Paul M. Blanch PE
Energy Consultant

June 11, 2020

Chairwoman Svinicki
USNRC
Washington DC

SUBJECT:
Safety Evaluation and Supporting Analysis Regarding the Algonquin Incremental Market Project Pipeline near the Indian Point Energy Center, Units 2 and 3

Dear Madam Chairwoman:

I am writing to you to request the NRC Commission's attention to an ongoing safety issue I and many others have attempted to address for almost ten years. This issue was originally identified to me by a retired safety expert very familiar with the Indian Point design and operation. His/her summary is provided in Attachment 1.

Once again, we plead the NRC enforce its regulations and provide an analysis as required by 10 CFR 50 and 49 CFR 192.917 and to cease "backward engineering" seeking a solution attempting to appease the public and elected officials and members of Congress.

I have communicated my concerns regarding this critical matter to the NRC Staff, Commissioners, OIG, Office of Investigation, Indian Point Resident Inspectors, Members of Congress, State of New York and local residents. We have employed every regulatory process including 10 CFR 2.206 requests, OIG investigations, allegations, and numerous FOIA requests to the NRC, FERC, and PHMSA.

Given all of these efforts, we still have no assurance that the multiple gas transmission lines traversing the Indian Point site do not present an unacceptable risk to the surrounding region.

You are well aware of the recent OIG event inquiry where the OIG findings noted:

> ***Finding 1***
>
> *While FERC's approval of the AIM Project pipeline relied in part on NRC's assessment of Entergy's site hazards analysis and NRC's independent analysis of the impact of a potential rupture of the portion of the pipeline that traversed IPEC property, OIG found (1)* ***NRC's independent analysis was incorrectly portrayed*** *in FERC's approval document as significantly more conservative than it actually was; (2)* ***NRC's inspection report contained*** *inaccuracies suggesting additional analysis had been conducted, when this was not the case; and (3) NRC's underlying independent analysis was conducted using a computer program that the National Oceanic and Atmospheric Administration (NOAA), which developed the program, said it* ***was not designed for****. Moreover, the majority of NRC's independent analysis described the impact of a potential rupture on an above ground point on IPEC property that NRC believed presented the most credible risk due to its exposure; however, ultimately the as-built 42-inch pipeline does not come above ground anywhere on IPEC property but does traverse the IPEC property.*
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> *OIG also found that NRC decisionmakers had differing understandings of the assumptions and factors driving the analysis conducted by an NRC Physical Scientist, who NRC considered a subject matter expert and who was responsible for conducting, documenting, and communicating his results. While the Physical Scientist attributed his analysis assumptions to OIG as engineering judgment,* ***he did not have a basis for it and did not document a basis or a methodology in his report****. When OIG briefed NRC managers on the issues OIG identified in the Physical Scientist's analysis, one noted that because the Physical Scientist conducted multiple calculations with increasing credit for pipeline enhancements, it* ***appeared to be backwards engineering to get a desired result****. An NRC senior manager said the Physical Scientist's use of credit for enhanced piping was inappropriate in part because the pipeline enhancements were not intended to mitigate the impact of a blast, but rather to reduce the chances of a rupture in the first place.*

Several NRC senior managers said that based on issues identified in this event inquiry pertaining to the Physical Scientist's analysis, it may be ***prudent to redo the analysis***[1]***.***

and

Finding 2

OIG found that through the stakeholder's 2.206 petition and associated concerns – ***which were relevant and on point*** *– NRC was presented an opportunity to reevaluate and confirm work previously conducted that supported the agency's conclusion that Entergy's hazards analysis was reliable. However, NRC failed to thoroughly re-examine the underlying premises of its analyses and did not accurately communicate its analytical work performed.*

First, in response to the stakeholder's assertion that it would take longer than 3 minutes for the pipeline operators in Houston, Texas, to close the valves, thereby stopping the flow of gas, ***NRC misrepresented*** *the assumptions used in the follow-up bounding analysis that was conducted to assess the impact of 60 minutes of gas released. While NRC's response to the stakeholder described having conducted an assessment that assumed an infinite source of natural gas with the pipeline valves open for an hour, OIG's investigation found that NRC assessed only 1 minute of gas released. Moreover, NRC never confirmed the validity of the licensee's assumption that the valves could be closed in 3 minutes. OIG contacted the pipeline operator who estimated it would take at least 6 minutes after detection of a leak to close the valves. While the Physical Scientist told OIG he used 1 minute of gas released in his calculations, NRC managers had inconsistent understandings of the amount of mass the Physical Scientist used.*

Second, in response to the stakeholder's question of whether NRC performed a validation and verification of NOAA's computer program to ascertain its adequacy for this purpose, NRC stated there was no need for NRC to perform a validation and verification of the computer

[1] It is not the responsibility of the OIG to direct the NRC Staff on how to redo the analysis however logic would dictate a reasonable engineer would conduct the analysis in accordance with federal regulations rather than another analysis with no guidance and only seeking a desired outcome.

program. However, OIG contacted NOAA, which confirmed the program is not designed for this purpose.

Third, NRC's response to the stakeholder stated that NRC used the methodology and equations of Regulatory Guide 1.91, NRC's guidance for evaluating postulated explosions near nuclear power plants, "without deviation"; however, OIG found that NRC used a draft regulatory guide in lieu of the final, approved version (which had been issued approximately 2 years prior) and ***deviated from the approved version in a manner that was less conservative and had an impact on the analysis outcome****.*

Fourth, the stakeholder asked whether NRC had any quality assurance requirements/procedures for conducting safety related calculations. ***NRC responded that they do not perform safety related calculations***[2] *and do not have a quality assurance program for these calculations, but they said a peer review by a qualified NRC engineer was performed on NRC's independent analysis and follow-up analysis. OIG's investigation revealed that the assigned engineer, who felt there were more qualified people in NRC to do this, performed a limited review that focused mainly on the licensee's hazards analysis and not NRC's analyses.*

An NRC senior manager conveyed to OIG that NRC decisionmakers rely on accurate information from the staff to support decisions and communicate accurately to stakeholders and, in this case, another Federal agency. However, NRC managers confirmed they do not have a quality assurance process or a formal peer review process to review this type of assessment.

On February 24, 2020 the NRC's Executive Director for Operations (EDO), Ms. Margaret Doane wrote a letter to all Commissioners and many NRC Staff. This letter directed Mr. David Skeen to respond to all remaining issues identified in the recent OIG Event inquiry. (OIG 14-024)

[2] In this fiasco the NRC has performed numerous safety related analysis and calculations used as the licensing basis for Indian Point. In the past, Sandia has conducted numerous safety related analysis and I believe this Sandia analysis was conducted in accordance with an NRC approved QA program. Therefore I place more credence on the Sandia analysis of total engulfment of the Indian Point site.

The EDO stated: "Dr Gavrilas has determined that there is no safety issue warranting immediate regulatory action at either Unit 2 or Unit 3." I interpret this to mean that Mr. Skeen will not review the initial, invalid and unsupported conclusion of safety based upon an irrelevant reference.

Ms. Doane's letter stated:

> *"This conclusion is based on the following summary findings that are explained in more detail in the attached enclosure:*
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> *• There is no significant degradation to defense-in-depth at either unit.*
> *• There is no significant loss of safety margin at either unit.*
> *• There is no high-risk impact at either unit from internal or external events, as all risk metrics are under the prescribed thresholds."*

My specific concern is that Ms. Doane made a materially false statement in this letter to the Commission and during your testimony to the US Senate EPW Committee.

Ms. Doane's letter continues to describe her justification which is based upon a 30-year-old document titled "Handbook of Chemical Hazard Analysis Procedures, Appendix F". This document is not approved by the NRC, not mentioned in Regulatory Guide 1.91, not incorporated by reference, and is more than 30 years outdated, yet Ms. Doane used it to determine that over 20 million residents are safe. In her letter she essentially dictated the outcome of the safety evaluation team and left the team no choice but to backward engineer the desired outcome.

Further, Ms. Doane quoted probabilities from an outdated reference that are totally inconsistent with the 30 year old handbook. The probabilities of gas pipe failure have dramatically increased since that report was issued.

Ms. Doane also misuses this 30-year-old handbook to say everything is fine when PHMSA data indicates a significant increase in pipeline failure probabilities over the past 10 years. This is unacceptable and requires immediate action by your office. My review of PHMSA data and data published by Sandia states the failure rate is about $6x10^{-4}$ failures/year-mile whereas the NRC is claiming a failure rate of $1x10^{-5}$ failures/year-mile.

Not only did you personally mislead Congress about the immediate risk of a catastrophic accident to the reactor and the spent fuel pool, Ms. Doane directed Mr. Skeen to support her unsupported predetermined conclusion of warranting no "immediate regulatory action at either Unit 2 or Unit 3." based on an unapproved document that does not address today's pipeline failure statistics.

This is a prime example of the NRC's continued "backward engineering" which the NRC's Inspector General's report cited as being inappropriate.

Jimi T. Yerokun's letter to Entergy dated April 23, 2020 stated:

> "In light of the issues identified by the NRC Expert Evaluation Team, the NRC requests that you update your evaluation and supporting analyses as necessary and assess the validity and materiality of the assumptions made in support of your conclusions regarding the consequences of a postulated rupture of the 42-inch gas pipeline. Please include the impact of updated information from the pipeline operator, Enbridge, as described in the Expert Evaluation Team report, regarding the time needed for operators to close valves in the event of a pipe rupture and the length of pipe that would need to be isolated. If an updated external hazards analysis is conducted, please reconcile any differences in the results."

Entergy responded to this letter the same day stating:

> "Entergy is currently reviewing the validity and materiality of the assumptions made in previous analyses and will update or clarify the hazards analysis as appropriate. These reviews and associated updates or clarifications, if needed, are expected to be complete by June 30, 2020, and will be available for NRC inspection at that time."

This analysis must be made available to the public and not hidden from view as proposed by Entergy.

I am not sure what the NRC expects from another unsupported risk analysis. We have already had at least three analyses by Entergy, at least three from the NRC, one from the State of New York, one from Sandia National Laboratories, and one from me, a professional engineer. None of these nine

analyses comply with federal laws which are very specific as to the requirements of a risk analysis — none comply with the requirements of the Code of Federal Regulation 49 CFR 192 and the U.S. Code 601 et seq.

In spite of warnings and findings from the OIG, the NRC Staff is essentially directing Entergy to support and "backward engineer" to justify a desired outcome.

During my March 20, 2020 meeting with the NRC's Evaluation Team and PHMSA representative I stated the following. Apparently, the Team elected to once again ignore my longstanding concerns in their final report that a valid risk assessment must be conducted and to be valid, it must be conducted according to federal regulations.

> "We've had enough attempts on risk assessment and have everyone thinking, this is what we think we need."
>
> I go on to state,
>
> "There is a regulatory and industry consensus of conducting a risk assessment, and that is specified in 49 CFR 192.917 and this is the only generally accepted guidance for conducting a risk assessment of gas lines. This went through rulemaking, comments".

And

> "It is my position that the risk assessment be conducted following the Pipeline Safety Act of 2016 and 49 CFR 192. The result must then be reviewed by PHMSA for compliance with its regulations."
>
> "But the clear requirements, Steve, in Subpart O of 192 are numerous, as you know. And 192.917 and 934 require a very detailed risk assessment. This should be outside of NRC space."
>
> "I briefly looked at the regulation 917, 935, and I briefly looked at the ASME B31.8 document.
>
> And what I observed from the ASME document 22 scenarios that one must evaluate, from tornado to flooding to ice age to global warming to

vandalism, didn't use the word terrorism. And those are probabilistic, more than consequences, I think."

And

> "Yes. But my, as we've talked, Dave, my biggest concern is the existing pipelines. Okay. We have two pipelines, one of them is idle right now and the 30-inch is active.
>
> "They run very close to the switchgear room and the control room. A leak in one of those pipes could cause unignited methane to migrate into the control room, just a few hundred feet away."
>
> "If that occurs, and I'm talking a gas leak, like we've all seen in our neighborhoods, but a sizeable one, two-inch or greater, and that gas migrates into, especially the control room and the electrical switchgear room, if that gets in there, we are in big trouble.
>
> "If you take out the switchgear room, then the danger of core damage, spent fuel pool damage, and all your post-Fukushima fixes would not be available. And that's something that absolutely, that is my number one concern, and that has been conveyed many times to the NRC and ignored.
>
> "So, the risk assessment not only applies to the AIM pipeline, it also applies to existing pipelines, and that's effective in the year 2004. So, I don't think PHMSA has assured that that has been done. And I don't mean to pick on PHMSA, but I've never been able to get a straight answer from them."

The concerns stated above were ignored in the Evaluation Team's report. I believe it to be negligent and irresponsible for the NRC to require Entergy to update its "consequences of a postulated rupture of the 42-inch gas pipeline," instead of relying on Enbridge to conduct a risk analysis that complies with the requirements of the federal laws and regulations. It is a Federal requirement under 49 CFR 192 and USC 601 et seq that this risk assessment be performed by the pipeline licensee and verified by PHMSA.

This analysis should be conducted by Enbridge and reviewed and approved as required by 49 U.S. Code § 60109[3]

The Yerokun letter to Entergy permits Entergy to select as the basis for its review any of the nine existing risk analyses that range from a risk probability of 10^{-9} to the Sandia analysis that predicts the entire site may be engulfed in a fireball.

Not only does the final Evaluation Team report ignore my input during the meeting and the concerns I have expressed over the past years to the NRC, Entergy, PHMSA, and FERC, it contains numerous assumptions and errors and it misrepresents historic gas transmission line failures. Disturbingly, the NRC discounted and ignored the Sandia Laboratories' analysis[4] in its final analysis as it did not support the NRC's desired results.

As part of the Evaluation Team's effort, Sandia National Labs was contracted[5] to provide an independent assessment of the risks of the pipelines to the safety of Indian Point. In its final report, Sandia concluded:

> "This dense gas behavior has implications with regards to explosion hazards since the vapor cloud would travel through vegetation and persist for a sufficient amount of time to result in potential ignition which can lead to a deflagration to detonation transition due to the congestion or have overpressures that exceed 1 psi from a deflagration explosion. The vapor cloud region between the flammability limits is roughly 1/3rd the cloud volume and if the cloud encounters an ignition source in congested areas, significant overpressures can result. **At approximately 6 to 7 minutes after release the flammability region of the vapor cloud will be either near or begin to engulf the SOCA and can result in an explosion with a high**

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[3] **(9)REVIEW OF INTEGRITY MANAGEMENT PROGRAMS.—**
(A) Review of programs.—
(i) In general.—
The Secretary shall review a risk analysis and integrity management program under paragraph (1) and record the results of that review for use in the next review of an operator's program.
(ii) Context of review.—
The Secretary may conduct a review under clause (i) as an element of the Secretary's inspection of an operator.
(iii) Inadequate programs.—
If the Secretary determines that a risk analysis or integrity management program does not comply with the requirements of this subsection or regulations issued as described in paragraph (2), has not been adequately implemented, or is inadequate for the safe operation of a pipeline facility, the Secretary may conduct proceedings under this chapter.

[4] "At approximately 6 to 7 minutes after release the flammability region of the vapor cloud will be either near or begin to engulf the SOCA and can result in an explosion with a high likelihood of exceeding an overpressure of 1 psi at the SOCA if ignited within the flammability region. The furthest point downwind distance within the flammability region is about 950 m (3,100 ft) at 8 minutes which is greater than any distance from the pipeline route to the SOCA (Security Owner Control Area) which varies from about 1580 ft to 2363 ft."

[5] A FOIA request has been submitted to the NRC for all communication between Sandia and the NRC

> **likelihood of exceeding an overpressure of 1 psi at the SOCA if ignited within the flammability region. The furthest point downwind distance within the flammability region is about 950 m (3,100 ft) at 8 minutes which is greater than any distance from the pipeline route to the SOCA (Security Owner Control Area) which varies from about 1580 ft to 2363 ft. At 8 minutes the flammability region would surround the SOCA.** [***emphasis added***] The results from this simulation indicate that for this release scenario explosion overpressures of greater than 1 psi at the SOCA would most probably occur given the surrounding congestion. Instances of natural gas pipeline accidents in which the natural gas was not immediately ignited at the release point and indicated that the cloud was not immediately buoyant can be found in references [15] [16]."

Should this event occur, the control and switchgear rooms of Unit #3 would be destroyed resulting in a major release from the reactor and the spent fuel pool, one more unanalyzed event. The Evaluation Team made no attempt to refute, discount a study contracted by the NRC to Sandia Labs apparently it was not consistent with the NRC's desired outcome of "no risk."

On June 8, 2020, the PDR released to me three letters citing this risk summary from the NRC Evaluation team.[6]

In these three letters, the EDO conveniently ignored the above conclusion of Sandia possibly because it was inconsistent with the NRC's desired backward engineering results, thus once again, misleading elected and appointed officials of New York State. The Team provided no explanation as to the justification for ignoring this this professional report from Sandia Labs' preeminent independent experts specifically contracted by the NRC for their renowned expertise for this express purpose.

Entergy neither own nor operates the Algonquin pipelines and neither Entergy nor the NRC has expertise in pipeline operation or gas line accident analysis. Consequently, according to federal regulations, Entergy should not be the organization that performs the risk analysis for the pipeline. Enbridge should perform the risk assessment.

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[6] **Sandy Galef - ML20122A124**
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A124

John Rhodes - ML20122A105
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A105

Lemuel Srolovic - ML20122A122
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A122

I formally request the NRC modify its request to Entergy to update its evaluation and supporting analyses based on a risk analysis performed under the requirements of 49 CFR 192.917 and 935 and that the NRC request that Enbridge provide a risk assessment that complies with the federal regulations. I further request the NRC justify why the NRC ignored its contractor's (Sandia) expert and professional report and conclusion.

Sincerely,

Paul M. Blanch
135 Hyde Rd.
West Hartford, CT 06117
pmblanch@comcast.net
860-922-3119

CC: Governor Andrew Cuomo
Mr. John Rhodes
Mr. Tom Congdon
Mr. John Sipos
Mr. Thomas DiNapoli
Mr. Lemuel Srolovic
Mr. Jeremy Magliaro
Ms. Lisa Burianek
Senator Charles Schumer
Senator Kirsten Gillibrand
Congresswoman Nita Lowey
Congressman Elliot Engel
Congressman Patrick Maloney
State Senator Andrea Stewart-Cousins
State Senator Peter Harckham
State Senator Leroy Comrie
Assemblyman David Buchwald
Assemblywoman Sandy Galef
Assemblywoman Amy Paulin
Assemblyman Steven Otis
David Skeen
Margaret Doane EDO

Rossana Raspa OIG
NRC Commissioners via robert.krsek@nrc.gov

Attachment 1

1. Since 2010, I (you) have expressed concerns regarding the impact of a gas pipeline explosion at Indian Point. The challenge to the plant would come from a cloud fire or vapor explosion that could occur if the pipeline ruptures and the ignition of the gas release is delayed.
2. Numerous past analyses by both Entergy and NRC have concluded that a cloud fire/vapor cloud explosion is not physically possible because methane is buoyant, and the gas will rise in the atmosphere. NRC has stated that the gas cloud will never reach the site at explosive levels and the consequences of a cloud fire/vapor cloud explosion are physically not possible.
3. OIG reported numerous inconsistencies with the analyses by both Entergy and NRC, including the use of a computer model (ALOHA) that was inappropriate for the purpose of the analysis. OIG did not conclude that the cloud fire/vapor cloud explosion was possible, but they did reflect on numerous non-conservative assumptions and false premises that were stated by both Entergy and NRC in their 10 CFR 50.59 analysis and confirmation analysis.
4. In response to the OIG report, NRC hired "outside experts" from Sandia Labs to analyze the cloud fire/vapor cloud explosion scenario. The experts at Sandia reported that a gas line rupture of the AIM gas line could potentially envelop the site with a vapor cloud which could be ignited and result in significant damage, far more damage than had previously been assumed. Sandia did not provide an estimate of the probability of a vapor cloud explosion. They simply demonstrated that if it occurred, the consequences would be potentially catastrophic.
5. The NRC Task Force Report appears to have ignored the Sandia report results and has continued to emphasize that a vapor cloud explosion could not occur even though the report concluded that – if it occurred – the results would be much worse than the Entergy or NRC analysis showed.
6. REDGUIDE 1.91 requires a site-specific safe shutdown analysis of the consequences of a gas line rupture if the probability of a gas line rupture exceeds 1E-6 (using conservative assumptions) or 1E-7 (using realistic assumptions). All estimates previously provided by Entergy and NRC concluded that the probably of a gas pipeline rupture exceeded these threshold values. Note that REGUIDE 1.91 requires the site-specific consequence analysis for **any** gas pipeline rupture – not for the lower probability of a cloud fire or vapor cloud explosion.
7. Entergy / NRC recognized that a site-specific safe shutdown analysis was required and completed this analysis. But neither Entergy nor NRC analyzed the site-specific consequences of cloud fire/vapor cloud explosion as part of the safe shutdown analysis. Both Entergy and NRC concluded the cloud fire / vapor cloud explosion was not a credible (i.e. probable) accident.
8. REGUIDE 1.91 does not provide for further refinement of the probability of an gas pipeline rupture. Instead, Entergy should have analyzed the results of a cloud fire/vapor cloud explosion and demonstrated that it can still safely shutdown IP3. If Entergy does not comply with provisions REGUIDE 1.91, then it must demonstrate that any alternative analysis is equivalent and meets the intent of the regulatory requirements.
9. Finally, NRC should recognize that the previous conclusions that have been stated and restated to the public, are in error as pointed out by the experts at Sandia Labs. A cloud

fire/vapor cloud explosion can occur because, although methane is positively buoyant at normal room temperatures and pressures, the gas will be released in a sub-cooled state from the rupture site. Sandia establishes that, in a sub-cooled state, the gas could remain on the ground and, under certain atmospheric conditions, could form a vapor cloud over Indian Point. Once over the plant, this gas cloud would be inducted into the turbine building and then into the switchgear room by their respective ventilation systems. Once the gas cloud exceeds explosive levels in the switchgear room, ignition of the confined cloud from the numerous sources of electrical energy would result in a confined explosion, which causes far more damage than an unconfined explosion. If the switchgear is destroyed, virtually all accident mitigation features in the plant will no longer have power and will not function. This would be the equivalent of a Fukushima accident without the tsunami.

10. NRC should recognize that the local community, OIG and now Sandia Labs have long stated that the consequences of a cloud fire/vapor cloud explosion would be potentially catastrophic and have asked for a risk analysis of this accident. NRC should now comply with REGUIDE 1.91 and require Entergy to conduct a valid 10 CFR 50.59 safe shutdown analysis that considers the effects of the cloud fire/vapor cloud explosion at Indian Point. A good place to start would be the Sandia report description of the impact of a vapor cloud explosion.
11. If NRC does not comply with the provisions of REGUIDE 1.91, then any alternative analysis must demonstrate that it would be equivalent to the REGUIDE 1.91 approach.

CHAIRMAN Resource

From: Paul <pmblanch@comcast.net>
Sent: Thursday, June 11, 2020 3:24 PM
To: CHAIRMAN Resource; Tom Congton; Geri Shapiro; David Buchwald; Krsek, Robert; Peter Harckham; Sandra Galef; Keegan, Pat; Skeen, David; Raspa, Rossana; Doane, Margaret; Amy Rosmarin; Ellen Weininger; Susan Babdolden; Tina Bongar; Catherine Parker
Cc: Paul M. Blanch; Patricia O'Connor; Charles Langley; Nina Babiarz; Dave Lochbaum; Lampert Pixie; Steve Comley; Lawrence Criscione; Holian, Brian; Bajwa, Chris
Subject: [External_Sender] Letter to NRC Chair on AIM analysis
Attachments: 20200611 ltr to NRC Chair - 6-2 edts.pdf

June 11, 2020

Chairwoman Svinicki

USNRC

Washington DC

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- *There is no high-risk impact at either unit from internal or external events, as all risk metrics are under the prescribed thresholds."*

My specific concern is that Ms. Doane made a materially false statement in this letter to the Commission and during your testimony to the US Senate EPW Committee.

Ms. Doane's letter continues to describe her justification which is based upon a 30-year-old document titled "Handbook of Chemical Hazard Analysis Procedures, Appendix F". This document is not approved by the NRC, not mentioned in Regulatory Guide 1.91, not incorporated by reference, and is more than 30 years outdated, yet Ms. Doane used it to determine that over 20 million residents are safe. In her letter she essentially dictated the outcome of the safety evaluation team and left the team no choice but to backward engineer the desired outcome.

Further, Ms. Doane quoted probabilities from an outdated reference that are totally inconsistent with the 30 year old handbook. The probabilities of gas pipe failure have dramatically increased since that report was issued.

Ms. Doane also misuses this 30-year-old handbook to say everything is fine when PHMSA data indicates a significant increase in pipeline failure probabilities over the past 10 years. This is unacceptable and requires immediate action by your office. My review of PHMSA data and data published by Sandia states the failure rate is about $6x10^{-4}$ failures/year-mile whereas the NRC is claiming a failure rate of $1x10^{-5}$ failures/year-mile.

Not only did you personally mislead Congress about the immediate risk of a catastrophic accident to the reactor and the spent fuel pool, Ms. Doane directed Mr. Skeen to support her unsupported predetermined conclusion of warranting no "immediate regulatory action at either Unit 2 or Unit 3." based on an unapproved document that does not address today's pipeline failure statistics.

This is a prime example of the NRC's continued "backward engineering" which the NRC's Inspector General's report cited as being inappropriate.

Jimi T. Yerokun's letter to Entergy dated April 23, 2020 stated:

> "In light of the issues identified by the NRC Expert Evaluation Team, the NRC requests that you update your evaluation and supporting analyses as necessary and assess the validity and materiality of the assumptions made in support of your conclusions regarding the consequences of a postulated rupture of the 42-inch gas pipeline. Please include the impact of updated information from the pipeline operator, Enbridge, as described in the Expert Evaluation Team report, regarding the time needed for operators to close valves in the event of a pipe rupture and the length of pipe that would need to be isolated. If an updated external hazards analysis is conducted, please reconcile any differences in the results."

Entergy responded to this letter the same day stating:

> "Entergy is currently reviewing the validity and materiality of the assumptions made in previous analyses and will update or clarify the hazards analysis as appropriate. These reviews and associated updates or clarifications, if needed, are expected to be complete by June 30, 2020, and will be available for NRC inspection at that time."

This analysis must be made available to the public and not hidden from view as proposed by Entergy.

I am not sure what the NRC expects from another unsupported risk analysis. We have already had at least three analyses by Entergy, at least three from the NRC, one from the State of New York, one from Sandia National Laboratories, and one from me, a professional engineer. None of these nine analyses comply with federal laws which are very specific as to the requirements of a risk analysis — none comply with the requirements of the Code of Federal Regulation 49 CFR 192 and the U.S. Code 601 et seq.

In spite of warnings and findings from the OIG, the NRC Staff is essentially directing Entergy to support and "backward engineer" to justify a desired outcome.

During my March 20, 2020 meeting with the NRC's Evaluation Team and PHMSA representative I stated the following. Apparently, the Team elected to once again ignore my longstanding concerns in their final report that a valid risk assessment must be conducted and to be valid, it must be conducted according to federal regulations.

> "We've had enough attempts on risk assessment and have everyone thinking, this is what we think we need."

> I go on to state,

> "There is a regulatory and industry consensus of conducting a risk assessment, and that is specified in 49 CFR 192.917 and this is the only generally accepted guidance for conducting a risk assessment of gas lines. This went through rulemaking, comments".

And

> "It is my position that the risk assessment be conducted following the Pipeline Safety Act of 2016 and 49 CFR 192. The result must then be reviewed by PHMSA for compliance with its regulations."

> "But the clear requirements, Steve, in Subpart O of 192 are numerous, as you know. And 192.917 and 934 require a very detailed risk assessment. This should be outside of NRC space."

> "I briefly looked at the regulation 917, 935, and I briefly looked at the ASME B31.8 document.

And what I observed from the ASME document 22 scenarios that one must evaluate, from tornado to flooding to ice age to global warming to vandalism, didn't use the word terrorism. And those are probabilistic, more than consequences, I think."

And

"Yes. But my, as we've talked, Dave, my biggest concern is the existing pipelines. Okay. We have two pipelines, one of them is idle right now and the 30-inch is active.

"They run very close to the switchgear room and the control room. A leak in one of those pipes could cause unignited methane to migrate into the control room, just a few hundred feet away."

"If that occurs, and I'm talking a gas leak, like we've all seen in our neighborhoods, but a sizeable one, two-inch or greater, and that gas migrates into, especially the control room and the electrical switchgear room, if that gets in there, we are in big trouble.

"If you take out the switchgear room, then the danger of core damage, spent fuel pool damage, and all your post-Fukushima fixes would not be available. And that's something that absolutely, that is my number one concern, and that has been conveyed many times to the NRC and ignored.

"So, the risk assessment not only applies to the AIM pipeline, it also applies to existing pipelines, and that's effective in the year 2004. So, I don't think PHMSA has assured that that has been done. And I don't mean to pick on PHMSA, but I've never been able to get a straight answer from them."

The concerns stated above were ignored in the Evaluation Team's report. I believe it to be negligent and irresponsible for the NRC to require Entergy to update its "consequences of a postulated rupture of the 42-inch gas pipeline," instead of relying on Enbridge to conduct a risk analysis that complies with the requirements of the federal laws and regulations. It is a Federal requirement under 49 CFR 192 and USC 601 et seq that this risk assessment be performed by the pipeline licensee and verified by PHMSA.

This analysis should be conducted by Enbridge and reviewed and approved as required by 49 U.S. Code § 60109[3]

The Yerokun letter to Entergy permits Entergy to select as the basis for its review any of the nine existing risk analyses that range from a risk probability of 10^{-9} to the Sandia analysis that predicts the entire site may be engulfed in a fireball.

Not only does the final Evaluation Team report ignore my input during the meeting and the concerns I have expressed over the past years to the NRC, Entergy, PHMSA, and FERC, it contains numerous assumptions and errors and it misrepresents historic gas transmission line failures. Disturbingly, the NRC discounted and ignored the Sandia Laboratories' analysis[4] in its final analysis as it did not support the NRC's desired results.

As part of the Evaluation Team's effort, Sandia National Labs was contracted[5] to provide an independent assessment of the risks of the pipelines to the safety of Indian Point. In its final report, Sandia concluded:

> "This dense gas behavior has implications with regards to explosion hazards since the vapor cloud would travel through vegetation and persist for a sufficient amount of time to result in potential ignition which can lead to a deflagration to detonation transition due to the congestion or have overpressures that exceed 1 psi from a deflagration explosion. The vapor cloud region between the flammability limits is roughly 1/3rd the cloud volume and if the cloud encounters an ignition source in congested areas, significant overpressures can result. **At approximately 6 to 7 minutes after release the flammability region of the vapor cloud will be either near or begin to engulf the SOCA and can result in an explosion with a high likelihood of exceeding an overpressure of 1 psi at the SOCA if ignited within the flammability region. The furthest point downwind distance within the flammability region is about 950 m (3,100 ft) at 8 minutes which is greater than any distance from the pipeline route to the SOCA (Security Owner Control Area) which varies from about 1580 ft to 2363 ft. At 8 minutes the flammability region would surround the SOCA.** [***emphasis added***] The results from this simulation indicate that for this release scenario explosion overpressures of greater than 1 psi at the SOCA would most probably occur given the surrounding congestion. Instances of natural gas pipeline accidents in which the natural gas was not immediately ignited at the release point and indicated that the cloud was not immediately buoyant can be found in references [15] [16]."

Should this event occur, the control and switchgear rooms of Unit #3 would be destroyed resulting in a major release from the reactor and the spent fuel pool, one more unanalyzed event. The Evaluation Team made no attempt to refute, discount a study contracted by the NRC to Sandia Labs apparently it was not consistent with the NRC's desired outcome of "no risk."

On June 8, 2020, the PDR released to me three letters citing this risk summary from the NRC Evaluation team.[6]

In these three letters, the EDO conveniently ignored the above conclusion of Sandia possibly because it was inconsistent with the NRC's desired backward engineering results, thus once again, misleading elected and appointed officials of New York State. The Team provided no explanation as to the justification for ignoring this this professional report from Sandia Labs' preeminent independent experts specifically contracted by the NRC for their renowned expertise for this express purpose.

Entergy neither own nor operates the Algonquin pipelines and neither Entergy nor the NRC has expertise in pipeline operation or gas line accident analysis. Consequently, according to federal regulations, Entergy should not be the organization that performs the risk analysis for the pipeline. Enbridge should perform the risk assessment.

I formally request the NRC modify its request to Entergy to update its evaluation and supporting analyses based on a risk analysis performed under the requirements of 49 CFR 192.917 and 935 and that the NRC request that Enbridge provide a risk assessment that complies with the federal regulations. I further request the NRC justify why the NRC ignored its contractor's (Sandia) expert and professional report and conclusion.

Sincerely,

Paul M. Blanch

135 Hyde Rd.

West Hartford, CT 06117

pmblanch@comcast.net

860-922-3119

CC: Governor Andrew Cuomo

Mr. John Rhodes

Mr. Tom Congdon

Mr. John Sipos

Mr. Thomas DiNapoli

Mr. Lemuel Srolovic

Mr. Jeremy Magliaro

Ms. Lisa Burianek

Senator Charles Schumer

Senator Kirsten Gillibrand

Congresswoman Nita Lowey

Congressman Elliot Engel

Congressman Patrick Maloney

State Senator Andrea Stewart-Cousins

State Senator Peter Harckham

State Senator Leroy Comrie

Assemblyman David Buchwald

Assemblywoman Sandy Galef

Assemblywoman Amy Paulin

Assemblyman Steven Otis

David Skeen

Margaret Doane EDO

Rossana Raspa OIG

NRC Commissioners via robert.krsek@nrc.gov

[1] It is not the responsibility of the OIG to direct the NRC Staff on how to redo the analysis however logic would dictate a reasonable engineer would conduct the analysis in accordance with federal regulations rather than another analysis with no guidance and only seeking a desired outcome.

[2] In this fiasco the NRC has performed numerous safety related analysis and calculations used as the licensing basis for Indian Point. In the past, Sandia has conducted numerous safety related analysis and I believe this Sandia analysis was conducted in accordance with an NRC approved QA program. Therefore I place more credence on the Sandia analysis of total engulfment of the Indian Point site.

[3] **(9)REVIEW OF INTEGRITY MANAGEMENT PROGRAMS.—**

(A) Review of programs.—

(i) In general.—

The Secretary shall review a risk analysis and integrity management program under paragraph (1) and record the results of that review for use in the next review of an operator's program.

(ii) Context of review.—

The Secretary may conduct a review under clause (i) as an element of the Secretary's inspection of an operator.

(iii) Inadequate programs.—

If the Secretary determines that a risk analysis or integrity management program does not comply with the requirements of this subsection or regulations issued as described in paragraph (2), has not been adequately implemented, or is inadequate for the safe operation of a pipeline facility, the Secretary may conduct proceedings under this chapter.

[4] "At approximately 6 to 7 minutes after release the flammability region of the vapor cloud will be either near or begin to engulf the SOCA and can result in an explosion with a high likelihood of exceeding an overpressure of 1 psi at the SOCA if ignited within the flammability region. The furthest point downwind distance within the flammability region is about 950 m (3,100 ft) at 8 minutes which is greater than any distance from the pipeline route to the SOCA (Security Owner Control Area) which varies from about 1580 ft to 2363 ft."

[5] A FOIA request has been submitted to the NRC for all communication between Sandia and the NRC

[6] **Sandy Galef - ML20122A124**

https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A124

John Rhodes - ML20122A105

https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A105

Lemuel Srolovic - ML20122A122

https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20122A122

Paul Blanch
135 Hyde Rd.
West Hartford, CT 06117
pmblanch@comcast.net
860-236-0326
Cell 860-922-3119