

# IAAC COMPLAINT

*Energy Alberta Peace River Nuclear Power Project*

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## CNSC Conveniently Ignores the Latest Research

**Source: INWORKS 2023–2025; Harvard Environmental Health 2025; Harvard Nature Communications 2026; IJMS March 2025; Current Environmental Health Reports Meta-Analysis 2024; European Journal of Epidemiology November 2024**

### The Argument

The Canadian Nuclear Safety Commission’s radiation health protection framework rests on three claims in that:

- The CNSCs’ risk coefficient of five percent per Gray adequately captures the cancer mortality risk from chronic low-dose radiation;
- The linear no-threshold model is conservative at low doses;
- Compliance with dose limits derived from these two claims constitutes adequate provision for the protection of health under the Nuclear Safety and Control Act.

The original INWORKS cohort study in August 2023 challenged the CNSC’s radiation health protection framework. The CNSC’s response, posted on its public website, acknowledged that INWORKS found “positive associations” between chronic low-dose radiation and deaths from leukemia, solid cancers, and circulatory disease. The CNSC acknowledged that the INWORKS risk estimate for solid cancer mortality was higher than the estimate currently used in radiation protection, but the CNSC took no regulatory action.

Between August 2024 and February 2026, six major peer-reviewed publications materially challenged or removed the scientific basis for each of these claims. Three further papers from the same INWORKS investigator group, using the same cohort, have since been published — each extending and in key respects amplifying the findings the CNSC acknowledged in 2023. The CNSC has not publicly acknowledged or responded to any of them.

The CNSC is avoiding a conclusion it does not want to reach, specifically in that the CNSC’s radiation health protection framework has been invalidated in its central quantitative claim that its risk coefficient of five percent per Gray represents an adequately conservative estimate of cancer risk from chronic low-dose radiation.

A framework whose central quantitative claim is wrong by a factor of ten to twenty-eight is not a framework with a margin of error. It is a framework that has been shown not to measure what it claims to measure.

## The Six Studies the CNSC Has Not Addressed

The following six studies were published after the CNSC’s August 2023 INWORKS response. None appear on any CNSC public guidance page, in any regulatory communication, or in any document filed in IAAC Registry #89430.

Study 1 — INWORKS Haematological Cancers	
<b>Publication</b>	Lancet Haematology, August 2024
<b>DOI</b>	10.1016/S2352-3026(24)00240-0
<b>Cohort</b>	309,932 individually monitored nuclear workers; France, UK, USA
<b>Key finding</b>	Leukemia mortality ERR 2.68 per Gray of red bone marrow dose (268 percent excess per Gray). First documentation of myelodysplastic syndrome as a dose-associated disease in a large occupational cohort.
<b>CNSC coefficient</b>	None for myelodysplastic syndrome. Leukemia coefficient in use predates this finding.
<b>CNSC response</b>	None.

This study documents a dose-associated bone marrow disease for which the CNSC has no risk coefficient. Peace River residents and workers who develop myelodysplastic syndrome will not appear in any CNSC health projection. The disease causes chronic immune failure and transforms to acute leukemia in 30 to 40 percent of cases. Its absence from the CNSC’s framework is not a minor gap. It is the absence of an entire radiation-associated disease pathway from the health accounting the Review Panel will be asked to rely upon.

Study 2 — INWORKS Temporal Variation	
<b>Publication</b>	European Journal of Epidemiology, November 2024
<b>DOI</b>	10.1007/s10654-024-01178-6
<b>Cohort</b>	309,932 workers; same INWORKS cohort
<b>Key finding</b>	Radiation-associated excess cancer risk persists for decades after exposure ends. Younger age at first exposure produces longer-duration excess risk.
<b>CNSC model</b>	Health consequences modelled as arising during the operating period. Risk treated as diminishing after decommissioning.
<b>CNSC response</b>	None.

The CNSC’s operating-period-bounded model systematically underestimates lifetime population harm by construction. A child born near the Peace River facility in 2030 who receives low-dose exposure during the facility’s operating years will carry elevated cancer risk into the 2090s, decades after the facility is decommissioned and the CNSC’s health projections cease to count. The 70-year operating licence is not a boundary on the health burden. It is a boundary on the CNSC’s accounting.

<b>Study 3 — INWORKS Site-Specific Cancers and Low-Dose Slope</b>	
<b>Publication</b>	American Journal of Epidemiology, May 2025
<b>DOI</b>	10.1093/aje/kwae256
<b>Cohort</b>	309,932 workers; 28,089 solid cancer deaths
<b>Key finding</b>	Positive dose-response associations for stomach, colon, lung, bone, skin, ovary, and thyroid individually. At 0–100 mGy, the cancer mortality association approximately doubles relative to the full-range slope. Authors explicitly state the ERR is larger than estimates currently informing radiation protection.
<b>CNSC claim</b>	LNT is conservative at low doses — it overestimates risk below regulatory limits.
<b>CNSC response</b>	None.

This is the most consequential INWORKS update for Peace River. The 0 to 100 mGy dose range is exactly the range most relevant to Peace River residents receiving routine emissions from the facility. The CNSC’s claim that its framework is conservative at low doses — that LNT overestimates risk below regulatory limits — is directly and explicitly contradicted by the principal investigators of the world’s largest nuclear worker study. The dose-response slope is not flatter at low doses, as the CNSC’s DDREF assumption requires. It is steeper. The CNSC’s safety margin runs in the wrong direction.

<b>Study 4 — Harvard Massachusetts Cancer Incidence</b>	
<b>Publication</b>	Environmental Health, December 2025
<b>Authors</b>	Alwadi, Koutrakis et al.
<b>Key finding</b>	Cancer incidence increased as distance to the nearest nuclear power plant decreased across all Massachusetts ZIP codes. Signal prompted a follow-on Harvard biomarker study measuring DNA damage in blood samples from residents near the Pilgrim plant.
<b>Limitation</b>	Geographic proximity used as exposure proxy, not individual dosimetry. Acknowledged.
<b>CNSC framework</b>	Predicts no detectable cancer signal in populations receiving authorised exposures.
<b>CNSC response</b>	None.

The limitation of proximity as an exposure measure is real and should be acknowledged in the submission. Its regulatory significance here is not as proof of causation but as the basis on which the Harvard research team — the scientists most familiar with the study’s limitations — concluded the signal was strong enough to warrant biological investigation. They launched a follow-on study measuring actual DNA damage in blood. A finding the investigators themselves considered serious enough to pursue further is a finding the CNSC is obliged to address.

Study 5 — Harvard National Cancer Mortality	
<b>Publication</b>	Nature Communications, February 23, 2026
<b>DOI</b>	10.1038/s41467-026-69285-4
<b>Authors</b>	Alwadi, Alahmad, Vieira, Landrigan, Christiani, Koutrakis et al.
<b>Key finding</b>	Every US county, every NPP, 2000–2018. Counties closer to nuclear plants had higher cancer death rates. Controls: income, education, smoking, body weight, race, healthcare access. Approximately 6,400 cancer deaths per year nationally associated with proximity.
<b>Limitation</b>	Geographic proximity used as exposure proxy, not individual dosimetry. Acknowledged.
<b>Peace River</b>	Peace River town sits at 30 km from the proposed site — the outer boundary at which this study and the 47-study 2024 meta-analysis both find statistically significant signals.
<b>Publication date</b>	Seven days before IAAC process resumed March 2, 2026.
<b>CNSC response</b>	None.

This study was published in one of the world’s most selective scientific journals, seven days before this regulatory process resumed, by a team that includes researchers from Harvard, Boston University, and the University of Toronto. The geographic proximity limitation acknowledged in Study 4 applies here equally and should be noted. What cannot be noted away is the combination: a 47-study meta-analysis across 17 countries finding elevated cancer risk within 30 kilometres of nuclear plants, and now a national US study with controls for every major confounding variable finding the same signal at the same distance. Peace River town is at exactly that distance. The CNSC has said nothing.

Study 6 — Epigenetic and Transgenerational Harm	
<b>Publication</b>	International Journal of Molecular Sciences, March 4, 2025
<b>DOI</b>	10.3390/ijms26052269
<b>Key finding</b>	Low-dose ionising radiation at doses within regulatory limits induces heritable epigenetic modifications in germline cells — DNA methylation, histone modification, noncoding RNA changes — transmitted to children and grandchildren never themselves exposed. Animal studies document transmission to the F3 generation.
<b>CNSC instrument</b>	Heritable effects coefficient captures classical DNA sequence mutation only. Epigenetic pathway not included.
<b>CNSC response</b>	None.

The CNSC’s heritable effects accounting captures the probability that radiation-induced DNA sequence mutation in an exposed parent will cause hereditary disease in a child. Epigenetic transgenerational harm operates through an entirely different mechanism — modifications to gene expression patterns rather than to the DNA sequence itself — and is not captured by that coefficient. The biological legacy of a 70-year operating licence extends across at least three generations of Peace River families through a pathway the CNSC’s framework was never designed to detect and has not acknowledged.

## Why INWORKS Cannot Be Dismissed

The CNSC's standard response to epidemiological findings it does not wish to incorporate is methodological critique. INWORKS does not admit of the critiques the CNSC has applied to proximity studies, ecological analyses, and single-country cohorts. INWORKS followed 309,932 individually monitored nuclear workers across France, the United Kingdom, and the United States over an average of 35 years, accumulating 10.72 million person-years of observation and 103,553 deaths.

Each worker carried a personal dosimeter. The dose-response association was measured against each individual's own recorded exposure, not against geographic proximity or population-level estimates. The healthy worker effect — the tendency of employed populations to be healthier than the general public at baseline — runs against the INWORKS finding, not in its favour: if anything, INWORKS underestimates the risk to the general public. The cohort was coordinated by the International Agency for Research on Cancer, the WHO's own cancer research body, with national coordination by France's IRSN, the UK's UKHSA, and the United States' NIOSH. The exposure scenario — chronic low-dose-rate external gamma radiation accumulated over a working lifetime — is the correct analogue for Peace River workers and, at lower magnitude, for Peace River residents.

There is one respect in which INWORKS systematically underestimates the risk to Peace River specifically: INWORKS dosimetry captures external gamma radiation only. It does not capture internal dose from tritium, carbon-14, or other radionuclides released by CANDU reactors. CANDU's tritium releases are substantially higher than those of light-water reactors, and tritium as organically bound tritium incorporates directly into human tissue. The INWORKS coefficients are therefore a lower bound for Peace River workers and residents, not a central estimate. The CNSC has used the internal-dose limitation to dismiss INWORKS. The correct inference is the opposite: if INWORKS finds the associations it finds while missing the dominant CANDU exposure pathway, the true coefficient for a CANDU-adjacent population is higher than INWORKS measures, not lower.

## How These Studies Affect the CNSC's Current Model

The CNSC's risk framework rests on five pillars. The six studies above remove or materially challenge each one.

- **The risk coefficient.** The CNSC uses five percent per Gray — the ICRP's nominal ten percent per Gray halved by a Dose and Dose Rate Effectiveness Factor of two, on the theoretical basis that chronic low-dose exposure allows DNA repair not available during an acute burst. INWORKS measures the chronic scenario directly and finds a central ERR of 52 percent per Gray at the full dose range and approximately 144 percent per Gray at the 0 to 100 mGy range relevant to Peace River. Whether the comparison is made in cancer deaths or in cancer cases — incidence and mortality share the same underlying coefficient, so the ratio is identical either way — the CNSC's framework projects between twelve and twenty-eight times fewer cancers than INWORKS directly measures for the relevant exposure scenario. The DDREF assumed a repair advantage. INWORKS shows no such advantage exists. This pillar is removed.
- **The conservatism of LNT.** The CNSC states that the linear no-threshold model errs on the side of overestimating risk at low doses — that there is a safety margin below regulatory limits. The AJE May 2025 INWORKS paper directly contradicts this: the cancer association slope at 0 to 100 mGy is approximately double the full-range slope. LNT, calibrated against the full-range slope, underestimates risk at exactly the dose range most relevant to Peace River residents. The safety margin the CNSC claims runs in the wrong direction. This pillar is removed.

- **The completeness of disease accounting.** The Lancet Haematology 2024 paper introduces myelodysplastic syndrome as a radiation-associated disease for which the CNSC has no coefficient. The EJE November 2024 paper establishes that radiation-attributed cancer risk persists for decades after exposure ends — a temporal dimension the CNSC’s operating-period-bounded model ignores. The IJMS March 2025 paper documents epigenetic transgenerational harm through a mechanism the CNSC’s heritable effects coefficient does not capture. The CNSC’s framework cannot see the majority of the health burden it purports to assess. This pillar is removed.
- **Population-level assurance.** The CNSC’s framework predicts that authorised exposures near nuclear plants are too low to produce a detectable cancer signal in surrounding populations. Two peer-reviewed Harvard studies find cancer signals at the proximity distances and dose levels the CNSC characterises as safe. Both carry methodological limitations that should be acknowledged. Neither has been acknowledged by the CNSC. A regulator whose framework predicts no signal where peer-reviewed literature consistently finds one is obligated to explain the discrepancy. It has not done so. This pillar is challenged.
- **Generational adequacy.** The CNSC’s framework protects the exposed generation and their direct offspring through classical genetic mutation coefficients. The IJMS March 2025 paper establishes that epigenetic transgenerational harm extends beyond this scope through heritable mechanisms the CNSC has no instrument to detect or limit. This pillar is removed.

Between **twelve and twenty-eight times more cancers** — whether measured as deaths or as diagnoses — is not a difference of modelling preference. It is the direct consequence of the CNSC using a theoretical correction factor derived from 1945 atomic bomb survivor data rather than the coefficient INWORKS measured directly for the exposure scenario Peace River workers and residents would actually experience. The ratio is the same in deaths and in cases because it arises entirely from the choice of coefficient, not from any assumption about survival. The CNSC has acknowledged that INWORKS finds a higher risk than its framework assumes. It has taken no action. Three further INWORKS papers have since confirmed and extended that finding. The CNSC has acknowledged none of them.

## CNSC Institutional Dysfunctionality and Its Consequences for This Review

The pattern documented in this Show Stopper is not a series of isolated oversights. It is the visible expression of a structural institutional failure: a regulator that treats its own published risk framework as a conclusion to be defended rather than a hypothesis to be tested against the evidence. The CNSC published an INWORKS response in 2023 in which it acknowledged that the study found higher cancer risk than its framework assumes and then concluded that no action was required. It offered no quantitative reconciliation between what INWORKS found and what its framework projected. It identified no mechanism by which its framework would be triggered to update. It simply declined to draw the consequence its own acknowledgement required. That is not regulatory caution. It is institutional dysfunction.

Dysfunction of this kind is not a matter of internal CNSC management. It has direct and specific consequences for the statutory function this Review Panel is required to perform. The Impact Assessment Act requires the Review Panel to evaluate whether the Energy Alberta project is in the public interest, having regard to health effects among other factors. That evaluation requires accurate health effect projections. The CNSC’s health projections are the primary scientific input through which health effects reach the Review Panel’s analysis. If those projections systematically understate harm by a factor of twelve

to twenty-eight because the CNSC has declined to update a risk coefficient in the face of directly contradicting evidence it has itself acknowledged, the Review Panel cannot perform its statutory function. It will be evaluating the public interest on the basis of health data that the current science has shown to be materially wrong, with no warning from the body responsible for producing that data that anything is amiss.

The CNSC's dysfunction also prevents the Review Panel from discharging its duty to Indigenous communities in the Peace River region. The duty to consult and accommodate requires meaningful engagement on the health consequences of the project. Meaningful engagement is impossible when the health projections underlying the consultation are derived from a framework the science has broken and the regulator has declined to fix. The Peace River Métis and First Nations communities who will live within the emission plume of this facility for 70 years are entitled to be consulted on the basis of accurate health projections, not on projections that project between twelve and twenty-eight times too few cancers because the CNSC has chosen institutional inertia over scientific currency.

The Review Panel should not accept that this is simply a matter of scientific disagreement on which the CNSC's position is as defensible as any other. The CNSC's own 2023 INWORKS response concedes the central point: INWORKS finds a higher risk than the CNSC's framework assumes. The CNSC then declines to update the framework or quantify the gap. Three further INWORKS papers have since made the gap larger and more specific. The CNSC has said nothing. That sequence — acknowledgement, inaction, continued silence through three confirmatory publications — is not scientific caution. It is a regulator that has subordinated its scientific mandate to its institutional interest in the stability of a framework it has built its licensing regime around. The Review Panel is not required to accept the outputs of that framework as if the foregoing had not occurred.

A regulator that acknowledges peer-reviewed evidence shows its framework understates cancer risk, takes no action, and then goes silent through three further confirmatory publications from the same research programme is not exercising scientific judgement. It is protecting an institutional position. A Review Panel that relies on the health projections of a regulator in that condition cannot discharge its statutory obligation to evaluate health effects under the Impact Assessment Act. **The CNSC's institutional dysfunction is not the Review Panel's problem to manage. It is the Review Panel's obligation to name.**

## The Statutory Argument

The Nuclear Safety and Control Act mandates that the CNSC regulate nuclear activities to protect the health and safety of persons. Section 24(4) requires, as a condition of licensing, adequate provision for the protection of health and safety. The phrase is adequate provision for the protection of health — not adequate compliance with a risk coefficient the CNSC has declined to update in the face of evidence it has acknowledged shows the coefficient understates harm.

The Impact Assessment Act requires consideration of health effects as a factor in the assessment of designated projects. Health effects are not defined by reference to the CNSC's internal risk framework. A Review Panel evaluating whether the Energy Alberta project is in the public interest cannot discharge its statutory function by reference to health projections that use a risk coefficient the current science has shown to be between twelve and twenty-eight times too low, without any acknowledgement by the CNSC that the science has moved.

The CNSC's obligation under section 9 of the Nuclear Safety and Control Act includes the mandate to conduct and sponsor research on matters within its mandate and to disseminate scientific, technical, and regulatory information. A regulatory body that acknowledges a finding, publishes a formal response declining to act on it, and then goes silent as three further papers from the same research programme confirm and extend that finding is not meeting its dissemination obligation. It is selectively publishing only what it is prepared to defend.

A licensing determination that rests on health projections derived from a risk framework the CNSC has not updated in response to evidence it has itself acknowledged does not constitute adequate provision for the protection of health under section 24(4) of the Nuclear Safety and Control Act. It constitutes compliance with an outdated and self-acknowledged-inadequate number. The Review Panel is respectfully asked to distinguish between the two.

### **What the IAAC Must Require**

The IAAC should require, as a condition of accepting the CNSC's health risk assessment as adequate for review purposes: that the CNSC provide a written, scientifically substantiated response to each of the six studies identified above, addressing specifically how each study affects or does not affect its risk coefficients, disease accounting, and dose limit adequacy assessments for the Peace River project; that the CNSC calculate the ratio between its current ICRP/BEIR risk projections and the projections that would result from applying the INWORKS central and low-dose coefficients, and explain in writing why a DDREF-corrected coefficient derived from 1945 atomic bomb survivors should be preferred over a coefficient measured directly from the chronic low-dose-rate exposure scenario that Peace River workers and residents would actually experience; that the CNSC address the AJE May 2025 finding that the low-dose cancer association slope approximately doubles at 0 to 100 mGy, and explain how this is consistent with the continued application of a DDREF premised on the opposite assumption; that the CNSC include disease categories for which the 2024 and 2025 INWORKS publications establish dose associations but for which no CNSC risk coefficient exists, including myelodysplastic syndrome, post-exposure cancer persistence, and cardiovascular disease; and that the CNSC's health projections be reviewed by at least two independent epidemiologists with no prior institutional affiliation with the CNSC, the IAEA, or any nuclear operator, who are asked specifically to assess whether the projections are consistent with the current peer-reviewed literature.

In the alternative, if the IAAC accepts that the CNSC is not required to respond to peer-reviewed literature published before the close of this review, the IAAC should record in its report to the Minister that the health risk projections for the Energy Alberta project were assessed using a framework whose risk coefficient is between twelve and twenty-eight times lower than the coefficient the world's largest nuclear worker study directly measured for the relevant exposure type; that the CNSC acknowledged in 2023 that INWORKS found higher risk than its framework assumes and took no action; that three further INWORKS publications since 2023 have confirmed and extended that finding and the CNSC has not addressed any of them; and that the Review Panel was therefore unable to form a view on the accuracy of the health projections it was asked to rely upon, because the body responsible for producing those projections declined to engage with the science that challenged them.

## References

The following references are cited in the new and updated material in this document. All references to CNSC internal documents are to the published CNSC versions available on [cnscccsn.gc.ca](http://cnscccsn.gc.ca).

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13. Canadian Nuclear Safety Commission, *Health Effects of Tritium*, INFO-0799, CNSC, Ottawa, 2010.
14. Canadian Nuclear Safety Commission, *Radiation and Incidence of Cancer around Ontario Nuclear Power Plants from 1990 to 2008 (RADICON)*, CNSC, Ottawa, 2013.
15. A companion quantitative analysis — CNSC INWORKS Quantitative Risk Analysis: Projected Excess Deaths, Peace River Workers and Public — is filed as a companion document to this submission and provides the full methodology, dose assumptions, worker scenario disaggregation, and formal requests for EIS dose table disclosure on which the multiplier figures cited in this Show Stopper are based.