

RADIOACTIVE GROUNDWATER AT LIMERICK NUCLEAR PLANT

THERE IS CAUSE FOR CONCERN, PRECAUTION, AND PREVENTION!

- Limerick Nuclear Plant's Leaks and Spills Caused Radioactive Groundwater Contamination, Confirmed By Exelon's Own Monitoring And Reports To NRC.
- At Least 12 Radionuclides Were Detected In Limerick's Monitoring Wells.
- 15 of 15 Limerick Nuclear Plant Monitoring Wells Found Beta Radiation. Beta Emitted Can Include Dangerous Long-Lived Radionuclides Such As Strontium-90 and Cesium-137. Beta Emitters Also Include Iodine-131, Tritium, and Other Radionuclides.
- Limerick's 600 Acre Site Has Only 15 Monitoring Wells, Placed By Exelon, The Company With A Vested Interest In The Outcome, That Has Shown It Can't Be Trusted To Provide Full and Timely Disclosure.
- There Is No Independent Proof Radioactive Groundwater Has Not Traveled To Drinking Water Wells Around Limerick. Within 1 Mile From The Center Of The Site Are 46 Domestic Withdrawal Wells, 2 Commercial Wells, and 1 Institutional Well. Residents Wondered If Radioactive Groundwater Contamination Explains Limerick's Purchase Of Hundreds More Acres Since The Mid 2000s. This Tactic Has Been Used By Other Polluters As A Cover Up.
- It's Only A Matter Of Time Until There Are More Radioactive Leaks Under Limerick From Miles Of Aging, Deteriorating Buried Pipelines Which Transported Highly Radioactive and Corrosive Liquids For Decades. Think What Happens To Pipes In Homes Over Time, That Aren't Even Continuously Transporting Such Corrosive, Radioactive Water.
- Radioactive Leaks In Limerick's Buried Pipelines and Fittings Could Go Undetected and Unreported For Decades, If Not Forever.
- Earthquakes Can Cause Leaking In Limerick's Underground Pipes. Earthquakes Are Becoming Stronger and More Frequent. There Are Two Faults Within 17 Miles of Limerick, One 9 Miles Away. The 8-23-11 Virginia Earthquake Caused Shaking and Concern At The Limerick Site.
- Limerick's Historic Radioactive Leaks and Spills Have Never Been Cleaned Up. In Fact, It Is Difficult, If Not Impossible To Completely Clean Them Up. It Is Also Costly, If Not Impossible To Completely Remove All Limerick's Radionuclides From Drinking Water.

PREVENTION IS THE ONLY CURE FOR THREATS TO HEALTH AND PROPERTY VALUES!

Limerick Nuclear Plant Should Be Closed To Minimize Future Health and Financial Harms From Radioactive Leaks Into Drinking Water.

A 20-year license extension to operate Limerick Nuclear Plant from 2029 to 2049 would allow 60 years of transporting Limerick's highly radioactive corrosive fluids in miles of buried pipeline under Limerick. Think what happens to pipes in older homes that aren't even exposed to that kind of risk.

- **Earthquakes, Combined With Deterioration Of Buried Pipes Carrying Highly Radioactive and Corrosive Fluids, Threaten Further Radioactive Groundwater Contamination At Limerick That Could Eventually Lead To A Drinking Water Disaster With No Truly Safe Solutions.**

Groundwater Is Already Radioactive At Limerick

**Exelon's 2009 Radiological Monitoring Report For Limerick Nuclear Plant Shows:
12 Radionuclides Are In Limerick's Groundwater (Page 10)**

**Exelon And NRC Deceptively Try To Claim It's Just Tritium
BUT EXELON'S OWN MONITORING REPORT PROVES IT'S NOT JUST TRITIUM**

In Exelon's 2009 Radioactive Groundwater Results For Limerick Nuclear Plant 12 Radionuclides Were Identified In Drinking Water / Well Testing "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

**Radionuclides Detected In Limerick's Groundwater After Exposure Can Cause:
Cancer - Birth Defects - Mutations - Miscarriages - In 1st and/or Successive Generations**

Beta Radiation Was Detected In 15 of 15 Groundwater Monitoring Locations

Beta / Gamma Emitters	Harmful Health Impacts
Iodine – 131	Thyroid Ovaries
Cobalt – 60	Liver Ovaries
Zinc – 65	Bone Ovaries
Cesium – 137	Muscles Ovaries
Strontium-90	Bone, Immune, Hormonal, Central Nervous Systems

All Can Cause Cancer - All Radioactive Isotopes Emitting Gamma Attack Reproductive Organs
The National Academy of Sciences BEIR VII Report Says There Is NO SAFE LEVEL of EXPOSURE to RADIATION - Synergistic, Additive, and Cumulative Harmful Health Impacts Are Not Evaluated

LIMERICK'S GROUNDWATER TEST RESULTS

From Exelon's 2009 Radiological Report to NRC For Limerick Nuclear Power Plant (Section A)

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 **15** of 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 locations

DRINKING WATER

Exelon claims there is no drinking water pathway.

➤ **But Exelon's claim is disputed by their own report on Page 12**

Well Survey Around Limerick Nuclear Plant

See Graphic From Exelon's 2009 Radiological Monitoring Report

Within 1-Mile (Radius From Center Of Limerick) From Page 12

Limerick has 1 Potable Water Supply Well 175 FEET from Reactor Building

➤ **Hopefully workers are not drinking this water or using this water for showering or other purposes.**

46 Domestic Withdrawal Wells

2 Commercial Wells

1 Institutional Well

2 Industrial Wells

1 Fire Water Well Is 500 Feet from cooling towers

RADIOACTIVE GROUNDWATER
AND
DRINKING WATER THREATS WILL INCREASE
AS LONG AS LIMERICK OPERATES

BREAKDOWNS and LEAKS

There Are Countless Opportunities For Breakdowns and Leaks Under Limerick Nuclear Plant To Contaminated Groundwater.

1. Miles of aging buried pipes under Limerick are corroding and deteriorating.

- Limerick operated since 1985.
- Miles of Limerick's old buried pipelines transported highly radioactive and corrosive chemicals for decades. They become very vulnerable to leaks over time.
- Pipes and fittings corrode and become brittle over time, then leak.
- Leaks in the miles of underground buried pipes are hard to detect.
- Radioactive leaks in the miles of Limerick's aging buried pipes can go undetected and/or unaddressed and/or unreported for long periods of time, if not forever. Radiation can slowly spread in groundwater to off-site wells.

2. Earthquakes can cause leaks by shaking and breaking Limerick's miles of underground pipes and vast numbers of fittings.

- Limerick is 3rd on the nation's earthquake risk list for nuclear plants.
- Two earthquake faults are extremely close to Limerick - 9 miles and 17 miles away.
- There is great cause for concern, considering the August 23, 2011 earthquake as far away as Virginia caused shaking with potential for damage to buried pipes at Limerick.

GROUNDWATER CONTAMINATION CAN SPREAD INTO OFF-SITE WELLS UNDETECTED.

Radiation In Groundwater Could Contaminate Off-Site Wells. Limerick's Radioactive Leaks Could Impact Off-Site Wells, Now Or In The Future.

- Limerick is one of the 102 of 104 of our nation's nuclear reactors that contaminated groundwater with radiation.
- Groundwater is confirmed to be radioactive under Limerick's 600 acre site.
- Reliable monitoring to accurately determine the full extent of spreading radioactive groundwater contamination would be cost prohibitive. Radiation could poison well water for long periods of time.
- Limerick's 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.
- Radiation in Limerick's groundwater was never cleaned up. There is no plan to clean it up.
- New leaks and spills can happen without full disclosure.
- Exelon failed to fully disclose and address radioactive water contamination at some of its other nuclear plants.
- At one nuclear plant site in Illinois, Exelon failed to provide full and accurate disclosure for years, then finally supplied 600 residents with bottled water for years more until they were finally put on public water.
- The same thing could happen at Limerick,, jeopardizing drinking water and public health.
- Once groundwater becomes radioactive it is difficult, if not impossible to clean up. Exelon never tried, either here or at its other nuclear plants.
- Radiation levels detected for a specific radionuclide are not the real issue, since there is no safe level of radiation and research on synergistic harmful impacts over time are unknown.
- Any radiation level in drinking water can cause risk for cancer, immune damage, and other health harms.

PREVENTION IS THE ONLY CURE

It's Not Likely Limerick's Radioactive Groundwater Can Be Completely Cleaned Up.

- Once groundwater becomes radioactive, it seems impossible to completely clean it up.
- There are countless residents whose properties could become virtually worthless due to radioactive contaminated groundwater caused by leaks and spills at Limerick.
- Filtration at residents' homes would be cost prohibitive for many.
- History shows Exelon won't pay to filter residents' water throughout their homes.
- All 100 to 200 radionuclides associated with producing nuclear power would have to be filtered out from all sinks and showers in a home to make it safer.
- It is difficult and very costly to try to remove all radiation from drinking water. Some water filtration companies claim it is impossible.

Why Exelon's Monitoring and Reporting Is Not Reliable On Limerick's Radioactive Groundwater Contamination

Exelon's Radioactive Groundwater Monitoring At Limerick Nuclear Plant Is Woefully Inadequate

- **The Limerick Site Is 600 Acres With Just 15 Monitoring Wells Placed By Exelon.**
There Are Miles Of Aging Buried Pipelines Under Limerick Carrying Highly Radioactive and Corrosive Liquids. After decades of operation slow leaks could go undetected and unreported for long periods of time, if not forever.
- **A Monitoring Diagram from Exelon's Radioactive Monitoring for Limerick Shows Only 15 Monitoring Wells on 600 Acres (On Average, Just 1 Monitoring Well For Every 40 Acres).** Diagram attached from Exelon's 2009 Radiological Monitoring Report On Limerick Figure 1 Graphic - A-2.
- **Only 15 Monitoring Wells For 600 Acres In This Fractured Bedrock Aquifer Cannot Accurately Determine The Direction Or The Extent Of Limerick's Radioactive Groundwater Contamination.**
 - ✓ Limerick Nuclear Plant is located in a fractured bedrock aquifer (Brunswick Formation).
 - ✓ Research on this kind of aquifer and statements from scientists suggest to accurately identify the extent of radioactive ground water contamination that traveled off site, wells would need to be placed 1 foot apart and stacked around the entire site.
 - ✓ Radioactive contamination can travel in any direction, at any depth, and fail to ever be detected in a fractured bedrock aquifer.
 - ✓ 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.
- **Placement Of Monitoring Wells Is Questionable.**
Exelon, the company with a vested interest in the outcome decided where to place the monitoring wells. Exelon has shown elsewhere why it can't be trusted.
Exelon's attached diagram Reveals:
 - ✓ **NO Monitoring Well SSE**
 - ✓ **Only 1 close to the site S**
 - ✓ **Only 1 close to the site SE**

- **Limerick's Radioactive Groundwater Contamination May Have Already Contaminated Nearby Drinking Water Wells.**
 - ✓ There has never been an independent study to prove nearby wells are not contaminated with radiation.
 - ✓ Exelon controls the entire woefully inadequate monitoring, testing, and reporting process.

RADIOACTIVE GROUNDWATER AT LIMERICK WAS CLEARLY CAUSED BY LIMERICK NUCLEAR PLANT

PROOF: April 27, 2010 Letter From Exelon to NRC

RE: Limerick Nuclear Plant's 2009 Radiological Environmental Operating Report

➤ In This Letter Exelon Admitted Radiation Found In Groundwater and Soil Was From Limerick Nuclear Plant

1. Exelon admits Cesium-137 was found in sediment and attributable to Limerick Nuclear Plant "liquid releases".
2. Exelon admits Tritium was in 3 of 15 Limerick groundwater monitoring locations.

Issues Related To Exelon's "Admission" Of Radioactive Contamination of Groundwater and Soil at Limerick:

- Exelon admits to detecting only Tritium and Cesium-137 in the groundwater and soil from Limerick Nuclear Plant leaks. That is ludicrous when a broad range of radionuclides associated with Limerick operations would logically be in Limerick's radioactive leaks into groundwater and soil along with Tritium and Cesium-137.
- 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.
- Exelon failed to completely clean up radioactive contamination of groundwater. Exelon says, "There are no commitments in this letter".
- If radioactive contamination of groundwater won't be cleaned up, then vast numbers of residential wells in the region could eventually become contaminated, as radioactive groundwater contamination spreads.

LEAKS AND SPILLS ARE DOCUMENTED AT LIMERICK NUCLEAR PLANT FOR OVER 20 YEARS

NRC Documents Prove Limerick Had Radioactive Leaks and Spills And That The Ground Water Is Radioactive.

Exelon Admitted To 4 Radioactive Leaks Over 20 years (1986 to 2006)

October 2, 2006 Mercury article by Evan Brandt on Limerick leaks.

Exelon's final results of a study, stated, "**Limerick is not "actively" leaking** radioactive tritium into groundwater or surface water." This title suggested to many that Limerick didn't leak which is deceptive and not true. It also absurdly suggested that tritium was the only radionuclide leaked into Limerick's groundwater, which is proven inaccurate by Exelon's own radiation reports to NRC for Limerick.

Exelon spokeswoman Rapczynski described "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 were "highly diluted" tritiated water into the Schuylkill River. 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".

Both NRC and Exelon downplayed the levels of tritium found, and ignored all the other radionuclides found in Limerick's groundwater and surface water In Exelon's own radiation reports to NRC.

Both dismissed 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 Questionnaire Sent to NRC from Exelon about Limerick Nuclear Plant, For Industry Groundwater Protection Initiative Voluntary Data Collection

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.

This Radioactive Spill Continued For Six Days.

➤ **NO ACTIONS were required to recover or reverse groundwater plumes. It's NO Wonder Groundwater Under Limerick Is Radioactive.**

➤ **NO investigations are on-going.**

- Condensation from condenser bays was observed DRIPPING DIRECTLY TO OPEN GROUND AND ASPHALT.
- Release to ground occurred for SIX DAYS - until catch containments were installed.
- Radiation released was estimated.
- Groundwater sampling identified Tritium in 1 down gradient well, MW-LM-9 at a concentration of 1750 pCi/L.
- All data on the leaks along the condenser bay joints was added to Limerick's decommissioning file - 10 CFR 50.75(g).

- 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.
- The catch containment water contained approximately 747 uCi of tritium.

How Far Has Radioactive Groundwater Traveled Over 20 Years?

How Many Leaks 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

Exelon's deception and inaction 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.
- 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.

Limerick Leak Went Unaddressed For Years

This Leak Was Reported Through Exelon's Own Document Mailed To ACE From a Whistleblower.

- Exelon's document proved the leak at Limerick went unaddressed for many years, yet both Exelon and NRC first publically denied the leak ever existed.
- Exelon denied this unaddressed Limerick leak, even though ACE informed Exelon the information came from a document from Exelon's own files.
- A year later, even though they first denied the leak existed, ACE was told by NRC that the leak had been fixed.

Cause For Concern:

1. Limerick's Radioactive Groundwater Could Have Traveled Off-Site Into Residential Wells

2. There Has Never Been A Comprehensive Independent Radiation Monitoring Protocol At Limerick Nuclear Plant Nor Independent Radiation Monitoring Of Well Water Around Limerick's Reactors.

- ✓ Exelon, The Company With A Vested Interest In The Outcome, That Has Shown It Can't Be Trusted To Provide Full and Timely Disclosure Elsewhere, Controls The Monitoring Protocol
- ✓ Many Radionuclides Go Unreported and Unmonitored
- ✓ Radionuclides Detected Are Only Reported If Above Background
March, 2011 - After Fukushima, Background Levels Were Raised From 360 to 620.

Elected Officials and Residents Expressed Concerns to ACE Regarding The Spread Of Limerick's Radioactive Groundwater Contamination.

Many Wonder Why Exelon Bought Hundreds More Acres Of Land Bordering Limerick Nuclear Plant - From Approximately 300 Acres to 600 Acres!

- ✓ **Most Believe It Could Be Due 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 Require An Independent Protocol For Groundwater Monitoring With Comprehensive Independent Radiation Testing In All Well Water Within 1 Mile, BEFORE Issuance of the Updated EIS And Relicensing.

If there is no funding to determine full and accurate independent evidence, PRECAUTION IN DECISION MAKING BECOMES EVEN MORE IMPERATIVE

- **Limerick Should Be Closed To Avoid Spread Of Radioactive Groundwater.**
- **Closing Limerick Nuclear Plant Is The Only Way To Minimize Future Risk Of Additional Radioactive Drinking Water.**

NRC WON'T PREVENT LIMERICK'S RADIOACTIVE GROUNDWATER CONTAMINATION FROM SPREADING OR INCREASING

NRC Ignores 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

An Unacceptable Threat to Groundwater and Public Drinking Water.

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 Its Oversight and Enforcement Responsibility.

Evidence Confirms NRC's Deception and Negligence:

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.
- **Thousands of residents relying on well water in communities surrounding Limerick Nuclear Plant deserve immediate full and truthful disclosure to protect their family's health!**

In 2002 Greenpeace called NRC's regulation of the nuclear industry a "FARCE". They urged shut down of U.S. nukes to "AVOID a TRAGEDY".

ACE agrees that NRC regulation is a FARCE.

➤ **Limerick Nuclear Plant should be closed to avoid a tragedy in our region.**

Below Is ACE's Letter to NRC Expressing Our Concern About NRC's Capitulation to the Nuclear Industry Which Is Leading To An Unfolding Radioactive Groundwater Disaster From Limerick and Other Nuclear Plants

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 renewal 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.

EXELON ATTEMPTS TO UNLOAD POTENTIALLY RADIOACTIVE PROPERTY ON EAST COVENTRY RESIDENTS.

Before Constructing Of Limerick Nuclear Plant, Homes In Bordering East Coventry Were Purchased. Residents Were Ordered To Be Immediately Evacuated. Now, Decades Later, Exelon Wants To Unload Those Homes On East Coventry.

Before the decision by East Coventry Supervisors was finalized, ACE was asked by an East Coventry Supervisor to attend the meeting and provide a summary of our investigations on Limerick Nuclear Plant.

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.
Evidence In This Report Shows "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 (610) 326-2387

