From: aceactivists@comcast.net [mailto:aceactivists@comcast.net]
Sent: Monday, March 16, 2015 9:24 AM
To: Bower, Fred
Cc: Burns, Stephen; DiPaolo, Eugene; Krohn, Paul
Subject: "Material Fatigue" Testing of Limerick Reactors Is Imperative

March 16, 2015

To: **NRC, Fred Bower**

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

Re: **Request for Reactor Cracking "Material Fatigue" TESTING Of Both Limerick Nuclear Plant Reactors**

Mr. Bower,

In previous correspondence you repeatedly failed to directly answer our questions about whether there was or was not Limerick reactor testing. You have cited regulations but failed to give us a yes or no answer about destruction testing and borehole testing of Limerick's rectors. We are still asking you for a yes or no answer about destruction testing and borehole testing at Limerick.

There are valid reasons to believe Limerick Nuclear Plant's reactors experienced embrittlement and cracking over the past 30 years which could be significant. We have identified some of the issues in this correspondence.

Based On Recent Reports On A Form Of Reactor Cracking Called "Material Fatigue", ACE Is Requesting That NRC Require "Material Fatigue" Testing At Limerick Nuclear Plant Before The End Of 2015. "Material Fatigue" Testing Is Critical To Preventing Catastrophic Reactor Failure At Limerick.

Independent experts and Belgium's nuclear safety chief are calling for the immediate checks of nuclear reactor vessels worldwide, after finding **more than 16,000 unexplained cracks** in two Belgium reactors.

EMBRITTLEMENT- INDUCED CRACKING HAS MAJOR IMPLICATIONS FOR LIMERICK NUCLEAR PLANT.
Embrittlement occurs partly due to the effects of high level radioactive bombardment during the fission process 24/7, occurring every day at Limerick for 30 years. Embrittlement subjects the reactor vessel to cracking at any time.

- Evidence from NRC Safety Inspection Reports suggests that Limerick's reactors have likely experienced substantial "Material Fatigue", over the past 30 years, especially due to Limerick's long list of shutdowns (scrams).
- Major concerns about Limerick's reactor embrittlement were repeatedly expressed to NRC by many people including experts and engineers, yet repeatedly ignored and dismissed by NRC.

LIMERICK HAS BEEN PLAGUED WITH A LONG HISTORY OF SCRAMS THAT COULD HAVE SUBJECTED ITS REACTORS TO SUBSTANTIAL "MATERIAL FATIGUE".
Limerick history of SCRAM events (automatic shutdowns or trips off line) shows a tremendous amount of stress was placed on the entire reactor system and supporting equipment. These are serious events that challenge nuclear safety systems, endangering public health and safety.

JUST A FEW EXAMPLES OF LIMERICK SCRAMS THAT COULD HAVE IMPLICATIONS FOR "MATERIAL FATIGUE" INDUCED CRACKING INCLUDE:
NRC's 1-31-12 RAI reveals that there were 14 Limerick scrams in 2011. Examples include:

- 2-25-11 - Unit 2
- 4-2-11 - Unit 2
- 5-29-11 - Unit 2
- 5-30-11 - Unit 2
- 6-3-11 - Unit 1

Records show that Exelon has a pervasive history of failing to properly analyze, determine, and correct the root cause of many of the 2011 scram events. This undermines our confidence in safe operations of Limerick's reactors.

Examples: A few other Limerick scrams

- 7-11-12 - Unit 1
- 7-18-12 - Unit 1 - scram and explosion
- 7-27-12 - Unit 2
- 8-31-12 - Unit 1
- 3-5-14 - Unit ?
- 3-11-14 - Unit 1
- 2-24-15 - Unit 1

The 7-11-12 scram revealed reactor fatigue cracks.

- In 1984, it was reported that hundreds of Limerick's safety-related welds were not properly welded by the Bechtel Power Corp. welders and that welds were not properly inspected by Bechtel and NRC inspectors..
- This is especially alarming due to the fact that the 7-11-12 scram was caused by the inoperability of two independent reactor channels, indicating they were subject to vibration.
- Fatigue cracks were observed along the weld toe due to reverse bending. Yet NRC granted Exelon "Relief Requests" for weld inspections, irrationally counting relief as compliance for relicensing. In essence, NRC is allowing elimination of a requirement to be a substitute for compliance.

Embrittlement concerns are compounded by Limerick's inherently defective reactors.

- In April, 1972 a GE Mark II BWR caused a nuclear accident due to the fact that the reactor design could not hold up to the intense vibrations in the reactor created by the cooling process.
- All GE Mark II boiling water reactors, including Limerick's, are inherently defective.
- Unlike Limerick, some nuclear plants scrapped their plants or sued GE due to this reactor defect.
- However, on November 15, 1972 the first component of Limerick's defective GE Mark II BWR arrived on site.
- Supports added to Limerick's reactors to reduce its vibrations would not reduce the vibrating forces inside the reactors.
- **The intense pressures created by the cooling process and fission bombardment for 30 years are of major concern in light of new understandings about embrittlement.**

NRC's recent approval of Exelon's experiments and permanent plant modifications and NRC's approval of amendments to Limerick's operating licenses irresponsibly allow Limerick to continue operating in violation of original NRC regulations for reactor safety at Unit 2.

- When NRC eliminates regulations, safety risks increase.
- Unit 2 could not comply with NRC's regulation and should have been shut down per original NRC regulations.

QUESTION: Did embrittlement issues affect NRC's decision to approve Limerick experiments and permanent plant modifications that include cutting power to MOV valve motors and alarms and placing valves in permanent open and shut positions? If not, we are asking NRC to reevaluate their approval based on new embrittlement concerns specifically related to Limerick's reactors, which have defects that could make embrittlement issues worse.

EMBRITTLEMENT-RELATED 11-9-14 ACE QUESTIONS UNANSWERED

- Very concerned about Embrittlement of Limerick's Reactors.
- NO Evidence of Destruction Testing since Limerick started operating.

- Has NRC or Exelon done Borehole Testing on Limerick's reactors? Was this testing a requirement for relicensing? If not, why not?
- Concern about elimination of Commitment No. 46 from Limerick's re-licensing application.
- Equipment deterioration occurring faster than aging models predicted.
- Without proof that Limerick's reactors are not deteriorating faster than expected, how did NRC verify Exelon's claims of reactor safety for Limerick re-licensing?

You FAILED to answer our questions / concerns from 11-9-14 on Limerick embrittlement and the elimination of Commitment No.46 In your 12-8-14 response. You sent three pages of vague Exelon plans for the future that NRC accepted in lieu of actual testing. You failed to provide a logical explanation for NRC's dangerous elimination of Commitment No.46. To suggest that "plans" are adequate to insure plant stability is ludicrous.

LIMERICK'S RECENT EXPERIMENTS AND PERMANENT PLANT MODIFICATIONS

On January 19, 2015, ACE e-mailed questions about Limerick's experiments and permanent plant modifications to Paul Krohn, who communicated NRC approval to Exelon. To date, two months later, he has failed to answer our e-mail on, ***"Limerick Nuclear Plant Changes, Tests, Experiments, and Permanent Plant Modifications Approved by NRC",*** which NRC based on Exelon's self-serving, self- assessment:

- In 2011, the motor operated valve system, vital to supplying cooling water to Limerick's reactor cores, broke down and caused failure of at least one critical system.
- Embrittlement, cracking, plus cooling water issues can lead to meltdowns.
- NRC is gambling with our safety. These experiments are risky untested schemes.

The fact that experts have stated that it is imperative for all nuclear plants to avoid automatic or manual scrams of reactors because scrams can cause reactors to crack shows how important this issue is.

- **It is obvious that Limerick cannot avoid shutdowns.**
- **This is a major concern that can be exacerbated with Exelon's experiments, irresponsibly approved by NRC.**

We have been contacting you on behalf of millions of people in the Greater Philadelphia Region who are being dangerously jeopardized by the unprotective lack of enforcement and decisions being made by NRC.

- In your 3-11-15 e-mail in response to our 1-12-15 and 2-2-15 e-mails you asserted that NRC has made a good faith effort to answer our questions. Instead of answering our questions, you simply quote references for regulations that fail to assure us that tests have been actually done.
- You stated that you have determined that our questions/concerns in both e-mails do not need any further response. We disagree, based on the magnitude of what is at stake for so many people in our region due to NRC's failed oversight of Limerick operations.
- You stated ***"WE (NRC) PLAN NO FURTHER ACTION ON ANY OF THESE MATTERS".***

THAT IS AN UNACCEPTABLE POSITION.

THESE ARE CRITICAL ISSUES RELATED TO THE LACK OF SAFETY OF LIMERICK OPERATIONS. We are losing all faith in NRC's ability to correct identified problems and violations at Limerick, some of which could lead to radiation accidents / meltdowns. Your tired denials and dismissals are getting old.

- **We still expect direct answers to questions we asked in our 11-9-14 email to you.**

We are grounded and bound by reality, unlike you and your NRC senior managers, who appear to be operating in a bubble that denies reality by dismissing real risks and harms. You refer us to regulations which are simply words on paper. NRC's regulations are flawed and jeopardize safety at Limerick. Embrittlement issues Limerick reactors are facing now could have catastrophic consequences. Due to the fact that NRC is holding a webinar on embrittlement issues, it's clear that NRC is being forced to address these critical issues.

The public needs NRC to require immediate independent "material fatigue" testing of both Limerick Nuclear Plant reactors, with the results of testing immediately reported to the public. We look forward to your timely response to our concerns and requests.

CC: Governor Wolf
Senator Casey
Senator Toomey
Congressman Dent
Congressman Costello
Congreeeman Meehan
PA Senator Rafferty
PA Senator Dinniman
Representative Vereb
Representative Quigley
Representative Hennessey
NRC Chairman Burns
NRC Gene Dipaolo
NRC Paul Krohn
NRDC
UCS
NIRS
Beyond Nuclear
Radiation and Public Health Project
Mercury
Philadelphia Inquirer