

Mild mutations, such as asthma and allergies, are ordinarily not even counted as a 'cost' of pollution. The economic burdens, 'health costs', fall more on the individual and family than on the government. Their pain and grief do not appear in the risk/benefit equation. Parents and

children are unaware of the 'acceptable burden' philosophy.

The prediction of the magnitude of the burden of severe genetic ills on an exposed population is essential to this philosophy. However, the data accumulated at Hiroshima and Nagasaki did not give clear answers. Either through ineptitude or loss of survivors of the bombing, who died before their story was told, the researchers failed to find any severe genetic ills clearly attributable to the parental exposure to radiation at low doses.[21] Probably the more fragile individuals in the population died from the blast, fire and trauma of the bombs, the women not surviving long enough to become pregnant.[22]

Governments could not use the research on genetic damage in children of medical radiologists,[23] although this damage was measurable, because, in the early days, radiation exposure to physicians was not measured. No quantitative dose/response estimates could be derived.

Animal studies of radiation-related genetic damage abounded, and the recommending body, ICRP, used (and still uses) mouse studies as a basis of its official predictions of the severe genetic effects of ionising radiation in humans.

As late as 1980, a US National Academy of Science publication from its committee on the Biological Effects of Ionising Radiation[24] stated:

New data on induced, transmissible genetic damage expressed in first generation progeny of irradiated male mice now allow direct estimation of first generation consequences of gene mutations on humans . . . As with BEIR I, a major obstacle continues to be the almost complete absence of information on radiation-induced genetic effects in humans. Hence, we still rely almost exclusively on experimental data, to the extent possible from studies involving mammalian species [i.e. mice].

These mouse studies are used as the basis of prediction, and permissible doses are set so that the expected number of severe transmittable genetic effects in children of those exposed could be presumed to be an *acceptable* burden for governments choosing a nuclear strategy.

The introductory section of ICRP Publication 2, 1959, states:

The permissible dose for an individual is that dose, accumulated over a long period of time or resulting from a single exposure, which, in the light of present knowledge carries a negligible probability of *severe* somatic [damage to the individual] or genetic [damage to the offspring] injuries, furthermore, it is such a dose that any effects that *ensue more frequently* are limited to those of a minor nature that would not be considered *unacceptable* by the exposed individual and by competent medical authorities. Section 30.[16] [Emphasis added.]

Mild mutations are notably happenings of a minor nature, normally neither reported nor monitored in the population. They are likely to be statistically hidden by normal biological variations and unconnected in the mind of the individual or his/her physician with the exposure. The publication continues:

The permissible doses *can therefore be expected to produce effects* [illnesses] that could be detectable only by statistical methods applied to large groups. Section 31.[16] [Emphasis added.]

In spite of this clarity, no such statistical audit of all health effects including chronic diseases in exposed people and mild mutations in their offspring has ever been done. More than 25 years have expired since this document was published and the world is more than 35 years into the nuclear age.

As late as 1965, ICRP Publication 9[25] stated:  
The commission believes that this level [5 rems radiation exposure per 30 years for the general public] provides *reasonable latitude* for the expansion of atomic energy programs in the foreseeable future. It should be emphasised that the limit may not in fact represent a proper balance between possible harm and probable benefit because of the uncertainty in assessing the risks and benefits that would justify the exposure. [Emphasis added.]

The committee protected itself against accusations of wrongdoing but failed to protect the public from its possible error. It defines its role as recommending, with the responsibility of action to protect worker and public health resting with individual national governments. Governments in turn tend to rely on ICRP recommendations as the best thought of internationally respected experts.

In spite of this uncertainty about responsibility and safety levels for exposure of the public, 5 rem per *year*, rather than per 30 years, was permitted for workers in the nuclear industry. The 5 rem per 30 years was set as the *average* dose to a population, with a maximum of 0.5 rem per year (15 rem per 30 years) for any individual member of the public.

For twenty years, between 1945 and 1965, health research on the effects of ionising radiation exposure has focused on *estimating* (not measuring) the number of *excess* radiation-induced fatal cancers and *excess severe* genetic diseases to be expected in a population (i.e. a whole country) given the *average estimated* exposure to radiation for the country. Disputes among scientists usually have to do with the magnitude of these numbers. Omitted from this research are other radiation-related human tragedies such as earlier occurrence of cancers which should have been deferred to old age or even might not have occurred at all because the individual would have died naturally before the tumour became life-threatening. These are not *excess* cancers, they are accelerated cancers. This approach also omits other physiological disorders such as malfunctioning thyroid glands, cardio-vascular diseases, rashes and allergies, inability to fight off contagious diseases, chronic respiratory diseases and mildly damaged or diseased offspring. The implications of such 'mild' health effects on species survival seem to have either escaped the planners of military and energy technology, or to have been deliberately not articulated. Other obvious limitations of this national averaging approach include the failure to deal with global distribution of air and water with the result that deaths and the cumulative damage to future generations are not limited to one country.

The usual procedure for setting the standard for a toxic substance or environmental hazard is to decide the relevant medical symptoms of toxicity and determine a dose level below which these symptoms do not occur in a normal healthy adult. This cut-off point is sometimes called the tolerance level and it represents a sort of guide to the human ability to compensate for the

presence of the toxic substance and maintain normal health. The tolerance level for a substance, if one can be determined, is then divided by a factor (usually 10) to give a safe level. This allows for human variability with respect to the tolerance level and also for biological damage which may occur below the level at which there are visible signs of toxicity, i.e. sub-clinical toxicity.

Human experience with ionising radiation had been recorded for more than fifty years prior to the nuclear age, the early history of handling radioactive material having been fraught with tragedy. The discoverer of the X-ray, W. K. Roentgen, died of bone cancer in 1923, and the two pioneers in its medical use, Madame Marie Curie and her daughter, Irene, both died of aplastic anaemia at ages 67 and 59 respectively. At that time, bone marrow studies were rarely done, and it was difficult, using blood alone, to distinguish aplastic anaemia from leukaemia. Both diseases are known to be radiation-related. Stories of early radiologists who had to have fingers or arms amputated abound. There were major epidemics among radiation workers, such as that among the women who painted the radium dials of watches to make them glow in the dark. Finally, there were the horrifying nuclear blasts in Hiroshima and Nagasaki.

The painful period of growth in understanding the harmful effects of ionising radiation on the human body was marked by periodic lowering of the level of radiation exposures permitted to workers in radiation-related occupations. For example, permissible occupational exposure to ionising radiation in the United States was set at 52 roentgen (X-ray) per year in 1925,[26] 36 roentgen per year in 1934,[27] 15 rem per year in 1949[28] and 5 to 12 rem per year from 1959 (depending on average per year over age 18) to the present.[29] Recently there has been an effort to increase permissible doses of ionising radiation to certain organs such as thyroid and bone marrow[30] in spite of research showing the radiosensitivity of these tissues. This newer trend probably reflects economic rather than physiological pressures, especially given the lack of an acceptable audit of physiological cost.

Comments on NRC Radiation Standards  
Joseph J. Mangano MPH MBA  
Radiation and Public Health Project  
February 5, 2007  
Submitted via email – <http://ruleforum.llnl.gov>

The U.S. Nuclear Regulatory Commission (NRC) should update its standards at aging nuclear power plants to better protect local residents, especially the most vulnerable, i.e. fetuses, infants, children, the elderly, and those suffering with an immune compromising disorder. The NRC needs to base its standards on recent scientific discoveries by official organizations in the U.S. and abroad that contradict previously held beliefs, including

- releases from reactors are greater than previously believed
- the very young are more susceptible to radiation
- latency from exposure to cancer manifestation may be shorter in certain populations
- rates of cancer and other diseases near reactors are higher than expected

The following contains summaries of these new findings that the NRC should consider:

1. High Cancer Rates Near Reactors. There have been many descriptive studies in the medical literature in the past decade that document elevated rates of cancer near nuclear facilities. Many of these analyses focus on cancer in children, who are more susceptible to the biochemical effects of radiation exposure. They include
  - At least 11 studies showing elevated childhood cancer rates near different facilities in the United Kingdom
  - Articles indicating elevated childhood leukemia rates near reprocessing sites in Europe (Dounreay, Sellafield, La Hague, and Krummel)
  - A 2003 study showing childhood cancer rates exceeding the national rate near each of 14 U.S. nuclear plants studied
2. Underestimation of Risk. In 2004, the Committee Examining Radiation Risks of Internal Emitters (CERRIE), a blue ribbon panel convened by the British Environmental Minister, concluded that risks from radiation exposure to humans may have been underestimated by as many as 10 times. A minority of CERRIE members projected this underestimate to be as many as 100 times. The CERRIE based its conclusions on a variety of new findings in radiation biology such as the “bystander effect” in which a cell harmed by radiation may affect otherwise healthy cells in the vicinity.
3. Miscalculation of Dose. In 2003, the European Committee on Radiation Risk (ECRR) produced a report that directly challenged the prevailing understanding of dose. The ECRR, which arose from criticisms of the International Commission

on Radiation Protection (ICRP) dose model presented at a European Parliament workshop, used over 500 professional references to support its conclusions, most of them recent. The ICRP model is lacking, states the ECRR report, because of recent discoveries in biology, genetics, and cancer research suggesting the ICRP model of cellular DNA is not a good basis for risk analysis. Thus, the maximum permissible dose to the public should be no more than 0.1 millisievert (mSv), rather than the ICRP “safe” dose of 100 mSv.

4. Elevated Risk to Fetus and Infant. In 2003, the U.S. Environmental Protection Agency issued draft paper EPA/630/R-03/003. It concludes that harm from radiation exposure is considerably higher in young persons than in adults (children age 2-16 have three times the risk, while children under age 2 have ten times the risk). This paper officially acknowledges that use of risk models based on “average” humans minimizes risk to those who are especially vulnerable.
5. New Findings on Fetal/Infant Susceptibility. Since 1956, when Dr. Alice Stewart demonstrated that prenatal pelvic X-rays yielding a dose as low as 10-20 mSv significantly raised the risk of cancer deaths by age ten, the risk radiation poses to the fetus and infant has been a focus of research – but largely ignored by standard setting bodies. In the most recent document the ICRP stated that below 100 milligrays, lethal effects to the fetus are “infrequent” (100 mGy equals 100 mSv). The following are among the more recent studies to identify radiation risks to the fetus and infant (other than childhood cancer):
  - The October 23, 1999 *Lancet* published research showing that every additional 100 mSv of radiation exposure to external ionizing radiation before conception added a 25% risk of a child being stillborn.
  - An article in the January 2004 *British Medical Journal* documented that males irradiated for cutaneous hemangioma under 18 months had a progressively lower attendance rate in high school, documenting lower rates even at doses of under 20 mSv.
  - The April 28, 2004 *Journal of the American Medical Association* presented a study associating risk of low weight births with prenatal dental radiography at a dose of over 0.4 mGy (0.4 mSv).
6. New Findings on Bomb Fallout Risks. In 1991, U.S. public health officials had not admitted that fallout from 1945-1963 atmospheric nuclear weapons tests caused any harm. However, the release of a 1997 report by the National Cancer Institute estimated that Iodine-131 from tests – still considered low dose exposure - caused between 11,000 and 212,000 Americans to develop thyroid cancer. No acknowledgement of this landmark research study was made by the NRC.
7. New Findings of Nuclear Worker Risks. In 2000, the U.S. Department of Energy released a report summarizing many research studies, and concluding that

workers at American nuclear weapons plants suffer from disproportionately high rates of various cancers. Congress subsequently passed a law entitling affected workers to compensation. Again, the NRC made no note of this important development and its implications for radiation safety standards.

8. New Findings on Short Latency Period. Much has been recently learned about risk to humans exposed to Chernobyl fallout. Perhaps the most striking finding has been the short latency between exposure and onset of thyroid cancer in children (as little as four years), and leukemia in infants (under one year). In the latter case, areas far from Chernobyl (Germany, Greece, Scotland, U.S., Wales) were affected, even though exposures were much lower than near the plant.
9. New Findings on In-Body Radioactivity. Beginning in the 1990s, the first studies of in-body (baby teeth) radioactivity of humans exposed to reactor emissions have been published. Studies in Germany, Greece, and the Ukraine showed elevated levels of Strontium-90 after Chernobyl. Another showed Plutonium-239 levels decreasing with distance from the Sellafield plant. Another showed Strontium-90 highest in counties near 7 U.S. nuclear plants, and rising since the late 1980s. These studies, all documented in the medical literature, constitute the research community's "gold standard" for dose estimates, but were first ignored, then opposed by the NRC, which has yet to conduct or commission such a study.

The importance of NRC standards cannot be emphasized enough. Since 1991, the number of nuclear power reactors worldwide has grown to 439, the amount of highly radioactive waste generated by these reactors has soared, and medical uses of radiation have proliferated. Moreover, the terrorist threat since the September 11, 2001 attacks make potential harm from radiation exposure even greater, in the event a reactor is attacked, a nuclear weapon strike is launched, or a "dirty bomb" is used.

The overriding theme of these recommendations should be the so-called Precautionary Principle, which states that if consequences of an action are unknown but have potential for negative consequences, it is better to avoid that action. In the health field, this belief has existed since the Hippocratic principle of "first do no harm" of over 2,000 years ago. The series of assumptions that radiation exposure carries no risk that were later reversed by empirical research – for pelvic X-rays to pregnant women, atomic bomb test fallout, and occupational exposures in nuclear weapons plants – suggests strongly that the NRC re-evaluate health risks of low-dose exposures, and lower the current limits.

# **U.S. Scientists Say They Are Told To Alter Findings**

**More than 200 Fish and Wildlife researchers cite cases where conclusions were reversed to weaken protections and favor business, a survey finds**

by Julie Cart  
© 2005 Los Angeles Times  
Posted on Pennet 3/22/05

More than 200 scientists employed by the U.S. Fish and Wildlife Service say they have been directed to alter official findings to lessen protections for plants and animals, a survey released Wednesday says.

The survey of the agency's scientific staff of 1,400 had a 30% response rate and was conducted jointly by the Union of Concerned Scientists and Public Employees for Environmental Responsibility.

A division of the Department of the Interior, the Fish and Wildlife Service is charged with determining which animals and plants should be placed on the endangered species list and designating areas where such species need to be protected.

More than half of the biologists and other researchers who responded to the survey said they knew of cases in which commercial interests, including timber, grazing, development and energy companies, had applied political pressure to reverse scientific conclusions deemed harmful to their business.

Bush administration officials, including Craig Manson, an assistant secretary of the Interior who oversees the Fish and Wildlife Service, have been critical of the 1973 Endangered Species Act, contending that its implementation has imposed hardships on developers and others while failing to restore healthy populations of wildlife.

Along with Republican leaders in Congress, the administration is pushing to revamp the act. The president's proposed budget calls for a \$3-million reduction in funding of Fish and Wildlife's endangered species programs.

"The pressure to alter scientific reports for political reasons has become pervasive at Fish and Wildlife offices around the country," said Lexi Shultz of the Union of Concerned Scientists.

Mitch Snow, a spokesman for the Fish and Wildlife Service, said the agency had no comment on the survey, except to say "some of the basic premises just aren't so."

The two groups that circulated the survey also made available memos from Fish and Wildlife officials that instructed employees not to respond to the survey, even if they did so on their own time. Snow said that agency employees could not use work time to respond to outside surveys.

Fish and Wildlife scientists in 90 national offices were asked 42 questions and given space to respond in essay form in the mail-in survey sent in November.

One scientist working in the Pacific region, which includes California, wrote: "I have been through the reversal of two listing decisions due to political pressure. Science was ignored - and worse, manipulated, to build a bogus rationale for reversal of these listing decisions."

More than 20% of survey responders reported they had been "directed to inappropriately exclude or alter technical information."

However, 69% said they had never been given such a directive. And, although more than half of the respondents said they had been ordered to alter findings to lessen protection of species, nearly 40% said they had never been required to do so.

Sally Stefferud, a biologist who retired in 2002 after 20 years with the agency, said Wednesday she was not surprised by the survey results, saying she had been ordered to change a finding on a biological opinion.

"Political pressures influence the outcome of almost all the cases," she said. "As a scientist, I would probably say you really can't trust the science coming out of the agency."

A biologist in Alaska wrote in response to the survey: "It is one thing for the department to dismiss our recommendations, it is quite another to be forced (under veiled threat of removal) to say something that is counter to our best professional judgment."

Don Lindburg, head of the office of giant panda conservation at the Zoological Society of San Diego, said it was unrealistic to expect federal scientists to be exempt from politics or pressure.

"I've not stood in the shoes of any of those scientists," he said. "But it is not difficult for me to believe that there are pressures from those who are not happy with conservation objectives, and here I am referring to development interest and others."

"But when it comes to altering data, that is a serious matter. I am really sorry to hear that scientists working for the service feel they have to do that. Changing facts to fit the politics - that is a very unhealthy thing. If I were a scientist in that position I would just refuse to do it."

The Union of Concerned Scientists and the public employee group provided copies of the survey and excerpts from essay-style responses.

One biologist based in California, who responded to the survey, said in an interview with The Times that the Fish and Wildlife Service was not interested in adding any species to the endangered species list.

"For biologists who do endangered species analysis, my experience is that the majority of them are ordered to reverse their conclusions [if they favor listing]. There are other biologists who will do it if you won't," said the biologist, who spoke on condition of anonymity.

# Private Labs

# FAKE ENVIRONMENTAL TESTS

## Government Finds

*By Associated Press*  
*Wednesday, January 22, 2003*

**WASHINGTON — Private laboratories are increasingly being caught falsifying test results for water supplies, petroleum products, underground tanks, and soil, hampering the government's ability to ensure Americans are protected by environmental laws, investigators say.**

The fraud has caused millions of people to fill their cars with substandard gasoline that may have violated clean air standards, or to drink water not properly tested for safety, the officials said. In addition, **officials making decisions at hazardous waste cleanup sites have relied on companies that fraudulently tested air, water and soil samples.**

"In recent years, what has come to our attention is that outside [non-government] labs are oftentimes in bed with the people who hired them, and conspired to commit environmental crime," said David Uhlmann, chief of the Justice Department's environmental crimes section.

The EPA's watchdog against fraud, Inspector General Nikki Tinsley, has called the rise of lab fraud a disturbing trend. "If it was my drinking water I'd consider it very serious," she said, declining to identify locations affected by the ongoing investigation.

Private laboratories test products that are regulated by anti-pollution laws, and **the results allow companies to certify that they're meeting the requirements of environmental protection laws.** In one instance three years ago, investigators discovered fraudulent test results by contract employees at the Environmental Protection Agency's lab in Chicago. The head of the laboratory was transferred and the contractor, Lockheed Martin, was suspended from performing tests.

**The Justice Department and Environmental Protection Agency have prosecuted dozens of employees and laboratories the past several years for fraudulent testing.** Uhlmann, the Justice Department official, said the prosecutions have grown but statistics are not kept on lab fraud cases. The growing number of cases stretch from New England, where a chemist for municipal water made up test results, to Texas, where the government recently prosecuted the largest tester of underground fuel tanks.

**Officials said they aren't certain whether an increasing number of labs are falsifying tests, or whether more are simply being caught through more aggressive investigations and whistle-blowers.**

Tinsley said there were **numerous reasons for lab misconduct: poor training, ineffective ethics programs, shrinking markets, and efforts to cut costs.** In some cases, the labs duped the companies that submitted samples for testing. In other instances, **the companies were part of a conspiracy with the labs, officials said.** Sometimes the fraud included "driveway tests," so-named because employees generate them on a computer in their own driveways, without ever visiting the facilities.

**Whatever the case, lab fraud hampers an environmental protection system that frequently relies on voluntary compliance by companies backed by test results, officials said.**

"If we can't rely upon science with supporting lab results, then we don't know what's out there for the public to eat or drink or use," said J.P. Suarez, the EPA's assistant administrator for enforcement and compliance assurance. "When people may not be getting harmed, they may be getting ripped off, using products that are not what they're paying for. And companies are paying for services they're not getting," he said.

**Among the recent examples:**

- **Intertek Testing Services, of Richardson, Texas, was fined \$9 million for falsifying results at its former laboratory in the Dallas suburb. The tests of air, soil, pesticides, nerve gas agents and other hazards were used to make decisions for severely polluted areas called "Superfund" sites, at Department of Defense facilities and other hazardous waste locations.**
- **Terian Koester, owner of Quality Water Analysis Laboratories in Pittsburg, Kan., was sentenced to 18 months in prison for violating the Clean Water Act and mail fraud. He was accused of fraudulent analysis of waste water, drinking water and hazardous waste.**
- **William McCarthy, a senior chemist for the Lawrence, Mass., drinking water filtration plant, pleaded guilty to violating the Safe Drinking Water Act. During the 1990s McCarthy, who supervised quality testing, admitted he fabricated drinking water quality results. The Lawrence filtration plant draws water from the Merrimack River and distributes it to more than 60,000 residents.**
- **Caleb Brett U.S.A. Inc., of Houston, was sentenced to pay a \$1 million fine and three years probation for misleading investigators about a scheme to falsify analyses on reformulated gasoline, a blended fuel that significantly reduces pollution in populated areas. The fraud resulted in distribution of 200 million to 300 million gallons of substandard gasoline in New York, New Jersey and Connecticut.**
- **Tanknology-NDE International, of Austin, Texas, was ordered to pay \$2.29 million in a criminal fine and restitution for false underground storage tank testing services. The nation's largest underground storage tank testing company admitted the fraud at postal facilities, military bases and a NASA facility, among other sites. The tests were supposed to detect leakage of petroleum products.**
- **Former environmental contractor James Edward Adams of Inman, S.C., was sentenced to 27 months in prison. His company, which provided testing services for underground storage tanks, directed employees to provide false test reports to owners and operators of petroleum tank facilities in South Carolina, North Carolina, Florida, Georgia, Virginia and Tennessee, prosecutors said.**

# **LIMERICK RADIATION AND CANCER**

- **LIMERICK ROUTINELY RELEASES RADIATION INTO AIR AND WATER**
- **RADIATION GETS INTO OUR FOOD, WATER, SOIL, VEGETATION, MILK, AND INTO OUR BODIES**
- **RADIATION CAUSES CANCER**
- **AFTER LIMERICK STARTED OPERATING CANCER RATES SKYROCKETED**

**THE LINK IS CLEAR!**

# **DOCUMENTED CANCER INCREASES IN OUR REGION SUGGEST**

## **Limerick Nuclear Plant Is A Tragic Cancer Time Bomb**

**IT WAS NOT ONLY INFURIATING,  
IT WAS UNACCEPTABLE AND UNPROFESSIONAL  
FOR NRC OFFICIALS TO MAKE FALSE CLAIMS 9-22-11  
ABOUT INCREASED CANCERS IN OUR REGION**

### **TO SET THE RECORD STRAIGHT:**

- 1. CANCER DATA IN THE FOLLOWING REPORTS ARE BASED ON PA CANCER REGISTRY DATA AND THE CDC WEBSITE.**
- 2. TO MAKE FALSE CLAIMS THAT DOCUMENTED CANCER DATA WAS CHERRY PICKED AND ANECDOTAL TO DISMISS SHOCKING CANCER DATA SHOWS JUST HOW BIASED NRC'S CANCER STUDY WILL BE.**
- 3. FOR NRC OFFICIALS TO MAKE UNSUBSTANTIATED CLAIMS THAT RADIATION RELEASES ARE TOO SMALL TO CAUSE CANCER DEFIES LOGIC AND DENIES A SIZEABLE BODY OF RESEARCH FROM INDEPENDENT SCIENTISTS AND PHYSICIANS.**
- 4. NRC'S SCIENTIFIC CREDIBILITY IS DAMAGED SEVERELY WHEN AN NRC OFFICIAL MAKES SUCH ABSURD CLAIMS.**

**TO BE CLEAR, THE FOLLOWING CANCER DATA REPRESENTS ACTUAL DOCUMENTED SKYROCKETING CANCER INCREASES FAR HIGHER THAN THE NATIONAL AVERAGE AFTER LIMERICK NUCLEAR PLANT STARTED OPERATING IN 1985 TO 1999. DATA IS IRREFUTIBLE AND CANNOT BE SUMMARILY DISMISSED!**

**A Packet Is Available Upon Request Which Includes  
Harmful Health Impacts of Radiation Released From Nuclear Power Plants  
Including Limerick Nuclear Power Plant**

1. "Radiation's Harmful Health Impacts", ACE Overview, February 2007
2. ACE Comments to the Secretary of the Nuclear Regulatory Commission urging NRC to approve the petition for rulemaking that would provide more protective radiation standards at older nuclear plants like Limerick, January 2007
3. Childhood Cancer Rates - 92.5% Higher than the National Average in Six Communities Close to Limerick Nuclear Power Plant (1995 to 1999). Alarming Upward Trend in Childhood Cancer Rates from the mid 1980s when Limerick Started Operating to the late 1990s. Data Source: PA Cancer Registry
4. Childhood Cancer Deaths (Ages 1 to 14) 1981-89 to 1990-98. Dramatic Increases  
Data Source: CDC
5. "Radioactive Baby Teeth: The Cancer Link" by Joseph Mangano, March, 2008
6. Radiation in Baby Teeth, Highest Near Limerick Nuclear Plant. Reported November 2003
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11. "Radiation and Children: The Ignored Victims", Nuclear Information Resource Service, August 2004
12. EPA said, Children can be up to 10 times more vulnerable to harmful impacts from hazardous chemicals such as radiation than adults - EPA moves to protect kids from chemicals - 2003
13. Children Most At Risk Near Limerick Nuclear Plant - 22 Schools Within 3 Miles - List and Map
14. Cancer Rates in Six Communities Close to Limerick Nuclear Plant are Far Higher than the National and Tri-County Averages for 8 of 11 of the most common US Cancers (1995 to 1999). Data Source: PA Cancer Registry
15. Alarming County Cancer Increases Since Limerick Started Operating in 1985  
Increases from 1985-86 to 1996-97 Data Source: PA Cancer Registry
16. Thyroid Cancer Incidence Skyrocketed with a 128% Increase since Limerick Nuclear Plant started operating in 1985. Thyroid Cancer Rates in 1998, 1999, and 2000 were about 75% Higher than the US Rate, which is also rising. Source: PA Cancer Registry

- A Thyroid Cancer Epidemic Was Linked With Nuclear Plants in a 2009 Scientific Article. Evidence suggested the closer you live to Limerick, the more risk of getting Thyroid Cancer.
17. Leukemia Rates In Six Communities Near Limerick Nuclear Power Plant Nearly Double State Average (1985 to 1994). Source: PA Cancer Registry. 48% County Increase Leukemia since Limerick Started Operating in 1985 (1985 to 1997). County - PA Cancer Registry. Leukemia Overview Near Limerick and Research Links to Low-Level Radiation.
  18. Brain / Central Nervous System Cancers among the highest in children in six communities close to Limerick. Upward trend similar to rising childhood cancer rates after Limerick started operating in 1985. Brain Cancer - significantly higher closest to Limerick Nuclear Plant.
  19. Breast Cancer Far Higher Than The National and Tri-County Averages (1995 to 1999), in Six Communities Close to Limerick Nuclear Power Plant (all ages). Highest rates among young women. 61% County Increase 1985-86 to 1996-97 Sources: PA Cancer Registry Research Links to Low Level Radiation.
  20. Ionizing Radiation From Nuclear Plants Can Affect the Whole Body - Body Chart and List
  21. "No Safe Dose" - "Biological Effects of Ionizing Radiation", National Academy of Sciences BEIR VI Report, 2005
  22. No Safe Dose - Compilation of Quotes on Radiation Exposure Risks From Scientific Experts - Nuclear Information Resource Service, June 2003
  23. "Hidden Radioactive Releases from Nuclear Power Plants in the United States", Nuclear Information and Resources Service, November 2005
  24. "Nuclear Reactor Emissions are Toxic", Radiation and Public Health Project Brochure, 2009
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  26. Exelon's Annual Radioactive Release Report No.35 to the Nuclear Regulatory Commission. - Selected Pages Document That Radiation Is Emitted From Limerick Nuclear Plant.
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  31. Ernest Sternglass, Ph.D, Emeritus Professor of Radiological Physics - Presentation in Pottstown 2004 / Janette Sherman, M.D., Toxicologist and Doctor of Internal Medicine, Presentation in Pottstown 2000.
  32. "Chernobyl: Lessons Learned" Children are by far the most vulnerable to radiation exposure, even in relatively small doses. Children exposed to radiation suffer from higher cancer rates, and have a greater likelihood of developing breast cancer as adults. American Academy of Pediatrics concluded children are extra sensitive to the DNA-damaging effects of radioactive energy. Life Extension, Page 60, December 2004

**AFTER LIMERICK NUCLEAR PLANT  
STARTED OPERATING IN 1985**

**CANCER RATES  
SKYROCKETED**

**THE LINK IS CLEAR!**

# RADIATION RELEASES

## From Limerick Nuclear Power Plant And

# LINKS TO CANCER

### RADIATION

A broad range of dangerous radionuclides are routinely released into our air and water from Limerick Nuclear Plant. Limerick also has accidental radiation releases. **There Is NO Safe Level.**<sup>i</sup>

- Permissible radiation levels does not mean they are safe.
- Radiation exposure can cause cancer and other serious disease and disability, at any level of exposure according to the National Academy of Sciences and Physicians for Social Responsibility.
- Fetuses, infants, and children are the most impacted.
- Infant mortality has been linked to radiation from nuclear plants. State data documents that Infant and neonatal mortality are far higher in communities around Limerick Nuclear Plant than the state average, as well as far higher than Philadelphia or Reading.

### CANCER

**Limerick Nuclear Plant's Radiation Releases Clearly Played A Major Role In The Alarming Cancer Increases After Limerick Started Operating.**

➤ NRC Lost All Credibility May 18, 2011, With Absurd Denials About Nuclear Plants Links to Cancer. <sup>ii</sup>

#### **Cancer Rates Skyrocketed After Limerick Opened**

**In Montgomery County – Home of Limerick Nuclear Plant**

**Increases Mid 80s to 90s<sup>iii</sup>**

✓ Prostate	Increased	132%
✓ Thyroid	Increased	128%
✓ Kidney	Increased	96%
✓ Multiple Myeloma	Increased	91%
✓ Hodgkin's Disease	Increased	67%
✓ Non-Hodgkin's Lymphoma	Increased	61%
✓ Breast	Increased	61%
✓ Pancreas	Increased	54 %
✓ Leukemia	Increased	48%

#### **Cancer Rates Far Higher Than U.S. and Tri-County Averages In 6 Communities Close to Limerick Nuclear Plant (1995 to 1999)<sup>iv</sup>**

Lower Pottsgrove, Upper Pottsgrove, West Pottsgrove, Pottstown, North Coventry, Douglass Berks  
**8 of 11 Most Common Cancers Above National and State Averages -Compared to U.S. and TriCounty**

<u>Type of Cancer</u>	<u>Above U. S.</u>	<u>Above Tri County</u>
✓ Kidney/Renal Pelvis	+ 60 %	+ 42.7 %
✓ Rectum	+ 44 %	+ 13.5 %
✓ Uterine	+ 44 %	+ 38.7 %
✓ Breast (female)	+ 39 %	+ 24.5 %
✓ Brain/Cent. Nervous System	+ 38 %	+ 32.5 %

✓ Urinary Bladder	+ 35.5 %	+ 17.9 %
✓ Colon	+ 21 %	+ 3.3 %
✓ Lung	+ 11.8 %	+ 18.4 %
✓ Leukemia	+ 11.5 %	+ 14.9 %

## **CHILDHOOD CANCER**

### **92.5 % Higher Than The National Average<sup>v</sup>**

In Six Communities Close To Limerick Nuclear Plant

Pottstown , West Pottsgrove, Lower Pottsgrove, Upper Pottsgrove, North Coventry, Douglass Berks Township

(Ages 0-19) All Cancers Diagnosed from 1995-1999 Rate per 100,000

Type of Cancer	Cases 0-19	Gr. Pottstown	U.S.	%AboveU.S.	Significance
All Cancers	40	28.33	16.04	+ 76.6	p<.02
Leukemia	13	9.21	3.89	+136.8	p<.055
Brain/Central Nervous Sys.	7	4.96	2.98	+ 66.4	
Kidney/Renal Pelvis	5	3.54	0.73	+384.9	p<.09
Non-Hodgkin's Lymphoma	4	2.83	1.04	+172.1	
All other	11				

Note: **Half Of Childhood Cancers Above Are Leukemia and Brain/Central Nervous System Cancers, Both Associated With Radiation Exposure .**

Rates calculated in 2003 using 1990-99 annual Greater Pottstown population 0-19 of 14,120.

For example, leukemia rate = 13 cases/10 years/14,120 x 100,000 = 9.21.

Rates are MUCH HIGHER for FOUR of the CANCERS most common in children, SIGNIFICANTLY HIGHER for ALL CANCERS and LEUKEMIA, and BORDERLINE SIGNIFICANT for KIDNEY/RENAL PELVIS.

### **71% Increase In Montgomery County, Home of Limerick Nuclear Power Plant<sup>vi</sup>**

Deaths from Neoplasms in Children Ages 1 to 14<sup>vii</sup> 1981-89 vs. 1990-98

But Rates In Neighboring Counties, PA, and the U.S. Were Down:

✓ Chester County	29.0% Decrease
✓ Berks County	30.6% Decrease
✓ Pennsylvania	17.1% Decrease
✓ U.S.	21.2% Decrease

### **UPWARD TREND AFTER LIMERICK STARTED OPERATING (Childhood Cancer)**

Late 1980's about 30 % HIGHER than the NATIONAL AVERAGE

Early 1990's about 60 % HIGHER than the NATIONAL AVERAGE

Late 1990's up to 92.5 % HIGHER than the NATIONAL AVERAGE

Late 1990's almost 100 % HIGHER than the STATE and TRI COUNTY

### **Limerick's Routine Radiation Releases Are Logically A Major Factor.**

Nationwide, cancer is the #1 disease-related death in children. All children are exposed to similar environmental pollutants, including pesticides and herbicides, cleaning chemicals, mold, second hand smoke, vehicle emissions, and even genetic factors.

### **Closing Limerick Is The Only Way to Stop Routine Radiation Releases.**

As long as Limerick operates, routine radiation will continue to be released into our air, increasing risk of cancer and other diseases and disabilities caused by radiation exposure.

<sup>i</sup> National Academy of Sciences BEIR VII Report

<sup>ii</sup> NRC Branch Chief, Paul Krohn – Statements From Video Taken At NRC Meeting 5-18-11

<sup>iii</sup> Source: Pennsylvania State Cancer Registry For Montgomery County - From 1985-86 To 1996-97

<sup>iv</sup> Source: PA Cancer Registry Statistics 1995 – 1999

<sup>v</sup> Source: CDC Website

<sup>vi</sup> Source: PA Cancer Registry

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## **NRC Lost All Credibility Related To: Nuclear Plant's Routine Radiation Releases And Cancer**

### **Links between elevated cancers around nuclear plants are obvious and already documented.**

- Nuclear plants like Limerick routinely release a broad range of radionuclides into the air and water around them.
- Radiation exposure can lead to cancer at any level.
- After a nuclear plant like Limerick starts operating and continuously releasing a broad range of radionuclides into the air and water, people in the region are continuously exposed to additive, cumulative, and synergistic doses of that radiation from all routes of exposure.
- Long-term exposure to the witches brew of radiation from nuclear plants like Limerick logically causes increases in cancers around it.
- Limerick Nuclear Plant is clearly a major factor in the shocking cancer increases around Limerick Nuclear Plant since it started operating.

It is **NOT** credible for the nuclear industry or NRC to assert or claim that Limerick's routine radiation emissions are not a major factor in the documented highly elevated cancers around it, especially in children.

### **5-18-11 In Limerick, NRC Made Inaccurate, Unsubstantiated, Deceptive Claims, Discounting Independent Scientists and Research.**

#### **1. Many Studies Show Links Between Nuclear Plants and Cancer.**

**U.S. and European studies, as well as four studies on PA Cancer Registry cancer data around Limerick, show increased cancers, especially in children,**

- Yet Paul Krohn, NRC's Branch Chief for Limerick claimed *"There is no research to show health problems. NRC cannot specifically tie cancer studies...around nuclear power plants to them."*

#### **2. Strontium 90 (SR-90) in Baby Teeth Is The Smoking Gun.**

**The Radiation and Public Health Project's "Tooth Fairy Study" verified Strontium-90 radiation in the baby teeth collected from children around Limerick Nuclear Plant. (Reported 2003).**

- Limerick Nuclear Plant's role in SR-90 in baby teeth around Limerick is clear.
- Strontium-90 was routinely released into our air and water from Limerick Nuclear Plant since 1985.
- SR-90 was detected around Limerick in water, milk, soil, and vegetation (2009 Exelon Report).
- SR-90 was detected in the teeth of children living in the region around Limerick, at some of the highest levels around nuclear plants studied in the U.S.
- Limerick Nuclear Plant's 26 years of SR-90 releases were obviously the major factor.  
Still, 5-18-11, NRC's Branch Chief, Paul Krohn blamed 50-year old bomb testing stating, *"Bomb testing didn't stop that long ago – from a scientific perspective SR-90 in teeth is from bomb testing."* It is NOT credible to blame decades old bomb testing far distances from Limerick for SR-90 found in baby teeth in the region around Limerick, when Limerick routinely released SR-90 since 1985.

### **Background Radiation Levels Were Drastically Increased After Chernobyl/Japan**

<b>Disasters.</b>	Pre-Chernobyl:	80 to 100 Millirems Per Year
	After Chernobyl:	360 Millirems Per Year
	After Japan:	620 Millirems Per Year

**Still, NRC Shamefully Dismissed the Obvious Role of the Chernobyl and Japan Nuclear Disasters In Drastic RADIATION BACKGROUND INCREASES.** 5-18-11 NRC's Paul Krohn asserted nuclear disasters didn't cause increases saying, "a lot of that is ...cosmic rays. Background increased by living changes – add to what people receive each went to about 620 from about 300." When challenged by residents, NRC's Richard Barkley responded, *"NRC didn't assert it was safer. That's just reality."*

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**In essence, NRC legally sanctioned increased radiation health harm to our region, 3-16-11, days after the Japan disaster.** Why? Exelon will not have to report on radiation detected for Limerick samples, if they are under 620 Millirems Per Year. That is both deceptive and dangerous. When independent scientists and physicians admit there is no safe level of radiation exposure, detection levels for Limerick monitoring should be zero.

**So called "Safe Dose Limits", are arbitrary, deceptive, and clearly NOT PROTECTIVE.** Debate inside EPA sparked "hot dissent" on a plan to radically hike post-accident radiation in food and water. Example: Proposed New Guidance would allow clean-up levels that exceed MCSs under the Safe Drinking Water Act by a factor of 100, 1000, and in two instances 7 million. EPA Public Employees for Environmental Responsibility (PEER) said, "We all deserve to know why some in EPA want to legitimize exposing the public to radiation at levels vastly higher than what EPA officially considers dangerous."

**Dr. Jeffrey Patterson, Professor Emeritus, University of Wisconsin's School of Public Health and Past President of Physicians for Social Responsibility says:**

- "Background Radiation" is NOT safe. We live with background radiation, but it does cause cancer".
- "There are absolutely no safe levels of radiation. Adding more radiation ADDS to the health impacts".
- "Exposure to radionuclides...increases risk of cancer.
- "Every effort must be taken to minimize radionuclide content in food and water."

**Dr. Steven Wing, University of North Carolina in Chapel Hill, School of Public Health said:** "Generally accepted thinking is that there is no safe dose in terms of cancer or genetic effects of radiation. The claims of no threat to health...just flies in the face of all the standard models and all the studies that have been done over a long period of time of radiation and cancer".

**Dr. Chris Busby, Scientific Secretary of the European Committee on Radiation Risk said, if one plans on living a long, healthy life, the most obvious way is to reduce radiation exposure.** Dr Busby's Book, "Radiation Toxicity Syndrome" focuses on harms from radiation exposure.

**NRC is involved in a cover-up; a dismissal and/or distortion of the effects of radioactivity from nuclear plants, even regarding the actual harms and deaths from Chernobyl and TMI.**

- ✓ Chernobyl - Almost a million people worldwide died from radioactivity discharged after the 1986 Chernobyl accident, yet NRC continues to use inaccurate low numbers. Research confirms many terrible diseases and disabilities are tied to Chernobyl.
- ✓ TMI - That 1979 accident in PA may be responsible for thousands of deaths. "Deadly Deceit: Low Level Radiation - High Level Cover-up" suggests between 50,000 to 100,000 EXCESS DEATHS occurred after the TMI accident.

**NRC officials must start to consider the vast body of independent research showing links between nuclear plant radiation releases and cancer.**

- NRC must stop remaining in denial of a body of documented independent research.
- NRC must stop using industry biased unsubstantiated conclusions, to protect nuclear industry interests.
- NRC should stop making bogus comparisons between continuous nuclear plant radiation releases and exposure to gamma rays from x-rays and planes. That is deceptive for so many reasons.

**We need NRC employees to have the courage and integrity to acknowledge obvious harms from nuclear plant routine and accidental radiation releases and speak up to protect public health instead of nuclear industry profits. Getting the truth told is the best way to stop the unprecedented injustice of unnecessary radiation poisoning of our environment and us.**

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# **Two Studies By The Radiation and Public Health Project (RPHP), Along With Cancer Rates Around Limerick Nuclear Plant Show Links**

## **Strontium-90 (Sr-90) Links to Limerick and Research**

- The Radiation and Public Health Project's "Tooth Fairy Study" showed SR-90 in baby teeth of children living near Limerick Nuclear Plant have some of the highest levels of Strontium-90 of any area around nuclear plants or other areas studied in the U.S.
- Children living near Limerick have suffered some of the highest cancer rates in the U.S., skyrocketing after Limerick opened in 1985 to the late 1990s.
  - Childhood cancer rates rose from 30% higher than the national average in the late 1980s to 92.5% higher in the late 1990s. Limerick started operating and releasing SR-90 in 1985.
- Exelon's 2009 Radiological Monitoring Report for Limerick confirms SR-90 is in our water, soil, vegetation, and milk.
- Signature cancers of Sr-90 are cancers of the bone, including Ewing's Sarcoma.
- Sr-90 closely resembles calcium and is readily taken up into the bones and teeth - considered the most hazardous bone-seeking element of nuclear fission because it so closely resembles calcium.
- Sr-90 lodges near the bone marrow, where stem cells form blood and immune system cells, increasing risk of many forms of cancer, especially in newborn infants.
- Sr-90 is considered very hazardous because of its long half-life of 28 years. Low dose exposure to Sr-90 is so serious because of protracted exposure over periods of days, months or years.
- Research confirms that low dose exposures over months or years can be hundreds to thousands of times more damaging than the same dose received in short diagnostic medical exposures or flashes from a nuclear bomb explosion. (Petkau)
- Damage is known to involve the developing immune, hormonal, and central nervous systems of infants and children.

**For the most reliable information on links between Strontium-90 in baby teeth and nuclear plants, the best source is the well researched and informative book: *Radioactive Baby Teeth: The Cancer Link* by Joseph Mangano, Radiation and Public Health Project.**

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# THYROID CANCER "Epidemic" Around Nuclear Plants

January 21, 2009 ACE took part in a press event in Philadelphia to report on an RPHP study on thyroid cancer links with nuclear plants. The 2009 scientific article reported a Thyroid Cancer Epidemic in a small 90-mile radius encompassing eastern PA, central New Jersey, and southern New York, where 16 reactors are located, including Limerick Nuclear Plant.

Dr. Lewis Cuthbert, ACE President expressed The Alliance For A Clean Environment's extreme concerns about the shocking thyroid cancer increases and rates above the national average in the region around Limerick Nuclear Plant, since Limerick started operating in 1985.

Documented statistics show shocking thyroid cancer increases in Montgomery County, home of Limerick Nuclear Plant, since Limerick started operating in the mid 1980's to the mid 1990's.

- **THYROID CANCER SKYROCKETED** After Limerick Nuclear Plant Started Operating in 1985 In Montgomery County, Home Of Limerick Nuclear Plant
  - 128% INCREASE** - 1985-86 to 1996-97
  - Source: Pennsylvania State Cancer Registry
- 1998, 1999, 2000 – Thyroid Cancer Rate Was About
  - 75% HIGHER** - Than U.S. Rate (Also Rising)
  - Source: CDC Website
- **Thyroid Cancer Rates Are Far Higher Than National Average** In Counties Closest Most Impacted By Limerick Nuclear Plant's Radioactive Emissions
  - 56.2 % Higher THAN U.S.** - Montgomery County
  - 53.9 % Higher THAN U.S.** - Chester County
  - 14.6 % Higher THAN U.S.** - Berks County
  - While Berks County is Upwind - It is still higher than the U.S. Average
  - Source: U.S. Centers for Disease Control and Prevention, <http://statecancerprofiles.cancer.gov>.
  - Rates adjusted to 2000 U.S. standard population.
- Our region's thyroid cancer rates are horrific, considering they're above the U.S. average when, U.S. (1980 – 2006) increased 154.7 % and PA (2001- 2005) Had The Highest Thyroid Cancer Rates In U.S.

## LINKS ARE CLEAR BETWEEN Limerick Nuclear Plant's Routine Radiation Emissions And Horrific Thyroid Cancer Rates Around It

- Limerick Nuclear Plant's routine Iodine-131 radiation releases into our air and water impact the thyroid. Proof: Distribution of KI pills for the thyroid in case of an accident or attack.
- Those Closest and Downwind To Limerick Have Highest Thyroid Cancer Rates.  
**Research Links Thyroid Cancer and Radiation Emissions From Nuclear Plants.**
- Nuclear plants, including Limerick, routinely release radioactive iodine. Radioactive iodine attacks the thyroid gland, a fact confirmed by the potassium iodide pills issued to residents within 10 miles of a nuclear plant to protect the thyroid in case of an accident or terrorist attack.
- Thyroid cancer is one of the most radiation-sensitive cancers. Radioactive iodine released from nuclear plants seeks out the thyroid gland and destroys its cells.

# BREAST CANCER Is Far Higher Than The National Average

## In Every Age Group In Six Communities Close To Limerick Nuclear Plant.

Includes Lower Pottsgrove, Upper Pottsgrove, West Pottsgrove, Pottstown, North Coventry, Douglass Berks

Breast Cancer By Age (diagnosed 1995-1999) Compared to the National Average	
Age	% HIGHER than U.S.
0-29	+ 15.3 %
30-44	+ 51.4 % <
45-64	+ 39.3 %
65+	+ 28.6 %

Source: Pa Cancer Registry

**Breast Cancer is an epidemic nationwide. It is alarming when Breast Cancer Statistics Around Limerick Nuclear Plant are so far higher than the national average in every age group.**

### **Breast Cancer Average Statistics Above U.S. Average**

1995-1999	Local	Rate per 100,000	% Above	% Above
Type of Cancer	Cases	Gr. Potts. U.S.	Oth. 3 Co.	U.S. Tri County
Breast (female) 263	161.5	116.0 129.8		+39.2 % +24.5 %

## **BREAST CANCER INCREASED 61%**

In Montgomery County, Home of Limerick Nuclear Plant, After Limerick Started Operating.

Source: PA Cancer Registry 1985-86 to 1996-97

### **Research That Links Breast Cancer With Radiation Exposure**

- The Chernobyl experience confirmed that children exposed to radiation have a greater likelihood of developing breast cancer as adults. Source: Life Extension, 12/04 (60)
- John W. Gofman, M.D., Ph.D. "Our estimate is that about three-quarters of the current annual incidence of breast-cancer in the U.S. is being caused by earlier ionizing radiation... Source: "Preventing Breast Cancer" 1995
- "Life's Delicate Balance" Causes and Prevention of Breast Cancer. Janette Sherman, M.D. Analyzes Links Between Cancer and Radiation and Other Toxics.
- Analysis of 350 Studies Finds Half Breast Cancers are Tied to Environment and Unrelated to Genetic Risk or Lifestyle Choices.

# LEUKEMIA - Rates Near Limerick Nuclear Plant and Links

Leukemia represented the largest number of childhood cancers among the 92.5% childhood cancers rates higher than the national average.

## Leukemia rates were significantly higher than the national average in six communities near Limerick Nuclear Power Plant

Pottstown, West Pottsgrove, Lower Pottsgrove, Upper Pottsgrove, North Coventry, Douglass Berks Township  
 Statistics: Joseph Mangano, MPH MBA National Coordinator RPHP

(Ages 0-19) All Cancers Diagnosed from 1995-1999

Type of Cancer	Rate per 100,000		U.S.	%AboveU.S.	Significance
	Cases 0-19	Gr. Pottstown			
All Cancers	40	28.33	16.04	+ 76.6	p<.02
Leukemia	13	9.21	3.89	+136.8	p<.055

(Source: PA Cancer Registry)

Note: Rates calculated using 1990-99 annual Greater Pottstown population 0-19 of 14,120.

For example, leukemia rate = 13 cases/10 years/14,120 x 100,000 = 9.21.

Joseph Mangano, MPH, MBA Radiation and Public Health Project New York, NY June 25, 2003

## **Leukemia Rates (1985 to 1994) Were Almost Double the State Average**

According to the Montgomery County Health Department Study on PA Cancer Registry Statistics.

Links:

- > A review of 17 medical journal articles by researchers from the Medical University of South Carolina showed that elevated child leukemia rates were elevated at all 17 reactors.
- > Leukemia death rates in U.S. children near nuclear reactors rose sharply in the past two decades, according to a study published in the European Journal of Cancer Care in 2008.
- > Leukemia rates in Chernobyl children confirm a link.

**The Leukemia Rate has been higher than the other parts of the three county area for at least 15 years with a total of 106 cases from 1985 when Limerick Nuclear Plant started operating to 1999. (see below)**

Leukemia incidence per 100,000, age adjusted to 1970 standard - Period Greater Pottstown (cases) Other 3-county % Above/Below

1985-89 9.5 (27) 7.1 +33.8%  
 1990-94 16.6 (44) 8.7 +90.8%  
 1995-99 11.6 (35) 10.6 + 9.1%

**The 15 year leukemia rate is approximately about 40% above the other three county rate.**

**This is a statistically significant difference (p<.01)**

Source: Pennsylvania State Cancer Registry

For the period 1995-99, there were 35 newly-diagnosed cases in the area. The age-adjusted rate was 11.6 per 100,000, higher than the rest of the three counties, the state, and the nation (See Table below).

Leukemia incidence per 100,000, age adjusted to 1970 standard, 1995-99 Area Rate (cases) % Above/Below Gr. Pottstown

Greater Pottstown 11.6 (35)  
 Other 3-county 10.6 + 9.1%  
 Pennsylvania 9.7 +19.6%  
 United States 10.4 +11.5%

Source: Pennsylvania State Cancer Registry

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# **BRAIN CANCER**

Source: Penn State - Graduate Student Research

Statistics: PA Department of Health, Bureau of Health Statistics ( 2001, August)

Analysis of cancer incidence in PA counties 1994-1998 <http://www.health.state.pa.us/stats>

Professor - Dr. Steven Couch

IN POTTSTOWN - The Address of Limerick Nuclear Power Plant

## **BRAIN CANCERS WERE SIGNIFICANTLY HIGHER**

- ✓ **Than state and national averages**
- ✓ **Than municipalities in a 12 mile radius**

Municipality-level statistics cannot account for the high numbers of brain cancers in Pottstown.  
1999 Brain Cancer Statistics - Rate per 100,000 in Pottstown 9.25

In the six communities studied close to Limerick Nuclear Power Plant.

Pottstown , West Pottsgrove, Lower Pottsgrove, Upper Pottsgove, North Coventry, Douglass Berks Township

## **BRAIN/CENTRAL NERVOUS SYSTEM CANCERS**

- ✓ **COMPARED TO NATIONAL AVERAGE            38.3 HIGHER**
- ✓ **COMPARED TO TRI COUNTY                    32.5 HIGHER**

**UPWARD TREND** - Brain/Central Nervous System cancer statistics since Limerick Nuclear Plant started operating in 1985.

- ✓ **1985-89 15 cases**
- ✓ **1990-94 19 cases**
- ✓ **1995-99 23 cases**

## **CHILDREN - BRAIN / CENTRAL NERVOUS SYSTEM CANCERS ARE AMONG THE HIGHEST CHILDHOOD CANCERS**

In six communities studied that are close to Limerick Nuclear Power Plant.

Pottstown , West Pottsgrove, Lower Pottsgrove, Upper Pottsgove, North Coventry, Douglass Berks Township  
According to PA Cancer Registry (1995-1999)

## **Another Link:**

## **Cancer Near German Reactors**

<http://www.oconline.org/our-work/kidshealth/healthprofessionals/first-annual-nw-health-conference-pdfs/day-1/Nussbaum%202.6.09.pdf>

**CANCER**

**RATES  
SKYROCKETED**

**AFTER LIMERICK  
NUCLEAR PLANT  
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# CHILDHOOD CANCER

## 92.5 % Higher Than The National Average

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Type of Cancer	Cases 0-19	Gr. Pottstown	U.S.	%AboveU.S.	Significance
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All other	11				

(Source: PA Cancer Registry)

Note: Rates calculated using 1990-99 annual Greater Pottstown population 0-19 of 14,120.

For example, leukemia rate = 13 cases/10 years/14,120 x 100,000 = 9.21.

Joseph Mangano, MPH, MBA Radiation and Public Health Project New York, NY June 25, 2003

- Rates are **MUCH HIGHER** for **FOUR** of the **CANCERS** most common in children.
- Rates are **SIGNIFICANTLY HIGHER** for **ALL CANCERS** and **LEUKEMIA**
- Rates are **BORDERLINE SIGNIFICANT** for **KIDNEY/RENAL PELVIS**.

Half Of Childhood Cancers Above Are Leukemia and Brain/Central Nervous System Cancers  
Both have been associated with radiation exposure.

## UPWARD TREND SHOWS A LINK TO LIMERICK

### Limerick Started Operating In 1985

By Late 1980's Rates Were About **30 %** HIGHER than the NATIONAL AVERAGE

By Early 1990's Rates Were About **60 %** HIGHER than the NATIONAL AVERAGE

By Late 1990's Rates Climbed To **92.5 %** HIGHER than the NATIONAL AVERAGE

Late 1990's Rates Were Almost **100 %** HIGHER than the STATE and TRI COUNTY

Nationwide, cancer is the #1 disease-related death in children. All children are exposed to similar environmental pollutants, including pesticides and herbicides, cleaning chemicals, mold, second hand smoke, vehicle emissions, and even genetic factors. Logic suggests that when major cancer causing pollution sources are added factors to overall common causes for cancer in children, rates will be far higher.

- Limerick Nuclear Power Plant Routinely Releases Radiation Into The Air, Water, and Soil. Additive, Cumulative, and Synergistic Radiation Exposure Is Logically A Major Factor In The Dramatic Upward Trend Of Childhood Cancer Rates In Communities Close To Limerick
- Research In the U.S. and Europe Shows Links Between Nuclear Plants and Childhood Cancer Increases.

## **It's Not Surprising That Childhood Cancer Rates Near Limerick Skyrocketed Above National, State, and Tri-County Averages.**

1. A CDC report confirmed vast numbers of chemicals in the bodies of people.
2. The Radiation and Public Health Project confirmed that children in this region have high levels of Strontium-90 radiation in their teeth. This study, while only looking for one kind of radiation in our children, Strontium-90, confirms that the radiation released at Limerick Nuclear Power plant is getting into the bodies of children in the area. Strontium-90 is not a naturally occurring radiation.
3. March, 2003, EPA reported that fetuses and children under two are the most vulnerable to certain cancer causing and mutagenic chemicals (10 times more vulnerable). Children 3 to 15 are 3 times more vulnerable. The youngest in society are most susceptible to the effects of radiation.
4. Developing fetuses, infants, and children are most susceptible to the harmful effects of radiation. Childhood cancer is a key indicator of impacts. Pregnant women in this region and then their newborn babies are exposed to the routine and accidental radiation releases from Limerick Nuclear Power Plant.
5. When babies are born with toxic chemicals in their bodies, then exposed daily through their lungs, skin, and eyes to additive, cumulative, and synergistic combinations of toxic chemicals, including the most damaging, radiation, the harmful impacts we have uncovered should not be surprising.
6. Skyrocketing childhood cancer rates are not the only sign that Limerick Nuclear Power Plant's routine and accidental radiation emissions may have had harmful impacts on our region's fetuses and children, as evidenced by:

### **Other Documented Harmful Impacts On Children In Our Region**

- ✓ Elevated infant and neonatal mortality at rates far higher than the state average, and even higher than Philadelphia and Reading.
- ✓ Learning disability increases at rates twice the state average (1990 to 2000):

## **Links to Limerick Nuclear Plant Are Obvious:**

**Unnecessary suffering of our region's children and their families, plus astronomical financial costs - (For just one child with cancer \$2.2 Million Tracked and Still Climbing) and environmentally linked disease and disability in our children can and must be prevented with the political will to take precautionary measures to CLOSE LIMERICK NUCLEAR PLANT NOW. Childhood cancer was a major factor in Germany closing their nuclear plants.**

- **Limerick Nuclear Plant's Routine and Accidental Releases Will Only Stop When Limerick Closes. Every Day Limerick Operates, Our Region's Children Are At Risk.**

# **Childhood Cancer**

## **71% INCREASE**

### **In Montgomery County**

#### **Home of Limerick Nuclear Power Plant**

1981-89 vs. 1990-98  
Deaths from Neoplasms in Children Ages 1 to 14 Source: CDC Website

**Childhood Cancer Deaths Are Up In Montgomery County,  
While Down In Neighboring Counties, PA, and the US**

**Chester County 29.0% Decrease**

**Note: Anecdotal Reports Suggest Chester County Communities Bordering Limerick  
North Coventry, East Coventry, Parkerford, Spring City, East Vincent, East Pikeland, Phoenixville  
Appear To Have High Rates Of Childhood Cancers**

**Berks County 30.6% Decrease**

**Pennsylvania 17.1% Decrease**

**U.S. 21.2% Decrease**

- Limerick Nuclear Plant, located in Montgomery County, started to operate in the mid 1980's, routinely releasing radiation into the air, water, and soil.
- Limerick Nuclear Plant's radiation emissions are likely a major factor in increased childhood cancer deaths in the county.
- The American Academy of Pediatrics states that children are extra sensitive to the DNA-damaging effects of radioactive energy.
- The Chernobyl experience confirmed that children are by far the most vulnerable to radiation exposure, even in relatively small doses.

**Children Are The Barometers Of Our Society**  
**Childhood Cancer Death Rate Comparisons Should Serve As A**  
**Warning To Close Limerick To Protect Children**

The Alliance For A Clean Environment (610) 326-2387



## **Child cancer risk higher near nuclear plants: study**

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Sat Dec 8, 2007 8:48am EST

BERLIN (Reuters) - A German study has found that young children living near nuclear power plants have a significantly higher risk of developing leukemia and other forms of cancer, a German newspaper reported on Saturday.

"Our study confirmed that in Germany a connection has been observed between the distance of a domicile to the nearest nuclear power plant .... and the risk of developing cancer, such as leukemia, before the fifth birthday," *Suddeutsche Zeitung* newspaper quoted the report as saying.

The newspaper said the study was done by the University of Mainz for Germany's Federal Office for Radiation Protection (BFS). A copy of the report was not immediately available.

The researchers found that 37 children within a 5-kilometer (3-mile) radius of nuclear power plants had developed leukemia between 1980 and 2003, while the statistical average during this time period was 17, the paper said.

The newspaper cited an unnamed radiation protection expert familiar with the study who said its conclusions understated the problem. He said the data showed there was an increased cancer risk for children living within 50 kilometers of a reactor.

German Environment Minister Sigmar Gabriel said in a statement that he would examine the study. He said the BFS should also evaluate its findings.

Germany plans to prematurely shut down all of its nuclear power plants by the early 2020s.

(Reporting by Louis Charbonneau)

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# CANCER

## ALARMING INCREASES

After Limerick Nuclear Power Plant Started Operating

In Montgomery County, PA  
Home of Limerick Nuclear Power Plant

Montgomery County - From 1985-86 To 1996-97

• Prostate	INCREASED	132%
• Thyroid	INCREASED	128%
• Kidney	INCREASED	96%
• Multiple Myeloma	INCREASED	91%
• Hodgkin's Disease	INCREASED	67%
• Non-Hodgkin's Lymphoma	INCREASED	61%
• Breast	INCREASED	61%
• Pancreas	INCREASED	54%
• Leukemia	INCREASED	48%

Source: Pennsylvania State Cancer Registry

# CANCER RATES

## FAR HIGHER

**Than U.S. and Tri County Averages  
In 8 Of 11 Most Common In U.S.**

PA Cancer Registry Statistics 1995 - 1999

## In 6 Communities Close To Limerick Nuclear Power Plant

Lower Pottsgrove, Upper Pottsgrove, West Pottsgrove, Pottstown, North Coventry, Douglass Berks

### **Compared To U.S. and Tri County**

<u>Type of Cancer</u>	<u>Above U. S.</u>	<u>Above Tri County</u>
<b>Kidney/Renal Pelvis</b>	<b>+ 60 %</b>	<b>+ 42.7 %</b>
<b>Rectum</b>	<b>+ 44 %</b>	<b>+ 13.5 %</b>
<b>Uterine</b>	<b>+ 44 %</b>	<b>+ 38.7 %</b>
<b>Breast (female)</b>	<b>+ 39 %</b>	<b>+ 24.5 %</b>
<b>Brain/Cent. Nervous Sys.</b>	<b>+ 38 %</b>	<b>+ 32.5 %</b>
<b>Urinary Bladder</b>	<b>+ 35.5 %</b>	<b>+ 17.9 %</b>
<b>Colon</b>	<b>+ 21 %</b>	<b>+ 3.3 %</b>
<b>Lung</b>	<b>+ 11.8 %</b>	<b>+ 18.4 %</b>
<b>Leukemia</b>	<b>+ 11.5 %</b>	<b>+ 14.9 %</b>

# **THYROID CANCER**

**In Montgomery County**

## **SKYROCKETED**

**When Limerick Nuclear Plant Started Operating  
Montgomery County Is The Home Of Limerick Nuclear Plant**

**1998, 1999, 2000 – Thyroid Cancer Rate Was About**

## **75% HIGHER**

**Than U.S. Rate (Also Rising)**

Source: CDC Website

## **128% INCREASE**

**1985-86 to 1996-97**

Source: Pennsylvania State Cancer Registry

# Thyroid Cancer Rates

In Two Counties Closest and Downwind  
Are FAR HIGHER Than The National Average.

## Montgomery County

**56.2 % Higher** Than U.S. Average

## Chester County

**53.9 % Higher** Than U.S. Average

Upwind Rates - While Still Higher - Not As Much

## Berks County

**14.6 % Higher** Than U.S. Average

Source: U.S. Centers for Disease Control and Prevention, <http://statecancerprofiles.cancer.gov>.  
Rates adjusted to 2000 U.S. standard population.

### LINKS ARE OBVIOUS

#### To Limerick's Routine Radiation Emissions

- Those Closest and Downwind To Limerick Have Highest Thyroid Cancer Rates Above U.S. Average
- Nuclear Plant Radiation Releases Clearly Impact The Thyroid Gland. That's Why Potassium Iodide Pills Are Used After A Nuclear Disaster.

#### Research Links Thyroid Cancer and Radiation Emissions From Nuclear Plants.

- Nuclear plants, including Limerick, routinely release radioactive iodine. Radioactive iodine attacks the thyroid gland, a fact confirmed by the potassium iodide pills issued to residents within 10 miles of a nuclear plant to protect the thyroid in case of an accident or terrorist attack.
- Thyroid cancer is one of the most radiation-sensitive cancers. Radioactive iodine released from nuclear plants seeks out the thyroid gland and destroys its cells.
- A 2009 scientific article reported a Thyroid Cancer Epidemic in a small 90-mile radius encompassing eastern PA, central New Jersey, and southern New York, where 16 reactors are located, including Limerick.

# **LEUKEMIA**

**After Limerick Nuclear Power Plant  
Started Operating In 1985**

**Leukemia Rate Climbed To Almost  
Double State Average**

Source: PA Cancer Registry (1985 to 1994)

**In Six Communities Close To Limerick Nuclear Plant**

Pottstown, West Pottsgrove, Lower Pottsgrove, Upper Pottsgrove, North Coventry, Douglass Berks Township

**Most Childhood Cancers  
In These Communities Were Leukemia**

1985-86 to 1996-97 Leukemia Rate Showed A

**48% INCREASE**

**In Montgomery County, PA - Home of Limerick Nuclear Power Plant**

Source: PA Cancer Registry Statistics

Bordering Chester County Communities Obviously Impacted, But Not Tracked

**Limerick Nuclear Power Plant Routinely Released Radiation  
Into The Air, Water, and Soil Since 1985**

**Research Links Low-Level Radiation Exposure With Leukemia**

# LEUKEMIA OVERVIEW NEAR LIMERICK

August, 2003

PA Cancer Registry Statistics - 6-borough/township – Greater Pottstown Area  
Near Limerick Nuclear Power Plant, Pottstown, PA.

Pottstown, West Pottsgrove, Lower Pottsgrove, Upper Pottsgrove, North Coventry, Douglass Berks Township  
Statistics: Joseph Mangano, MPH MBA National Coordinator RPHP (609) 399-4343

Leukemia represented the largest number of childhood cancers among the 92.5% childhood cancers rates higher than the national average. Leukemia rates were significantly higher.

(Ages 0-19) All Cancers Diagnosed from 1995-1999

Type of Cancer	Cases 0-19	Rate per 100,000		%AboveU.S.	Significance
		Gr. Pottstown	U.S.		
All Cancers	40	28.33	16.04	+ 76.6	p<.02
Leukemia	13	9.21	3.89	+136.8	p<.055

(Source: PA Cancer Registry)

Note: Rates calculated using 1990-99 annual Greater Pottstown population 0-19 of 14,120.

For example, leukemia rate = 13 cases/10 years/14,120 x 100,000 = 9.21.

Joseph Mangano, MPH, MBA Radiation and Public Health Project New York, NY June 25, 2003

Note:

- A review of 17 medical journal articles by researchers from the Medical University of South Carolina showed that elevated child leukemia rates were elevated at all 17 reactors.
- Leukemia death rates in U.S. children near nuclear reactors rose sharply in the past two decades, according to a study published in the European Journal of Cancer Care in 2008.

**The Leukemia Rate has been higher than the other parts of the three county area for at least 15 years with a total of 106 cases from 1985 when Limerick Nuclear Plant started operating to 1999. (see below)**

Leukemia incidence per 100,000, age adjusted to 1970 standard

Period Greater Pottstown (cases) Other 3-county % Above/Below

1985-89	9.5	(27)	7.1	+33.8%
1990-94	16.6	(44)	8.7	+90.8%
1995-99	11.6	(35)	10.6	+9.1%

**The 15 year leukemia rate is approximately about 40% above the other three county rate. This is a statistically significant difference (p<.01)**

Source: Pennsylvania State Cancer Registry

For the period 1995-99, there were 35 newly-diagnosed cases in the area. The age-adjusted rate was 11.6 per 100,000, higher than the rest of the three counties, the state, and the nation (See Table below).

Leukemia incidence per 100,000, age adjusted to 1970 standard, 1995-99 Area Rate (cases) % Above/Below Gr. Pottstown

Greater Pottstown	11.6	(35) -----
Other 3-county	10.6	+9.1%
Pennsylvania	9.7	+19.6%
United States	10.4	+11.5%

Source: Pennsylvania State Cancer Registry

# **BREAST CANCER**

**Significantly Higher  
Than The National Average**

**In Six Communities  
Close To Limerick Nuclear Plant**

Includes Lower Pottsgrove, Upper Pottsgrove, West Pottsgrove, Pottstown, North Coventry, Douglass Berks

Breast Cancer By Age (diagnosed 1995-1999)  
Compared to the National Average  
Source: Pa Cancer Registry

Age	% HIGHER than U.S.
<b>0-29</b>	<b>+ 15.3 %</b>
<b>30-44</b>	<b>+ 51.4 %</b>
<b>45-64</b>	<b>+ 39.3 %</b>
<b>65+</b>	<b>+ 28.6 %</b>

**These Breast Cancer Statistics  
So Far Higher Than The National Average In Every Age Group  
Are Alarming When  
Breast Cancer Is An Epidemic Nationwide**

## Breast Cancer Average Statistics Above U.S. Average

Breast Cancer Averages Are Higher Than U.S. and Tri-County Averages

1995-1999 Type of Cancer	Cases	Local Gr. Potts.	Rate per 100,000 U.S.	Oth. 3 Co.	% Above U.S.	% Above Tri County__
<b>Breast</b> (female)	263	161.5	116.0	129.8	<b>+39.2 %</b>	<b>+24.5 %</b>

# BREAST CANCER INCREASED 61%

## In Montgomery County Home of Limerick Nuclear Plant After Limerick Started Operating

Source: PA Cancer Registry 1985-86 to 1996-97

### Research

#### Links Breast Cancer With Radiation Exposure

- The Chernobyl experience confirmed that children exposed to radiation have a greater likelihood of developing breast cancer as adults. Source: Life Extension, 12/04 (60)
- John W. Gofman, M.D., Ph.D. "Our estimate is that about three-quarters of the current annual incidence of breast-cancer in the U.S. is being caused by earlier ionizing radiation... Source: "Preventing Breast Cancer" 1995
- "*Life's Delicate Balance*" Causes and Prevention of Breast Cancer. Janette Sherman, M.D. Analyzes Links Between Cancer and Radiation and Other Toxics.
- Analysis of 350 Studies Finds Half Breast Cancers are Tied to Environment and Unrelated to Genetic Risk or Lifestyle Choices.

# BRAIN CANCER

Source: Penn State - Graduate Student Research  
Statistics: PA Department of health, Bureau of Health Statistics ( 2001, August)  
Analysis of cancer incidence in PA counties 1994-1998 <http://www.health.sate.pa.us/stats>  
Professor - Dr. Steven Couch - (717) 948-6036

## IN POTTSTOWN

### The Address of Limerick Nuclear Power Plant

#### Brain Cancer Climbed Significantly Higher

- ✓ Than state and national averages
- ✓ Than municipalities in a 12 mile radius

Municipality-level statistics can not account for the high numbers of brain cancers in Pottstown.  
1999 Brain Cancer Statistics - Rate per 100,000 in Pottstown 9.25

#### BRAIN/CENTRAL NERVOUS SYSTEM CANCERS

In the six communities studied close to Limerick Nuclear Power Plant.  
Pottstown , West Pottsgrove, Lower Pottsgrove, Upper Pottsgove, North Coventry, Douglass Berks Township

- ✓ COMPARED TO NATIONAL AVERAGE 38.3 HIGHER
- ✓ COMPARED TO TRI COUNTY 32.5 HIGHER

Brain/Central Nervous System cancer statistics show an UPWARD TREND  
Since the late 1980's. Limerick Nuclear Plant started operating in 1985.

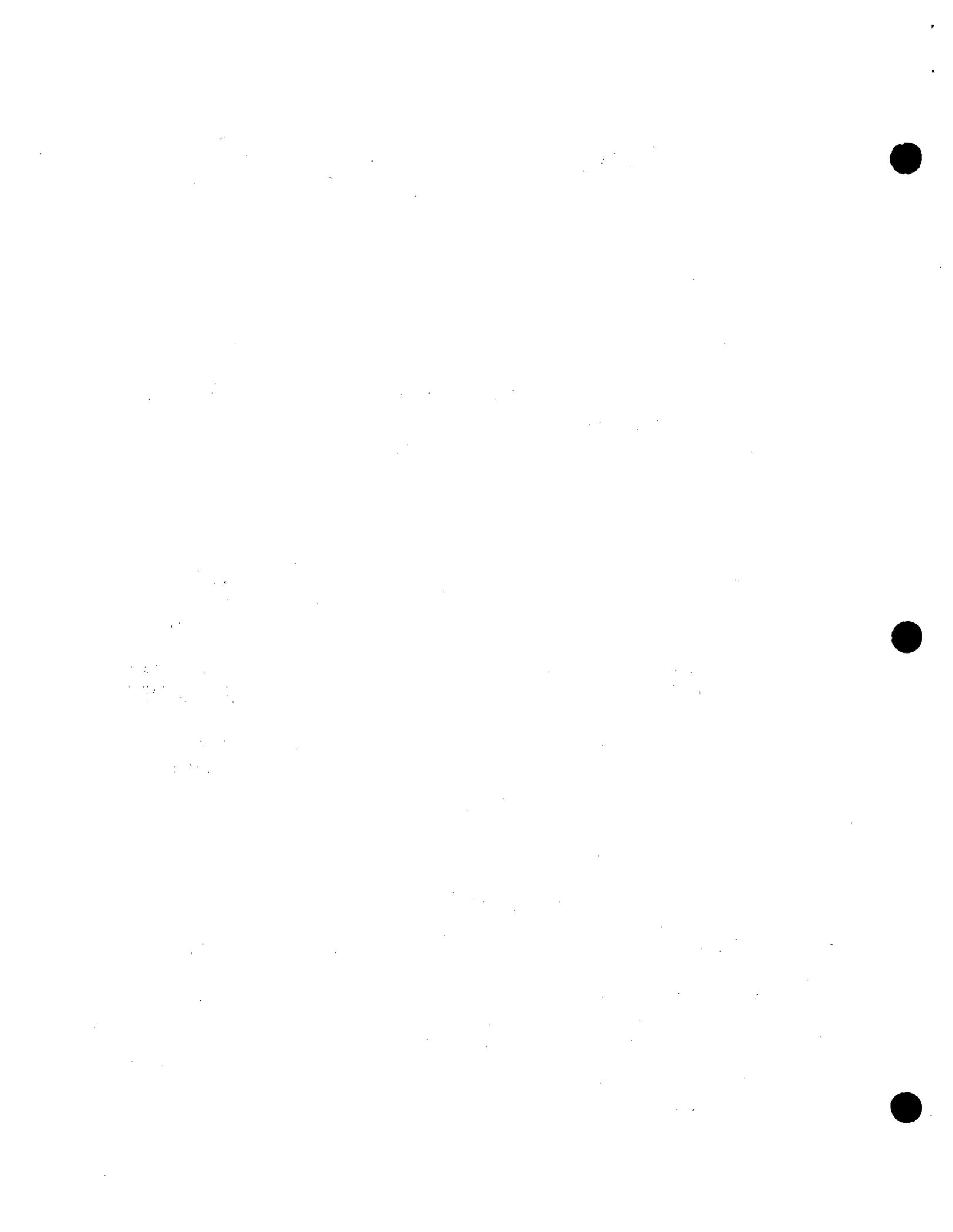
1985-89 15 cases  
1990-94 19 cases  
1995-99 23 cases

## CHILDREN

#### BRAIN / CENTRAL NERVOUS SYSTEM CANCERS ARE AMONG THE HIGHEST CHILDHOOD CANCERS

In the six communities studied close to Limerick Nuclear Power Plant.  
Pottstown , West Pottsgrove, Lower Pottsgrove, Upper Pottsgove, North Coventry, Douglass Berks Township

According to PA Cancer Registry (1995-1999)



# LUNG CANCER

**A Study Reported In 1997 (1985 to 1994)  
Found Lung Cancer**

**33% Higher  
Than The Tri County Average**

Source: PA Cancer Registry

**In Six Communities Close To Limerick Nuclear Power Plant  
vs. U.S. and Tri County**

**1995 to 1999**

Includes Lower Pottsgrove, Upper Pottsgrove, West Pottsgrove, Pottstown, North Coventry, Douglass Berks

Tri County refers to Berks, Chester, and Montgomery Counties

<u>Type of Cancer</u>	<u>Local Cases</u>	<u>Rate per 100,000</u>			<u>% Above</u>	<u>% Above</u>
		<u>Gr. Potts.</u>	<u>U.S.</u>	<u>Oth. 3 Co.</u>	<u>U.S.</u>	<u>Tri County</u>
<b>Lung</b>	197	62.3	55.7	52.6	<b>+11.8 %</b>	<b>+18.4 %</b>

Sources: Pennsylvania State Cancer Registry, National Cancer Institute (cancer cases) 1995-1999.  
U.S. Census Bureau (population data)

Statistics: Joseph Mangano, MPH MBA National Coordinator RPHP (718) 857-9825

**Limerick Nuclear Plant Is A Major Air Polluter  
Under Health Based Standards Of The Clean Air Act.**

**Limerick Continuously Emits Unprecedented Amounts Of PM-10  
From The Cooling Towers Plus Other Sources.**

**PM-10 Gets Deep Into The Lungs. It Can Cause Serious Damage  
To The Lungs. ACE Believes Limerick Is A Likely Major Factor In  
Elevated Lung Cancers Close To It. Many Young People Who Never  
Smoked Are Getting Lung Cancer and Dying In This Region.**

## **Child cancer risk higher near nuclear plants: study**

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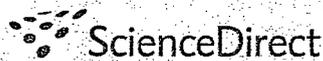
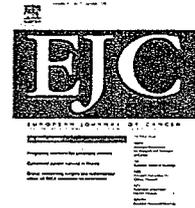
(Reporting by Louis Charbonneau)

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## Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980–2003

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### ABSTRACT

The 1984 Windscale study raised concern about a possible association between living in the vicinity of nuclear power plants and childhood cancer. No such effect for all cancers was seen in ecological studies in Germany (1980–1995). Results from exploratory analyses led to a new study.

Pre-selected areas around all 16 major nuclear power plants in Germany formed the study area. The design is a matched case-control study; cases are all cancers under five years diagnosed in 1980–2003: 1592 cases, and 4735 controls. Inverse distance of place of residence to the nearest nuclear power plant at the time of diagnosis was used as the independent variable in a conditional logistic regression model.

Results show an increased risk for childhood cancer under five years when living near nuclear power plants in Germany. The inner 5-km zone shows an increased risk (odds ratio 1.47; lower one-sided 95% confidence limit 1.16). The effect was largely restricted to leukaemia.

The results are compatible with the corresponding subgroups in the previous German ecological studies, with which this study shares most of the cases. They contrast with the lack of an effect observed or expected from other studies due to low doses from routine nuclear power plant operation.

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### 1. Introduction

The German population has long been worried about the potential dangers and health effects of nuclear power. In 1984, the public was frightened by reports of elevated childhood cancer rates within a 10-mile zone of the Windscale (Sellafield) nuclear power plant in England, other investigations followed shortly.<sup>1–5</sup> The German Childhood Cancer Registry, founded in 1980, investigated whether there had been a similar increase in Germany. In an ecological study with a similar design to the UK (United Kingdom) studies,<sup>1–4,6</sup> the incidence

rates of all cancers in children under 15 years of age during 1980–1990 in communities within a 15-km zone of all West German nuclear power plants (812 cases) were compared with those in reference communities with similar population densities and degrees of urbanisation. No statistically significant increase in risk was found (relative risk [RR] 0.97; 95% confidence interval [CI] [0.87;1.08]).<sup>7</sup> Nevertheless, exploratory analyses of subsets showed statistically significant results particularly for acute leukaemia in children under five years of age living in the inner 5-km zone (RR 3.01; 95%CI [1.25;10.31]). When five more years of data had been accrued

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URL: <http://www.kinderkrebsregister.de> (C. Spix).

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(1991–1995) the study was repeated: the RR for all cancers amongst children under 15 living within a 15-km zone was 1.05 (95% CI [0.92;1.20]) and the RR for acute leukaemia amongst children under 5 living within a 5-km zone was 1.39 (95% CI [0.69;2.57]).<sup>8</sup>

In the late 1990s, a third party obtained data up to 1998 from the German Childhood Cancer Registry (GCCR) by county via the Bundesamt für Strahlenschutz (Federal Office for Radiation Protection) for the State of Bavaria. The data were analysed in an exploratory manner applying linear regression to standardised incidence ratios (SIR's) by county. Elevated SIR's were observed for selected combinations of years, counties, and disease subgroups around Bavarian nuclear power plants. The GCCR criticised the methods used in this analysis.<sup>9</sup> Nevertheless the results, published over the Internet but never in a peer-reviewed journal and quoted briefly by the *Deutsches Ärzteblatt*,<sup>10</sup> were sufficiently alarming to the public to induce the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety to call for applications for another study. The design originated from discussions with a Bundesamt für Strahlenschutz (Federal Office for Radiation Protection)-expert committee. The design was influenced by the exploratory results of the previous studies.<sup>11</sup> The study is a matched case-control study in which the exposure surrogate is the distance of individual residences at the date of diagnosis from the nearest nuclear power plant. Data from 1996 to 2003 are now included.

The main question of the investigation presented here is: Is the risk of childhood cancer associated with living in the proximity of nuclear power stations? The distance measure, previously based on community midpoints, is now determined by the place of residence at the date of diagnosis. A subset of cases and controls was to be interviewed with regard to potential confounders.

Since the emissions from a nuclear power plant add only minimally to the background radiation level, no effect would be expected on the basis of the usual models for the effects of low levels of radiation, as presented by the biological effects of ionizing radiation (BEIR) – Committee and the international commission on radiological protection (ICRP).<sup>12,13</sup> However, these models are based mainly on data from adults, as childhood cancer is very rare. The BEIR Committee reviewed studies on leukaemia/childhood cancer of populations living around nuclear facilities but did not draw any conclusions from them, as they generally do not include individual estimates of radiation dose.<sup>12</sup>

This paper presents the overall results of the recent study conducted by the GCCR. Another paper presents the results for leukaemia and the comparison with the previous ecological studies in more detail.<sup>14</sup>

## 2. Materials and methods

### 2.1. Nuclear power plants

The study covered the data available at the GCCR for 1980–2003. The expert committee selected all 16 sufficiently large and long running German nuclear power plants, resulting in the inclusion of only West German nuclear power plants. A power plant was considered relevant for the study from 1 year

after it started producing energy until 5 years after ceasing to operate (Table 1). The committee then selected areas around these power plants, with an emphasis on the east side because of the predominant west winds in Germany. For each nuclear power plant, the corresponding county, its next neighbour and usually one more county east of it were to be included. These counties define the area for this specific nuclear power plant. These areas overlap for several nuclear power plants. The total study area is shown in Fig. 1. The borders shown are county borders. As can be seen, nuclear power plants tend to sit close to district borders. A county in Germany consists either of one large city (community) or of a larger mixed/rural area with a varying number of smaller towns and villages (communities).<sup>11</sup>

### 2.2. Participants

One thousand five hundred and ninety two cases of cancer amongst children under 5 years of age, with oncologic diseases included in the International Classification of Childhood Cancer (ICCC)<sup>15</sup> resident in the study area at the date of diagnosis with known address and diagnosed in the relevant study period of the nearest nuclear power plant were included. All cases were matched with controls selected from the records of the appropriate registrar's offices. The controls were matched for date of birth (as closely as possible but at least within 1.5 years), age, sex and nuclear power plant area (at the date of diagnosis). Per control, a community was selected randomly out of the respective area according to the case-corresponding population (by sex, age and year of diagnosis). This community was asked to make available addresses and names of children with the matching criteria. From this address list the control closest to the date of birth of the case was selected.

Not all communities complied with our request to provide the addresses of controls. Six controls per case were requested and three of these were selected randomly. Finally, 4735 controls were used in the analysis.

For all case and control children, the geo-code of the place of residence at the date of diagnosis was obtained from the Land register.<sup>16</sup> For 9.9% of the case children and 8.4% of the controls, the address could not be coded and was replaced by the street mid-point (140 cases, 359 controls) or by the community or zip-code area mid-point (20 cases, 40 controls). The position of the chimney of each nuclear power plant was coded in the same way from high-resolution maps. All distances were given in metres.

### 2.3. Control for potential confounders

To assess potential confounding, the families of a subset of all cases and controls were invited to participate in a telephone interview covering other potential risk factors for childhood cancer.<sup>17,18</sup> The subset included all cases with selected diagnoses (leukaemia, lymphoma or a central nervous system tumour) diagnosed in 1993–2003 and their controls. The questions were summarised to a total of 20 potential confounders: social status, information on additional radiation exposure (parents, child), other risk factors (such as pesticides, mother's hormone intake), immune sys-

Table 1 - Relevant nuclear power plants and their operation periods and study periods

Name	Operating period	Study period
Brunsbüttel	23.06.1976 - 31.12.2003	01.01.1980 - 31.12.2003
Brokdorf	08.10.1986 - 31.12.2003	08.10.1987 - 31.12.2003
Krümme	14.09.1983 - 31.12.2003	14.09.1984 - 31.12.2003
Stade	08.01.1972 - 31.12.2003	01.01.1980 - 31.12.2003
Unterweser	16.09.1978 - 31.12.2003	01.01.1980 - 31.12.2003
Lingen	31.01.1968 - 05.01.1977	01.01.1980 - 05.01.1982
Emsland	14.04.1988 - 31.12.2003	14.04.1989 - 31.12.2003
Grohnde	01.09.1984 - 31.12.2003	01.09.1985 - 31.12.2003
Würgassen	10.10.1971 - 26.08.1994	01.01.1980 - 26.08.1999
Grafenrheinfeld	09.12.1981 - 31.12.2003	09.12.1982 - 31.12.2003
Biblis	16.07.1974 - 31.12.2003	01.01.1980 - 31.12.2003
Obrigheim	22.09.1968 - 31.12.2003	01.01.1980 - 31.12.2003
Neckarwestheim	26.05.1976 - 31.12.2003	01.01.1980 - 31.12.2003
Philippsburg	09.03.1979 - 31.12.2003	09.03.1980 - 31.12.2003
Isar	20.11.1977 - 31.12.2003	01.01.1980 - 31.12.2003
Gundremmingen	14.08.1966 - 13.01.1977 <sup>a</sup>	01.01.1980 - 31.12.2003
	09.03.1984 - 31.12.2003	

All periods right censored at 31.12.2003 (end of study) and study periods left censored at 1.1.1980 (start of childhood cancer registration). The order is roughly North to South.

a. The 'gap' was intentionally included in the study period.

tem related issues (such as vaccinations, breast feeding and child's social interaction), type of region and folic acid in pregnancy. In addition, we asked about previous residences of the child.

#### 2.4. Statistical methods

The main question was whether there is a monotonic descending relation between proximity of place of residence at the date of diagnosis to the nearest nuclear power plant included in the study at the time of diagnosis and the risk for childhood cancer. On the basis of the linear no-threshold low-dose effect excess relative risk-models as proposed by the BEIR Committee, the ICRP and the dispersion models presented by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), a conditional logistic regression with  $1/(\text{distance})$  as the continuous independent variable was used.<sup>12,13,19</sup> In the following  $1/(\text{distance in km})$  is referred to as measure of proximity. We adopted the view proposed by BEIR that a beneficial effect of radiation cannot be expected even at extremely low doses.<sup>12</sup> This is the basis for the one-sided analysis.

Additionally, categorical analyses were performed for the inner 5- and 10-km zones versus the respective outer zones. The results of the categorical models and the continuous model were compared by calculating the corresponding odds ratio (OR) from the continuous model, using the mean proximity of the controls in the respective inner zone. The conditional logistic regression model included one proximity measure at a time (continuous or categorical) and no other covariates.

If it is assumed that the estimated odds ratios are approximations of relative risk estimates, the categorical results can be converted to population attributable risks and to an attributable risk fraction for exposed cases with corresponding confidence intervals.<sup>20</sup>

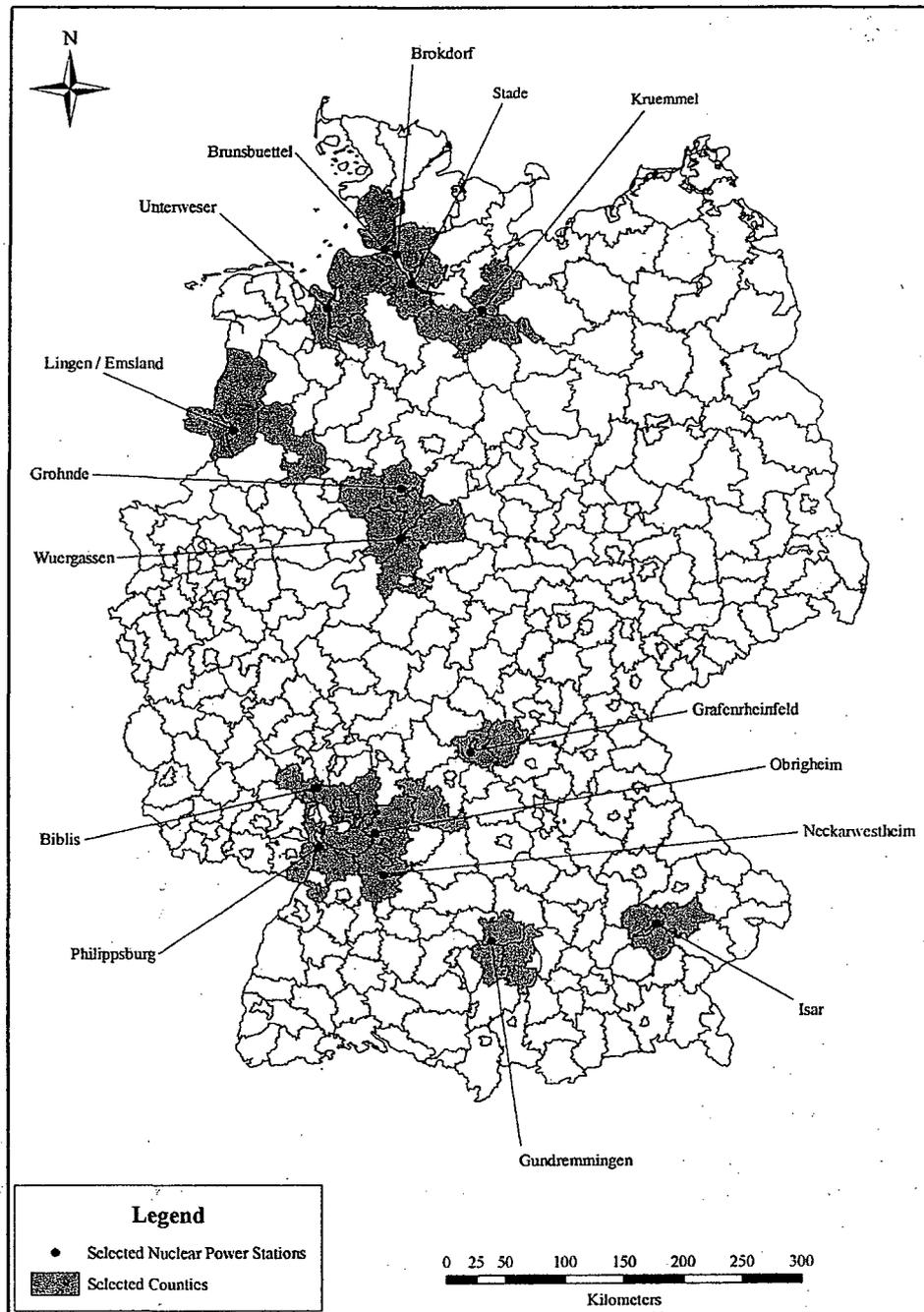
The primary analysis included all cases in children under 5 years of age at diagnosis. The diagnostic groups defined in advance in the study protocol were leukaemia (ICCC Ia-e), lymphoid leukaemia (ICCC Ia), acute non-lymphocytic leukaemia (ICCC Ib), central nervous system tumours including medulloblastoma (ICCC IIIa-f) and embryonal tumours except for medulloblastoma (ICCC IVa, V and VIa). Detailed results for the leukaemia subgroups are presented elsewhere.<sup>14</sup> In further subgroup analyses, we divided the operating periods of the nuclear power plants by half, and we analysed only those who were to be interviewed. All regression results are presented with one-sided lower confidence limits (CL) at a significance level of 5%.

#### 2.5. Sensitivity analyses

The randomness of the selection of the three matched controls from the maximum of six controls was assessed by repeating the regression using all available (up to 6) controls. The appropriateness of the fitted curve was investigated by fractional polynomial and Box-Tidwell-models for assessing the 'best fitting' curve (based on the deviance).<sup>21,22</sup>

Further sensitivity analyses were required in addition to those planned in advance. While 10% of the communities generally refused to provide control addresses, the proportion of refused addresses was higher (16%) amongst the communities situated in the inner 5-km zone. Therefore, the relevant analyses were repeated only for cases and controls from communities which provided control addresses.

The questionnaire part of the study raised a strong suspicion that communities might have sent the addresses of persons who were never resident in the respective community before the date of diagnosis of the corresponding case (about 5%). We therefore simulated artificial datasets by removing this 5% of controls from the analysis, assuming these 5% were either randomly distributed with respect to distance from the



**Fig. 1 - Selected nuclear power plants and study areas in Germany. Each nuclear power plant is identified by name; Lingen/ Emsland are two reactors 2 km from each other.**

nuclear power plant, or more likely to live close to it or far from it. For a sub sample of the controls (45%) we were able to check the address information at the date of diagnosis of the corresponding case. Amongst these we found 15% of controls that had not lived in the indicated place at that time, though they might have lived there prior to the date of diagnosis of the corresponding case. The analysis was repeated including only controls, where the address could be checked

and excluding those, whose address at the date of diagnosis of the corresponding case had been incorrect.

The previous German studies had shown single nuclear power plants to influence the results considerably, so the calculations were repeated leaving the nuclear power plants out of the analysis one by one.

As confounder assessment we planned to use a change by more than one standard deviation (out of the calculation for

the respective subset of cases not including any confounder variables) of the continuous proximity parameter.

To ensure the correctness of our analyses all relevant computations were repeated independently by the coordinating centre of clinical trials (KKS) of the University of Mainz.

### 3. Results

Table 2 shows the characteristics of the case children and the controls. The age and sex distributions were similar, as these were matching criteria. The case children lived 1.2–81.6 km from the nearest nuclear power plant and the controls between 1.1 km and 92.0 km.

The parameter from the continuous model for the measure of proximity was  $\beta = 1.18$  (lower one-sided 95% confidence limit [CL] 0.46) (Table 3, Fig. 2). The diagnostic groups defined in the study protocol showed a statistically significant effect only for leukaemia, which was stronger than the general effect (Table 2). We also give the complementary calculation beyond the study protocol (non-leukaemia cases, Table 3). No statistically significant difference was found comparing the first and second half of the respective operating periods of the nuclear power plants. The effect in the subgroup eligible

for interviewing was almost the same as that in the study as a whole, although it was not statistically significant because of small numbers ( $\beta = 1.05$ ; lower one-sided 95% CL -0.30) (Table 3).

When the continuous model was refitted with all available (maximally 6) controls per case (1592 cases, 8527 controls), the parameter estimate was  $\beta = 1.18$  (lower one-sided 95% CL 0.50), which is identical to that obtained with the three selected controls (compare to Table 3). When the model was refitted after exclusion of communities that did not provide control addresses (leaving 1310 cases and 3905 controls), a statistically significant parameter estimate was found  $\beta = 1.01$  (lower one-sided 95% CL 0.24) (compare to Table 3).

When 5% of all controls were either excluded randomly from the dataset with respect to their distances from the nearest nuclear power station, or selectively from close to or far from the nearest nuclear power station, we found average statistically significant estimated regression parameters of 1.18, 1.54 or 1.09, respectively, based on 1000 simulations each. These are all close to the results found with the full data (compare to Table 3). Excluding the controls from the analysis, which had their address at the date of diagnosis checked and found incorrect, led to an estimated regression parameter of

Table 2 – Characteristics of cases of all malignancies in children under 5 years of age, as defined by the ICCC, diagnosed in 1980–2003 resident in the study areas, and their matched controls

	Cases		Controls	
	N	%	N	%
All	1592	100.0	4735	100.0
Boys	893	56.1	2656	56.1
Girls	699	43.9	2079	43.9
Age (years)				
0 < 1	344	21.6	1016	21.5
1 < 2	330	20.7	984	20.8
2 < 3	340	21.4	991	20.9
3 < 4	315	19.8	947	20.0
4 < 5	263	16.5	775	16.4
5 < 6	0	0.0	22	0.5
Diagnostic groups <sup>a</sup>				
Leukaemia	593	37.3	1766	37.3
Central nervous system tumours	242	15.2	720	15.2
Embryonal tumours	486	30.6	1447	30.5
Other	271	17.0	802	16.9
First half of power plant operation period	698	43.8	2073	43.8
Second half of power plant operation period	894	56.2	2662	56.2
Eligible for interview (1993–2003, selected diagnoses)	471	29.6	1402	29.6
Distance from nearest nuclear power plant (km)				
< 5	77	4.8	148	3.1
5 < 10	158	9.9	464	9.8
10 < 20	523	32.9	1589	33.6
20 < 30	403	25.3	1181	24.9
30 < 40	225	14.1	726	15.3
40 < 50	137	8.6	371	7.8
≥ 50	69	4.3	256	5.4
Mean proximity measure <sup>b</sup> in the inner 5-km zone	0.3133	-	03245	-
Corresponding harmonic mean distance (km)	3.2	-	3.1	-

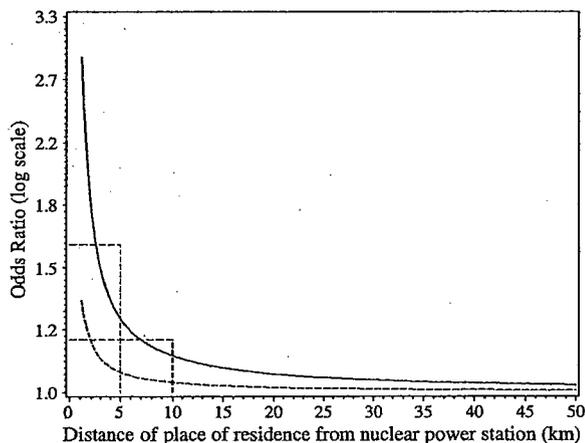
a Controls matched to cases with respective diagnosis.

b Proximity measure = 1/distance in km (kilometres).

**Table 3 – Estimated parameters from the conditional continuous logistic regression model for all cancers, diagnostic groups and some relevant time periods**

	Estimated regression coefficient	Lower one-sided 95% confidence limit	N cases	N controls
All malignancies: 1980–2003	1.18	0.46	1592	4735
Diagnostic groups 1980–2003				
Leukaemia	1.75	0.65	593	1766
Central nervous system tumours	–1.02	–3.40	242	720
Embryonal tumours	0.52	–0.84	486	1447
All malignancies except leukaemia	0.76	–0.20	999	2969
First half of power plant operation period	1.89	0.85	698	2073
Second half of power plant operation period	0.54 <sup>a</sup>	–0.47	894	2662
Eligible for interview, diagnosed 1993–2003 with leukaemia, lymphoma, or a central nervous system tumour	1.05	–0.30	471	1402

<sup>a</sup> The difference between the first and the second half was not statistically significant.



**Fig. 2 – Graphical representation of the main regression analyses. Estimated regression curve for all malignancies versus distance from nearest power plant, based on 1592 cases and 4735 matched controls based on conditional logistic regression modelling. Distance axis cut off at 50 km. Black line: continuous fitted regression curve. Dotted curved line: lower one-sided 95%-confidence limit of continuous fitted regression curve. Dotted straight lines: categorical analysis for <5 km and <10 km respectively.**

1.05, which again does not differ much from the full data (compare Table 3).

Leaving the nuclear power stations out of the data set one by one yielded statistically significant regression coefficients close to the overall estimate.

Fractional polynomial modelling and the Box–Tidwell model both suggested that an alternative measure of proximity of the form  $1/\sqrt{\text{distance}}$  would fit slightly better than  $1/\text{distance}$ , but not significantly so.

The categorical analyses showed a statistically significant effect for children living in the inner 5-km zone OR = 1.61 (lower one-sided 95% CL 1.26). Comparing diagnostic groups, the effect was again found only for leukaemia (OR = 2.19; low-

er one-sided 95% CL 1.51). Living in the inner 10-km zone had a far smaller effect (OR = 1.18; lower one-sided 95% CL 1.03). The fitted curve for all malignancies predicted similar OR's for the inner 5-km and 10-km zone as obtained by the categorical analysis (Table 4, Fig. 2).

Based on the categorical analysis, our result indicates that 29 out of the total observed 77 cases (38%; 95% CI [24%;61%]) diagnosed in the inner 5-km zone in 1980–2003 may be attributed to the fact that they were living in this 5-km zone. These were 1.2 cases per year, representing 0.2% (95% CI [0.1%; 0.4%]) of all 13,373 cases of cancer in children under 5 years in Germany in those years.

## 4. Discussion

### 4.1. Principal findings

Our results show an increased risk for cancer amongst children under 5 years of age living in the proximity of nuclear power plants in Germany. The continuous model, in agreement with the categorical analyses, identified the inner 5-km zone as the zone of increased risk (about 1.5-fold higher). The observed effect was largely restricted to leukaemia (Tables 3, 4).

Expression of the categorical estimate for living in the inner 5-km zone as an attributable risk fraction would attribute 29 out of 77 observed cases (38%; 95% CI [24%;61%]) in 1980–2003 to having lived in that zone representing 0.2% (95% CI [0.1%;0.4%]) of all 13,373 childhood cancer cases under 5 years in 1980–2003 in Germany.

### 4.2. Previous studies

The associations found in our study were strongest for leukaemia in children under 5 years of age living within a 5-km zone of a nuclear power plant. This group had yielded the most notable exploratory result in the first of the previous ecological studies.<sup>7,8</sup> It has to be pointed out that the cases of this study diagnosed in the study years 1980–1995 had already been included in the previous studies and that the results pre-

**Table 4 - Estimated odds ratios from the conditional categorical and continuous logistic regression models for all cancers and for diagnostic groups**

	OR for inner 5 km derived from continuous model <sup>a</sup>		Modelling 5-km distance categorically		OR for inner 10 km derived from continuous model <sup>b</sup>		Modelling 10-km distance categorically	
	OR	Lower one-sided 95% confidence limit	OR	Lower one-sided 95% confidence limit	OR	Lower one-sided 95% confidence limit	OR	Lower one-sided 95% confidence limit
All malignancies	1.47	1.16	1.61	1.26	1.23	1.09	1.18	1.03
Diagnostic groups								
Leukaemia	1.76	1.24	2.19	1.51	1.37	1.12	1.33	1.06
Central nervous system tumours	0.72	0.33	0.81	0.37	0.83	0.54	1.03	0.71
Embryonal tumours	1.19	0.76	1.20	0.75	1.10	0.86	1.05	0.81

Cases diagnosed/controls resident in the study area in 1980-2003.

OR: odds ratio

a Using the mean proximity measure of the controls in the inner 5-km zone:  $1/(\text{distance in km}) = 0.3245$ .b Using the mean proximity measure of the controls in the inner 10-km zone:  $1/(\text{distance in km}) = 0.1786$ .**Table 5 - Results of studies on all malignancies under the age of 5 years in the vicinity of nuclear power plants performed at the German Childhood Cancer Registry: previous studies 1 and 2 compared to recent study (categorical estimates)**

Study periods	Relative risk estimate/Odds ratio	95%-confidence interval/lower one sided 95% confidence limit	Cases 5-km zone
Previous studies			
1980-1990 Study 1	1.43	[0.89; 2.43] <sup>a</sup>	45
1991-1995 Study 2	0.97	[0.50; 1.89] <sup>a</sup>	22
1980-1995 Study 1+2	1.24	[0.84; 1.85] <sup>a</sup>	67
Recent study: Results shown for previous studies' study periods, for the period following the previous studies and for the total study period			
1980-1990 (period of study 1)	1.99	1.33 <sup>b</sup>	31
1991-1995 (period of study 2)	1.41	0.90 <sup>b</sup>	20
1980-1995 (period of previous studies 1+2)	1.70	1.26 <sup>b</sup>	51
1996-2003 (period following previous studies)	1.45	0.96 <sup>b</sup>	26
1980-2003 (total recent study period)	1.61	1.26 <sup>b</sup>	77

Relative risks and odds ratios by different study periods in the inner 5-km zone (periods shown analogous to periods of former studies).

a Relative risk resulting from ecological study, two-sided 95% confidence interval.

b Odds ratio resulting from case-control study, lower one-sided 95% confidence limit.

sented here are consequently not entirely independent. Table 5 summarises the findings from the previous studies for all malignancies, cases under the age of five in the inner 5-km zone. It compares them with the results of this case-control study split up by the previous study periods (1980-1990, 1991-1995) and separating the new study years (1996-2003). The observed effect estimate is larger in the earliest study period (Table 5). This corresponds to the observation, that the regression parameter is larger in the first half of the nuclear power plant operation periods, though not significantly so (Table 3). While the ecological effect estimates are smaller, they are generally in the same order of magnitude (Table 4). It is thus unlikely, that the previous findings were affected by ecological bias in a major way.

This issue will be discussed more thoroughly for leukaemia in a separate paper.<sup>14</sup>

#### 4.3. Strengths and weaknesses

The GCCR, founded in 1980, is a nationwide childhood cancer registry cooperating with all paediatric oncology units and therapy optimisation studies in Germany. Registration for cases under the age of 15 is 95% complete since the mid-1980ies.<sup>23</sup> Almost all cases are registered with their full address at the date of diagnosis. Given this data base, this is one of the largest studies with this objective world wide (1592 cases, including 593 leukaemia cases).

Distance to the nearest nuclear power plant at the date of diagnosis is a crude surrogate for potential exposure to radiation, however, it does not account for topography, weather, vegetation, differences in background radiation, other sources of individual exposure to radiation or the time actually spent by the individual in the home. Information

on previous residences of the child from the questionnaire could not be used in the analysis due to poor and selective participation in the questionnaire part of the study (see below). The extremely low number of parents reporting occupation in a nuclear installation (0 cases, 4 controls) did not allow evaluating an effect of parental radiation exposure.

The former studies investigated only the inner 15-km zone. In the case control study, the study areas around the nuclear power plants were very large and included cases and controls from up to about 100-km distance from the nuclear power plants, which increases the statistical power slightly. Adding unexposed cases and controls does not, however, cause bias.

German nuclear energy providers are required to maintain the exposure of the population below 0.3 mSv/year.<sup>24</sup> Compared to this, the annual background radiation exposure estimated for the German population is 1.4 mSv/year. The average annual dose of persons of any age from medical procedures is 1.8 mSv, though this is lower for children (no specific figures given).<sup>25</sup> The actual emissions from nuclear power plants are far lower; e.g. for a 50-year-old person in 1991 living 5 km from one of the German nuclear power stations included in the study, the expected cumulative exposure to atmospheric discharges would have ranged from 0.000019 mSv (Obrigheim) to 0.0003200 mSv (Gundremmingen).<sup>26</sup> At these levels of radiation, no detectable effects are expected from the usual models.<sup>12,13</sup>

The sensitivity analyses for the various expected and unexpected problems in control recruitment yielded statistically significant regression parameters of a similar magnitude to that reported in Table 2. We conclude that the biases due to these problems were small and the results cannot be explained by the biased control recruitment. The specificity of the effect for leukaemia makes it unlikely that biased control recruitment is the explanation for the effects seen in this study. The analysis excluding the nuclear power station areas one by one showed that the result is not caused by a specific nuclear power plant.

With regard to uncontrolled confounding, there may be other risk factors close to nuclear power stations, although no risk factors of the necessary strength for this effect are known for childhood cancer and specifically childhood leukaemia. We saw considerable self-selection by the persons who were to be interviewed, so that those who were interviewed were not representative of the study population as a whole, particularly with respect to their distance distribution from nuclear power plants. Assessing the change in the (biased) estimate by confounders as planned nevertheless, showed that none of them changed the distance parameter estimate by more than one standard deviation. This is true for all diagnoses investigated in the survey subset of the study as well as for diagnosis subgroups.

#### 4.4. International context

The best-known quantitative summaries of current knowledge on the effects of environmental low-dose radiation effects are based mostly on adult data. Children are included, but their small number makes a negligible impact. These models deal mainly with solid tumours and adult leukaemia,

applying them to children or to acute leukaemia should be done with caution.<sup>12,13</sup> The BEIR Committee has refused to assess studies of residents living near nuclear facilities, many of which had childhood cancer as the main objective, because of lack of actual data on exposure. They are reviewed, but not summarised or discussed beyond this.<sup>12</sup> Many other studies have addressed the health risks of children of parents exposed (occupationally or to radiation from the atomic bombs dropped in Hiroshima and Nagasaki) and these are therefore not comparable. If we had nevertheless applied the models proposed for adults, no detectable effect would have been predicted.

A French study of a design similar to that of the earlier incidence studies in Germany, in which SIR were computed for communities by distance, found no elevated SIR for leukaemia amongst children under five living in the inner 5-km zone of French nuclear installations (670 cases, SIR 0.97; 95% CI [0.69;1.33]).<sup>27</sup> When this study was repeated, with distance replaced by estimated gaseous discharges, neither the highest exposure category ( $\geq 0.001$  mSv/year; 750 cases, SIR 0.93; 95% CI [0.30;2.17]), nor any other exposure category was associated with an elevated SIR for leukaemia.<sup>28</sup> A recent study addressed the risk for leukaemia of children under six years of age in countries near the Chernobyl site (421 cases), on the basis of estimated cumulative doses from gaseous discharges and from food, derived from individual residence histories. This study estimated an OR of 1.46 (95% CI [1.00;2.12]) for doses between 1 and 5 mGy compared with  $<1$  mGy.<sup>29</sup> 1 mGy is a far higher exposure than from a nuclear power plant under regular conditions in Germany.<sup>26</sup>

For some of the nuclear power plants in relatively isolated communities in northern Britain, Kinlen suggested population mixing as a potential cause of elevated leukaemia risks.<sup>30</sup> We inspected migration figures,<sup>31</sup> but there are no indications that any of the nuclear sites investigated here were particularly isolated and all have average migration at any time during the study period. This is not to say that infective causes may not in principle be an alternative explanation for the patterns we see in this study.

## 5. Conclusion

The design of this study aimed to clarify issues raised by previous ecological studies in Germany by using the same data plus more recent cases in a case-control study assigning individual distance estimates (as compared to community based zones). In Germany 1980-2003 we see an increased risk for cancer in children under 5 years of age, particularly leukaemia, when living in proximity ( $<5$  km) to a nuclear power station. This observation is not consistent with most international studies, unexpected given the observed levels of radiation, and remains unexplained. We cannot exclude the possibility that this effect is the result of uncontrolled confounding or pure chance.

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The research group is independent from the funding agency. The authors are responsible for the content.

### Conflict of interest statement

All authors declare that they have no conflict of interest and no organisational, personal or financial connection with other people or organisations that could inappropriately influence this work.

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# **Radiation Exposure**

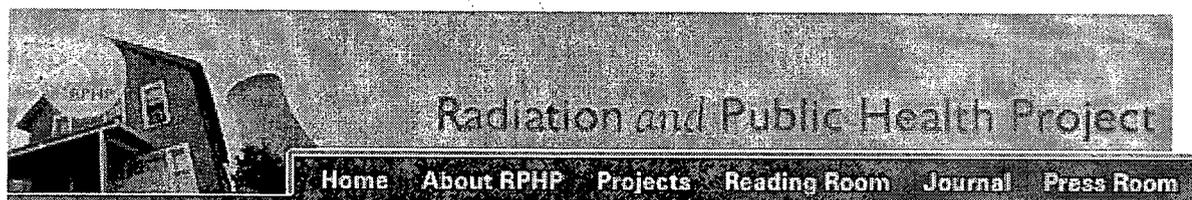
## **Limerick Nuclear Power Plant**

- **Limerick Nuclear Plant Routinely Emits Radiation Into Our Air, Water, Soil**
- **Cancer Rates Rose Dramatically Since Limerick Started Operating**

### **RADIATION**

#### **The Most Dangerous Carcinogen**

- **Developing Fetuses, Infants, and Children Are Most Susceptible To The Harmful Impacts From Radiation Exposure, Even In Small Doses**  
**Childhood Cancer Is A Key Indicator Of Impacts.**  
**Childhood Cancer Rates In This Region Far Exceed The Nation, State, and Tri-County.**
- **Children are Extra Sensitive to DNA-Damaging Effects of Radioactive Energy**
- **Children of Chernobyl Confirm Carcinogenic Impacts**
- **Radiation Releases Are Confirmed To Be Getting Into Our Children's Bodies**



### *Press Release*

For Immediate Release  
 April 11, 2005

Contact: Joseph J. Mangano, MPH MBA  
 National Coordinator  
 Radiation and Public Health Project  
 Telephone 610 666-2985  
[Odiejoe@aol.com](mailto:Odiejoe@aol.com)

## **LIMERICK NUCLEAR REACTOR EMISSIONS AND THE POTENTIAL LINK TO LOCAL CANCER RATES**

### **1. Limerick History and Percent Time in Operation**

The Limerick nuclear power plant consists of two reactors. Both were announced by the PECO company in 1969; but because of construction delays and public opposition, much time elapsed before the plant began producing electricity. Limerick Unit 1 achieved initial criticality (began producing nuclear power, at limited capacity) on December 22, 1984, while Limerick Unit 2 went critical on August 1, 1989. Each has a license to operate for 40 years from the U.S. Nuclear Regulatory Commission (NRC).

In their first years of operation, the Limerick reactors were closed fairly frequently due to mechanical problems. But from 1999-2005, the reactors were operational 96.7% and 96.3% of the time, according to the NRC (data through February 2005). While the economic benefits of high operating rates are clear, the question of whether running aging reactors more of the time is also raised.

### **2. Philadelphia Region Has Most Reactors in U.S.**

The Limerick plant lies about 21 miles northwest of central Philadelphia. But 13 nuclear reactors are within 90 miles of the city (see Table 1). The Philadelphia area has the largest concentration of nuclear reactors in the U.S., along with northern Illinois.

<b>ID</b>	<b>Reactor</b>	<b>Location</b>	<b>From Phila.</b>	<b>Startup</b>	<b>Closed</b>
1	Limerick 1	Pottstown PA	20 mi. NW	12/22/84	
2	Limerick 2	Pottstown PA	20 mi. NW	08/01/89	
3	Salem 1	Salem NJ	25 mi. SW	12/11/76	
4	Salem 2	Salem NJ	25 mi. SW	08/08/80	
5	Hope Creek	Salem NJ	25 mi. SW	06/28/86	
6	Oyster Creek	Forked River NJ	50 mi. E	05/03/69	
7	Peach Bottom 1	Delta PA	60 mi. SW	03/03/66	10/31/74
8	Peach Bottom 2	Delta PA	60 mi. SW	08/07/74	
9	Peach Bottom 3	Delta PA	60 mi. SW	08/07/74	

# Nukes: Cancer Links

## Radioactive Baby Teeth: The Cancer Link



Joseph J. Mangano

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Publisher: Radiation and Public Health Project

Pub. Date: March 2008 ISBN-13: 9780615168753 154pp

#### Synopsis

In 2001, college administrators entered a remote, musty storage room near St. Louis. Not knowing what was in the room, the group was puzzled to find a large wall with hundreds of long boxes stacked against it. They pulled out one of the boxes, took off the cover, and found --- baby teeth.

Quite by accident, the group had unearthed 85,000 baby teeth left over from a study done decades before. The study had found how much radiation from atomic bomb tests had entered human bodies, by testing teeth.

News of the discovery spread like wildfire in newspapers across the country. Coverage focused on the fact that the teeth could answer a critical question - how much cancer was caused by radiation exposure?

In this book, read about the mystery faced by scientists of how much radiation from nuclear weapons and reactors actually infiltrated people's bodies - and how much cancer it really caused. Learn about the furious opposition researchers faced from government and industry. Discover how the research helped end above-ground nuclear testing, how it challenged the claim that nuclear reactors are safe, and how it exposed an undeniable link with cancer.

Joseph Mangano draws on his direct experience and his involvement with scientists and citizens to create a lively, intriguing story - a story that continues today. Mangano is a health researcher, and is Executive Director of the Radiation and Public Health Project, based in New York.

**Cancer Rates In Our Region Have Skyrocketed  
Since Limerick Nuclear Power Plant Started Operating In The Mid 1980s**

The Most Reliable  
Independent Research On Links  
Between Nuclear Power, Radiation, and Cancer

Can Be Found At:  
The Radiation and Public Health Project  
[www.radiation.org](http://www.radiation.org)

## **Evidence Shows A Link**

### **Limerick Nuclear Plant Released Strontium-90 Into Our Air and Water For 26 Years - Since 1985**

#### **Strontium-90 Is Confirmed To Be In Our:**

- ✓ **Water**
- ✓ **Soil**
- ✓ **Milk**
- ✓ **Vegetation**

**Exelon's 2009 Radioactive Monitoring Report**

#### **Strontium-90 Is In Our Children**

**Confirmed By**

**RPHP's Tooth Study On Baby Teeth Around Limerick Nuclear Plant**

**SR-90 Serves As A Marker Showing Radionuclides Released From Limerick Gets Into Our Children**

#### **Childhood Cancer Rates Skyrocketed To 92.5% Higher Than The National Average By 1999.**

- ✓ Strontium-90 was routinely released into our air and water from Limerick Nuclear Plant since 1985.
- ✓ SR-90 was detected around Limerick in water, milk, soil, and vegetation (2009 Exelon Report).<sup>i</sup>
- ✓ Logically SR-90 in the teeth of our children is from Limerick Nuclear Plant's 26 years of releases. Limerick's role in SR-90 found in baby teeth around Limerick is clear.

***It is not credible for NRC to suggest SR-90 found in water, soil, vegetation, and milk, or the baby teeth of children in this region is from decades old bomb testing done far distances from us.***

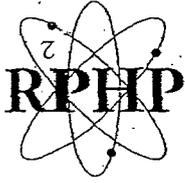
Still, 5-18-11, NRC's Branch Chief, Paul Krohn blamed 50-year old bomb testing stating, "Bomb testing didn't stop that long ago – from a scientific perspective SR-90 in teeth is from bomb testing."

## **Strontium-90 (Sr-90) Research Links SR-90 To Bone Damage and Cancer:**

**Studies of SR-90 in baby teeth of children living near Limerick have shown some of the highest levels of Strontium-90 of any area around nuclear plants or other areas studied in the U.S.**

**Children living near Limerick have suffered some of the highest cancer rates in the U.S., skyrocketing after Limerick opened in 1985 to the late 1990s. Childhood cancer rates rose from 30% higher than the national average in the late 1980s to 92.5% higher in the late 1990s.**

- Sr-90 is considered very hazardous because of its long half-life of 28 years. Low dose exposure to Sr-90 is so serious because of protracted exposure over periods of days, months or years.
- Research confirms that low dose exposures over months or years can be hundreds to thousands of times more damaging than the same dose received in short diagnostic medical exposures or flashes from a nuclear bomb explosion. (Petkau)
- Damage is known to involve the developing immune, hormonal, and central nervous systems of infants and children.
- Signature cancers of Sr-90 are cancers of the bone, including Ewing's Sarcoma. Bone cancers have been identified in our children
- Sr-90 closely resembles calcium and is readily taken up into the bones and teeth - considered the most hazardous bone-seeking element of nuclear fission because it so closely resembles calcium.
- Sr-90 lodges near the bone marrow, where stem cells form blood and immune system cells, increasing risk of many forms of cancer, especially in newborn infants.



## Radiation and Public Health Project

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November 19, 2003; contact: Joseph Mangano (917-903-5847)  
Dr. Lewis Cuthbert or Donna Cuthbert (ACE) (610-326-2387) (610) 326-6433

### **RADIATION IN TEETH RISING, HIGHEST NEAR LIMERICK POTENTIAL LINK TO CHILDHOOD CANCER SEEN**

Pottstown PA, November 19 - Radioactivity levels in Pennsylvania baby teeth rose during the 1990s, and are highest in Pottstown PA, closest to the Limerick nuclear power reactors, according to results of a study released today.

The study also found that the trends in average radioactivity levels and childhood cancer are similar, suggesting a link between the two. The study was presented in Pottstown by the Radiation and Public Health Project (RPHP), a New York City-based research group.

"We tested 95 baby teeth from children living in Berks, Chester, and Montgomery Counties, and found that average Strontium-90 levels rose 21% in the 1990s, and are 34% higher than in the rest of Pennsylvania," says Joseph Mangano, RPHP National Coordinator and study author. "In 34 teeth from Pottstown children, the excess is 62%." RPHP enlisted a laboratory to test teeth for Strontium-90 (Sr-90), a yellowish metal found only in atomic bomb explosions and nuclear reactor emissions. Sr-90 is radioactive and causes cancer.

Mangano explained that in the three-county area, increases in average Sr-90 levels were followed four years later by rises in cancer in children under age ten. High local rates of childhood cancer rates have recently been discussed in the Pottstown area; in the late 1990s, cancer incidence under age 20 in six local townships and boroughs was 94% above the state and national rate.

"It's important to collect this kind of clinical data in order to work toward prevention and solutions," says Dr. Lewis Cuthbert, President of The Alliance For A Clean Environment, who also spoke at the press conference. "By testing amounts of a specific toxic chemical in the body, the tooth study is producing useful information on one potential factor." Pottstown Mayor Anne Jones also spoke in support of the tooth project, saying that "this kind of research provides documented evidence of harm, which can and should be used to demand use of the Precautionary Principle in all government decisions. We must put an end to the alarming rates of childhood cancer plaguing our community."

RPHP is asking for donations of baby teeth from local children who have been diagnosed with cancer, so that comparisons could be made of Sr-90 averages in children with and without the disease. Based on 61 U.S. teeth, children with cancer have about a 50% higher average Sr-90 level, and more teeth would make this preliminary comparison more significant.

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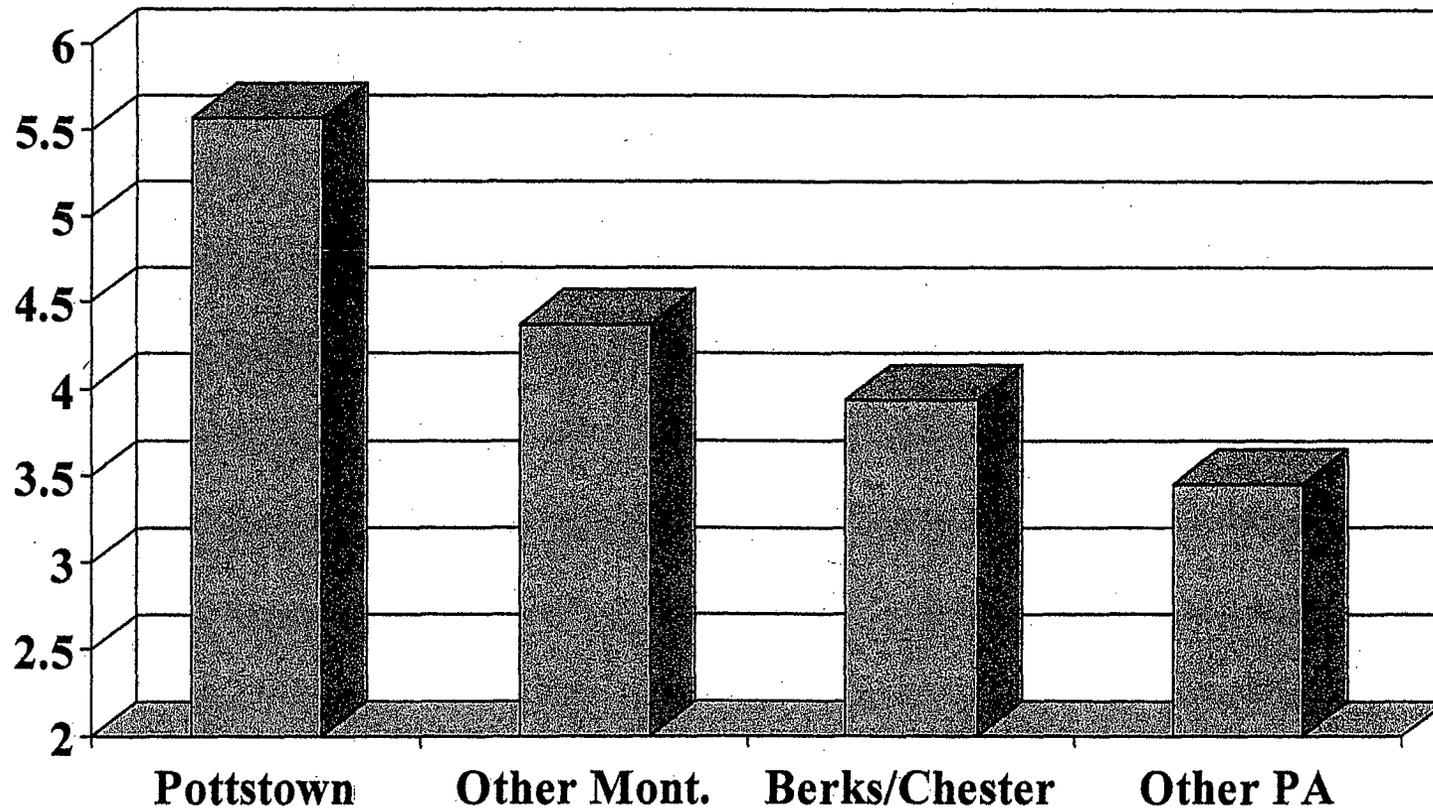
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Susanne Saltzman, MD  
Janette Sherman, MD  
Agnes Reynolds, RN

# RADIATION IN BABY TEETH

Figure 1

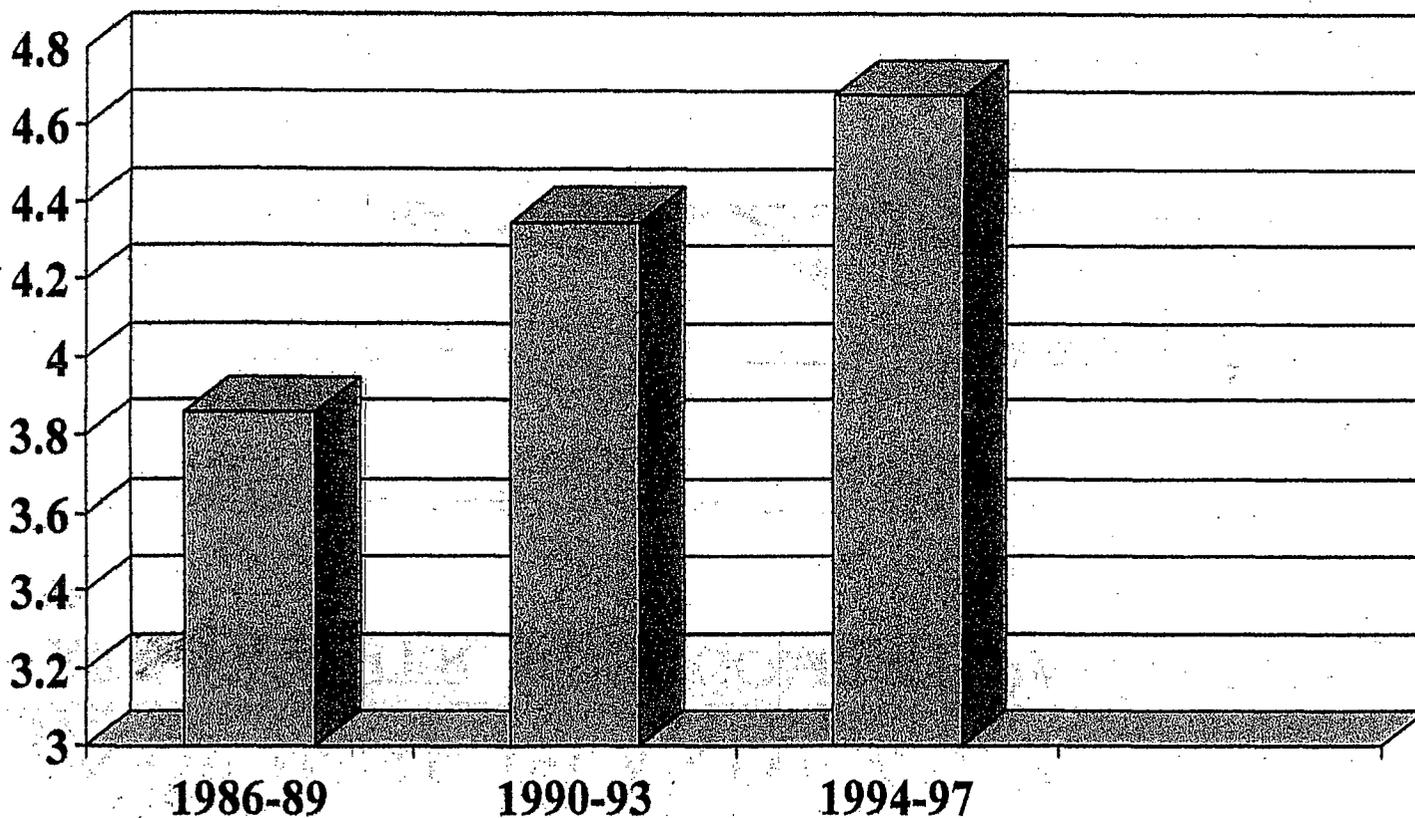
## AVERAGE SR-90 IN BABY TEETH BY AREA OF PENNSYLVANIA



Scale represents average picocuries Sr-90 per gram calcium at birth in baby teeth. Only births after 1979 included. Number of teeth include Pottstown (34), Other Montgomery (18), Berks/Chester (43), Other PA (34).

Figure 2

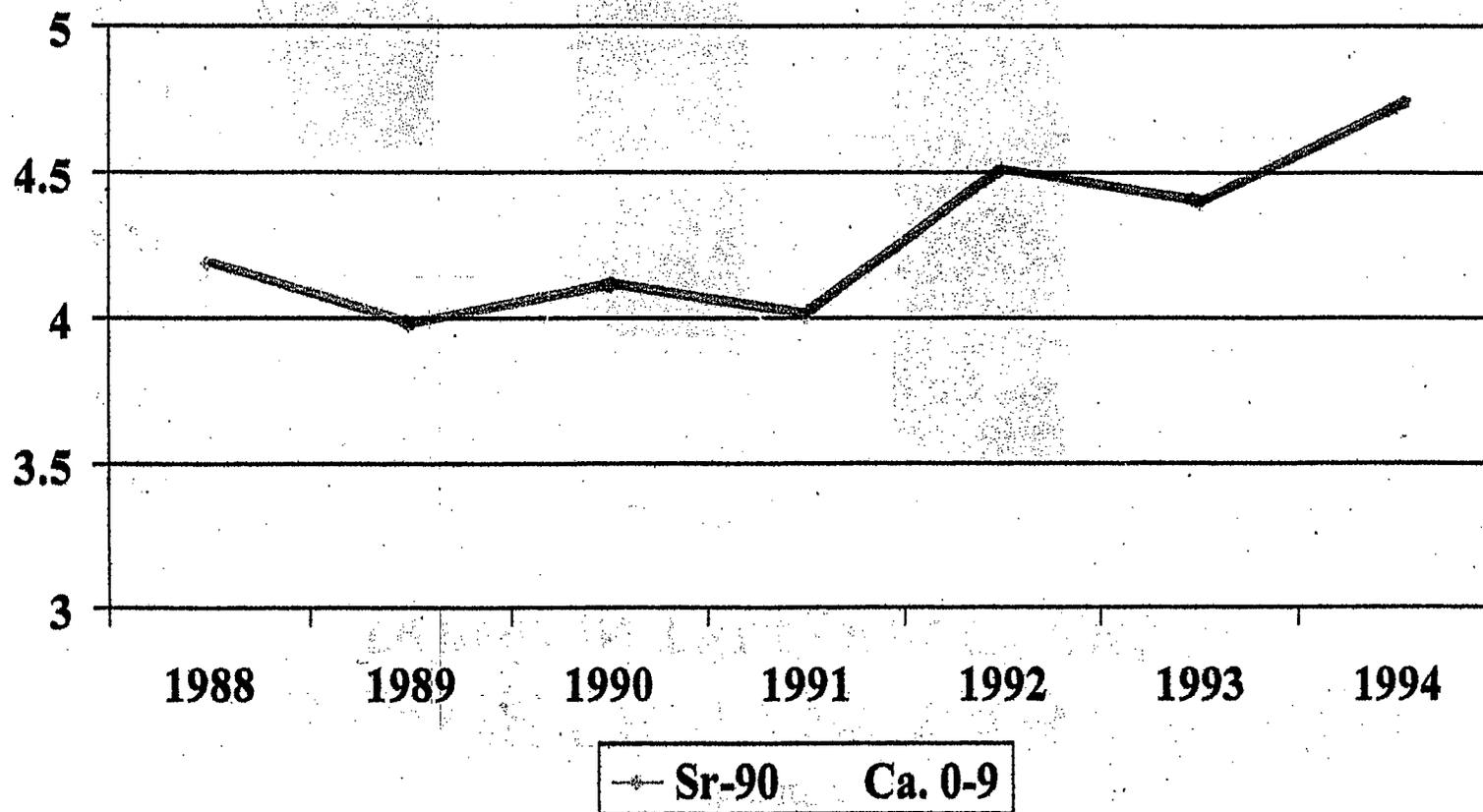
# AVERAGE SR-90 IN BABY TEETH TREND IN TRI-COUNTY AREA



Scale represents average picocuries Sr-90 per gram calcium at birth in baby teeth. Number of teeth include 17 in 1986-1989, 42 in 1990-1993, and 29 in 1994-1997. Years represent birth years.

Figure 3

# TRENDS IN SR-90 AND CANCER AGE 0-9 BERKS, CHESTER, MONTGOMERY (PA) COUNTIES



Scale represents cancer cases 0-9 per 25,000 population, average picocuries Sr-90 per gram of calcium at birth in baby teeth. Points represent middle year of three-year groups, e.g., 1988 = 1987-1989. Four year lag between points, e.g., first Sr-90 point is 1987-1989, first ca 0-9 point is 1991-1993. Sources: Radiation and Public Health Project (Sr-90 data), Pennsylvania Cancer Registry (ca 0-9 data).

## EXECUTIVE SUMMARY

Since 1996, the Radiation and Public Health Project (RPHP) has conducted the only known study of radiation levels in the bodies of persons living near nuclear reactors. Specifically, it has measured Strontium-90 (Sr-90) concentrations in baby teeth. Strontium is chemically similar to calcium; after it enters the body by breathing, food, or water, it attaches to bone and teeth. Sr-90 has a slow decay rate, and remains in the body for many years.

One area that the study focused on is the Pottstown PA region, near the Limerick nuclear plant. Health and safety concerns about Limerick are reflected in the following data:

### Major Meltdowns

- Limerick's two reactors began operations in 1984 and 1989, respectively. In recent years, the Exelon Generation Company LLC has operated the reactors a high percentage of the time (96.7% in 2002 and 2003). The issue of whether aging parts are being pushed past their safe limits, raising the risk of a catastrophic mechanical failure and meltdown, is a serious consideration.
- The reactor lies about 30 miles northwest of downtown Philadelphia. The Al Qaeda terrorist network has considered an attack against U.S. reactors, raising the concern that reactors in heavily populated areas might be primary targets. The federal estimate of 610,000 local cases of radiation poisoning if either Limerick reactor suffered a major meltdown is the highest in the U.S.

### Radioactivity Routinely Emitted

- Radioactivity from the Limerick reactors is routinely released into the environment. There are variations over time when reactors accidentally emit radioactivity or release it as part of routine maintenance.
- Including Limerick, there are 13 nuclear reactors, 11 of which are still operating, situated within 80 miles of Pottstown, the heaviest concentration in the U.S. (along with northern Illinois). Each reactor releases radioactivity into the environment on an ongoing basis.

### High Cancer Rates Near Limerick

- From 1995-1999, cancer incidence in children under age 20 living in Greater Pottstown was 94% higher than the national, state, and regional rates. For the entire 1990s, the rate was 77% higher (total of 40 children diagnosed with cancer).
- Childhood cancer mortality in Montgomery County rose 30% from the 1980s to the 1990s, compared to a 22% reduction in the state and nation.
- From 1995-1999, cancer incidence for young adults (age 20-54) in Greater Pottstown was 18% above the national average. A total of 287 local residents in this age group were diagnosed with cancer during these five years.

- Local incidence of breast cancer in 1995-1999 exceeded the U.S. rate by 51% (age 30-44); by 39% (age 45-64); and by 29% (age 65 and over). In the five year period, 263 local women were diagnosed with breast cancer.

#### Tooth Study Results

The combination of personal appearances in Pottstown by RPHP's Janette Sherman and Joseph Mangano, plus interest from local residents, resulted in 146 baby teeth being donated to RPHP. These teeth were all tested for Sr-90, and principal results of the analysis are as follows:

1. The average concentration of Sr-90 in <sup>95</sup>100 baby teeth from Montgomery, Berks, and Chester county children born after 1979 is 34% above the rest of Pennsylvania, while the average in Pottstown is 62% higher.
2. From 1986-89 to 1994-97, average Sr-90 levels in the tri-county area steadily rose 21%, reversing a decline that began in the early 1960s. This pattern is similar to that in five other states where the majority of teeth have been collected.
3. In the tri-county area, trends in Sr-90 are similar to trends in cancer deaths among children under age ten

The above results suggest that current reactor emissions - not old fallout from Nevada bomb tests in the 1950s and 1960s - account for a substantial proportion of radioactivity in the bodies of local children. More importantly, there is a statistical link between Sr-90 and childhood cancer in Montgomery, Berks, and Chester counties.

Further studies, such as comparing Sr-90 in teeth of healthy children with teeth of children with cancer, are warranted. (RPHP has recently begun such a study). Moreover, any policy discussions concerning Limerick should take into account the actual excess diseases and deaths caused by routinely-emitted low-dose radioactivity, along with a (hypothetical) catastrophic accident.