Forum Article

False and Misleading Statements Leading to an Unreliable Source of Information Regarding Early Research into Radiation Dose-Response: Part 1. A Response to Beyea

John Cardarelli II

Abstract **A commentary written by Jan Beyea claimed that the HPS interview of Edward Calabrese on the historical evolution of the linear no-threshold model was unreliable because it overlooked key historical text and statistical concepts. Beyea states that the purpose of his commentary was to defend the integrity of historical figures and committees from the accusation of scientific misconduct as presented by Calabrese. Based on his review of the video series and other documents, he provided what he defined as evidence of errors of fact, reasoning, and statistics to support his position. If true, Beyea's work would have the effect of impugning the reputation of Calabrese, myself, and the credibility of the HPS. This response intends to expose the issues with Beyea's commentary, including mischaracterization of Calabrese's work, lack of objectivity, misleading and factually incorrect statements, reliance on secondary sources, ignoring evidence specifically provided in the video series, and failing to address evidence provided in primary-sourced documents that contradict his conclusions. As a result, the reliability of Beyea's commentary is highly compromised, representing a serious lack of scholarship, research, and objectivity such that it should be retracted by *Health Physics Journal* based on the Committee on Publication Ethics guidelines. The HPS interview-style documentary reflects historical events based on primary-sourced documents as discovered by Calabrese. Scientific debate on this topic is necessary to progress our field, but the debate must be supported by facts with primary-sourced evidence and not driven by outdated public policies, logical fallacies, or ideology. Health Phys. XXX(00):00–00; 2026**

KEY WORDS: de minimis regulations; Health Physics Society; historical profiles; linear hypothesis; cancer risk assessment; LNT

INTRODUCTION

During my term as President of the Health Physics Society (HPS, 2021-2023), I led an effort to inform the scientific community about the historical foundations of the linear no-threshold (LNT) model used for cancer risk assessment (Cardarelli et al. 2023). Edward Calabrese agreed to be interviewed and share primary-sourced evidence on how the LNT model became the dominant approach for cancer risk assessment. He has more than 1,100 peer-reviewed publications, 12 substantial toxicology/risk assessment textbooks, is co-editor of 24 books, and is the recipient of numerous awards including the Marie Curie Prize for his work on hormesis. Most notably, as of 2024, ScholarGPS ranked him #3 in the world in the field of Environmental Health Sciences and #4 in the Dose-Response Relationships field for his lifetime accomplishments. ScholarGPS rankings are based on "the most productive (number of publications) authors whose work are of profound impact (citations) and of utmost quality (h-index)."

Twenty-two short videos were produced covering the origins of the LNT theory to a path forward based on the knowledge gained since its inception over 70 y ago (HPS 2022). The video series received worldwide attention, bringing awareness and adding to the scientific debate regarding the validity of the LNT model in low-dose environments. Calabrese provided historical documents identifying errors, scientific misconduct, and a lack of scientific integrity in the field of radiation science involving multiple Nobel Prize winners and elite leaders in the field of radiation genetics (Calabrese 2024). More recently, its release generated a flurry of email correspondences that uncovered a covert coordinated effort among contemporary leaders within the Environmental Protection Agency (EPA), National Academies of Science (NAS), and the National Commission on Radiation Protection and Measurements (NCRP) to protect and maintain the LNT theory in US policies and regulations (Cardarelli 2024a). The increased awareness also brought criticism from devout LNT believers that any exposure to ionizing radiation presents risks and should be controlled as

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low as reasonably achievable. This debate is welcomed and decades overdue because those in power who have controlled the narrative supporting the LNT theory have ignored calls for an objective and transparent exchange (Cardarelli 2023, 2024a and b).

This commentary provides detailed responses to Jan Beyea's criticisms that the video series had "errors of fact, reasoning, and statistics." This response exposes his numerous shortcomings including mischaracterization of Calabrese's work, lack of objectivity, misleading and factually incorrect statements, reliance on secondary sources, ignoring evidence specifically provided in the video series, and failing to address evidence provided in primary documents that contradict his conclusions. The 74 responses are presented in order as they appear in his commentary and are as follows:

1. [p. 507] Beyea uses the term "theories" when describing Calabrese's evidence supporting his claim that scientific misconduct was carried out on behalf of Muller and others (e.g., NAS BEAR 1 committee).
   A. HPS Video Series Episode 12: "Was There Scientific Misconduct Among the BEAR Genetics Committee Members" addresses the evidence supporting this claim using primary source data. Beyea fails to address or discredit the primary source data — yet he claims this information represents a "theory." This is a factually incorrect and mischaracterization of Calabrese's work.
   B. The same term "theories" was also used by Bahadori in his attempt to dismiss Calabrese's discoveries of fact based on primary sources (Bahadori 2023). When someone dismisses a truth by labeling it as "just a theory," they are employing a logical fallacy often related to equivocation or loaded language. Here's how these apply:
      A. Equivocation Fallacy: This occurs when a term like "theory" is used ambiguously, exploiting the difference between its scientific meaning (a well-substantiated explanation) and its colloquial meaning (a mere guess). By conflating these meanings, the argument misrepresents the truth.
      B. Loaded Label Fallacy: This happens when a label, such as "theory," is used to imply something negative or dismissive without addressing the actual evidence or reasoning behind the claim. This manipulates perception rather than engaging with the facts.
   C. On the contrary, assuming that the label "theory" inherently diminishes the validity of the concept is itself a fallacy since labels do not determine truth or falsity. These fallacies undermine critical reasoning by focusing on terminology rather than the evidence supporting the claim. Calabrese's primary-sourced evidence represents factual events that have occurred.
2. [p. 507] Beyea states the HPS acceptance of Calabrese's work as "authoritative and trustworthy" is not warranted because he argues it is "not deserved" due to a lack of historical accuracy and absence of statistical analysis supporting it.
   A. HPS Video Series Episode 1: "Who Is Dr. Edward Calabrese" explains why HPS accepts the work of Calabrese as "authoritative and trustworthy" and the reason for the documentary. Beyea fails to mention this here or when it is stated in Cardarelli et al. 2023. Further, Calabrese's lifetime achievements mentioned in the introduction support why he was accepted by the HPS as an authoritative and trustworthy source.
3. [p. 507] Beyea makes a statement that "No disclaimer was made in the paper that their views did not necessarily represent the view of the HPS."
   A. No disclaimer was deemed necessary in the paper (Cardarelli et al. 2023) since I was the President and official spokesman for the HPS at that time. However, a disclaimer appears on the HPS website and at the end of every episode in the video series.
4. [p. 507] Beyea states the purpose of his paper was to defend "the integrity of historical figures and committees."
   A. His paper does not discredit any of the primary-sourced evidence provided by Calabrese. Instead, Beyea relies on secondary sources to support his position while failing to challenge the integrity and accuracy of Calabrese's primary-sourced information.
   B. When someone relies on secondary sources to support their argument while ignoring conflicting primary sources, this behavior can be described as "cherry-picking evidence" or confirmation bias.
   C. Similar criticisms of Beyea were provided by Cuttler (2016) for his failure to "challenge any of the analyses and conclusions" presented by Calabrese's work. Sacks & Siegel (2016) stated that Beyea and other LNT advocates "employ hidden circular reasoning to arrive at their epidemiologic conclusions that increasing cumulative radiation doses cause increasing rates of cancer." Their tactic is to divert attention from debating the actual effects of Low Dose or Dose Rate (LDDR) radiation to debating the state of mind of the scientists who originated the claim. Siegel et al. (2017) criticized Beyea for ignoring key data contradicting his beliefs about the validity of LNT at low doses.

5. [p. 508] Beyea states, "The purpose of this commentary is to begin to provide sufficient evidence of errors of fact, reasoning, and statistics to show that not only is the Calabrese prosecutorial case irrelevant to the validity of the LNT but that the case for scientific misconduct falls apart."
   A. Beyea does not define "scientific misconduct" anywhere in his paper. Without a definition, he distorts the facts to create an argument that he believes justifies the actions of the 1956 Committee and Muller. Calabrese used the NAS Code of Conduct to justify his claim that scientific misconduct was done by the 1956 NAS Committee and by Muller. The HPS documentary shows this definition in Episode 12 (timestamp 17:30).
6. [p. 508] Beyea states that members are given professional credit for watching the HPS video series. However, they do not receive professional credit for studying the critiques that have been written about Calabrese's misconduct claims.
   A. This is a factually incorrect statement. According to the HPS Directory, Beyea has been a member of the HPS since 1981 (nearly 45 y). He should know that HPS does not provide professional credits. Only the American Academy of Health Physicists (AAHP) provides continuing education credits to Certified Health Physicists (CHP). AAHP is an independent organization from the HPS. Beyea is not listed as a CHP in the HPS Directory, but he should have known this after being a member of HPS for over 40 y.
   B. A member of the AAHP Continuing Education Committee contacted me on 18 April 2022 (within days of the video documentary release) letting me know that they started an application for preapproval for up to 10 Continuing Education Credits toward maintaining one's CHP status. They asked if I would be willing to be listed as the "trainer contact." I said yes.
   C. The following was published in the May 2022, *Health Physics Newsletter*: "Great news! Not only can certified health physicists (CHPs) view the fascinating and informative HPS History of the Linear No-Threshold Model (LNT) video series, but they also may earn 10 American Academy of Health Physics (AAHP) continuing education credits (CECs). Watch all 22 episodes, which describe the historical foundations of the current protection philosophy based on an LNT model for cancer risk assessment, and then use the preapproval lookup code (2022-04-21-185) when submitting your CECs for recertification by the AAHP. And if you're a CHP who's not yet a member of the HPS, we welcome you to the Home for Radiation Protection Professionals: become a member today at hps.org/join."
   D. Beyea's comment should have been directed to AAHP and not HPS. It inaccurately suggests the HPS has a bias that harms the Society.
7. [p. 508] Beyea criticizes Cardarelli et al. for "misleading" the readers because support for the LNT is primarily based on more recent data. He references NCRP Commentary 27 as supporting evidence for his assessment.
   A. Beyea failed to acknowledge that the purpose of that paper (and the video series) was not to discuss the studies supporting the LNT model (i.e., NCRP Commentary 27). The purpose was to document the historical evolution of how the LNT model became the default model for cancer risk assessment. If it had been about an objective evaluation of the LNT model, a completely different product would have been produced. His statements incorrectly suggest the video series was about the validity of the LNT model.
   B. A critical review paper by Ulsh (2018) indicates a strong pro-LNT bias by NCRP.
   C. Cardarelli's "Overt Scientific Bias…" paper exposed a clear bias within NCRP and NAS leadership, questioning the ethical conduct of those leading these organizations/committees (Cardarelli 2024a). The credibility of NCRP Commentary 27 is affected. Beyea's reliance on NCRP exposes his appeal to authority to support his position — a logical fallacy. This was discussed in Cardarelli's "Bias" paper.
8. [p. 508] Beyea states, "One cannot ignore the history of the atomic bomb cancer data or the history of the last 20 y, when large sample-size studies of protracted exposure to humans were developed (Hauptmann et al. 2020). It is necessary to look at and argue about current data to evaluate the LNT, as well as to make sense of the limited datasets collected in the early days."
   A. Episode 17: "Studies With a Surprising Low-Dose Health Effect" specifically focuses on this topic. Many of the atomic bomb studies published from 1955 to 1978 were presented, including a discussion of Neel's original study of atomic bomb survivors. Beyea failed to recognize the information presented in this episode or has chosen to ignore it.
9. [p. 508] Beyea states that Cardarelli and "his coauthors put their trust in Calabrese's words without any apparent review by persons knowledgeable about the historical period or any direct reading of the contested historical reports."

A. Beyea makes a declarative statement as if it is true. This is a false statement. There were many debates and arguments with Calabrese during the production of these videos of which people are not aware. I required Calabrese to produce primary-sourced documents to support his opinions/statements. The documents shown in the videos represent anything that could be perceived as controversial. For example, Episode 6: The Birth of the LNT Single-Hit Theory (timestamp 11:07) shows the handwritten letter from Muller's PhD student expressing doubts of his work that Muller later referenced in his Nobel Prize lecture. In Episode 8: "Fly in the Ointment" (timestamp 7:30), Calabrese suggested that there was an effort to "save the hit theory" implying a motive of the early researchers. I strongly challenged Calabrese to provide irrefutable evidence using this language because of the serious nature of that interpretation. A letter is shown in the video highlighting these words that supported Calabrese's statement. Without that letter, that section of the interview would have been removed. There are many more examples throughout the 22 videos as well. Beyea had no knowledge of what went into making this documentary, but he attempts to discredit the videos by making unsubstantiated comments that he cannot prove. It is clear that he was factually incorrect in his statement.

10. [p. 508] Beyea makes three statements that he states Calabrese (and Cardarelli's paper) are asking readers to believe:
    A. "Researchers who did groundbreaking research before 1950 relied on data they knew to be faulty to reject a dose threshold model, thereby engaging in scientific misconduct";
        A. TRUE: See Episodes 3 to 12 and Cardarelli's "Response to Badahori"; They had a clear motive to "save the hit theory" (Cardarelli 2023a).
    B. "To increase funding for genetics and to support an ideology, a 1956 committee of the National Academy of Sciences engaged in scientific misconduct in support of dose linearity by suppressing genetic data from Hiroshima and Nagasaki and by suppressing disagreements among committee members about risk magnitude";
        A. TRUE: See Episode 11: "Creation of the Biological Effects of Atomic Radiation (BEAR) I Committee"; Episode 12: "Was There Scientific Misconduct Among the BEAR Genetics Committee Members," and Episode 15: "Follow the Money Trail: We Are Just All Conspirators Here Together." These videos present the evidence that Beyea doubts. Beyea should have provided primary sourced evidence that conflicted with the primary sources presented by Calabrese.
    C. "A 1972 NAS committee failed to take into account genetic mice data that showed dose-rate effects."
        A. TRUE: See Episode 20: "BEIR I Acknowledges Repair but Keeps LNT. Why?" and Episode 21: "BEIR I Mistake Revealed, LNT Challenged, Threshold Supported." These episodes summarize how the mice data were discussed in the 1972 NAS committee. They decided to dismiss the data that showed a threshold for females in favor of a linear response for males. Later, it was determined that these data had errors which, after correction, showed a hormetic effect in females and a threshold for male mice.
    D. All three statements are demonstrably TRUE — supported by primary sourced documents presented in the HPS documentary series. It seems clear that Beyea's commentary is fatally flawed once these statements are shown to be accurate. This alone could be enough to retract his paper.

[p. 508] Beyea references his two articles in 2016 and 2017 critiquing Calabrese. Calabrese responded to Beyea's 2016 paper but chose not to respond to his 2017 paper. In Beyea's 2017 paper (page 372), he writes, "Based solely on secondary sources written by historians, I have not been able to figure out exactly which committee members' calculations went into generating the 50,000 tangible mutation estimate, but it is clear that Demerec's low estimate must have been one of them. There is no other way that the reported number could be as low as 50,000, because all other estimates that may have contributed were greater than 50,000" (Beyea 2017).

A. Episode 12: "Was There Scientific Misconduct Among the BEAR Genetics Committee Members?" (timestamp 9:15) clearly shows that Demerec's low estimate (5,200) was one of the three reports removed by James Crow in an attempt to lower the uncertainty by keeping the six highest estimates and removing the three lowest estimates. It also contributes to the scientific misconduct discussion.

B. In 2017, Beyea admitted he relied on secondary sources written by historians. He relied on these historians to be accurate, but they weren't, and his acceptance of their interpretation without confirmation constitutes confirmation bias on his part (Beyea later refers to this as "selective stakeholder

perception"). Calabrese's publications relied on primary sources. Many are shown in the HPS documentary.

C. Beyea also relied on secondary sources throughout his 2024 paper. He writes with such authoritative certainty most readers would tend to believe him. He was wrong in 2017 and wrong throughout his 2025 commentary.

12. [p. 508] Beyea wrote "Without mention of the contrary published papers, the viewers of the series and the readers of the article are not 'informed.' Rather, they are misled. A reader gets no sense that the scientific misconduct information is deeply contested."
    A. The purpose of Beyea's paper was to defend "the integrity of historical figures and committees." The HPS series is a historical documentary of how the US came to accept and incorporate the LNT model; it was not to refute or support the scientific validity of the LNT model. Beyea makes a strong statement that this series misleads viewers because the scientific misconduct information is deeply contested. In fact, those contesting it rely on secondary sources, which have shown to be wrong. HPS required primary sourced data to support Calabrese's interpretation of events. He provided everything HPS requested for all 22 episodes. Beyea does not provide primary sourced documents to support his argument or contradict the documents provided by Calabrese. So if there is any misleading information being provided, it originates with Beyea.
13. [p. 508] Beyea argues that HPS took a prosecutorial position to posthumously convict historical figures who are no longer able to defend themselves of "scientific misconduct." This motivated him to write this paper.
    A. What Beyea does not know is that the HPS offered to do a follow-up video to have "world experts" defend the LNT position or give an alternative interpretation of its history — none agreed to go on camera under the same conditions of Calabrese. (e.g., no notes, no script, must provide primary source documentation). Ironically, the NCRP videos describing how to interpret epidemiological data were scripted (admission to this effect can be provided via email correspondence from J. Boice). It also is worth noting that the two individuals in the NCRP videos were instrumental in working covertly to suppress the scientific debate about the validity of the LNT and take over the HPS (Cardarelli 2024a).
    B. What is there to defend? The primary source documents are there in their own words (e.g., letters, transcripts). Further, Cardarelli's "Bias Paper" showed how living people conducted unethical acts, but they have done nothing to date (August 2025) to defend themselves. Ignoring these facts is the modus operandi of those who have no defense — other than to attempt a smear campaign to discredit those who've exposed their acts. Beyea's commentary is consistent with this practice.
14. [p. 508] Beyea states that it's "an incredible claim for an organization's leadership to have made about three Nobel Prize winners (Hermann Muller, George Beadle, and Edward Lewis) and other prominent scientists, just because Dr. Calabrese, a critic of the LNT, says so."
    A. A Nobel Prize doesn't make one without question nor validate the science. The very essence of science is to question! When new evidence is found, science should evolve. Beyea suggests that these Nobel Prize winners are untouchable and that we must accept that their motives were always true and pure.
    B. As the President of the HPS, I recognized the statements made in the series could be (and have been) challenged and bring unwarranted attacks on me professionally and to the Society. Beyea's paper is an example of this. That is why I insisted on seeing and providing primary sourced documents for any statement made by Calabrese that could be considered controversial. See my response in 9(A) for more details.
    C. The information revealed in the series is "incredible." It's also worth noting that the LNT message has been the dominant message for nearly 70 y and efforts to challenge it have been met with ignoring, canceling, excluding, and shunning by the authoritative powers. See Cardarelli 2024a.
15. [p. 509] Beyea states that Calabrese and HPS authors "...have distorted the record, I believe inadvertently. If there is any 'shocking exposé,' as the HPS authors claim, I shall argue it is of their own work."
    A. Beyea's article is more representative of a shocking exposé because he provides no primary source documentations to support his claims. Yet, he expects readers to accept his version of history and reject Calabrese's version of history.
16. [p. 509] Beyea references a 2011 article ("Croc 2011" — which is actually spelled "Crok") to infer that the HPS series conducted "character assassination" and conducted "sloppy historical analysis."
    A. These are strong accusations that should require hard evidence. These are easily refuted. The Crok article stated that "Calabrese makes some scurrilous accusations, he accuses a dead man [Muller]

of being a liar. That's character assassination." In Episode 8: "Fly in the Ointment" (timestamp 12:50), Calabrese describes the evidence that exposed Muller as a liar. HPS accepted this statement based on the primary sourced materials he provided to support it. The fact that Muller was dead at the time is meaningless. Beyea should have seen this evidence in Episode 8 and sought his own primary sourced documentation to challenge the documents provided by Calabrese (and shown in the HPS series), but he didn't.

B. Episode 14: "Should the Genetics Panel Science Paper be Retracted" (timestamp 12:30) presents a similar story criticizing a deceased Nobel Prize winner (Robert Millikan) for scientific fraud. Beyea should have acknowledged this historical precedent in his paper. To label or suggest that Calabrese or the HPS conducted "character assassination" because the subject is dead is salacious and defamatory without providing evidence. Beyea infers it by accepting Crok's definition — which itself has many problems.

C. Beyea's failure to discuss recently published articles supporting the series represents his incomplete historical analysis.

D. Episodes 12, 15, and 21 all provide documents that support the "scientific misconduct" conclusion.

17. [p. 509] Beyea states that he could not replicate Calabrese's claims of misconduct yet attempts to explain what is needed to make this claim.

A. Beyea compliments Calabrese as a serious researcher in that he lists his sources in his citations. He claims he cannot replicate Calabrese's interpretation but does not attempt to refute Calabrese's interpretation by providing his own set of primary sourced documentation.

B. Instead, Beyea shifts the burden of proof away from the primary sources to his "statistical analysis" as providing the "guardrails against false interpretation of count data that can be caused by statistical fluctuations and uncertainties." This has nothing to do with scientific misconduct and obfuscates the issue of whether Calabrese is correct about his "scientific misconduct" conclusions. He attempts to redirect attention to whether LNT is supported by the science or not. That was not the purpose of the HPS video series.

18. [p. 509] Beyea stated in the abstract, "In reviewing a video series that they created for the website of the Health Physics Society…," suggesting he watched the video series as part of his review method. He also relied on word searches of documents he was able to obtain via internet searches. He used this method to check Calabrese's "claim that a 1956 genetics report by the National Academy of Sciences (NAS) failed to discuss the early atomic bomb genetics studies in Japan…." Beyea argued that since the word "Japan" was included in report, the committee must have discussed the early studies. Thus, he assumed his critique of Calabrese was correct that he "has no way of proving negative claims, such as what was *not* done or *not* said in a document."

A. Beyea failed to provide the full context of Calabrese's statements which is shown in Episode 11: "Creation of the Biological Effects of Atomic Radiation (BEAR) I Committee" (timestamp 20:15). Calabrese discussed how the BEAR Committee started to address the Japan study by James V. Neel but ultimately dismissed it. The BEAR Committee didn't review the study as part of their evaluation. Beyea did a word search and found the word "Japan" and must have concluded that they did discuss it. The committee did discuss the fact that they would not incorporate it into their analysis. Beyea writes "by the word's presence, along with the context, that the genetics atomic bomb data actually did inform the report." Beyea does not provide any evidence of the context that was discussed by the committee. Calabrese provides the transcript and HPS highlights (timestamp 20:35) where Muller convinced the committee to exclude Neel's study. The highlighted language by Muller states, "We should beware of reliance on illusionary conclusions from human data, such as the Hiroshima-Nagasaki data, especially when they seem to be negative." Beyea should have gained a better understanding of why the committee didn't address the atomic bomb study by Neel, as was clearly discussed in the series. Therefore, Beyea's effort to derail the content Calabrese provided in the documentary failed immensely. Such information, since it is unreliable, supports an argument to retract his commentary.

19. [p. 510] Beyea states: "A puzzling feature of the HPS authors' article is how the authors can leap to a call for changes to regulatory policy without consideration of the recent history of the cancer LNT."

A. His statement is factually incorrect and misleading. Our paper did not call for changes to regulatory policy. It specifically states:

A. Re-examine the current regulatory and cancer risk models by replacing the most fundamental assumption (that any increase in dose is an increase in risk) with a true null hypothesis (that there is no effect).

B. Work toward an understanding of the low dose response using an integration of evolutionary

biology principles and **current epidemiological research findings**. (emphasis added)

C. Re-evaluate the regulatory paradigm of "as low as reasonably achievable" (ALARA) to determine its merit on a scientific basis; and

D. Harmonize radiation protection by considering all dose response models and applying the LNT model only to the point where adverse health effects are observed (e.g., above 100 mSv or 50 mSv y^{-1}).

20. [p. 510] In reference to the BEIR VII report, Beyea states, "No controversial claims about low-LET radiation effects should be made without first reviewing what this comprehensive report has to say about the topic."

A. Beyea suggests this report represents the "modern LNT history." I published an article that answered the question, "Should the BEIR VII report continue to be used to justify the use of the LNT model for LDDR radiation environments?" (Cardarelli and Ulsh 2018). The answer was NO and a rationale was provided.

B. Ironically, Beyea referenced that paper in a positive context on p. 509 where he notes our criticisms about medical exposures in the INWORKS study and how that criticism led to a 2023 update. That same paper says BEIR VII should not be used to justify the use of LNT model for LDDR radiation environments. Beyea seems to have ignored that section.

21. [p. 510] Beyea mentions the Russells' mice data and how it was not used in genetic risk assessment as described on page 96-97 of BEIR VII. Beyea also stated that "any hypothetical correction to the mouse baseline rate is irrelevant today, as it was in the 1972 BEIR I report, which also did not use the mouse spontaneous rate (NAS 2006) at pp. 12 and 123."

A. Episodes 19, 20 and 21 discuss Russells' work with mice and genetic repair and how the 1972 BEIR I report chose to handle it. Episode 21 (timestamp 22:00) discusses how the corrected Russell mice data would have likely changed the LNT recommendation. Beyea claims the correction was "hypothetical," yet the Department of Energy required the Russells to publish a correction to their results after conducting an ethics investigation into their past publications, which was exposed by Paul Selby (Russell, & Russell 1996, 1997). Calabrese and Selby (who worked with/for Bill Russell for decades) recently published articles that Beyea should have cited. Instead, Beyea makes a misleading statement by characterizing the necessary correction as "hypothetical," which is a factually incorrect statement.

22. [p. 510] Beyea mentioned the "2018 NCRP report" and how it didn't mention Muller, Stern, Uphoff, Lewis, or Russell, nor genetic data as if that somehow negates their errors of the past, and infers that the 2018 NCRP Commentary 27 represents the latest science.

A. Beyea incorrectly refers to the 2018 NCRP Commentary as a "report." In my 2024 "Bias" paper, I note the significant difference between an NCRP "report" and an NCRP "commentary." Beyea's use of the term "report" is misleading because it infers that the entire NCRP commission voted to accept it, when in fact a commentary only requires 11 of 13 members to approve it. Beyea must not have been aware of my recent paper or chose to ignore it.

B. Beyea also fails to acknowledge a peer-review publication by Ulsh (2018) which was highly critical of NCRP Commentary 27. This represents his lack of scholarship to review the literature objectively, thereby misleading his readers into believing that the NCRP Commentary 27 was not contested, a criticism he's levied in his article about the HPS. The difference is that the HPS video series was not intended to discuss the pros and cons of the LNT model as Beyea seems to believe. The purpose of HPS video series was to educate viewers on the history on how it came to be — not to argue for or against it.

23. [p. 510] Beyea discusses a few epidemiologic studies that didn't show a threshold effect at 50 R and then states, "Thus, the dose levels of these early animal studies are too high to be of any obvious use in resolving issues of dose or dose-rate threshold for cancer. This should have been stated."

A. This limitation is discussed throughout the HPS video series, especially in Episode 3 (timestamp 7:30) which referred to mutations vs. cancer. Beyea stated that he reviewed the HPS video series, so he should have known that the HPS (via Calabrese's interview) noted this limitation in the application of the LNT.

B. I do not believe my response warrants a debate on which studies support vs. contest the LNT model for Beyea's paper to be retracted, although it is worth noting that his referenced papers can be easily countered.

24. [p. 511] Beyea states, "If anyone had tried in 1972 to follow Calabrese's hindsight approach for cancer, they would have been contradicted by now."

A. The doses that Beyea is referring to are 37.5 R and 86 R to mice — not humans. He then states that there is "near universal agreement that radiation-induced cancer occurs in humans based

on atomic bomb data and the protracted epidemiological studies mentioned above." Those studies have limitations as well, but again, his arguments address a different topic. Here he attempts to draw us into a pro vs. con debate of the validity of the LNT model. That's not what the video series was about.

B. Episode 17 (timestamp 6:45 to 10:30) presents several studies by multiple authors that showed a clear J-shaped response for atomic bomb survivors. Beyea failed to acknowledge those studies.

C. Beyea is welcome to ask HPS and others to interview experts to describe their version of the history of the LNT — or do it himself, in which case he can he defend his version of history. The HPS video series has been out for more than 3 y, viewed by more than 20,000 unique IP addresses in more than 700 cities and 70 countries world-wide in the first year of its release! To date, no one has provided scientific evidence that would warrant a significant correction to any episode. We state at the end of each episode that they must provide their sources to support a change. Beyea's work relies on secondary sources and cherry-picked studies that do not invalidate the primary source information provided by Calabrese and presented in the HPS video series.

25. [p. 511] Beyea states that "selective stakeholder perception" explains why Calabrese's claim of scientific misconduct is in error.

A. Beyea defines this term as "the inability of some advocates to see words in documents that contradict their thesis." In other words, "confirmation bias." Beyea admits to being a victim of it as well. He claims it is not a moral failing and justifies it by coining the phrase "selective perception." He states, "If it occurs repeatedly, an author's work can be one-sided and misleading."

B. Beyea's commentary is replete with one-sided, misleading, and overtly false statements such that it warrants immediate retraction in my opinion. In this context, my recent publication (Cardarelli 2024a) exposed such behavior by leaders within the NCRP and NAS. Beyea "selectively preferred" to rely on NCRP and NAS documents to support his arguments for the LNT model.

C. Beyea did this in 2016 and 2017 as well — demonstrating his repeated behavior to perpetuate misinformation and make factually incorrect statements. Calabrese responded to his 2016 paper and chose not to respond to his 2017 paper. I note a factually incorrect statement he made in his 2017 paper (see comment 13). Hence, Beyea's work reflects the very criticism he's attributing to Calabrese and the HPS — the difference is Calabrese provided primary-sourced information to support his work — Beyea does not.

D. See response comment #4(C) for similar criticisms by other authors of Beyea's publications.

26. [p. 511] Beyea states that Calabrese's conclusion that the 1956 BEAR Panel didn't discuss the Neel Study was "strange on its face…" because Neel was on the Panel.

A. Episode 11 (timestamp 20:15) shows the actual transcript where Muller influenced the panel not to discuss/consider Neel's study (see a more detailed response in response comment #18). Neel shared and discussed his study with the British panel and challenged Muller in a conference at a later date (August 1956). Beyea's paper lacks these details, yet relied on Neel's autobiography published nearly 50 y later (1994) and Neel's 1963 paper to support his claim that it was discussed by the 1955-56 Genetics Panel. Neither of Beyea's references invalidate the language in the 1956 transcript of the actual meeting which was the primary source used by Calabrese.

B. In Episode 11 (timestamp 23:40), Calabrese discusses Neel's 1994 autobiography and acknowledges that Neel didn't mention his work was ignored by the NAS 1956 panel. Calabrese also states (timestamp 27:30) that the panel did not commit scientific misconduct for not discussing Neel's study. He states that the panel was simply biased and may have feared its leaders. Beyea wrote that "Calabrese apparently did not find…" evidence of the committee's consideration of Neels study and justifies his conclusion based on Neel's autobiography. In Episode 11, Calabrese was aware that the Neel's autobiography excluded language that would have supported the fact that the US committee didn't deliberate Neel's study. Calabrese knew it and discussed it in this episode. As a result, Beyea's lack of detailed historical analysis misleads the readers.

C. Episode 15: Follow the Money Trail: "We are just all conspirators here together" provides additional context (and documentation) on why the American committee didn't address the Neel study but the British committee did. At timestamp 4:06, a letter by Neel to Warren Weaver explains why he shared his data with the British panel stating, "I trust you will see it as an attempt at intellectual honesty rather than disloyalty to your committee." Beyea's following paragraphs about doubling-dose is irrelevant here regarding this point.

D. Episode 15 (timestamp 4:56) shows the actual letter from Neel to Beadle stating, "We couldn't prove

that he [Muller] was wrong, but we didn't feel he could prove that he was right. In other words, we felt that there were a number of unvalidated assumptions behind a good many of his points."

27. [p. 512] Beyea provides a quote by Neel stating, "The question is not, 'Is there damage?' but rather, 'Can the damage be detected?'"
    A. The origin of this logic was presented in Episode 18: "Ideology Trumps Science, Precautionary Principle Saves the LNT." Beyea's failure to note this in his paper suggests he didn't view the HPS documentary or has chosen to ignore it.
28. [p. 512] Beyea writes "Thus, there was no censoring of threshold effects in the atomic bomb data because, as had long been known, there was no suggestion of a threshold in the data."
    A. Episode 11 (timestamp 14:08) shows the transcript where Sonneborn lists the facts they all agree upon before deliberations. The Genetics Panel agreed that "The frequency of genetic mutations induced by any type of ionizing radiation is simply proportional to the total dose delivered." Thus, the reason a threshold was not discussed was because the panel agreed up front that one didn't exist.
    B. Beyea further misleads the reader into believing that "There was no suggestion of a threshold in the data." Episode 17 shows several studies over a 30-y period where a J-shaped dose response is consistently present among the atomic bomb survivors. Further, Neel's original 1955 study did not support the LNT theory. All of this information isn't challenged by Beyea, yet he makes a declarative statement that there was no censoring of threshold effect in the atomic bomb data — when, in fact, he has no basis upon which to make his assertion.
29. [p. 512] Beyea states, "Calabrese and the HPS authors claim that the parallel British (MRC 1956) report reached different conclusions about the atomic bomb data."
    A. This statement is misleading and factually incorrect because it excludes the whole story of what the differences were and why they eventually came to a **similar agreement** about LNT.
    B. In Episode 15 (timestamp 4:15), Calabrese mentions how the two reports were publicized as being in agreement but then explains that it was due mainly due to political concerns because they were trying to speak with one voice. Calabrese then proceeds to describe the subtle differences between the reports — despite their general agreement.
    C. In Episode 15 (timestamp 19:40), I state "The American and British reports were published at the same time but had differing views on the genetic effects associated with radiation exposure. The American report strongly supported a linear no-threshold model, whereas the British report was more reserved." This same statement was in our HPS publication as well. Beyea's statement that Calabrese and the HPS authors claim that these reports "reached different conclusions about the atomic bomb data" is out of context, misleading, and factually incorrect. The video documentary clearly acknowledges the similar conclusions but exposes the difference between the level of agreement between the two reports.
    D. In a key reference at the end of Episode 15 titled "The Muller-Neel dispute and the fate of cancer risk assessment," (Calabrese 2020) describes the differences despite similar conclusions. "Despite the pressure to display a high level of international agreement on critical issues of genetic risk, Charlette Auerbach (1956) wrote that 'There is nothing in the British report corresponding to the categorical American statement: 'Any radiation is genetically undesirable,' " or "From the genetic point of view, they (the radiations) are all bad." Likewise, in their remembrance of Himsworth, Black and Gray (1995) stated that the Himsworth-guided British report on radiation genetics "...suggested levels at which an individual not feel 'undue concern about developing any of the delayed effects.'" Letting the report (MRC 1956A) speak for itself, on page 62, item 255 states: "We consider, therefore, that an individual would, without feeling undue concern about developing any of the delayed effects, accept a total dose of 200 r in his life-time, in addition to radiation from the natural background, provided that his dose is distributed over tens of years …. " Beyea's historical analysis missed this discussion that Calabrese discovered.
30. [p. 512] Beyea provides additional context to this statement made in the HPS paper "Today, there remain no observable genetic effects in humans resulting from the radiation exposure studies of atomic bomb survivors." He states this is a form of "selective stakeholder perception" because we excluded content he felt should have been included.
    A. Nothing about our statement is incorrect. No declaration was made about a threshold, just that there were no observable genetic effects. Beyea incorrectly inferred that no observable genetic effects was equivalent to a threshold. We didn't use the term threshold — we simply shared the facts as reported by the RERF. Our statement is accurate while Beyea's statement misleads the readers.

31. [p. 512] Beyea writes, "Once again, there was no indication of any dose threshold for genetic effects in the early atomic bomb data."
    A. Episode 17 (timestamp 12:30) shows nine studies in which the data show a J-shaped response for leukemia among the atomic bomb survivors from 1955 through 1978. Although genetic effects are different from leukemia, Calabrese identified multiple studies where a consistent hormetic (J-shaped) response exists among atomic bomb survivors. Beyea fails to acknowledge this or chose to ignore these facts. Instead, he referenced a 2021 study, which he acknowledged provided "weak evidence" supporting his statement.
32. [p. 513] Beyea states that Calabrese and our HPS paper attempted to "undercut" the linearity claims by the 1956 Genetic Panel. This is factually incorrect.
    A. In our HPS paper, we summarize what Calabrese describes in Episode 12: "Was There Scientific Misconduct Among the BEAR Genetics Committee Members?" Beyea misleads the readers by suggesting we had some motive to undercut the 1956 Committee's attempt to reach consensus on the estimates of birth defects from a population dose of 0.1 Gy based on the LNT model. All that is presented in the paper and in Episode 12 are the facts based on the meeting transcript and subsequent publications resulting from their work. Episode 14, "Should the Genetics Panel Science Paper be Retracted," also provides Calabrese's efforts to retract the associated Science paper for scientific misconduct. His request was denied by the NAS President but not because she didn't find evidence of scientific misconduct. Watch Episode 14 for details on why she denied Calabrese's request. Beyea fails to (1) acknowledge the information provided that supported Calabrese's efforts to retract the Science paper, (2) provide primary sources that would invalid Calabrese's documents, and (3) mention Episode 14 in his paper.
    B. The purpose of Beyea's paper was to defend the integrity of historical figures and committees (see response comment #5). He fails to provide evidence to contradict the information presented by Calabrese (e.g., meeting transcript, letters, Science paper). Instead, he attempts to divert attention from those documents by suggesting a motive that "What Calabrese is essentially claiming is that linearity should be dropped because the 1956 Committee's supposedly messed up the slope calculations." Neither Calabrese nor HPS make such a claim or had that motive. HPS used Calabrese's primary sources to understand the historical foundations of how the LNT model came to be.
    C. Episode 12 (timestamp 17:30) shows the Code of Conduct for NAS Members. It states, "NAS members shall carry out their scientific research with integrity and the highest standards. NAS members shall not commit scientific misconduct, defined as fabrication, falsification, or plagiarism. Scientific error or incorrect interpretation of research data that may occur as part of the scientific process does not constitute scientific misconduct." Beyea fails to even define scientific misconduct in his paper, which was one of its main themes. HPS provided the NAS definition in the documentary. See Episode 12, timestamp 19:20.
    D. Beyea claims the 1956 NAS committee "messed up" the slope calculations. No they didn't — each came to the committee with their own calculation; hence, there was nothing to mess up. What resulted from the committee's efforts was unexpected — it wasn't messed up. Therefore, they took steps to falsify and fabricate the research record, which meets the NAS definition of Scientific Misconduct. Their motive was clearly described in the video series.
33. [p. 513] Beyea describes Calabrese accusation of scientific misconduct as "inflammatory charges."
    A. Calabrese's statements were taken very seriously by the HPS. As a result, multiple requests were made for primary-sourced documents to support his claim. As President of the HPS, I was satisfied that Calabrese presented his case in a fair and objective manner based on primary-sourced documents (e.g., transcript, letters, Science paper, and exchanges with NAS President). That is why the video series dedicated two Episodes to this topic (Episodes 12 and 14). For Beyea to characterize Calabrese and HPS as making "inflammatory charges" of scientific misconduct without acknowledging the evidence provided in these episodes is sloppy historical analysis and a form of extreme bias. He simply didn't provide an honest or objective assessment on this issue.
34. [p. 513] Beyea quotes from the 1956 report to defend the committee from science misconduct accusations by stating they acknowledged reservations with their estimates and therefore did not commit scientific misconduct. In this context, Beyea states, "The 1956 Committee does not hide the disagreement," and "There was no suppression of the limitations of the calculation, no hiding of their disappointing vagueness nor suppression of disagreements among committee members."
    A. Beyea failed to note the falsification of the research record in the Science paper when they said six committee members took up the challenge —

when in fact three committee members refused and three others were arbitrarily removed. See Episode 12 (timestamp 9:20).

B. Beyea failed to note that even after removing three of the lowest estimates in an effort to reduce the overall uncertainty down to 750-fold — the committee arbitrarily decides to just state the uncertainty was 100-fold — without having to provide any justification. See Episode 12 (timestamp 10:10)

C. Beyea failed to note that the committee's fabricated change to the uncertainty estimate was challenged by outside scientists, which ultimately required the NAS President to decide that no such justification was needed. See Episode 12 (timestamp 12:00).

D. See response comment #11 for specifics on where Beyea makes an error in his 2017 paper by relying on secondary sources associated with this topic.

E. Beyea's reliance on the report does not refute the meeting transcript, correspondence between committee members and the NAS president, or the Science publication. Instead, he states that the Committee's disagreements were "judgment calls" thereby supporting his conclusion that they are not scientific misconduct. Again, he never defines scientific misconduct, so the vagueness of his arguments can easily mislead one into believing his historical version, when in fact he is wrong.

35. [p. 513] Beyea states, "Calabrese bases his claim about suppressed differences, not by references to the test of the 1956 report but to selected unpublished correspondence that led him to the following claim, which is repeated in the HPS article" that the Science publication states six took up the challenge when in fact three refused and three others had their estimated removed (falsification of the record).

A. Beyea relies on the 1956 report as if it is the gold standard. It is not. Calabrese based his conclusion on the transcript, committee documents, and letters. These are the primary sources, not the report or associated Science publication. However, the Science article is where the scientific misconduct accusation originated.

B. Anyone can access the "unpublished correspondence" to verify or refute the messaging in the 1956 report. A professional historian would pursue those documents, like Calabrese did. A scientific organization, like the HPS, should require that type of information if it is going to base its reputation and integrity on an "inflammatory" claim of scientific misconduct. Beyea could have obtained these documents too, but he didn't. Instead, his historical analysis resulted in a highly biased and unreliable paper.

C. The "unpublished correspondence," which effectively negates Section 2.2 of his paper, is described in Episode 12.

36. [p. 513] Beyea states, "What is inexplicable here is how Calabrese and the HPS authors could have overlooked the clearly stated self-critical language in the 1956 report. Anyone serious about assessing their accusations should read the full report."

A. Calabrese's statements presented in his publications and in the HPS document about the science misconduct of the 1956 Committee were based on primary-sourced documents, as clearly detailed in Episode 15. Beyea admittedly relies on secondary sources and keyword searches.

B. Characterizing the HPS effort as not being serious is disingenuous and misleading, especially since Beyea falsely accuses HPS of doing exactly what he did. See response comment #29(D) above as one example of Beyea's sloppy historical analysis.

C. What is inexplicable here is how Beyea overlooked the content in the HPS video series. Anyone serious about assessing his accusations should watch this documentary and then ask how Beyea could have missed the content.

37. [p. 513] Beyea states, "This false theory that disagreements were suppressed can be traced to specific Calabrese publications…." Beyea then quotes Calabrese, who stated that the record was falsified because three of nine estimates were dropped and then the journal Science reported that only six accepted the challenge. The example cited by Beyea has nothing to do with disagreements among panel members. Calabrese specifies where he believed the panel falsified and fabricated the scientific record to support his conclusion that they performed scientific misconduct. There's no suppression associated with these statements.

A. Beyea presents his case stating, "Calabrese is apparently unaware that one of the excluded three committee members (Sewall Wright) did not want his estimate used (Beatty 2006), and the other two did not include all expected mutations in their calculations, so their reports were reported separately in the report." This is a false and misleading statement. Beyea relied on secondary sources to support his statements. Episode 12 (timestamp 2:10) shows Weaver's charge to the 12 geneticists on the panel. The following shows the error of Beyea's historical analysis.

A. Nothing in Beatty 2006 suggests that Sewall Wright did not want his estimate used, therefore Beyea's reliance on this secondary source led to his inaccurate assessment of the facts.

B. Beatty 2006 states (p. 63) that "In the end, Wright refused to be party to this particular activity." Episode 12 (timestamp 15:10) shows the cover page of nine reports submitted by the panel members, including Wright, who took up the challenge. Beatty was wrong, and therefore Beyea was wrong. Calabrese was right. (Beatty 2006)

C. Beatty 2006 (p. 63) also stated that Wright, Neel, and Demerec "...explicity refused to contribute a number to the final report." This is factually incorrect. Neel is the only one of these three that refused to take up this challenge. Sonneborn and Little were the other two who didn't take up the challenge (Episode 12: timestamp 3:54). Wright provided a 9-page summary of his calculations and Demerec provided a 7-page summary of his calculations. Again, Beatty 2006 was wrong, leading Beyea to be wrong.

A Beyea 2017 discussed Demerec's contribution (p. 372) to the panel's estimate. Yet Beatty stated "…Demerec, explicitly refused to contribute a number to the final report…." Beyea referenced Beatty four times in his 2017 article. Beyea should have recognized this conflicting information, but he didn't. He cannot have it both ways. One of them is wrong — and it is Beatty, yet Beyea references his paper to support his false theory that there was no scientific misconduct with the panel members. (Beatty 2006, 2017). For transparency purposes — the Beatty paper is also included in the references at the end of Episode 12.

D. Calabrese provides a detailed discussion about the 1956 NAS Panel's activities, which ultimately led Calabrese to conclude there was scientific misconduct. (Calabrese 2015a, b) This was the subject of Episode 12. Beyea didn't provide any primary-source documents to counter Calabrese's conclusions.

E. Beyea's explanation for the omission of the other two is not supported with any documentation — other than his 2017 paper, which also relied on a Ph.D. dissertation by Jolly. Jolly states (p. 348) that, "Nine panel members submitted calculations on the genetic effects of additional radiation exposure." It should be noted that this statement also conflicts with the language in the Science article, which stated that six members provided estimates.

B. Beyea implies that Calabrese "suppressed" the panels disagreements based on his publications. It's unclear what Beyea is referring to, since Calabrese acknowledges throughout the HPS documentary and in his publications that the panel had disagreements. There's no "suppression" of these facts. Episode 12 demonstrates this. The scientific misconduct claim results from the fact that the Panel falsified the research record (e.g., reporting that six took up the challenge when nine actually did) and fabricated the results (e.g., arbitrarily reducing the panel's uncertainty estimate). Beyea misleads the reader into thinking Calabrese "suppressed" the disagreement among Panel members. This is factually incorrect.

38. [pp. 514] Beyea references his 2017 paper stating "Calabrese apparently wanted the committee to combine all the damage estimates regardless of the fact that two of the estimates were for different problem…." This is not true.

A. Actually, it was Crow who suggested combining the estimates in a letter to Weaver dated 29 March 1956. It is shown in Episode 12 (timestamp 8:14). A more detailed discussion was published describing each of the nine reports (Calabrese 2015). Both the Beatty 2006 and Calabrese 2015 references are listed at the end of Episode 12. It appears that Beyea failed to acknowledge Calabrese 2015.

B. Beyea further states, "…the committee did not suppress the other two calculations; they contribute to a separate estimate for tangible mutations appears in the report…" Beyea 2017 references the 1956 NAS Report (p. 25) to support this statement. The 1956 NAS Report specifically mentions that six members (p. 27) provided estimates, not nine, and there's no discussion about the "other two calculations" on p. 25 (as Beyea referenced) contributing to the tangible mutations. There is a discussion of tangible mutations, but nowhere does it state that it results from two panel members' calculations; therefore, I was unable to validate Beyea's statement.

39. [p. 514] Beyea continues to suggest that Calabrese's claims about hiding uncertainty are inappropriate (for supporting his scientific misconduct claim) because the 1956 NAS report included disagreements among the panel members' calculations. Here the report specifically refers to six geneticists, not nine. He also states, "If one reads the report section where the calculations are called disturbingly vague and not meaningful to some geneticists, it is hard to see how anyone could consider that the 1956 report hid uncertainty."

A. The report falsely states that six geneticists provided calculations — when nine did.

B. Episode 12 (timestamp 8:10), shows a letter from Crow to Weaver stating, "The limits presented on

our estimates of genetic damage are so wide that the reader will, I believe, not have any confidence in them at all." The 1956 report states, "The most probable estimates as thus calculated by the six geneticists do not differ widely" (p. 27). The internal letters conflict with the published report. Calabrese exposed how Crow and the NAS Committee arbitrarily modified the uncertainty estimate, which supports his claim of fabrication of the scientific record.

40. [p. 514] Beyea provides his explanation for the low uncertainty estimate provided by the 1956 BEAR panel by suggesting "that the estimates were best considered as geometric means, not arithmetic means, …" and references his 2017 paper. He criticized Calabrese by stating he "appears not to accept the fact that the estimates were best considered as geometric means, not arithmetic means, which means the uncertainties were geometric standard deviations that appear smaller to the uninitiated." Beyea provides no evidence to support his explanation — except to postulate.
    A. Beyea (2017, p. 363) states Calabrese is not a historian because he didn't publish in historical journals. Beyea also admits he's not a historian but relies on historians when he goes outside the scientific record to rebut trans-science charges like fraud, misconduct, and financial self-interest. He relies on secondary materials prepared by historians like Beatty. He specifically stated, "I particularly want to avoid the approach of postulating the thought processes of historical figures, which can look like an attempt to pressure the reader into a favorable frame of mind. I also want to avoid the risk of missing cultural and historical context."
        A. Beyea did exactly what he claims he particularly tries to avoid. He provided no evidence or documentation to verify that the 1956 panel's arbitrary uncertainty estimate was a geometric standard deviation. Instead, he postulated this scenario in an attempt to discredit Calabrese's conclusion that the uncertainty reported by the Panel was fabricated so the public would be more willing to accept their recommendation (Episode 12, timestamp 10:10). An act defined as scientific misconduct by the NAS Code of Conduct definition (Episode 12, timestamp 17:30).
    B. Using Beyea's "word search" strategy, Jolly's dissertation (p. 332) mentions "geometric" one time in the context of estimating a permissible dose, an unrelated issue. Beatty's 2006 publication doesn't even mention it. (Beatty 2006; Jolly 2002). If these historians didn't explain the low uncertainty estimate, how can Beyea come to his conclusion without postulating? Calabrese's scientific misconduct assertion due to fabricating an uncertainty estimate are supported by letters and other primary sourced documentation. Episode 12 (timestamp 8:10), shows a portion of a 29 March 1956 letter from Crow to Weaver stating, "The limits presented on our estimates of genetic damage are so wide that the reader will, I believe, not have any confidence in them at all." This is further discussed by Calabrese in the episode.
    C. Beyea does not provide any calculation to support the 1956 Panel's fabricated uncertainty estimate of 100-fold, yet he attempts to pressure the reader into a favorable frame of mind that the Panel did not fabricate their reported uncertainty estimate. He further missed the cultural and historical context behind the Panel's decision as described by Calabrese, supported by primary sourced documentation, and presented in Episode 12.
41. [p. 514] Beyea attempts to dismiss Calabrese's findings of scientific misconduct by stating that neither the committee members' disagreements nor calculations of genetic damage affected any of the NAS Committee's formal recommendations. He supports his argument by quoting Crow "Yet there is a supreme irony. The whole rancorous debate had no effect on the specific recommendations" (Crow 1995).
    A. Beyea misinterpreted the purpose of the rancorous debate. It was a dispute between Muller and Wright over the significance of genetic death, unrelated to the disagreements or calculations mentioned earlier.
    B. In the same article, Crow also stated "The National Academy of Sciences at that time had not done this kind of policy-setting report. It has done many since, but this one was outstanding in the way it immediately and permanently changed public policy in radiation protection" p. 424.
    C. Beyea also fails to include this Crow statement: "In my view, he [Muller] and Pauling, along with others much less visible (including me), **oversold the dangers** and should accept some blame for what now seems, to me at least, to be an irrational emphasis by the general public and some regulatory agencies on low-level radiation in comparison to greater risks" p. 425 (emphasis added).
    D. Crow recognized the significance of their 1956 report in setting public policy and admits they oversold the dangers of low-level radiation exposures. Beyea neglected to provide full context of Crow's 1995 paper by failing to acknowledge Crow's statement about overselling the dangers from low-level radiation exposures.

42. [p. 514] Beyea states that "Calabrese overlooked key sentences in a 1947 document that undermine his claim that Delta Uphoff, who later made important contributions to medical research, was a biased investigator."
    A. There is nothing to undermine because Calabrese didn't make this claim - Uphoff and Stern made this statement in their own report (Stern and Uphoff 1947). Beyea even acknowledges that Calabrese said it was Stern who had labeled Uphoff's lab work as biased. Stern (and Uphoff) did so as a potential explanation for the "unexpectedly low" control rate when compared to similar studies. As a result, they concluded "a final interpretation of these results cannot be offered." See Episode 9 "Why the First Human Risk Assessment Was Based on Flawed Fruit-Fly Research," (timestamps 17:17 & 18:24).
    B. Calabrese provides necessary context on Uphoff in Episode 9 by acknowledging that she was a "very inexperienced, brand new, master's student" when she was brought in to repeat the chronic study of Caspari, which showed a threshold response. (Episode 9: timestamp 15:04) A low control rate, as reported, supports a linear response. A control rate, as estimated by Caspari, would have supported Caspari's threshold finding.
    C. Beyea's comment that Uphoff "later made important contributions to medical research" is irrelevant to his argument.
    D. Calabrese just points outs the unusual fact that they included a statement about investigator bias regarding their own research. Beyea also stated, "To be fair, the actual language in the 1947 report is unusual."
43. [p. 514] Beyea quotes Calabrese's previous publications and states that, "Calabrese has built his accusations that Uphoff was biased on half of a quotation, overlooking the other half." Calabrese observed that Uphoff and Stern wrote, "a personal bias of the experimental" was a potential reason for an abnormally low control rate when compared to other studies. The other half Beyea refers to is, "It is hard to conceive of a bias," which Beyea claims negates Stern's and Uphoff suggestion that they were biased.
    A. Again, Calabrese did not make this accusation. In Episode 9, (beginning timestamp 14:00), Calabrese describes why he questioned Uphoff and Stern's conclusion was uninterpretable and possibly the result of investigator bias as noted by the authors. The quote that Beyea notes where their attempt to dismiss the bias suggestion that "It is unlikely that this is the case" is highlighted in this Episode (timestamp 18:25).
    B. In reference to Caspari and Stern's chronic study, which found a threshold effect, Uphoff and Stern suggested it could have been due to an abnormally high control rate. However, they also stated (p. 5), "There exists, however, independent evidence not favorable to this interpretation." This becomes important, as explained by Calabrese in Episode 9, timestamp 22:17 through 24:40. It challenges the validity of Uphoff and Stern's control rate. Beyea failed to incorporate the full context of this discussion in his paper, but it is captured in the HPS video series.
    C. Beyea also failed to note that Calabrese stated, "In the final analysis, there was no clear answer whether there was bias to see a lower control to detect a treatment effect, lack of research experience, or simply chance variation" (Calabrese 2011).
44. [p. 515] Beyea claims Calabrese distorts the message that the Uphoff and Stern 1947 report was uninterpretable because no such admission appears in their 1949 Science paper, which relied on the 1947 data. He also stated "The HPS authors apparently accepted his claims on faith."
    A. Episode 9 (timestamp 17:19) highlights the following sentence from Uphoff and Stern's 1947 report: "In view of the former results on chronic irradiation, as well as of the fact that the control rate of the present report is unexpectedly low, **a final interpretation of these results cannot be offered**. Several alternative interpretations are discussed" [emphasis added]. Beyea includes this same quote in his paper. (p. 9) The readers can decide for themselves how to interpret this statement, but as the HPS President and producer of the HPS video series, I accepted this statement as evidence that Uphoff and Stern could not interpret their results, which was consistent with Calabrese's interpretation. My decision was not based on faith. Beyea leaped to his biased conclusion which reflects his poor historical analysis.
    B. Episode 9 (timestamp 22:00 — 26:07): Calabrese describes the basis for the 1949 Science paper, which was a meta-analysis of the uninterpretable Uphoff and Sterns' studies and two other studies. At timestamp 25:11, the 1949 Science paper states, "A more detailed account of the work will be presented later." To date, no such account has been found.
45. [p. 515] Beyea states, "There is no scientific misconduct here. Calabrese has misread the situation and jumped to inflammatory accusations."
    A. Calabrese has consistently argued that the scientific misconduct by the 1956 BEAR Panel was due to falsification of the scientific record by publishing

in their report and in the Science paper that six members took up the challenge to estimate mutations when, in fact, nine did. Also, the panel fabricated the uncertainty so their conclusions would be more likely to be accepted by the public. (See Episode 12.)

B. Readers are referred to response comments #3, #5, #10, #11, #12, #13, #17, #25, and #26 for more evidence and commentary that supports Calabrese's accusation of scientific misconduct.

C. Beyea relied on secondary sources to justify his conclusion that no scientific misconduct was done by the 1956 Genetics Panel. He's misread the situation and lacks primary-sourced evidence to support his version of history. As a result, Beyea's commentary provides misleading and unreliable information.

46. [p. 515] Beyea stated that "Calabrese came to unjustified conclusions, embarking on a decades-long posthumous attack on the character of Curt Stern." He offered complimentary statements by James Neel, Ernst Caspari, and John Lucchesi to defend Stern's reputation and support his attack on Calabrese.

A. Episode 8 (timestamp 7:00): Calabrese compliments Stern by stating "Curt Stern, to his credit, he backed down, just like a real scientist probably should … you showed me the data, the data looks substantial by credible people, and he backed down." This was in reference to his original belief that Caspari's control group was aberrantly high (which led to his threshold conclusion). Caspari challenged Stern's belief and convinced him that his control group was consistent with the literature — and Stern rightfully backed down and accepted Caspari's conclusions.

B. Beyea referenced Calabrese (Calabrese 2015b) in his paper but failed to inform his readers that Calabrese was complimentary of Stern for accepting Caspari's work (p. 434). Beyea came to unjustified conclusions, embarking on a biased attack on the character of Calabrese, which he has done for nearly a decade.

47. [p. 515] Beyea stated that Calabrese accused Stern "of obfuscations and orchestrating coverup…twisted lies to save the LNT single-hit theory." He further states, "This is a relentless barrage of unjustified criticisms, diatribes really, based on a distorted set of false premises and interpretations about Stern and Uphoff that can easily be contradicted by checking the original sources."

A. Beyea's comments are totally without merit. In Episode 8: "Fly in the Ointment" (timestamp 7:30), Dr. Calabrese suggested that there was an effort to, "...save the hit theory..." exposing a motive of the early researchers. A primary sourced document, a letter, is shown in the video highlighting these words that support Calabrese's statement. Beyea failed to provide a single primary sourced document to support his inflammatory comments about Calabrese. It is Beyea who continues a relentless barrage of unjustified criticisms about Calabrese and now the HPS. His diatribe is a distorted set of false premises and twisted interpretations about Calabrese that were easily contradicted in the HPS video series. This is a spectacular example of his biased historical analysis.

48. [p. 515] Beyea stated, "Unfortunately, Uphoff's contributions to medicine and science are now obscured in search engine results, because articles by Calabrese falsely accusing her of bias, solely or in cooperation with Curt Stern, now dominate her mentions on the web."

A. This was discussed in my #42 response comment. Beyea makes another false and misleading statement by suggesting Calabrese accused Uphoff of bias. He did not. Stern and Uphoff suggested that a personal bias of the experimenter (Uphoff) could have cause the particularly low control value. Calabrese simply points out this unusual statement in their report. See response comment #42(B) for more detail.

49. [p. 516] Beyea claims he has "dug just as deeply as Calabrese into this work (Beyea 2017), including the statistics," which is one of his research areas.

A. I welcome Beyea's deep research because it contributes to the discussion about the history of the LNT and its validity or failure as a policy. However, his work lacks objectivity, reflects his personal bias, and overly relies on secondary sources. His few publications on the topic don't come close to Calabrese's lifetime achievements in this area. His record is hardly equivalent to Calabrese's. Beyea's publications on this topic could have never passed the scientific rigor I placed on Calabrese to support his interpretation of history. I required primary sources from Calabrese — Beyea doesn't provide any. As President of the HPS, I would not have risked the reputation of our scientific organization on secondary sources.

50. [p. 516; Section 2.4] Beyea states, "Calabrese claims that the National Academies committee that authored the 1972 BEIR report ignored the dose rate dependency of genetic mouse data. That would be incredible, if true, …"

A. This is another patently false statement by Beyea. Episode 20: "BEIR I Acknowledges Repair but Keeps LNT. Why?" specifically addresses this topic. This is another example of his careless historical

analysis misleading readers on a topic he considered incredibly important.

51. [p. 516; Section 2.4] Relative to Section 2.4 of Beyea's paper, he states, "There is no basis for inferring scientific misconduct."
    A. Calabrese makes no inference that the 1972 BEIR committee committed scientific misconduct. That accusation was directed only to the 1956 NAS BEAR Genetics Panel. Beyea erroneously attempts to conflate the scientific misconduct claim with the 1972 BEIR committee to justify his statement. This is very misleading and questions the reliability of his historical analysis.
52. [p. 516; Section 2.5] Beyea correctly points out that our paper excluded the words "we believe" in regards to Muller's Noble Prize speech (Cardarelli et al. 2023).
    A. Beyea attempts to imply a motive behind this error by suggesting that it was a significant error because it changed the essence of Muller's statement — which was his belief vs. a declarative statement. Beyea does acknowledge that Muller eventually dropped these words two years after his Nobel Prize.
    B. Episode 6 "The Birth of the LNT Single-Hit Theory" timestamp 8:27 and Episode 7 "Pursuit to Be the First to Discover Gene Mutation" timestamp 2:30, includes the entire quote by Muller.
    C. Beyea employs a technique known as the "Logic chopping fallacy" or "nit-picking." This fallacious approach involves concentrating on trivial aspects of an argument rather than addressing its main point or substance. It's an attempt to divert attention from the core argument by highlighting minor flaws or inconsequential details. This technique can create the illusion that the entire argument is flawed or invalid based on minor errors and can derail productive discussions by shifting focus away from the main issues.
    D. It's important to note that while attention to detail is valuable in argumentation, excessive focus on minor points at the expense of the main argument is fallacious. This technique is distinct from legitimate critique and is often recognized as a potential logical fallacy in debates and discussions.
53. [p. 516, Section 2.5] Beyea states that "Muller spoke the truth in stating what he believed. That is not scientific misconduct."
    A. Neither Calabrese nor the HPS said Muller conducted scientific misconduct in his Nobel Prize speech. Although, as presented in Episodes 6 & 7, Calabrese points out several limitations of the Ray-Chaudhuri dissertation that Muller mentioned in his Nobile Prize speech. Further, Calabrese discovered that Muller knew about the results of the Caspari research showing a threshold response before he gave his famous speech.
    B. Again, Beyea is misleading his audience by conflating fact with fiction. He obscures distinction between truth and falsehood, making it difficult for the audience to discern the truth. His failed attempts at a rigorous historical analysis have serious consequences.
54. [p. 517, Section 2.5] Beyea discusses the peer-review process and how it could have been different in 1927 vs. today's standards. He stated "Muller's production of mutations by x rays, for which he won the Nobel Prize in 1946, was replicated and published…within approximately 1 y of his 1927 *Science* publication. He specifically quotes a 1997 paper by Crow and Abraham that Muller "...gave the full details of his work and that the skeptics were silenced."
    A. Episode 4 "Muller: How Ambition Affects Science" timestamp 16:54, shows where Calabrese discusses Muller's paper given at the Fifth International Congress in Berlin. Calabrese states that Muller showed his data during the conference but then proceeds to summarize it as having no methods or references and described it as a "slipshod paper."
55. [p. 517, Section 2.5] Beyea states, "The HPS authors should have let readers know that Muller's biographer has defended him, arguing that Calabrese's 'characterization of Muller and his supporters is unjust, misleading, and hurtful'" (Carlson 2017).
    A. Beyea is relying on a secondary source as a proxy as if it represents truth and is without error. Further, he's suggesting that the HPS failure to inform its viewers was unjust and misleading. The intent of the HPS video series was to inform the scientific community about the historical foundations that underpin the LNT model's use for cancer risk assessment (Cardarelli et al. 2023). It was not to assess the character of Muller; however, Calabrese exposed many scientific and ethical failings of many involved in this story. He based his interpretation on primary documents. The video series did not mislead its viewers by excluding how a biographer took offense to Calabrese's statements about Muller.
56. [p. 517, Section 2.6] Beyea titles this section, "False claim that the 1956 NAS committee engaged in financial misconduct."
    A. The title of this section is misleading and factually incorrect. Neither Calabrese nor HPS made a claim that the committee committed, "financial misconduct." The HPS documentary shows primary

documentation provided by Calabrese, who summarizes the financial discussions among the committee members. For example, Episode 15 "Follow the Money Trail: 'We Are Just All Conspirators Here Together" presents the concerns about future funding of genetics research. Timestamp 16:50 shows the transcript from the 5-6 February 1956 meeting (transcript p. 35) where Warren Weaver, the committee chair, states, "*There may be some very practical results — and here is the dangerous remark — don't misunderstand me. We are just all conspirators here together. I am not talking as an officer of the Rockefeller Foundation but I will bat my head in the Rockefeller Foundation to try to get a very substantial amount of free support for genetics if at the end of this thing we have a real case for it. I am not talking about a few thousand dollars, gentlemen. I am talking about a substantial amount of flexible and free support of genetics."*

B. Beyea writes "Maxine Singer and Paul Berg attributed Weaver's 'bribe' offer in the second meeting as reflecting Weaver's determination to get a report finished." Here he relies on a biography written by these authors in 2005, some 49 y after the meeting, to support his interpretation of events. Calabrese (and the HPS) relied on the meeting transcript, which does not mention the word "bribe."

C. It's not clear why Beyea would want to suggest a "bribe" was made to the genetics panel, but accusing anyone of committing a "bribe" can be reasonably interpreted as inflammatory and scandalous. Calabrese never used that word in the HPS video series.

D. Presenting the facts is not the same as making a claim of "financial misconduct" as Beyea suggests. This further demonstrates his lack of historical analysis, resulting in him perpetuating misleading and unreliable information.

57. [p. 517, Section 2.6] Beyea states the committee "accepted the linear no-threshold (LNT) model for mutations at the start of their first meeting in 1955 and never wavered. Thus, the idea that Warren Weaver's promise of potential funding … made in 1956 at the second meeting, influenced support for the LNT, is inconsistent with the time."

A. Episode 11, "Creation of the Biological Effects of Atomic Radiation (BEAR) I Committee" timestamp 13:40, Calabrese discusses Tracy Sonneborn's statement during the 5-6 February 1956 meeting (the second meeting; not the first meeting in November 1955). Here Sonneborn presents several statements to the committee in which he tried to establish the minimum in which the whole committee can agree without dispute. These included (1) that their primary concern is focused on humans, (2) genetic mutations are directly proportional to the total dose (i.e., LNT), and (3) that the overwhelming majority of mutations are harmful. (transcript page 82-89).

B. Beyea claims this discussion occurred in first meeting in November 1955. No discussion occurred that is consistent with his characterization that the committee accepted the LNT and never wavered in the first meeting. It occurred during the second meeting — after Warren Weaver's "dangerous remark" about additional funding (see transcript page 35).

C. Beyea makes two errors by stating (1) that the timing of the Weaver statement occurred after the Committee acceptance of LNT (i.e., Sonneborn's declaration) when it didn't, and (2) that the blind acceptance of the LNT model occurred during the first meeting when it didn't.

58. [p. 518] Beyea quotes Cardarelli et al. "Personal letters among the NAS BEAR genetics panelists and transcripts of their meetings showed that some members of the radiation genetics community had a vested interest in maintaining this ideology so that they would continue to received research funding." (Cardarelli et al. 2023)

A. I stand by that statement based on the meeting transcripts mentioned above.

59. [p. 518] Beyea asks, "How did past peer reviewers miss the overlooking of historical text identified in this article?" He writes about establishing scientific credibility, acknowledges that peer reviews do not guarantee every part of an article to be true, and that it is assumed in peer review that authors correctly report their findings.

A. In this case, no one is better at performing a peer review of Beyea's commentary than Calabrese. I provide my review based on my extensive experience working with Calabrese in producing and defending the HPS video series. Few, if any, chose to obtain the original documents that refute or invalidate Calabrese's work.

B. Anyone who wishes to independently purchase the original documents used by Calabrese to verify the accuracy and context of his claim of scientific misconduct of the 1956 BEAR genetics panel can do so since all are referenced in Calabrese's publications. Clearly, Beyea chose not to do this. Instead, he relied on secondary sources, digital keyword searches, or evidence of some other subjective

strategy to justify his misleading and unreliable conclusions.

C. Beyea writes, "Calabrese's charges of scientific misconduct have never been replicated, only criticized." He then writes, "I am aware of only one claim by Calabrese for which someone else … came independently to the same conclusion based on original historical sources." Beyea attempts to dismiss this as an indirect self-citation. I have shown that Beyea relied on secondary sources to support his position, which conflicted with the primary sources from which Calabrese based his claim of scientific misconduct.

D. Hopefully, the types of textual errors I have identified here will help future reviewers of Beyea's papers pursue the original documents to justify a claim of what was, or was not, covered in reports, articles, and correspondence. At a minimum, they could start by watching the HPS video series.

60. [p. 519] Beyea writes that, "previous and current leaders of the Health Physics Society (HPS) endorsed a narrative that accuses prominent deceased researchers of scientific misconduct."

A. This is a factually incorrect and misleading statement. At the end of each episode and on the HPS website, the following disclaimer language is provided: "*The views expressed do not necessarily represent official positions of the Health Physics Society.*"

B. Beyea failed to acknowledge that this video series was about the history of how LNT came to be the regulatory paradigm and model for cancer risk assessment that is today (Cardarelli et al. 2023). It was not intended to be a discussion about the pros and cons of the LNT model.

C. Also, a consistent message is delivered at the end of each episode stating, "*The HPS is a trusted source of radiation information. We are a scientific organization, and as is offered with the scientific peer review process, viewers are encouraged to send comments or suggested corrections to 'FactCheck@hps.org,' and be sure to include your sources so that we may correct the record if necessary. If any changes are made, they will appear at the end of this episode.*" Beyea did not submit any comments or suggested corrections to FactCheck@hps.org. Instead, he submitted Part 1 of his commentary for publication. He gives no indication of what he plans to include in Part 2. Given the errors and misleading and unreliable information he's provided in his Part 1 commentary, I see no reason to consider his recommendations until he can provide primary sources that challenge or contradict those documents discovered and presented by Calabrese in the HPS video series.

D. It's worth noting that I was forced to change the original title of my recent HP article because the HP Editors stated that it would not be published unless it was changed (Cardarelli 2024a). I was surprised they allowed Beyea to title his paper as "Part 1" without some hint of what is expected in following papers. It is an odd practice and some could infer it as an intimidation tactic. Frankly, Beyea's paper should be retracted due to his numerous misleading and false statements making it an unreliable source of information.

E. I've included "Part 1" in my title to reflect my anticipation of his Part 2. If there is a Part 2, perhaps the HP editors and reviewers will ensure his submissions are of better scientific and historical quality.

61. [p. 519] Beyea states, "They [Calabrese and HPS] wish us to believe that dose threshold models have been rejected for regulation in the past for nefarious reasons, not because they have been found unconvincing or impractical for regulation."

A. There is convincing evidence to support a belief that nefarious activities have occurred in the past to maintain the LNT model. Bill Russell suppressed the results of a cancer and mutation study he conducted in the mid- to late-1950s that showed a threshold effect in mice. It took 35 y before he exposed these results in a publication co-authored with Arthor Upton, Paul Selby, and others to win a court case in the UK in which Russell's colleague, Paul Selby, testified (Cosgrove et al. 1993). Russell explains his reasoning by stating, "It was, therefore, something of a surprise not to obtain a positive result in the experiment described here, and it was feared that publication of a negative finding could mislead the public into a false feeling of safety" (Calabrese, & Selby 2022). Beyea should have cited this in his commentary.

B. In June, 2023, Milloy published an online article exposing nefarious actions taken by prominent people in the radiation community from the EPA, NCRP, and NAS that suppressed relevant scientific information contradicting the scientific validity of the LNT model (Milloy 2023). I published a summary of this article, complete with more than 40 supplementary emails, in *Health Physics Journal* (Cardarelli 2024a).

C. The HPS video series showed evidence of motives to "save" the hit theory (see response comments #9, #10, #47, #52) and financial promises of "free" research money (see response comments #10, #56). I'll let the viewers of the documentary

decide if those were nefarious in nature or just part of an academic practice.

62. [p. 519] Beyea states, "The misconduct allegations by Calabrese and the HPS authors that are analyzed in this article are not supported by the original text, leading to false premises that have persisted in Calabrese's papers since at least 2014."
    A. This is a misleading and false statement. The HPS made no such allegation of scientific misconduct. In the opening statement of Episode 12 (timestamp 1:00), I stated, "Were their [BEAR Genetics Panel] actions transparent and objective? Was there scientific misconduct? Watch, and decide for yourself." Sharing the history, based on primary sourced documents, does not mean HPS made any such accusation.
    B. In Episode 1, (timestamp 1:50) I describe the purpose of this documentary and state, "*We [HPS] are a scientific organization and as such, seek truth and transparency on how science may or may not be incorporated in radiation protection standards, guidelines, and policies. These videos are offered to the world in a transparent pursuit of truth to garner trust among those who view them."*
    C. Beyea used a clever logical fallacy known as framing bias by selectively emphasizing or omitting aspects of this issue, which distorts the reader's perception and understanding. He artfully exercises his own "selective stakeholder perception" by making this false statement. This leads to other logical fallacies such as the straw man fallacy, where an opponent's argument is distorted to make it easier to refute, or the bandwagon fallacy, where popularity is used as evidence of validity.
63. [p. 519] Beyea writes, "What does a furor at 50 R have to do with the HPS authors' proposal of a dose threshold at 10 R? We are not told."
    A. Again, Beyea missed the point of the HPS video series (and associated publication). It was to present the history of the LNT model, not to validate or refute its use in cancer risk assessment. In response to his question, I refer him and his supporters to read the HPS Position Statement on Radiation Risk (https://hps.org/documents/radiationrisk.pdf).
64. [p. 519] Beyea writes "Calabrese claimed that the committee censored the record in the interest of future financial gain, which it did not. No censoring occurred, as shown by examination of the actual committee report."
    A. This is another factually incorrect statement. I refer the readers to response comments #40 and #56 for a detailed discussion about the financial motive provided to the panel by its Chair. Beyea's summary and conclusion section continues to perpetrate a false and misleading history via his own selective stakeholder perception. HPS presented the source documents provided by Calabrese in the documentary to support his interpretation.
    B. I refer the readers to response comment #39(B), which quotes a letter from Crow to Weaver stating, "The limits presented on our estimates of genetic damage are so wide that the reader will, I believe, not have any confidence in them at all." Calabrese exposed how Crow and the NAS Committee arbitrarily modified the uncertainty estimate, which supports his claim of fabrication of the scientific record.
    C. Beyea says he relied on the actual committee report to support his version of events. Calabrese relied on the actual committee meeting transcripts, which conflicted with the report. Calabrese exposed these conflicts and concluded that they met the scientific misconduct definition by falsifying and fabricating the scientific record.
65. [p. 519] Beyea states, "Furthermore, the early atomic bomb genetic data did not, as Calabrese and the HPS authors claim, show or suggest a threshold dose response."
    A. I refer the reader back to response comment #28. Episode 17 shows multiple studies over a 30-y period where a J-shaped dose response is consistently present among the Atomic Bomb survivors with leukemia. Further, Neel's original 1955 study did not support the LNT theory. All of this information isn't challenged by Beyea, yet he makes a declarative statement that there was no censoring of threshold effect in the atomic bomb data — when, in fact, an argument can be made that there was.
66. [p. 520] Beyea states, "The HPS leadership has gone along, handing out professional credit, according to the video website, for watching these video interviews of Calabrese that promote falsehoods about historical events and personalities." See response comment #6 for a detailed response. Beyea's comment is inaccurate and inappropriately attacks the credibility of the HPS.
67. [p. 520] Beyea states, "Calabrese and the HPS authors have an important role to play in challenging conventional wisdom about dose response, but when errors creep into their work and remain unresolved for long periods of time, their credibility will suffer. While contrary views are needed in the scientific enterprise to help guard against hardening of the intellectual

arteries, conspiracy theories and character assassination (Croc 2011) are not needed."

A. I agree with Beyea's statement that we have an important role to play in challenging conventional wisdom about dose response. However, it is Beyea who's allowed errors to creep into his work by relying on secondary sources and failing to conduct a proper historical analysis. Therefore, his credibility and publications are unreliable and must be treated with great skepticism.

B. It is a false allegation that Calabrese and the HPS engaged in conspiracy theories or character assassination. The facts presented are based on primary sources; Beyea's are not.

68. [p. 520] Beyea states, "No villains need to be created to explain strong disagreements among researchers and within advisory committees."

A. Beyea suggests that Calabrese and HPS created villains in an effort to strengthen the case of scientific misconduct against the 1956 Genetic Panel. That term was never used in the HPS video series. He misleads his readers in this context and exposes his personal bias. He cleverly engaged in a circumstantial ad hominem attack on Calabrese and the HPS by attempting to suggest that the pursuit for truth based on primary sources was biased and therefore false.

69. [p. 520] Beyea states, "The challenge now is to correct the record and prevent such errors from happening in future historical work."

A. Ideally, Beyea should apologize in a thoughtful retraction to his readers and the HPS for falsely attacking the content presented in the video series based on his careless historical analyses and personal bias. He could benefit from hiring someone without a stake in the dose-response debate to check his claims about reports, papers, and correspondence using primary sources instead of relying on secondary sources.

70. [p. 520] Beyea states "The HPS authors should: 1. Make clear that they did not check the original documents adequately, which is apparently the case."

A. This is another misleading statement. As the producer of the HPS documentary, I required that original documents support any potentially controversial position expressed by Calabrese. These were shown throughout the HPS video series. I refer the reader to response comment #12 for further insight.

71. [p. 520] Beyea states HPS should "2. Update their article and the website of the video series to indicate that questions have been raised about the factual accuracy and relevance to more recent dose-response assessments of many of Calabrese's historical claims. An errata sheet would be helpful."

A. Please see my response comment #60. In summary, given the errors, misleading and unreliable information that Beyea provided in his Part 1 commentary, I see no reason to consider his recommendations until he can provide primary sources that challenge or contradict those documents discovered and presented by Calabrese in the HPS documentary.

72. [p. 520] Beyea states HPS should "3. Provide references and links to this commentary, to earlier publications, and later, to other properly documented commentaries that they receive in the future that differ from the current website or support it."

A. I refer the readers to response comments #5, #7, #12, #17, #22, #32, and #62. These discuss the purpose of Beyea's commentary (i.e., challenge the accusation of scientific misconduct) and the HPS video series (i.e., describe the historical evolution of the LNT model). Beyea also attempts to conflate his primary purpose by erroneously characterizing the video series as an anti-LNT message.

B. During my tenure as HPS President (2021-2023), this issue of providing references that support or refute the validity of the LNT was discussed among the HPS Board of Directors, and they decided not to do it. The challenge would be how to select references and deciding when to end it. There are thousands of publications on this topic. Ultimately, it is left to the researcher/readers/viewers to base their conclusion on the peer-reviewed literature or other reputable sources.

73. [p. 521] Beyea states HPS should "4. Arrange for corrections, references, and links to be provided to anyone who obtained professional credit for viewing the interviews of Calabrese."

A. I refer the readers to response comments #6 and #66. HPS does not provide professional credits. Beyea should address his concern to the AAHP.

B. As a Certified Health Physicist, I'm a member of AAHP and would suggest they share Beyea's commentary (if it is not retracted) and my responses to it because these exchanges could represent an important contribution to the LNT scientific discussion.

74. [p. 521] Beyea states HPS should, "5. Recommend that the video series be renamed, 'The early history of the LNT by Professor Edward Calabrese.'"

A. I disagree with Beyea. The title accurately reflects the historical foundations of the LNT dose response model for cancer risk assessment. Episode 1 explains why Calabrese was interviewed. No one has come forward with primary sources that challenge or contradict the historical record exposed by Calabrese.

DISCUSSION AND CONCLUSION

LNT supporters aren't defending a scientific consensus — they're peddling a political narrative. The LNT model, which claims there's no safe level of radiation exposure, has become a convenient weapon for advancing agendas like overregulation, fear-mongering, and hindering technologies such as nuclear power and nuclear medicine. Critics like Beyea default to politics and logical fallacies because their version of history and science is flimsy and highly questionable. Unfortunately, when their tactics of ignoring the facts presented by Calabrese and many others fail, they attack in an effort to discredit and harm their professional career and to silence them into submission. The commentary by Beyea is an example of his attempt to counter the facts presented by Calabrese in the HPS video series on the historical evolution of the linear no-threshold model. The documentary accurately presents historical events based on primary-sourced documents as discovered by Calabrese. Suggested changes are always welcomed, but they must be supported with primary-sourced evidence and not driven by ideology. My criticisms of Beyea are consistent with those from Calabrese, Cuttler, Sacks, and Siegel.

The Committee on Publication Ethics (COPE) has established clear criteria for retracting a paper, emphasizing transparency and integrity in the publication process. A paper should be considered for retraction if there is evidence of unreliability. COPE emphasizes that retractions are aimed at correcting the literature and alerting readers to articles that contain such seriously flawed or erroneous content that their findings and conclusions cannot be relied upon. I believe Beyea's commentary meets this standard, and the *Health Physics Journal* should retract it. His commentary demonstrates several critical flaws that undermine its integrity and accuracy, warranting its removal from the scientific record. These flaws fall under several COPE categories, including:

1. Falsification and Misrepresentation of Data: Beyea's paper misrepresents Edward Calabrese's work and arguments. Instead of directly addressing the primary source data presented by Calabrese, Beyea characterizes evidence-based claims as mere "theories." This constitutes a falsification of the nature of Calabrese's research and the foundation upon which it rests. As detailed in HPS video series Episode 12, Calabrese's claims are supported by primary source data, which Beyea fails to discredit or even adequately address.
2. Lack of Objectivity and Bias: Beyea's stated purpose is to defend the "integrity of historical figures and committees," indicating a pre-existing bias that compromises the objectivity of his analysis. He relies heavily on secondary sources while neglecting to critically examine or challenge the primary-sourced information presented by Calabrese. This selective approach to evidence is inconsistent with the principles of unbiased scientific inquiry.
3. Misleading Statements and Omission of Important Information: Beyea makes several misleading statements that distort the context of the debate. For example, Beyea neglects to define "scientific misconduct," a crucial omission given that Calabrese's claims are explicitly based on the NAS Code of Conduct. Beyea also inaccurately characterizes "members" receiving professional credit for watching the HPS video series. He fails to recognize that those "members" are Certified Health Physicists in the AAHP, not just members of the HPS. These omissions and misstatements contribute to a distorted and inaccurate portrayal of the facts, violating COPE guidelines on honest and transparent reporting.
4. Concerns about Validity: Given the demonstrated errors of fact, reasoning, and omission of relevant information, serious concerns arise regarding the overall validity of Beyea's conclusions. The paper, in my opinion, does not meet the standards of scholarly rigor and objectivity expected in scientific publications.

In conclusion, Beyea undermined the validity of his defense of historical figures accused of scientific misconduct by (1) relying on secondary sources, (2) mischaracterizing historical facts, (3) using logical fallacies, (4) ignoring evidence provided in the video series, and (5) failing to contradict the primary-sourced evidence presented in the HPS video series describing the historical evolution of the LNT model for cancer risk assessment. Ultimately, his numerous errors and misleading assertions warrant a careful re-evaluation of his claims and consideration for retraction, underscoring the importance of rigorous scrutiny. Comprehensive analysis of primary sources and an impartial perspective are paramount to establishing discourse on a foundation of precise representation.

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