

IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project — Registry #89430

A Formal Submission to the Impact Assessment Agency of Canada
IAAC Registry #89430 — Energy Alberta Peace River Nuclear Power Project
March 2026

SHOW
STOPPER
31

THE IAAC PROCESS IS INVALID AND CANNOT BE CURED

Seven Independent Grounds of Structural Invalidity, Institutional Failure, and the Case for a Full Process Restart

Show Stoppers 1 through 29 establish, across three categories — the evidence, the institution, and the law — that this project cannot be approved. Show Stopper 30 establishes something prior to all of them: that the process through which approval is being sought has been corrupted in ways the IAAC cannot cure by proceeding.

This Show Stopper — SS31 — makes the cumulative legal case. It does not repeat the factual analysis of Show Stoppers 1 through 30 in full. It integrates the conclusions of those submissions into a structured argument for invalidity and restart, with each of the seven grounds of invalidity stated in terms of the statutory provisions it violates, the facts on the record that establish the violation, and the reason no supplementary process can cure it.

The IAAC is not merely in the position of a decision-maker with an incomplete record. It is trapped in the precise legal sense — every path available to it on the current record produces a consequence it cannot lawfully defend. The IAAC cannot proceed to a positive finding without producing a knowingly invalid approval.

The seven grounds are as follows. First, the project description does not satisfy the substantive requirements of IAA s. 10 and Regulation 7 of the Physical Activities Regulations, because the designated project has no committed technology and no Canadian regulatory basis for either technology under simultaneous consideration. Second, the planning phase participation record cannot be certified as satisfying IAA ss. 6(1)(h), 11, and 27, because it was built against a CANDU MONARK project description the proponent was simultaneously moving away from, without formal notice, without supplementary participation, and without a Plant Parameter Envelope. Third, the three categories of information the IAAC's own June 2025 Summary of Issues declared mandatory — a waste management plan, 100-year water projections, and a health baseline — have not been provided, and the assessment has continued. Fourth, Canada's obligations under the World Heritage Convention (SOC Decision 4339) and the Alberta-NWT Transboundary Water Agreement have been formally placed on the record of this proceeding by a government party and remain unaddressed. Fifth, the CNSC cannot discharge its advisory function on the current record across six documented dimensions, including the absence of a VDR for either technology, two-cycle IAEA dose framework non-compliance, and a formal institutional refusal of the benefits-outweigh-harm analysis the Panel must conduct. Sixth, the Panel cannot complete the statutory assessments required by IAA ss. 60 to 63 on a record that does not define the project, does not satisfy mandatory information requirements, and relies on a primary technical adviser structurally incapable of supporting the Panel's central statutory obligation. Seventh, the FPIC given by the nineteen affected Indigenous communities during the planning phase is not valid consent to a project whose physical character has materially changed without notice.

The Agency has continued the assessment with knowledge of each of these grounds. That conduct is irresponsible in the institutional sense — not as a rhetorical characterisation, but as a specific description of what occurs when a quasi-judicial body exercises statutory authority on a record it has been formally told is invalid, without requiring the proponent to remedy the invalidity and without disclosing the grounds of invalidity to the Panel. Part One documents the eight specific instances in which the Agency has exceeded its powers, undermined the process, or continued in ways that compromise the lawfulness of any finding the Panel might make. Parts Two through Four address the CNSC's independent failures and the CNSC's failure to discharge its mandatory disclosure obligations. Part Five documents Energy Alberta's conduct as the proximate cause of the invalidity grounds that trace to the project description and participation record. Part Six states the conditions that must be satisfied before a restarted process can produce a lawful outcome.

THE EIGHT IAAC NEGLECTS THAT INVALIDATE THIS ASSESSMENT

Each of the following is independently sufficient to require the Panel to halt the assessment and refer the matter back for a restarted process. They are numbered here for cross-reference throughout this submission.

IAAC Neglect 1 — Conducting a Statutory Assessment Against a Legally Undefined Project Description

IAA s. 10 and Physical Activities Regulation 7 require identification of the physical components of the designated project before the assessment commences. The reactor is the project. A project description naming two mutually exclusive technologies simultaneously does not satisfy s. 10. Every statutory assessment performed on the current record is an assessment of a legally undefined project.

(Part One, §1.1; SS 23, SS 29)

IAAC Neglect 2 — Allowing the Planning Phase to Close on a Participation Record That Cannot Be Certified

The Agency allowed the planning phase to close with all participant submissions directed to CANDU MONARK-specific parameters, then permitted the proponent to enter a Westinghouse AP1000 MOU without formal process notice, without an amended project description, and without a supplementary participation opportunity. The record's adequacy under IAA ss. 6(1)(h), 11, and 27 cannot be certified.

(Part One, §1.2; SS 29)

IAAC Neglect 3 — Proceeding Without the Mandatory Assessments the IAAC's Own Summary of Issues Required

The June 2025 Summary of Issues formally required a complete waste management plan, 100-year climate-adjusted water projections, and a Peace River health baseline characterisation before the Impact Statement phase. None has been provided. The assessment has continued on a record the Agency's own process declared factually incomplete.

(Part One, §1.3; SS 24, SS 28)

IAAC Neglect 4 — Advancing While UNESCO's August 2026 Mission Is Live and Canada's Treaty Obligations Are Formally Unaddressed

UNESCO's 2023 SOC Decision (SOC 4339) required all major PAD watershed projects to address OUV impacts before approval. UNESCO's August 2026 Reactive Monitoring Mission is proceeding this year. The NWT government formally documented a Transboundary Water Agreement breach on this proceeding's record in July 2025. The Agency has addressed neither obligation.

(Part One, §1.4; SS 25)

IAAC Neglect 5 — Treating the CNSC as Adequate Technical Authority for an Analysis the CNSC Has Formally Declined to Conduct

IAA ss. 60–63 require a public interest determination that is, at its core, a benefits-outweigh-harm analysis. The CNSC formally refused to apply this standard — 'Not accepted' on the published IAEA record — and confirmed the same in Federal Court (CARN v BWXT, 2022 FC 849). The Agency has not disclosed this to the Panel or commissioned an independent analysis.

(Part One, §1.5; SS 26)

IAAC Neglect 6 — Accepting Dose Projections From a Framework the IAEA Found Non-Compliant in Two Consecutive Reviews

IAEA GSR Part 3 Requirement 29 requires a dose constraint before facility design is fixed. The IAEA's 2019 IRRS mission found the CNSC non-compliant (Recommendation R2). The 2024 follow-up found R2 still open. No dose constraint exists for the Peace River facility. The Agency accepted the resulting dose projections as adequate health protection without requiring the CNSC to remedy the non-compliance.

(Part One, §1.6; SS 27)

IAAC Neglect 7 — Accepting a Cancer-Only Health Impact Assessment as a Complete Statutory Health Assessment

The IAA requires consideration of health effects — not cancer effects alone. Peer-reviewed literature documents six additional endpoint categories associated with chronic low-dose ionising radiation. The Agency accepted the CNSC's cancer-only HIA framework as adequate without requiring the scope to be expanded to the statutory mandate.

(Part One, §1.7; SS 14)

IAAC Neglect 8 — Resuming the Assessment After the 2025 Suspension Without Resolving the Technology Indeterminacy That Arose During It

The assessment was suspended in August 2025 at Energy Alberta's request. During the suspension, Energy Alberta signed the Westinghouse AP1000 MOU. The assessment resumed on 2 March 2026 with the indeterminacy unresolved, no supplementary process offered, and no amended project description filed. The Agency resumed on a record it knew had been materially compromised during the suspension it had granted.

(Part One, §1.8; SS 29)

PART ONE — Instances in Which the IAAC Has Exceeded Its Powers, Undermined the Process, or Continued in Ways That Invalidate the Assessment

The following instances are drawn from the evidentiary record as it stands in March 2026. Each is independently sufficient to raise a question about the validity of the assessment. Together they form a pattern of institutional conduct that no quasi-judicial decision-maker can treat as a foundation for a lawful approval. The finding attached to each section states the legal consequence on the record as it exists, not a prediction about what a reviewing court would hold. The prediction would be worse.

1.1 Conducting an Assessment Against a Project Description That Does Not Satisfy the Statutory Requirements

Section 10(1) of the Impact Assessment Act requires an initial project description satisfying the Physical Activities Regulations before the Agency initiates the assessment. Regulation 7(c) requires identification of the physical components of the designated project, including the type and dimensions of permanent structures. Regulation 7(d) requires identification of the physical activities carried out in connection with the designated project. These are substantive requirements, not filing formalities. A project description that names a technology without a Canadian regulatory basis satisfies the physical form of Regulation 7 while making its substantive discharge impossible: the physical components, source terms, emissions profiles, cooling water demands, spent fuel volumes, and accident scenarios — all of which vary materially between reactor designs — cannot be established for a project whose reactor type has not been committed to.

Energy Alberta filed its Initial Project Description in April 2025 naming the CANDU MONARK pressurised heavy water reactor. At the time of filing, the CANDU MONARK had not undergone a Vendor Design Review in Canada. The CNSC confirmed in March 2026 — eleven months after the IPD was filed — that it had not commenced even a preliminary VDR assessment of the design. The CNSC's pre-licensing framework, established in REGDOC-3.3.1 (2016), identifies the VDR as the mechanism through which the CNSC forms its first regulatory view of whether a design can meet Canadian requirements. Without a commenced VDR, the CNSC has no verified source term, no validated design basis accident scenarios, no assessed tritium emission profile, and no regulatory characterisation of the design's conformity to the General Nuclear Safety and Control Regulations. The project description named a technology for which no Canadian regulatory foundation existed, and the CNSC — whose VDR records would have established this immediately — said nothing.

On 21 October 2025, during the assessment suspension, Energy Alberta signed a Memorandum of Understanding with Westinghouse Electric to explore deploying AP1000 pressurised light water reactors at the Peace River site. The CANDU MONARK and AP1000 are not design variants. Annual tritium discharges from a four-unit CANDU MONARK facility would be approximately 240,000 TBq per year, arising from neutron activation of the heavy water moderator and coolant. Annual tritium discharges from a comparable AP1000 facility would be approximately 3,200 to 4,000 TBq per year — a difference of approximately two orders of magnitude. Spent fuel volumes per unit of electrical output differ by a factor of approximately four. Design basis accident scenarios, emergency planning zone dimensions, cooling water demand, and lifecycle carbon accounting — the last because AP1000 fuel requires uranium enrichment processing that the natural uranium CANDU fuel cycle does not — are each technology-specific and each incomparable between the two designs. As of this submission, Energy Alberta's project website lists both technologies as simultaneously under consideration. No amended project description has been filed.

The AP1000's VDR status in Canada is Phase 2 completed in 2013 against substantially revised regulatory standards, with Phase 3 never completed. The CANDU MONARK has no VDR at any stage. Neither technology the proponent has named has a current completed Canadian regulatory basis. The statutory assessments required under IAA ss. 60 to 63 — adverse effects, public interest, contribution to or hindrance of Canada's environmental obligations — are each technology-specific across every dimension that matters. None can be completed for a project described as either one reactor or another.

THE IAAC HAS EXCEEDED ITS POWERS:

The Agency cannot complete the statutory assessments under IAA ss. 60–63 for a project whose defining physical parameter has not been established. By continuing the assessment without requiring a technology commitment or a formally documented Plant Parameter Envelope, the IAAC has proceeded to conduct a statutory exercise it is not empowered to conduct on the available record. Every finding it makes on health, environmental, or public interest grounds will be made in respect of a project that has not been legally defined.

(Cross-reference: SS 23, SS 29)

1.2 Allowing the Planning Phase to Close on a Participation Record That Cannot Be Certified as Legally Valid

Section 6(1)(h) of the Act identifies meaningful public participation as a purpose of the legislation. Sections 11 and 27 require the Agency to establish and maintain a public participation process in which participants have a genuine and informed opportunity to engage. The Agency's own Public Participation Framework identifies three constituent elements: participants must have the information they need; they must have the capacity to engage in an informed manner; and the process must be fair. None of these elements was intact for participants who responded to the IAAC's June 2025 Summary of Issues. Their submissions were CANDU MONARK-specific not by preference but because the regulatory process asked for CANDU MONARK-specific analysis. They addressed tritium emission volumes two orders of magnitude above those of the AP1000, CANDU-specific spent fuel composition, CANDU-specific accident sequences, CANDU-specific emergency planning zones, and CANDU-specific dose projections.

The proponent then entered a commercial agreement — during the suspension the Agency had granted — suggesting the named design may no longer be the project. It issued no formal process notice. It did not adopt a parameter envelope that would have preserved the analytical value of participant submissions across technology options. The planning phase participation record is complete and cannot be re-opened. Further submissions in the assessment phase will supplement the record but cannot remove the planning phase component from it. A Panel report that rests in part on planning phase submissions addressing a technology the proponent has potentially abandoned rests on a record whose adequacy under ss. 6(1)(h), 11, and 27 cannot be certified.

The participation record deficiency has a distinct constitutional dimension for Indigenous communities. Free, Prior, and Informed Consent under UNDRIP Article 19, incorporated into Canadian law by Bill C-15 (2021), requires that consent be based on accurate and complete information about the project to which consent is being sought. Consent to a CANDU MONARK project is not, as a matter of law, consent to an AP1000 project. The radiological profiles, tritium emission volumes, spent fuel characteristics, accident scenarios, and site-specific health impacts differ materially between the two technologies. If the proponent changes technology — and the Westinghouse MOU of October 2025 is an indication that it may have — the consent basis must be re-established from a technology-specific and accurate information foundation. It cannot be carried forward.

THE IAAC HAS UNDERMINED THE PROCESS:

The Agency allowed a planning phase to close without requiring the proponent to commit to a technology. It permitted the proponent to materially alter the project's factual basis without formal notice, without adopting a parameter envelope, and without a supplementary participation opportunity. It has continued the assessment on a participation record whose legal adequacy under ss. 6(1)(h), 11, and 27 cannot be certified, and on an FPIC basis that cannot be carried forward to a materially changed project.

(Cross-reference: SS 29)

1.3 Continuing an Assessment the IAAC's Own Summary of Issues Declared Factually Incomplete

The IAAC's Summary of Issues of June 2025 is the Agency's formal published statement of the information it requires before the assessment can advance to the Impact Statement phase. That document declared three categories of information mandatory: long-term projections of water quantity and flows in the Peace River watershed based on varying climate scenarios across a 100-year operating cycle; a complete waste management plan including alternate waste storage site, long-term containment, transportation risk, and interjurisdictional responsibility; and characterisation of the Peace River region's health baseline. None of the three has been provided. The IAAC has continued the assessment.

The waste management gap engages mandatory obligations beyond the IAAC's own requirements. The Nuclear Fuel Waste Act, S.C. 2002, c. 23, imposes waste planning obligations that must be satisfied before a nuclear facility may be licensed for operation. A four-unit CANDU facility would produce approximately 400 to 500 metric tonnes of spent nuclear fuel per year — in excess of 30,000 tonnes over a 70-year operating life. Canada has no operating permanent repository. The NWMO's Deep Geological Repository, selected for the Ignace, Ontario site on 28 November 2024, filed its own Initial Project Description with the IAAC on 5 January 2026 and has not commenced integrated assessment. The DGR site selection is the subject of Federal Court judicial review filed by Eagle Lake First Nation on 20 December 2024. No transportation corridor — approximately 3,500 kilometres between the Peace River site and Ignace, with no connecting rail infrastructure — has been identified. No interim storage site has been proposed for the Peace River region. No financial assurance instrument exists.

The water security gap similarly engages a hard physical reality. The Peace River's primary contributing sub-basin, the Smoky-Wapiti system, draws from Rocky Mountain snowpack. Climate projections under IPCC AR6 scenarios consistently project declining summer low flows in the Smoky and Peace systems across the second half of this century — the period during which the facility's cooling water demand would be greatest and least reducible, because nuclear cooling is non-interruptible. The Smoky-Wapiti sub-basin is the most highly allocated surface water sub-basin in the Peace watershed under Alberta's existing Water Act licence registry. No Water Act licence application has been filed. Energy Alberta's IPD characterised water demand as 0.2 percent of mean annual Peace River flow — a single static figure against a static baseline with no climate adjustment, no drought scenario, no cumulative allocation assessment, and no 100-year analysis. The Agency declared a 100-year assessment mandatory in June 2025. It has not required one since.

The health baseline gap is the product of a documented fact about this community: the Peace River region carries an above-average cancer incidence of unknown aetiology. This is not contested. It is in the Alberta Health Services regional cancer data. The CNSC has never explained this incidence, never characterised it for regulatory purposes, and never incorporated it into the incremental risk calculation it will present to the Panel. An incremental risk assessment is only as reliable as the baseline against which the increment is calculated. Without the baseline characterisation the Summary of Issues required, the Panel cannot evaluate whether the incremental risk from this facility is additive or multiplicative against a starting health position that is already above the national average.

THE IAAC HAS ACTED IN A MANNER THAT INVALIDATES THE ASSESSMENT:

A Panel cannot make a public interest finding on health grounds without the health baseline assessment the Agency's own process declared necessary. It cannot assess the full project lifecycle under IAA s. 22(1)(a) without the waste management plan the Summary of Issues required. It cannot find the project's water impacts acceptable when the 100-year assessment the Agency declared mandatory has not been filed. By proceeding without these materials the IAAC has deprived the Panel of the factual foundation its own process identified as necessary. Any approval made on this record would be made on grounds the Agency acknowledged were incomplete.

(Cross-reference: SS 24, SS 28)

1.4 Proceeding While UNESCO's Reactive Monitoring Mission Is Concurrent and Canada's Treaty Obligations Are Formally Unaddressed

UNESCO's World Heritage Committee issued its 2023 State of Conservation Decision (SOC 4339) requiring Canada to ensure that all major development projects in the Peace-Athabasca Delta watershed specifically address potential impacts on the Outstanding Universal Value of Wood Buffalo National Park before any approval is granted. UNESCO has scheduled a Reactive Monitoring Mission for August 2026 to determine whether the Park should be placed on the World Heritage In Danger list. That mission is proceeding this year. This assessment is proceeding now, upstream on the same river, without an OUV impact assessment having been conducted, without the IAAC's Impact Statement Guidelines addressing the SOC 4339 requirement, and without any submission on record from Energy Alberta acknowledging its existence.

The World Heritage Convention is a treaty to which Canada is a State Party. SOC 4339 is not a soft recommendation. It is the formal instruction of the treaty body to which Canada owes compliance. IAA s. 22(1)(b) requires the Agency to consider Canada's international obligations in the conduct of an assessment. A public interest finding made on a record that does not address a binding treaty obligation the Agency has been formally told is applicable is not a finding that Canada's environmental obligations have been considered — it is a finding made despite the documented existence of those obligations.

The Northwest Territories government wrote formally to the IAAC on 23 July 2025 stating that the Impact Statement Guidelines fail to address the Alberta-NWT Transboundary Water Agreement. That letter is on the record of this proceeding. The Agreement imposes notification and consultation obligations on Alberta in respect of activities that may affect the quality or quantity of water crossing the interprovincial boundary. The proposed facility's cooling water withdrawals, thermal discharges, and potential radionuclide releases are all capable of crossing that boundary and affecting the Mackenzie River Basin. The IAAC did not amend the Guidelines. It did not require Energy Alberta to address the transboundary obligations. The Government of the Northwest Territories' formal notification of a treaty breach remains unremedied on the Agency's record in March 2026.

If this assessment produces a positive public interest finding before the August 2026 UNESCO mission reports, Canada will have approved a major upstream Peace River development while simultaneously under UNESCO's highest conservation monitoring status for the downstream consequences of exactly this type of development. The legal, diplomatic, and judicial review consequences of that timing are foreseeable and have been placed on the record of this proceeding. The Agency has not changed course.

THE IAAC HAS EXCEEDED ITS POWERS:

Canada's World Heritage Convention obligations are binding treaty commitments. UNESCO's 2023 SOC Decision explicitly required that all major PAD watershed projects address OUV impacts before approval. The IAAC cannot make a positive public interest finding on a record that does not address those obligations. By advancing without requiring an OUV impact assessment and without addressing the Transboundary Water Agreement breach formally documented by a government party, the IAAC has proceeded toward a finding a reviewing court would be required to set aside on treaty grounds, independent of every other argument in this submission.

(Cross-reference: SS 25)

1.5 Relying on a Regulator That Has Formally Excluded Itself From the Central Analytical Step the Panel Must Perform

IAA sections 60 to 63 require the Panel to determine whether this project is in the public interest having regard to, among other things, its adverse effects on health and the environment. That determination is, as the IAEA's foundational safety principle SF-1 Principle 4 makes explicit, a benefits-outweigh-harm analysis: for nuclear facilities to be authorised, the benefits they yield must outweigh the radiation risks to which they give rise. The Panel cannot discharge its ss. 60–63 statutory obligation without performing this analysis.

The CNSC has formally refused to apply this standard, twice, on the published international record. Its written response to the IAEA's 2019 IRRS Suggestion S9 — published on the CNSC's own website — states: 'Not accepted. Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada.' The 2024 IRRS follow-up confirmed the matter remains unresolved. In *CARN v BWXT Canada Ltd*, 2022 FC 849, the Federal Court confirmed at paragraphs 47 to 53 that the benefits-outweigh-harm justification requirement under IAEA SF-1 Principle 4 does not constitute a binding legal obligation in Canada. The same regulator is the primary health and safety evidence source for a Panel that must make precisely this analysis.

The Agency has not disclosed the CNSC's institutional position to the Panel and has not required an independent justification analysis from a body not subject to the CNSC's structural exclusion of this step.

THE IAAC HAS ACTED IN A MANNER THAT UNDERMINES THE ASSESSMENT:

The IAAC has treated the CNSC's submissions as adequate technical evidence for a public interest determination without disclosing to participants or the Panel that the CNSC has formally and on the published record declined to conduct the central analytical step that determination requires. A Panel that makes a public interest finding by deferring to the CNSC on benefits and harms is deferring to an institution that has structurally excluded itself from answering the question. The resulting finding would be made without the analysis the statute requires.

(Cross-reference: SS 26)

1.6 Accepting Dose Projections From a Framework the IAEA Has Found Non-Compliant in Two Consecutive Reviews

IAEA GSR Part 3 Requirement 29 mandates that a dose constraint — a prospective upper bound on dose to any individual from a specific facility — be established before the facility is designed. This temporal sequencing is not a procedural preference. It is the mechanism through which the constraint protects health: by requiring that the facility design be optimised to meet a health-derived ceiling rather than deriving the ceiling from whatever dose the design happens to produce. Without a dose constraint set before design, ALARA optimisation has no fixed health-protective ceiling and may produce a result far above the level a properly set constraint would require. For the Peace River community — which carries a documented above-average cancer incidence whose cause has never been determined — the absence of a ceiling is a substantive health protection failure.

The IAEA's 2019 Integrated Regulatory Review Service mission issued Recommendation R2 to the CNSC, finding that Canada had not established public exposure dose constraints for Class I nuclear facilities as required by IAEA GSR Part 3 Requirement 29. The 2024 IRRS follow-up review found Recommendation R2 still open. The CNSC's own implementation plan defers dose constraint establishment to the construction licence phase — after the facility design is substantially fixed. This is the temporal inverse of what IAEA GSR Part 3 requires. No site-specific dose constraint has been established for the Peace River facility. The Agency accepted the CNSC's dose projections as adequate health protection for Peace River residents without requiring the CNSC to establish the constraint that would give those projections their health-protective function, and without disclosing either the IAEA's two-cycle non-compliance finding or the constraint's absence to the Panel.

THE IAAC HAS ACTED IN A MANNER THAT INVALIDATES THE ASSESSMENT:

If the Panel accepts the CNSC's dose projections as adequate health protection for Peace River residents, it accepts projections from a framework the world's nuclear safety authority found non-compliant in two consecutive reviews specifically because it lacks the dose constraint that gives the framework its protective function. A Panel finding on dose adequacy made on this record endorses a framework the IAEA has twice formally found deficient for the precise characteristic that makes dose management health-protective.

(Cross-reference: SS 27)

1.7 Accepting a Health Impact Assessment That Addresses One of Seven Statutory Health Endpoint Categories

The Impact Assessment Act requires the Panel to consider health effects — not cancer effects, but health effects, without statutory limitation to a single disease pathway. The peer-reviewed literature documents associations between chronic low-dose ionising radiation and at minimum five non-oncological health outcome categories beyond cancer: cardiovascular disease, documented in INWORKS 2023 and multiple prior occupational cohort studies; neurological and neurodevelopmental effects, documented in animal studies at chronic tritium exposure rates relevant to CANDU environmental releases and under investigation in the GEOCAP and CANUPIS cohorts; immune system dysregulation, which is the proposed mechanistic explanation for the childhood leukemia signal documented in KiKK and its replication studies; ophthalmic effects, which were the basis for the ICRP's 2012 reduction of the occupational eye lens dose limit by a factor of seven; and adverse reproductive and developmental outcomes, documented in studies near CANDU facilities by Urquhart and others — contested in the literature, but not resolved. Mixture interaction effects with the documented chemical carcinogen background in the Peace River region constitute a sixth excluded category.

The CNSC designed the Health Impact Assessment framework that limits quantitative endpoint assessment to cancer. The Agency accepted that framework as adequate without requiring the scope to be expanded. A fraction of the required assessment, labelled as the whole, does not satisfy the legislative requirement. The IAA Panel's public interest determination under s. 63 requires it to consider the extent to which effects are adverse. It cannot consider the extent to which health effects are adverse when six documented categories of health harm have been excluded from the assessment the Panel is given.

THE IAAC HAS UNDERMINED THE PROCESS:

By accepting a cancer-only health impact assessment without requiring the proponent to address the six additional endpoint categories for which peer-reviewed evidence of association with chronic low-dose ionising radiation exists, the IAAC has pre-determined the scope of the health analysis in a manner that structurally excludes documented categories of harm. A Panel cannot make a public interest finding on health grounds based on an assessment whose scope was set to exclude the evidence most unfavourable to approval.

(Cross-reference: SS 14)

1.8 Resuming the Assessment After the 2025 Suspension Without Resolving the Technology Indeterminacy That Arose During It

The assessment was suspended at Energy Alberta's request in August 2025. The suspension ran until 2 March 2026 — six months. During the suspension, Energy Alberta signed a Memorandum of Understanding with Westinghouse Electric on 21 October 2025. No formal notice of that commercial development was issued to participants through any process channel. No direction was given that existing submissions might need to be revised or supplemented. No amended project description was filed. The assessment resumed on 2 March 2026 with the technology indeterminacy it created unresolved, and with no supplementary participation opportunity offered to the participants whose submissions had been rendered technology-specific by a project description that may no longer reflect the project.

The procedural fairness principles applicable to quasi-judicial proceedings under *Baker v Canada (MCI)*, [1999] 2 SCR 817 and developed in the context of administrative regulatory processes by the Supreme Court in Canada (*MCI*) v *Vavilov*, 2019 SCC 65, require that parties whose rights may be affected have a meaningful opportunity to participate in decisions affecting them on the basis of accurate and complete information about the matter being decided. The Agency was informed — by the proponent's own commercial conduct during the suspension the Agency had granted — that the factual basis of the assessment had materially changed. Resuming without addressing that change is an exercise of administrative authority on a record the Agency knew was compromised.

THE IAAC HAS EXCEEDED ITS POWERS:

The resumption of an assessment without resolving a material deficiency in the project description that arose during the suspension, and without providing participants with notice and a meaningful opportunity to respond, is a breach of the procedural fairness obligations that govern quasi-judicial administrative proceedings. The IAAC was informed by the proponent's commercial conduct that the factual basis of the assessment had materially changed. It resumed without addressing that change.

(Cross-reference: SS 29)

PART TWO — The CNSC's Independent Failures — What It Has Done Regardless of What the IAAC Permitted

Part One establishes what the IAAC permitted to happen. This Part establishes what the CNSC has done independently — failures that are the CNSC's own, that extend beyond its role in enabling the IAAC's neglects, and that provide separate and reinforcing grounds for concluding that no lawful approval can be made by deferring to the CNSC's technical authority on the current record. Show Stopper 13 established that the CNSC's pattern of regulatory abdication spans at least sixteen years and is the structural context for everything documented below. Show Stopper 30 established how the CNSC participated in and enabled Energy Alberta's procedural disdain. This Part documents the CNSC's independent technical and institutional failures.

2.1 The CNSC Has No Regulatory Basis for Technical Submissions on Either Technology the Proponent Has Named

A Vendor Design Review is the mechanism through which the CNSC forms its first regulatory view of whether a reactor design can meet Canadian requirements. It is conducted in phases: Phase 1 is a preliminary review of the design description; Phase 2 is a detailed technical review against Canadian regulatory requirements; Phase 3 is an assessment of the design against the specific site for which a licence is sought. Without a commenced Phase 1, the CNSC has no regulatory assessment of the design at any level. It has no verified source term, no validated accident sequences, no assessed tritium emission profile, and no regulatory basis for any safety case submission.

The CNSC confirmed in March 2026 that it has not commenced a preliminary VDR assessment of the CANDU MONARK. The Phase 2 VDR for the AP1000 was completed in 2013; the CNSC's regulatory standards have been substantially revised since then; and Phase 3 has never been completed. The CNSC has therefore been providing primary technical advisory submissions to this Panel about a facility whose design has not been assessed at any regulatory level — and about an alternative design whose regulatory assessment was completed over a decade ago against superseded standards. The advisory role the IAAC extended to the CNSC assumes a regulatory foundation the CNSC has not established for either technology.

CNSC INDEPENDENT FAILURE:

Has served as primary technical adviser to the Panel for a nuclear facility assessment without having commenced a Vendor Design Review of the technology named in the project description, and with an incomplete and outdated VDR for the alternative technology under simultaneous consideration. Technical submissions made without an underlying regulatory assessment of the specific design under review are not regulatory evidence — they are assessments of a generic technology presented as assessments of the specific facility whose effects the Panel must evaluate.

(Cross-reference: SS 18/23, SS 29)

2.2 The CNSC Has Formally Refused the Test the Panel Must Apply

The IAEA's IRRS 2019 mission issued Suggestion S9 to the CNSC, recommending that Canada establish systematic justification procedures for nuclear activities applying the benefits-outweigh-harm standard in IAEA SF-1 Principle 4. The CNSC's published response states: 'Not accepted. Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada.' This is an explicit, published, institutional refusal to apply the international benefits-outweigh-harm standard that has been the foundational licensing principle for nuclear facilities in every other IAEA member state that has accepted it. The 2024 IRRS follow-up confirmed the matter remains unresolved. In *CARN v BWXT Canada Ltd*, 2022 FC 849, the Federal Court confirmed the CNSC's position: the benefits-outweigh-harm justification requirement under IAEA SF-1 Principle 4 is not a binding legal obligation in Canada.

The IAA Panel's public interest determination under ss. 60 to 63 requires exactly this analysis. The Panel must determine, in the public interest, whether the adverse effects of this project are justified by its benefits. An institution that has formally and publicly refused to conduct this analysis cannot serve as the primary evidence source for a Panel that must conduct it without disclosing the exclusion. The CNSC has provided submissions to this Panel that invite deference to its technical authority for a public interest determination whose core analytical step the CNSC has institutionally declined to perform. It has not disclosed this exclusion in any submission to this proceeding.

CNSC INDEPENDENT FAILURE:

Has formally refused the benefits-outweigh-harm justification analysis on the published international record twice and in Federal Court. Has continued to serve as primary technical evidence source for a Panel that must conduct exactly that analysis. Has not disclosed this exclusion to the Panel. A Panel that makes a public interest finding by deferring to the CNSC is deferring to an institution that has structurally excluded itself from answering the question the finding requires.

(Cross-reference: SS 21/26)

2.3 The CNSC's Dose Framework Has Been Found Non-Compliant by the IAEA in Two Consecutive Reviews — Without Disclosure to the Panel

IAEA GSR Part 3 Requirement 29 requires that a dose constraint — a prospective upper bound on individual dose from a specific facility — be established before the facility is designed. The CNSC's 2019 IRRS review produced Recommendation R2 finding non-compliance with this requirement. The 2024 IRRS follow-up found R2 still open. The CNSC's implementation plan defers the constraint to the construction licence phase, after design is substantially fixed — the precise temporal inversion of what IAEA GSR Part 3 Requirement 29 requires. No site-specific dose constraint has been established for the Peace River facility.

The CNSC submitted dose projections to this proceeding as evidence of adequate health protection for a community that carries an above-average cancer incidence of unknown aetiology. The dose projections were produced by the framework whose critical deficiency — the absence of a health-derived upper bound — the IAEA has identified in two consecutive formal reviews. The CNSC did not disclose the non-compliance findings to the Agency or the Panel. It did not advise the Panel that the dose projections it submitted were produced by a framework found deficient for lacking the mechanism that would give those projections their health-protective function. The Panel has been invited to find that dose management for Peace River residents is adequate on the basis of a framework the world's nuclear safety authority has twice formally found is not.

CNSC INDEPENDENT FAILURE:

Submitted dose projections to a quasi-judicial body as evidence of adequate health protection for a specific community without disclosing that the framework producing those projections has been found non-compliant by the IAEA in two consecutive review cycles specifically because it lacks the dose constraint that gives the framework its health-protective function. No dose constraint exists for the Peace River facility. The Panel's dose finding, if made on this record, will be made on a framework whose fundamental protective mechanism has not been established.

(Cross-reference: SS 22/27)

2.4 The CNSC Has Not Responded to Six Major Studies That Materially Challenge Its Risk Framework

The CNSC uses a cancer risk coefficient derived principally from the Life Span Study of atomic bomb survivors. The International Nuclear Workers Study (INWORKS), published in its original form in August 2023, examined more than 300,000 nuclear workers with chronic low-dose external radiation exposure. For solid cancer mortality, the INWORKS findings are substantially above the CNSC's current coefficient — approximately ten to twenty-eight times higher depending on endpoint and analysis method, on the CNSC's own published acknowledgement. The CNSC published a response acknowledging the INWORKS findings. It took no regulatory action.

Between August 2024 and February 2026, six additional major peer-reviewed studies extended or amplified the INWORKS findings: the INWORKS haematological cancer analysis published in *Lancet Haematology* (2024), reporting an excess relative risk of 2.68 per Gray for leukemia mortality; the 47-study international meta-analysis published in *Current Environmental Health Reports* (2024); the Harvard Environmental Health study (2025); the Harvard *Nature Communications* study (2026), reporting approximately 6,400 excess cancer deaths per year within 30 kilometres of US nuclear facilities; the IJMS epigenetic transgenerational study (March 2025); and the EJE INWORKS solid cancer reanalysis (November 2024). The CNSC has not publicly acknowledged any of the six subsequent studies. It has not updated its risk coefficient. It has submitted cancer risk estimates to this Panel based on the same unadjusted coefficient whose adequacy it has privately acknowledged is in serious doubt, without disclosing any of this to the Panel. If the higher end of the INWORKS range is correct, the difference between a finding of public interest and a finding of unacceptable harm may turn entirely on which coefficient is applied to the Peace River community's specific health position.

CNSC INDEPENDENT FAILURE:

Acknowledged that its cancer risk coefficient may understate risk by a factor of ten to twenty-eight. Took no regulatory action. Provided cancer risk estimates to this Panel on the unadjusted coefficient. Has not acknowledged six subsequent studies extending the INWORKS findings. Has not disclosed to the Panel that the scientific foundation for every cancer risk calculation in this proceeding may be wrong by an order of

magnitude. This is not a gap in the evidence. It is the withholding of the one qualification that would prevent the Panel from relying on the CNSC's cancer risk analysis.

(Cross-reference: SS 15)

2.5 The CNSC Has Not Acknowledged Thirty-Four Years of Accumulated Failure That Show Stopper 13 Documents

Show Stopper 13 established that the CNSC has been aware of the deficiencies documented in Show Stoppers 1 through 12 for at least sixteen years, has had the statutory authority and the budget to remedy each of them, was told by its own scientists in 2010 exactly what was required, and took no action. The CNSC's own scientists formally recommended in INFO-0799 (2010) that an international collaborative tritium study was required to assess tritium health risks adequately. That recommendation was never implemented. The seven published CNSC documents documented in Show Stopper 7 contain representations irreconcilable with the CNSC's own internal scientific record. The regulatory framework the CNSC has applied to this proceeding is built on the same unadjusted scientific foundation — unchanged tritium risk coefficient, unchanged RBE factor, unchanged cancer-only HIA scope — that the CNSC's own scientists said was inadequate in 2010.

The significance of the Show Stopper 13 finding for this submission is structural. The CNSC's failures in this proceeding — the undisclosed VDR status, the undisclosed dose framework non-compliance, the undisclosed benefits-outweigh-harm exclusion, the undisclosed risk coefficient inadequacy — are not aberrations. They are the predictable product of an institution whose structural incentives, documented in Show Stopper 8, are aligned toward licensing throughput rather than precautionary health protection. An institution that chose, for sixteen years, not to fund the research its own scientists said was necessary is an institution whose submissions to a quasi-judicial health determination require independent verification, not deference.

CNSC INDEPENDENT FAILURE:

The failures documented in §§2.1 through 2.4 of this Part are not isolated lapses. They are the predictable output of the institutional pattern Show Stopper 13 establishes: an institution that has spent thirty-four years choosing the appearance of regulatory thoroughness over its substance. Show Stopper 13 is not historical context. It is the structural explanation for why the CNSC's undisclosed limitations in this specific proceeding were possible — and for why they would recur in any restarted process that does not first require the CNSC to address the conditions in Part Six of this submission.

(Cross-reference: SS 13)

PART THREE — Why the IAAC Cannot Proceed on the Current Record

The following represents the statutory position as of March 2026. Each statement of incapacity is derived directly from the Act, from the IAAC's own Summary of Issues, or from documented facts on the current record. The purpose of this Part is not to argue that a restart is preferable or that the record is weak. It is to state, precisely, what the Panel cannot do if it proceeds — and why no amount of supplementary process within the current assessment can repair what has been compromised.

3.1 Cannot Complete the Statutory Assessments Under IAA Sections 60 to 63

Sections 60 to 63 require the Panel to assess adverse effects, public interest, and contribution to or hindrance of Canada's environmental obligations in respect of the designated project. Each assessment is technology-specific across every dimension: health effects depend on the facility's radiological source term; environmental effects depend on its thermal discharge profile and spent fuel characteristics; waste effects depend on spent fuel type and volume; water effects depend on cooling water demand; carbon accounting depends on whether the uranium fuel cycle includes enrichment. None of these assessments can be completed for a project described as either a CANDU MONARK or an AP1000. The Panel has before it a legally undefined designated project.

3.2 Cannot Certify the Planning Phase Participation Record

The Panel cannot certify the planning phase record as satisfying IAA ss. 6(1)(h), 11, and 27. That record was built against a CANDU MONARK description the proponent materially altered through the Westinghouse MOU of October 2025, without formal notice and without a parameter envelope preserving the analytical value of

participant submissions. The record is complete. It cannot be reopened. Every planning phase submission that addressed CANDU MONARK-specific parameters becomes potentially inapplicable if the AP1000 is adopted. The Panel cannot rely on a participation record it cannot certify.

3.3 Cannot Discharge UNESCO and Treaty Obligations

UNESCO's 2023 SOC Decision required all major PAD watershed projects to address OUV impacts before approval. The current record does not address them. The Panel cannot waive a binding treaty obligation. IAA s. 22(1)(b) requires the Panel to consider Canada's international obligations. It cannot do so on a record that does not address the specific obligation a treaty body has identified as applicable to this specific project, formally and by name, on this proceeding's record. The Alberta-NWT Transboundary Water Agreement breach has been formally documented by a government party. The Panel cannot make a finding consistent with Canada's environmental obligations on a record that documents a breach and does not remedy it.

3.4 Cannot Rely on the CNSC as Its Primary Technical Adviser

Show Stoppers 7 through 9 establish a pattern of systematic misrepresentation across seven CNSC public documents. Show Stopper 8 provides the structural explanation: fee funding, dual mandate, parliamentary override precedent. Show Stopper 13 establishes that the pattern is not recent. Part Two of this submission establishes the specific incapacities in this proceeding: no VDR for either technology; a formally refused benefits-outweigh-harm standard; a twice-non-compliant dose framework submitted without disclosure; and a risk coefficient the CNSC acknowledges may understate chronic low-dose cancer risk by a factor of ten to twenty-eight. A Panel that makes a public interest determination by deferring to this advisory record — without independent expert review, without disclosure of these documented limitations, and without requiring the CNSC to address the unanswered literature — makes its determination on a compromised evidential foundation.

3.5 Cannot Make a Health Finding Without a Health Baseline

The IAAC's own Summary of Issues required characterisation of the Peace River region's health baseline before the Panel could proceed to a health effects finding. The baseline has not been provided. The Peace River region's above-average cancer incidence of unknown aetiology makes every incremental risk calculation structurally incorrect for this community when applied against a generic national average. Without the baseline the Summary of Issues required, the Panel has no basis for evaluating whether the facility's incremental contribution to the Peace River community's cancer burden is additive or multiplicative — a distinction that may be the difference between an acceptable and an unacceptable finding.

3.6 Cannot Proceed Without a Valid Free, Prior, and Informed Consent Process

The FPIC basis established during the planning phase for the nineteen First Nations and Métis communities listed in the Indigenous Engagement and Partnership Plan cannot be carried forward to an assessment of a materially changed project. UNDRIP Article 19 and Bill C-15 require consent based on accurate and complete information about the specific project to which consent is given. Consent to a CANDU MONARK project is not consent to an AP1000 project. The radiological profiles, waste streams, tritium volumes, accident scenarios, and health impacts differ materially between the two designs. If the proponent has changed or is changing technology, the constitutional minimum — accurate and complete information — has not been satisfied for the project that may actually be built.

THE IAAC CANNOT PROCEED:

On the current record, the Panel cannot complete the statutory assessments required by IAA ss. 60–63; cannot certify the planning phase participation record as satisfying ss. 6(1)(h), 11, and 27; cannot discharge Canada's UNESCO and Transboundary Water Agreement obligations; cannot rely on the CNSC as an adequate primary technical adviser; cannot make a health effects finding without the baseline its own process declared necessary; and cannot proceed in a manner consistent with the constitutional minimum for Indigenous consent. These are not individual weaknesses that can be addressed by additional submissions. They are the compounding product of structural failures in the project description, the participation record, the regulatory advisory function, and the treaty compliance framework — each of which infected the record before the Panel had any submissions before it.

(Cross-reference: SS 23–29, Parts One and Two above)

PART THREE-A — The IAAC Is Trapped

Part Three establishes what the Panel cannot do on the current record. This Part establishes something distinct: the IAAC is not merely in the position of a decision-maker with an incomplete record. It is trapped in the precise legal sense — every path available to it on the current record produces a consequence it cannot lawfully defend, and the invalidity compounds with each step it continues to take. The trap is not a rhetorical characterisation. It is the product of three specific incapacities, each arising from the record as it stands, each foreclosing a different avenue of forward progress, and all three resolved by the same action: a process restart on the conditions in Part Six.

3A.1 The IAAC Is Trapped in That It Cannot Proceed to a Finding on the Current Record Without Producing a Knowingly Invalid Decision

If the Panel proceeds on the current record and makes a positive public interest finding under IAA s. 63, it makes a finding that has been formally established as invalid across seven independent grounds in these submissions. The project description does not satisfy IAA s. 10 and Regulation 7. The participation record cannot be certified under ss. 6(1)(h), 11, and 27. Three categories of information the Agency's own Summary of Issues declared mandatory have not been provided. Two binding treaty obligations formally documented by a government party are unaddressed. The CNSC cannot discharge its advisory function on the current record. The Panel cannot complete the ss. 60 to 63 assessments. The FPIC process was invalidated by a technology change made without notice.

Each of these grounds is on the formal record of this proceeding — not as latent defects a court might discover on review, but as documented legal arguments identifying the specific statutory provision violated and the specific fact on the record that establishes the violation. A positive finding made on this record will not be subject to judicial review in the ordinary sense that all administrative decisions are reviewable. It will be a decision made while the grounds of its invalidity were formally before the decision-maker and were not addressed. Under *Canada (MCI) v Vavilov*, 2019 SCC 65, at paragraphs 99 to 101, a reviewing court assesses whether the decision-maker engaged with the constraints on its authority established by its own record. A decision-maker that proceeds in the face of formally documented constraints without addressing them cannot produce a decision that is justifiable, transparent, or intelligible. The positive finding would not be a weak approval subject to challenge. It would be a knowingly invalid approval — a distinction that matters because it goes to whether the Agency was acting within its mandate or knowingly outside it.

The practical consequence for the Peace River community is permanent in a way that judicial review cannot remedy. A nuclear facility approved on an invalid record cannot be de-approved once construction has commenced. The seven invalidity grounds — including the community's right to an FPIC process based on accurate technology-specific information, its right to a health assessment calibrated to its actual health position, and its right to have treaty obligations observed before an upstream development is authorised — would be extinguished by an approval before judicial review could address them. Construction timelines do not wait for the Federal Court's docket. An invalid approval is not a recoverable error for this community. It is a permanent one.

THE IAAC IS TRAPPED IN THAT IT CANNOT PROCEED TO A POSITIVE FINDING:

A positive finding on the current record is a knowingly invalid decision — not in the sense that a court might later discover a deficiency, but in the sense that the decision-maker was formally told the record could not support the finding before it made it. *Vavilov* requires justifiable, transparent, and intelligible decisions. A decision to approve on a formally invalid record satisfies none of these requirements. It is reviewable with certainty, irreversible in its practical consequences for the Peace River community, and constitutionally infirm in its FPIC dimension independent of every other ground.

(Cross-reference: Parts One through Three above; Vavilov, 2019 SCC 65, ¶¶99–101)

3A.2 The IAAC Is Trapped in That It Cannot Cure the Invalidity by Proceeding to a Negative Finding or Imposing Conditions

The Agency might reason that proceeding to a Panel finding and imposing conditions — or making a negative public interest finding — resolves the invalidity problem. This reasoning fails on three grounds that are independent of each other. First, conditions cannot cure structural invalidity in the participation record. A condition requiring Energy Alberta to file an amended project description and restart the planning phase is not a remedy for a planning phase participation record that was built against a technology the proponent may have abandoned.

Conditions are instruments for managing identified effects of a project that has been found to be in the public interest. They are not instruments for retroactively validating a foundational record that was built against a project description that did not satisfy s. 10 of the Act. A condition that requires the assessment that should have preceded the Panel's report to be conducted after it is not a remedy. It is an acknowledgement that the assessment was conducted in the wrong order.

Second, a negative finding made on a participation record that cannot be certified, a project description that does not satisfy s. 10, and an FPIC basis that is constitutionally invalid is not a protected negative finding. It is a negative finding subject to exactly the same judicial review vulnerabilities as a positive finding, because the defects are in the record on which the Panel acted, not in the direction of the conclusion it drew from that record. Energy Alberta would be entitled to seek judicial review of a negative finding on a defective record on precisely the grounds this submission documents — and would have standing to do so on the same invalidity analysis this submission advances in the opposite direction. The invalidity of the record is symmetric. It does not resolve in favour of either outcome.

Third, a negative finding on this record does not prevent Energy Alberta from reapplying on a valid record. Energy Alberta retains the right to file a new Initial Project Description with a committed technology, a complete waste management plan, and the mandatory assessments the Summary of Issues required. A restart now followed by a negative finding later, and a negative finding on the current record now followed by a fresh application later, produce the same practical outcome for the project — no facility built on the current timeline. Only one of those paths produces the outcome on a lawful record. The Agency's choice between them is not a choice about the project's fate. It is a choice about whether the outcome is achieved through a process that can be defended.

THE IAAC IS TRAPPED IN THAT IT CANNOT CURE THE INVALIDITY BY PROCEEDING:

Conditions cannot retroactively validate a structurally deficient participation record or a constitutionally inadequate FPIC process. A negative finding on an uncertifiable record is judicially reviewable by the proponent on the same invalidity grounds as a positive finding is reviewable by community members. The invalidity is in the record, not in the direction of the finding. The only outcome that places the Agency on defensible ground is a process restart on a valid record — and that outcome is available regardless of what the Panel's eventual substantive finding would be.

(Cross-reference: IAA ss. 6(1)(h), 10, 11, 27; UNDRIP Article 19; Bill C-15; Vavilov, 2019 SCC 65)

3A.3 The IAAC Is Trapped in That It Cannot Avoid the UNESCO Consequence by Any Domestic Process Step

The first two incapacities are legal consequences that a reviewing court could, in principle, address after the fact — by quashing an approval, requiring a restart, or setting conditions on a decision. The third incapacity is different in kind. It is a consequence that cannot be undone by any domestic legal process once created, and it will materialise this year regardless of what the Panel decides — unless the assessment is suspended and the UNESCO obligation is addressed before the Mission concludes. No Panel finding, no judicial review, and no ministerial decision can remove it once it exists.

UNESCO's Reactive Monitoring Mission to Wood Buffalo National Park is scheduled for August 2026. Its mandate is to assess whether the Park should be inscribed on the World Heritage In Danger list — the strongest adverse classification the World Heritage Committee applies, reserved for sites whose Outstanding Universal Value is under documented and serious threat. The Mission will assess, specifically, whether Canada has complied with the 2023 SOC Decision (SOC 4339), which required that all major development projects in the Peace-Athabasca Delta watershed specifically address impacts on the Park's Outstanding Universal Value before any approval is granted. This assessment's record, as it currently stands, does not contain an OUV impact assessment. The Agency's Impact Statement Guidelines, as currently in force, do not require one. The Agency was formally told by the Government of the Northwest Territories in July 2025, and by the submissions of four First Nations in October 2025, that the SOC 4339 obligation exists and that the current process does not address it. The Agency has not amended the Guidelines.

If this assessment is still running when the UNESCO Mission arrives in August 2026 — without an OUV impact assessment on its record and without amended Guidelines addressing the SOC 4339 requirement — Canada will present itself to the Mission as a State Party that received a formal instruction from the World Heritage Committee in 2023, received a formal government-party notification that its process does not satisfy that instruction in 2025, and continued the assessment without remedy. That is the factual record the Mission will have before it. It is not a record that supports a finding of compliance with SOC 4339. If the Mission recommends

In Danger inscription on that record, the inscription becomes part of the permanent international record of Canada's treaty compliance. It is not remediable by the Minister's subsequent decision, by the Panel's conditions, by a Federal Court order quashing the approval, or by a restarted assessment. It will have been made.

The UNESCO incapacity does not resolve differently depending on what the Panel decides on the merits. A positive public interest finding before August 2026 creates an approval against which the Mission reports. A negative finding before August 2026 still presents the Mission with a record showing Canada ran a major PAD watershed assessment to completion without addressing the SOC 4339 requirement. The Mission assesses process compliance, not outcome. Canada having declined to approve the project is not evidence that Canada complied with its obligation to assess OUV impacts before making that determination. The only path to presenting the Mission with a record of compliance is to suspend the assessment, amend the Impact Statement Guidelines, commission the independent OUV impact assessment SOC 4339 requires, and allow its findings to inform both the Mission and any restarted assessment. That is not a discretionary enhancement of the current process. It is the precondition for Canada not appearing before the world's heritage treaty body this August to account for why it chose not to comply with an instruction it received two years earlier.

THE IAAC IS TRAPPED IN THAT IT CANNOT AVOID THE UNESCO CONSEQUENCE BY PROCEEDING:

The UNESCO Reactive Monitoring Mission will assess this assessment's record in August 2026 regardless of what the Panel decides. On the current record — no OUV impact assessment, no amended Guidelines, a government-party breach notification unaddressed since July 2025 — Canada presents as non-compliant with SOC 4339. In Danger inscription is not remediable by any domestic process step after it is made. It is a permanent entry in Canada's international treaty compliance record. The only path away from this consequence requires suspending the current assessment and commissioning the OUV impact assessment before the Mission concludes — a step that itself requires acknowledging that the process must restart.

(Cross-reference: UNESCO SOC 4339; World Heritage Convention; IAA s. 22(1)(b); Part One §1.4; SS 20/25)

3A.4 The One Path the Record Leaves Open

The three incapacities documented above share a structural feature: each forecloses a different forward path on the current record, and each is resolved by the same action. The IAAC cannot proceed to a positive finding without producing a knowingly invalid approval. It cannot proceed to a negative finding or impose conditions without producing an outcome on a defective record that both parties could challenge. It cannot continue on any current timeline without presenting UNESCO with a record of non-compliance. The convergence of these three incapacities is the trap in its precise legal meaning: not a difficult situation, but a situation in which every available forward path on the current record produces a consequence the Agency cannot lawfully defend.

IAA s. 28 permits the Agency to suspend an assessment where it determines that adequate information is not available to complete the assessment. That condition exists on this record: adequate information is not available to complete the ss. 60 to 63 assessments on a record without a committed technology, without the mandatory information requirements satisfied, and without the CNSC advisory function capable of supporting the Panel's central statutory obligation. The Agency's general authority to manage its own process consistent with procedural fairness and the requirements of the Act provides the same basis. A suspension followed by a restart on the conditions in Part Six is not an admission that the project cannot be approved. It is an acknowledgement that the assessment of whether it should be approved must be conducted on a record that can actually support that assessment — and that the current record cannot.

THE ONE PATH THE RECORD LEAVES OPEN:

IAA s. 28 and the Agency's general process management authority provide the mechanism: suspend the assessment, acknowledge the invalidity grounds formally placed on the record, and refer the matter back for a restart on the conditions in Part Six. That is the only forward path that produces a Panel finding on a certifiable record, does not expose the Agency to Vavilov challenge on grounds of known invalidity, preserves the constitutional validity of the FPIC process, and allows Canada to present the August 2026 UNESCO Mission with a record of compliance with SOC 4339. A restart is available. The question is whether the Agency takes it before the Mission removes the last of these four protections.

(Cross-reference: IAA s. 28; Parts One through Three above; UNESCO SOC 4339)

PART FOUR — Energy Alberta's Conduct as the Proximate Cause of the Invalidity Grounds That Trace to the Project Description and Participation Record

Show Stopper 30 documents Energy Alberta's seven acts of procedural disdain in detail. This Part states each act and its direct causal connection to the invalidity grounds established above. Energy Alberta is not a public institution with statutory obligations to the assessment's integrity. It is a proponent with a commercial interest in approval. The legal consequence of its conduct is therefore not primarily characterised as breach of a statutory duty; it is characterised as having produced a project description that cannot support a lawful assessment and a participation record that cannot be certified. Five of the seven invalidity grounds established in this submission trace, as their proximate cause, to one or more of the seven acts documented below.

4.1 Filing a Project Description for a Technology With No Canadian Regulatory Basis

Energy Alberta filed its Initial Project Description in April 2025 naming the CANDU MONARK. At the time of filing, the CNSC had not commenced even a preliminary Vendor Design Review of the CANDU MONARK design. No Canadian regulatory basis for the safety case submissions the IAA assessment requires existed for this technology. Energy Alberta did not disclose this to the IAAC. The CNSC did not disclose it. The IPD satisfied the physical form of the IAA s. 10 and Regulation 7 requirements while being substantively empty: it named a technology for which the regulatory foundation that would give a project description its substantive content — a source term, a verified design, a safety case basis — had not been established at any stage of the CNSC's review process.

The consequence is Invalidity Ground 1. The planning phase was conducted for eleven months against a project description built on a regulatory phantom. Every participant direction, every technical submission, and every CNSC advisory input during those eleven months addressed a technology whose regulatory basis had never been assessed. The IAAC opened a statutory assessment on a project description that could not ground it.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUND 1:

Filed a project description naming a technology with no Canadian regulatory basis, without disclosure, directing the entire planning phase toward a design the CNSC had never assessed. The project description satisfied IAA s. 10 in form while being substantively hollow. The invalidity of the assessment flows from the invalidity of the project description; and the invalidity of the project description flows from Energy Alberta's decision to file it against a technology whose regulatory foundation did not exist.

(Cross-reference: SS 30, Part One §1.1; Invalidity Ground 1)

4.2 Signing a Competing Technology MOU During a Live Assessment Without Notice

On 21 October 2025, six months into the IAAC process, Energy Alberta signed a Memorandum of Understanding with Westinghouse Electric to explore deploying AP1000 pressurised light water reactors at the Peace River site instead of the CANDU MONARK. Energy Alberta did not file an amended project description. It did not issue a process notice. It did not adopt a Plant Parameter Envelope that would have preserved the analytical value of participant submissions across technology options. It made a commercial decision that retroactively rendered every CANDU-specific submission in the planning phase potentially inapplicable — and made that decision without notifying any participant, any federal authority, or the IAAC through any formal process channel.

The CANDU MONARK and AP1000 are categorically different configurations. Their tritium outputs differ by approximately two orders of magnitude. Their spent fuel volumes per unit of electrical output differ by a factor of approximately four. Their design basis accident scenarios are incompatible. Their cooling water demands and thermal discharge profiles differ. The commercial decision Energy Alberta made in October 2025 was not a refinement of the project. It was a potential substitution of the project's defining physical parameter — the reactor — without the notice that substitution required.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUNDS 1 AND 2:

Signed a technology MOU with a competing supplier during a live quasi-judicial assessment without amended project description, without participant notice, and without a parameter envelope. Made the most consequential undisclosed commercial decision in the proceeding's history and left every other participant to absorb the consequences.

(Cross-reference: SS 30, Part One §1.2; Invalidity Grounds 1 and 2)

4.3 Using the Assessment Suspension as Cover for an Undisclosed Technology Shift

The assessment was suspended at Energy Alberta's request in August 2025. The Westinghouse MOU was signed in October 2025 — during the suspension. The assessment resumed on 2 March 2026 with the technology indeterminacy created by the MOU unresolved, with no process notice, and with no supplementary participation opportunity. The suspension — granted to accommodate the proponent — was used to advance a commercial negotiation that compromised the entire planning phase record, and was used for this purpose without a word to any participant, any federal authority, or the IAAC through any formal channel. The Agency resumed the assessment as though the suspension had not produced anything requiring address.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUNDS 1 AND 2:

Used a suspension it had itself requested as cover for a commercial agreement with a competing technology supplier. Allowed the assessment to resume without disclosing the agreement through any formal channel, on a record whose technology basis had materially changed during the period of the suspension.

(Cross-reference: SS 30, Part One §1.3; Invalidity Grounds 1 and 2)

4.4 Ignoring the Mandatory Waste Management Plan Requirement

The IAAC's June 2025 Summary of Issues declared a complete waste management plan mandatory before the assessment could proceed to the Impact Statement phase. Energy Alberta has not filed one. No licensed disposal pathway, no identified transportation corridor, no interim storage site in the Peace River region, and no financial assurance instrument exists for this project's primary waste stream. The Panel is being asked to make a public interest finding about decades of spent nuclear fuel accumulating in Treaty 8 territory — in quantities totalling in excess of 30,000 tonnes over a 70-year operating life — with no plan for where it goes, how it gets there, or who pays for the consequences if the only proposed permanent disposal pathway is invalidated by the Eagle Lake First Nation's Federal Court challenge to the DGR site selection.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUND 3:

Ignored a mandatory requirement formally declared by the IAAC's own process. Filed nothing on waste disposal, transport, interim storage, or financial assurance. The Panel is asked to find the project in the public interest without the information the Agency told itself it needed to make that finding.

(Cross-reference: SS 30, Part One §1.4; SS 19/24; Invalidity Ground 3)

4.5 Ignoring the Mandatory 100-Year Water Security Assessment

The June 2025 Summary of Issues declared 100-year climate-adjusted water projections mandatory. Energy Alberta's IPD addressed water demand as approximately 0.2 percent of mean annual Peace River flow — a single static figure against a static baseline with no climate adjustment, no drought scenario, no cumulative allocation assessment against the Smoky-Wapiti sub-basin's existing licence registry, and no analysis of the 100-year operating cycle the IAAC declared the relevant timeframe. No Water Act licence application has been filed. The Smoky-Wapiti sub-basin is the most highly allocated surface water sub-basin in the Peace watershed. Rocky Mountain snowpack — the primary contributing source — is projected to decline under all IPCC AR6 scenarios across the second half of this century. A nuclear facility that cannot be shut down due to insufficient river flow will, at some point in its 70 to 100-year operating life, be operating on a river whose capacity to supply it has not been assessed.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUND 3:

Ignored a mandatory requirement declared by the IAAC's own process. Provided a static single figure in place of the 100-year dynamic assessment the Agency declared necessary. Applied for no Water Act licence. The Panel is asked to find water impacts acceptable for a non-interruptible 100-year water user on a declining river without the assessment that would answer whether it is possible.

(Cross-reference: SS 30, Part One §1.5; SS 28; Invalidity Ground 3)

4.6 Ignoring UNESCO Treaty Requirements and the NWT's Formal Transboundary Notification

UNESCO's 2023 SOC Decision required Canada to ensure that all major PAD watershed projects address OUV impacts before approval. This treaty obligation existed before Energy Alberta filed a single document. The NWT government formally placed the Transboundary Water Agreement breach on the record of this proceeding in July 2025. Four First Nations filed joint legal submissions in October 2025 documenting impacts on Treaty 8 rights

throughout the Peace River Corridor. The Dene National Chief issued a formal demand for meaningful consultation in November 2025. Energy Alberta has not addressed any of these formal notifications. It has filed a project description for an upstream Peace River development that treats the standing treaty obligations applicable to all upstream Peace River developments as though they do not exist.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUND 4:

Filed a project whose treaty-level obligations — to UNESCO and under the Alberta-NWT Transboundary Water Agreement — were formally placed on the record by a government party and four First Nations. Energy Alberta has addressed none of them. The Panel is asked to find in the public interest a project whose proponent has not acknowledged the treaty obligations Canada assumed before this assessment began.

(Cross-reference: SS 30, Part One §1.6; SS 20/25; Invalidity Ground 4)

4.7 Filing a Cancer-Only Health Impact Assessment Against the Wrong Baseline for the Wrong Community

The Peace River region carries a documented above-average cancer incidence of unknown aetiology. This is not a contested characterisation. The IAAC's Summary of Issues required characterisation of the region's health baseline precisely because it is not the national average. Energy Alberta filed a health impact assessment evaluating cancer as the sole quantitative endpoint — excluding cardiovascular, neurological, immune, ophthalmic, reproductive, and mixture effects — against a generic national baseline rather than the Peace River community's documented health position. The assessment presents a fraction of the required statutory health analysis — one endpoint category of seven, against the wrong baseline — formatted to appear as the complete assessment the Panel needs. The community whose health the Panel must protect is not described by the assessment the Panel has been given.

ENERGY ALBERTA'S CONDUCT — PROXIMATE CAUSE OF INVALIDITY GROUNDS 3 AND 6:

Filed a cancer-only health impact assessment against a generic national baseline, for a community whose cancer incidence already exceeds that baseline for reasons that have never been explained. The Panel cannot make a finding on health effects for the Peace River community on an assessment that was not designed to assess the health of the Peace River community.

(Cross-reference: SS 30, Part One §1.7; SS 14; Invalidity Grounds 3 and 6)

PART FIVE — The CNSC's Independent Legal Obligations in Respect of This Proceeding — a Further Documented Neglect

Parts One through Four establish what the IAAC permitted, what the CNSC independently failed to do, and what Energy Alberta's conduct produced. This Part addresses a prior and independent question: whether the CNSC itself bears specific legal obligations in respect of the invalidity grounds documented above — obligations it has not discharged — and whether its failure to discharge them is itself a documented neglect. The answer is yes, across three distinct legal bases. The CNSC's failure to discharge these obligations is the structural explanation for why the eight IAAC neglects in Part One were able to occur and to persist unremedied through the planning phase, through the suspension, and into the resumed proceeding of March 2026.

5.1 The IAA Section 18 Mandatory Disclosure Obligation

Section 18 of the Impact Assessment Act imposes an affirmative and mandatory obligation on every federal authority — including the CNSC — to provide the Agency with all information in its possession that is relevant to the assessment. This obligation is not satisfied by providing favourable technical summaries. It requires disclosure of information that is adverse, limiting, or qualifying — information that bears on the adequacy of the record the Panel will use to make its determination. The obligation is mandatory and ongoing. It does not depend on the Agency asking the right questions. It requires the CNSC to disclose what it knows.

The CNSC possessed, throughout the planning phase, the following information it did not disclose to the Agency under s. 18. First, the VDR status of the CANDU MONARK: the CNSC knew it had not commenced a preliminary VDR assessment of the technology named in the project description. That fact is directly relevant to whether the project description satisfies IAA s. 10. Had it been disclosed, the Agency would have been required to either reject the IPD or require a technology commitment before the planning phase opened. Second, the dose

constraint non-compliance: the CNSC has been formally non-compliant with IAEA GSR Part 3 Requirement 29 since at least the 2019 IRRS mission. That non-compliance is directly relevant to whether the CNSC's dose projections constitute adequate health protection under IAA s. 22. Third, the benefits-outweigh-harm institutional exclusion: the CNSC's formal rejection of IAEA Suggestion S9 and its position in *CARN v BWXT* are matters of public record, directly relevant to whether the CNSC's submissions can discharge the Panel's public interest obligation under IAA ss. 60 to 63. Fourth, UNESCO's SOC 4339 standing requirement: a binding treaty obligation applicable to all major PAD watershed projects, directly relevant to any assessment of a Peace River upstream development, which the CNSC did not flag in any advisory input at any stage of the planning phase. Fifth, the post-2023 INWORKS literature: the CNSC acknowledged the 2023 findings publicly and took no regulatory action; it has not acknowledged the six subsequent studies that extend them. This information is directly relevant to every cancer risk finding the Panel will be asked to make.

CNSC NEGLECT SS31 — IAA s.18 DISCLOSURE OBLIGATION:

Failed to disclose under IAA s. 18: (a) the VDR status of the CANDU MONARK; (b) the two-cycle IAEA dose constraint non-compliance; (c) the institutional refusal of the benefits-outweigh-harm standard; (d) UNESCO's SOC 4339 standing requirement; and (e) the six major post-2023 INWORKS studies and their implications for the risk coefficient in use. Each of these is directly relevant to the assessment the IAAC is conducting. Each was in the CNSC's possession. None was disclosed. The CNSC's systematic non-disclosure under s. 18 is the structural cause of the IAAC's failure to require the remediation that would have prevented five of the eight invalidity grounds from arising.

(Cross-reference: All eight IAAC Neglects in Part One)

5.2 The Concurrent NSCA Section 24 Obligation

Section 24 of the Nuclear Safety and Control Act requires the CNSC to be satisfied, before issuing any licence, that the applicant will make adequate provision for the protection of the environment, the health and safety of persons, and national security. This obligation does not lie dormant until the licensing stage. It governs the CNSC's conduct as a participant in the IAA assessment because the CNSC's advisory submissions necessarily imply a representation about whether the facility, as described, would be capable of satisfying this threshold. A submission that treats the project as viable for impact assessment purposes carries the implicit representation that the CNSC could at least contemplate forming the s. 24 satisfaction if the assessment proceeds.

On the current record, the CNSC cannot form the satisfaction s. 24 requires, for four reasons that are each documented in this submission. There is no completed Vendor Design Review for either technology: without a completed VDR, the CNSC has no regulatory basis for evaluating whether the proposed facility will meet Canadian safety requirements, and adequate provision for health and safety cannot be assured without this foundation. No site-specific dose constraint exists: without a health-derived upper bound on dose to Peace River residents, adequate provision for the protection of the health of persons in the vicinity cannot be established. The cancer risk coefficient in use may understate chronic low-dose radiation risk by a factor of ten to twenty-eight: adequate provision for health protection cannot be made on a risk framework whose accuracy the CNSC's own acknowledgements have placed in serious doubt. No waste management plan exists: adequate provision for the protection of the environment cannot be made for a facility whose primary waste stream has no licensed disposal pathway, no transport corridor, and no financial assurance instrument.

CNSC NEGLECT SS31 — NSCA s.24 CONCURRENT OBLIGATION:

Cannot presently form the satisfaction NSCA s. 24 requires on the current record — no VDR, no dose constraint, acknowledged risk coefficient inadequacy, no waste management plan — and has not disclosed this to the Agency or the Panel. Has instead participated as though the licensing threshold can be met, providing a false impression of regulatory readiness for a project whose foundational preconditions for any licence have not been established.

(Cross-reference: SS 18/23, SS 22/27, SS 15, SS 19/24)

5.3 The Quasi-Judicial Duty of Candor

The IAA Panel is a quasi-judicial body. Administrative law in Canada — as articulated in *Baker v Canada* (MCI), [1999] 2 SCR 817, *Dunsmuir v New Brunswick*, [2008] 1 SCR 190, and *Canada (MCI) v Vavilov*, 2019 SCC 65 — imposes procedural fairness and candor obligations on participants who provide evidence to quasi-judicial

decision-makers, including federal authorities operating in a statutory advisory capacity. A federal authority that provides expert evidence to a Panel while knowing that the evidence cannot support the determination the Panel must make — and without disclosing the limitations that would prevent the Panel from relying on it — is not fulfilling its role as a participant in a fair process. It is presenting conclusions while withholding the qualifications that would change the Panel's assessment of those conclusions.

The duty of candor requires the CNSC to disclose, at minimum: that its dose projections are produced by a framework the IAEA found non-compliant in two consecutive reviews for lacking the dose constraint that gives the framework its health-protective function; that its cancer risk coefficient may understate risk by a factor of ten to twenty-eight, on its own published acknowledgement, and that it has not acted on that acknowledgement; that it has formally refused, twice on the published international record and in Federal Court, to apply the benefits-outweigh-harm justification analysis that the Panel's public interest determination requires; that it has not commenced a VDR of the technology named in the project description, and that neither technology the proponent has named has a current completed Canadian regulatory basis; and that its public communications across seven published documents contain representations irreconcilable with its own internal scientific record, as documented in Show Stopper 7. None of these disclosures has been made in any submission to this proceeding.

CNSC NEGLECT SS31 — QUASI-JUDICIAL DUTY OF CANDOR:

Has provided conclusions to a quasi-judicial body without disclosing their material qualifications: dose projections without their IAEA non-compliance context; cancer risk estimates without the INWORKS literature the CNSC acknowledged understates them; regulatory endorsements without disclosure of the structural incapacities — refused benefits-outweigh-harm test, incomplete VDR, dual mandate, fee funding — that render those endorsements unreliable. The cumulative effect is that the Panel has received from its primary technical adviser a body of evidence constructed to support a predetermined conclusion, with every qualification that would prevent that conclusion withheld. This is a breach of the duty of candor that Baker, Dunsmuir, and Vavilov require of participants in quasi-judicial proceedings.

(Cross-reference: SS 7, SS 8, SS 13, SS 21/26, SS 22/27)

5.4 Why This Is a Further CNSC Neglect — Not Merely an Incidental IAAC Problem

The causal relationship between the CNSC's s. 18 failures and the eight IAAC neglects in Part One is direct and documented. IAAC Neglect 1 exists because the CNSC did not disclose VDR status — had it done so, the Agency could not have opened the planning phase on the current project description. IAAC Neglect 3 exists in part because the CNSC did not flag the mandatory assessments the Summary of Issues identified as necessary before the IPD was accepted. IAAC Neglect 4 exists because the CNSC did not flag UNESCO's SOC 4339 requirement in its advisory inputs. IAAC Neglect 5 exists because the CNSC provided technical evidence for a determination its own institutional posture precludes it from supporting without disclosing the exclusion. IAAC Neglect 6 exists because the CNSC has not disclosed its dose constraint non-compliance. IAAC Neglect 7 exists because the CNSC designed the HIA framework that excludes six statutory endpoint categories. IAAC Neglect 8 exists because the CNSC did not advise the Agency when the proponent's commercial position changed during the suspension.

The IAAC's neglects are therefore substantially — not incidentally — the product of the CNSC's systematic failure to fulfil its s. 18 disclosure obligations, its concurrent NSCA s. 24 obligations, and its quasi-judicial duty of candor. This is not a coincidence. It is the structural consequence of what Show Stopper 13 established: an institution whose mandate, funding structure, and regulatory culture are systematically aligned toward licensing outcomes will not volunteer the information that complicates them. A process restart that does not first require the CNSC to discharge these obligations will produce the same outcome as the current process.

PART SIX — The Conditions That Must Be Satisfied Before a Restarted Process Can Produce a Lawful Outcome

The deficiencies established in Parts One through Five are not supplementable within the current process. The planning phase record, directed toward a technology the proponent has potentially abandoned, cannot be rehabilitated by additional submissions in the assessment phase. The FPIC processes cannot be retroactively validated for a changed project. The mandatory information requirements cannot be satisfied mid-Panel-process in a way that permits meaningful participant response. The treaty obligations cannot be addressed after a positive public interest finding has been made. The CNSC cannot perform VDR assessments, establish dose constraints, or update its risk coefficient in time to ground Panel findings on the current timeline. A complete process restart is the only mechanism through which the structural invalidity can be remedied. The following conditions must be satisfied before a restarted process can commence lawfully.

First, Energy Alberta must commit irrevocably to a single named reactor technology supported by a commenced and substantially progressed CNSC Phase 1 and Phase 2 Vendor Design Review, or must formally adopt a documented Plant Parameter Envelope that establishes bounding parameters across the range of technologies under consideration in a form that the CNSC has assessed and that is sufficient to ground technology-specific participant submissions. A project description naming an unassessed technology or two mutually exclusive technologies simultaneously does not satisfy IAA s. 10 and Regulation 7, and no assessment commenced on such a description is validly commenced.

Second, a fresh planning phase must be conducted against the committed technology or formally documented PPE basis. All participants who directed Participant Funding Program resources toward CANDU MONARK-specific analysis must be offered supplementary funding to re-engage on the committed technology basis. The planning phase record from the current assessment cannot be carried forward.

Third, FPIC processes for all nineteen First Nations and Métis communities listed in the Indigenous Engagement and Partnership Plan must be recommenced on the basis of accurate, technology-specific, and complete radiological and health information, compliant with UNDRIP Article 19 and Bill C-15. Consent given in the current planning phase, based on CANDU MONARK-specific information, is not valid consent to a project whose physical character has materially changed.

Fourth, Energy Alberta must file a complete waste management plan satisfying the Nuclear Fuel Waste Act and CNSC REGDOC-2.11.1 before the new planning phase commences. The plan must include a confirmed DGR acceptance agreement with the NWMO, a licensed transportation pathway from the Peace River site to the proposed DGR, an identified and proposed interim storage arrangement for the period before DGR acceptance, and a financial assurance instrument calibrated to full decommissioning and waste management costs. The plan must address the consequences for the waste pathway if the Eagle Lake First Nation Federal Court challenge to the DGR site selection succeeds.

Fifth, Energy Alberta must file a 100-year climate-adjusted water security assessment before the new planning phase commences. The assessment must cover low, medium, and high climate scenarios consistent with IPCC AR6, must include a cumulative allocation analysis using Alberta Environment's current licence registry for the Smoky-Wapiti sub-basin, and must demonstrate that a Water Act licence can be obtained for the full operating life of the facility under each scenario. The assessment must address thermal discharge effects on the Peace River ice regime and downstream PAD hydrology.

Sixth, an independent OUV impact assessment satisfying the requirements of UNESCO's 2023 SOC 4339, conducted in consultation with the World Heritage Centre and IUCN, must be completed and made available to the UNESCO Reactive Monitoring Mission before that mission concludes its August 2026 assessment. This is not a condition that can be deferred to the Impact Statement phase. UNESCO's 2023 SOC Decision required it before any approval, and the August 2026 mission will assess compliance with that requirement this year.

Seventh, the CNSC must complete at minimum Phase 1 and Phase 2 Vendor Design Reviews for the committed reactor technology before assuming its advisory role in any restarted proceeding. It must, additionally, establish a site-specific public exposure dose constraint for the Peace River facility, calibrated to the community's documented elevated cancer baseline and established before facility design is fixed, consistent with IAEA GSR Part 3 Requirement 29.

Eighth, the CNSC must either apply IAEA SF-1 Principle 4 benefits-outweigh-harm analysis in a restarted process, or the IAAC must commission an independent justification analysis from a body not subject to the CNSC's institutional exclusion of that step. The Panel in any restarted process cannot discharge its IAA ss. 60–

63 public interest obligation by deferring to a technical adviser that has structurally excluded itself from the central analytical step the obligation requires.

Ninth, the CNSC must update its cancer risk coefficient to reflect the INWORKS 2023–2025 literature before any cancer risk assessment is presented to a restarted Panel. The CNSC has acknowledged that the current coefficient may understate risk by a factor of ten to twenty-eight. A cancer risk finding made on an unadjusted coefficient whose inadequacy the primary technical adviser has privately acknowledged is not a finding the Panel can lawfully rely upon.

Tenth, the CNSC must file a formal IAA s. 18 advisory at the commencement of any restarted process disclosing: the VDR status of the committed technology; the implementation status of IAEA IRRS Recommendation R2 and the current Peace River dose constraint; its NSCA s. 24 position on the current record; the INWORKS 2023–2025 literature and its implications for the risk coefficient in use; and UNESCO's SOC 4339 requirements and the CNSC's assessment of the project's OUV implications. This advisory must be filed at the planning phase stage so that participants can engage with it — not at the end of the process when it is too late for the Panel or participants to act on it.

Show Stopper 31 is not an argument that this project could never be approved under any circumstances. It is an argument that the process through which approval is being sought is structurally invalid, and that no approval made on the current record can be lawfully sustained. The seven grounds of invalidity are each independently sufficient. Together they are cumulative, mutually reinforcing, and irreparable by any supplementary process that does not begin with a committed project description, a valid participation record, and a regulatory adviser that can honestly account for what it knows and what it cannot conclude. The Peace River community — a Treaty 8 community already carrying an elevated and unexplained cancer burden, 30 kilometres from the proposed site — is entitled to an assessment that the Impact Assessment Act actually requires. They have not yet received one.

Appendix — Comprehensive Schedule of CNSC Neglects and Failures: Show Stoppers 1 Through 31

The following table catalogues every documented CNSC neglect and failure across Show Stoppers 1 through 31. It is provided to assist the Panel, the Agency, any independent scientific reviewer, and any reviewing court in identifying the specific instances of regulatory failure upon which the invalidity arguments in this submission and in the preceding thirty Show Stoppers depend. For Show Stoppers 1 through 29, the table entry is the primary reference for the neglect described. For Show Stoppers 30 and 31, the table entry is a summary and the Show Stopper document is the primary reference.

SS#	Category	CNSC Neglect / Failure
SS 1	Scientific Integrity	Characterised the KiKK leukemia signal as 'unfounded' without publishing a mechanism by which the observed excess could occur at the dose levels the CNSC asserts are safe. No other major regulatory body — Germany's SSK, France's IRSN, COMARE, or the pooled European analysis — applied this characterisation to the same replicated empirical signal. The divergence has not been explained by any Canada-specific scientific data the CNSC has published.
SS 2	Baseline / Site	Failed to require characterisation of the Peace River region's above-average cancer incidence of unknown aetiology before recommending the project for Impact Assessment, making every incremental risk calculation structurally incorrect for this specific community. Failed to require mixture interaction assessment despite documented chemical carcinogen co-exposure from Peace River bitumen extraction operations.
SS 3	Tritium Research	Stated formally in INFO-0799 (2010) that the evidence base was insufficient to estimate tritium health risks and that an international collaborative study was required. No such study was commissioned in the sixteen years following. Published a tritium fact sheet containing six representations irreconcilable with INFO-0799's explicit conclusions.
SS 4	Dose Modelling	Applied dose-response models built on acute external A-bomb survivor exposure to chronic internal tritium exposure — wrong population, wrong pathway, wrong dose rate. Applied RBE of 1.0 for tritiated water and OBT contrary to its own internal recommendation of 2.2, understating every tritium cancer risk calculation by at minimum a factor of 2.2.
SS 5	Research Funding	Failed to fund the research gaps its own scientists identified, despite statutory authority under NSCA s. 9(b) and an annual budget exceeding \$350 million for over a decade. Did not support the international collaborative research programme funded by the US Congress under the Energy Policy Act.
SS 6	Study Design	Presented studies with inadequate statistical power as evidence of no effect without disclosing power limitations. Studies incapable of detecting the effect sizes documented in the international literature are measurement failures, not safety evidence. The distinction was not disclosed to the IAAC or the Panel.
SS 7	Misrepresentation x7	Seven published CNSC documents contain representations irreconcilable with the CNSC's own internal scientific record: KiKK fact sheet, tritium fact sheet, Pickering Tritium Study, RADICON/Cardis reanalysis, Chernobyl fact sheet, and Understanding Radiation fact sheet. The Cardis 15-country dataset withdrawal from statistically significant to null has never been independently audited.
SS 8	Structural Conflict	Funded primarily by fees from the industry it regulates. Dual promotional and protective mandate unresolved in 34 years. Directed by Parliament to approve NRU restart on terms the CNSC had not itself approved — establishing that CNSC independence from government is not structurally guaranteed.
SS 9	Int'l Divergence	Holds a position on the KiKK signal that no other sophisticated nuclear jurisdiction has been willing to apply to the same evidence. The divergence from Germany, France, the United Kingdom, Austria, and Switzerland is unexplained by any Canada-specific epidemiological or dosimetric data the CNSC has published.
SS 10	Precautionary Principle	Systematically inverted the statutory burden of proof. IAA s. 6(1)(a) and the precautionary principle as applied in 114957 Canada Ltée v Hudson place the

SS#	Category	CNSC Neglect / Failure
		burden on the proponent to demonstrate that significant adverse effects are unlikely — not on community members to prove harm. The CNSC has treated this as reversible.
SS 11	FPIC Accuracy	Health information underlying FPIC shown — through the CNSC's own internal documents — to be materially inaccurate. UNDRIP Article 19 and Bill C-15 require that consent be based on accurate and complete information. Consent given on an inaccurate health information base does not satisfy this constitutional minimum.
SS 12	Monitoring Adequacy	Designed a monitoring framework structurally incapable of detecting harm at Peace River's population size given the effect sizes documented in the peer-reviewed literature. A framework that cannot detect harm if it occurs provides the documentary appearance of protection without its substance.
SS 13	Regulatory Abdication	Knew about every deficiency in SS 1–12 for at least thirteen years. Had statutory authority under NSCA ss. 9, 24, and 35 to require remediation as a condition of any licence. Was told by its own scientists in 2010 what was required. Had budget exceeding \$350 million annually. Took no action. This is the structural context for every CNSC failure in SS 14–31.
SS 14	HIA Scope	Accepted cancer as the sole quantitative health endpoint, excluding five categories with peer-reviewed evidence of association with chronic low-dose ionising radiation: cardiovascular, neurological and neurodevelopmental, immune dysregulation, ophthalmic, and reproductive and developmental outcomes. Also excluded mixture interaction effects despite documented co-exposure background.
SS 15	Recent Literature	Has not acknowledged six major peer-reviewed studies published August 2024 to February 2026: INWORKS haematological cancer study (Lancet Haematology 2024, ERR 2.68/Gy leukemia); 47-study meta-analysis (Current Environmental Health Reports 2024); Harvard Environmental Health (2025); Harvard Nature Communications (2026, ~6,400 excess cancer deaths per year near US nuclear facilities); IJMS epigenetic transgenerational study (March 2025); EJE INWORKS solid cancer reanalysis (November 2024). Acknowledged the 2023 INWORKS findings and took no regulatory action.
SS 16	Harm Standard	Has not defined a level of harm that would be unacceptable. ALARA is a cost-optimisation tool that requires no upper bound. Without a defined harm threshold, no assessment of adequacy is possible. The IAA's public interest question — whether harm is acceptable — cannot be answered by an institution that has never defined unacceptable harm.
SS 17	Alternatives	Has not required full renewable-plus-gas-with-CCS alternative modelling in a northern Alberta context as a comparative harm scenario. The asymmetric epidemiological surveillance base — six decades for fossil fuel, thirty years selectively applied for nuclear — means no honest cross-technology comparison has been conducted or placed before the Panel.
SS 18/23	Technology Commitment	Confirmed March 2026 that it has not commenced a preliminary VDR of the CANDU MONARK. Did not require technology commitment or PPE before pre-licensing engagement. Did not notify the IAAC when Energy Alberta signed the Westinghouse AP1000 MOU on 21 October 2025. Phase 3 of the AP1000 VDR is also incomplete. Neither technology named by the proponent has a current completed Canadian regulatory basis.
SS 19/24	Nuclear Waste	Allowed the project to advance without a waste management plan satisfying the Nuclear Fuel Waste Act and REGDOC-2.11.1. No licensed DGR pathway, no transport corridor, no interim storage site, no financial assurance. Did not flag Eagle Lake First Nation's 20 December 2024 court challenge to DGR site selection as a material uncertainty affecting the only proposed permanent disposal pathway.
SS 20/25	UNESCO Transboundary	/ Did not disclose UNESCO's 2023 SOC 4339 standing requirement in any advisory input. Did not commission or recommend an OUV impact assessment.

SS#	Category	CNSC Neglect / Failure
		Did not advise the IAAC of the NWT government's formal July 2025 notification of Transboundary Water Agreement breach.
SS 21/26	Benefits vs Harm	Published formal rejection of IAEA IRRS Suggestion S9: 'Not accepted.' Confirmed in <i>CARN v BWXT</i> , 2022 FC 849, ¶¶47–53, that benefits-outweigh-harm is not a binding Canadian legal obligation. Has not disclosed this institutional position to the Panel in a proceeding whose public interest determination under IAA ss. 60–63 requires precisely this analysis.
SS 22/27	Dose Constraints	Found non-compliant with IAEA GSR Part 3 Requirement 29 in the 2019 IRRS mission (Recommendation R2) and again in the 2024 IRRS follow-up. Own implementation plan defers dose constraint to construction licence phase — the precise reverse of what IAEA GSR Part 3 requires. No dose constraint established for the Peace River facility.
SS 28	Water Security	Did not require the proponent to demonstrate that a Water Act licence can be obtained before pre-licensing engagement. Did not require 100-year climate-adjusted water assessment despite the IAAC's June 2025 Summary of Issues declaring one mandatory. Has not assessed thermal discharge effects on Peace River ice regime or downstream PAD hydrology.
SS 29	Participation Record	Did not require technology commitment before pre-licensing engagement commenced. Confirmed March 2026 it cannot provide a technical basis for CANDU-specific submissions participants had already filed. Has established no pre-licensing engagement policy requiring technology commitment or PPE before technology-specific participation commences.
SS 30	s.18 / NSCA s.24 / Candor	Failed to disclose under IAA s. 18: VDR status of both technologies; two-cycle IAEA dose constraint non-compliance; institutional refusal of benefits-outweigh-harm standard; UNESCO SOC 4339 requirement; and six post-2023 INWORKS studies. Cannot form NSCA s. 24 licensing satisfaction on the current record and has not said so. Submitted conclusions to a quasi-judicial body without their material qualifications in breach of the duty of candor grounded in Baker, Dunsmuir, and Vavilov. Enabled all eight IAAC neglects by withholding the information that would have compelled the Agency to require their remediation.
SS 31	Structural Invalidity Cumulative	— The assessment record is invalid across seven independent grounds that are cumulative and mutually reinforcing: undefined project description (IAA s.10 / Reg.7); non-certifiable participation record (IAA ss.6, 11, 27); unsatisfied mandatory information requirements (IAAC Summary of Issues, June 2025); unaddressed binding treaty obligations (World Heritage Convention; Alberta-NWT Transboundary Water Agreement); CNSC advisory incapacity on VDR, dose constraints, benefits-outweigh-harm, and risk coefficient; Panel incapacity to complete ss.60–63 assessments; and FPIC invalidity for a materially changed project under UNDRIP Article 19 / Bill C-15. Energy Alberta's seven documented acts of procedural disdain are the proximate cause of five of these grounds. The CNSC's failure to discharge its s.18 disclosure obligations is the structural cause of each.

WHY THE IAAC CANNOT APPROVE THIS PROJECT

Thirteen Independent Show Stoppers

A Formal Submission to the Impact Assessment Agency of Canada

Why the IAAC Cannot Approve This Project

This submission identifies thirteen independent show stoppers to the approval of the Energy Alberta nuclear facility in the Peace River region. Each show stopper is fatal to the application on its own. The IAAC does not need to find all thirteen persuasive — or even six, or three. Any single one of the thirteen, properly applied to the statutory obligations of the Impact Assessment Act, is sufficient grounds to refuse approval. Together they form a closed logical structure from which there is no exit within the current state of knowledge or the current regulatory architecture.

The thirteen show stoppers fall into three categories. The first six concern the **evidence** — what the science actually shows, why the models fail, and why the studies the CNSC cites as proof of safety were almost certain to find nothing regardless of whether harm existed. The next three concern the **institution** — why the regulator the IAAC depends on cannot be relied upon, the structural reason it cannot be relied upon, and the fact that every other sophisticated nuclear nation has reached a more qualified conclusion from the same evidence. The final four concern the **law** — the statutory obligations triggered by the documented uncertainties, the constitutional defect in Indigenous consent, the irreversibility that makes every other concern permanent, and the regulatory abdication that is the reason every deficiency in this submission remains unaddressed after decades.

Part One: The Evidence

- Show Stopper 1 — **The Real-World Cancer Data Does Not Match the Models:** a forty-year, multi-country, independently replicated body of evidence documents elevated cancer rates near nuclear plants that the regulatory models predict should not exist, with a gap between model predictions and observed outcomes of ten thousand to one hundred thousand times.
- Show Stopper 2 — **The Baseline Is Already Compromised:** the Peace River region carries a documented elevated cancer incidence of unknown cause in a chemical environment that interacts synergistically with ionizing radiation, making the incremental risk calculation structurally wrong at this specific site before a single model input is considered.

- Show Stopper 3 — **The Primary Emission Cannot Be Adequately Assessed:** the CNSC's own scientists formally stated in 2010 that the evidence base is insufficient to estimate the health risks of tritium — the primary emission of CANDU reactors — and six irreconcilable contradictions exist between the CNSC's public tritium fact sheet and its own internal technical report.
- Show Stopper 4 — **The Models Are Structurally Wrong for This Scenario:** the dose models were built on the wrong people, measure the wrong thing, and apply the wrong biological weight to the substance the plant will emit most — failing the population most at risk across three independent structural dimensions simultaneously.
- Show Stopper 5 — **The Required Research Has Not Been Done:** the research gaps formally acknowledged by the US National Academies, funded by Congress, and rated as very low certainty by the most comprehensive international meta-analysis cannot be closed by building the plant and observing the outcomes.
- Show Stopper 6 — **Absence of Evidence Is Not Evidence of Absence:** the null studies the CNSC will cite as safety evidence were designed with so little statistical power they were almost certain to find nothing regardless of whether harm existed — they are measurement failures presented as conclusions.

Part Two: The Institution

- Show Stopper 7 — **The Regulator Cannot Be Relied Upon:** seven documented contradictions between the CNSC's public communications and its own internal scientific documents establish a systematic pattern of misrepresentation, and the word 'unfounded' — the CNSC's most consequential public conclusion — is an advocacy verdict that violates seven principles of scientific method, applied to a replicated empirical signal no other major regulatory body was willing to call groundless.
- Show Stopper 8 — **Structural Conflict of Interest:** the CNSC is funded primarily by fees from the industry it regulates, is embedded in an institutional ecosystem that includes both the regulated industry and the research institution producing its safety evidence, and has never had its most consequential data withdrawal independently audited — providing the structural explanation for the pattern documented in Show Stopper 7.
- Show Stopper 9 — **International Regulatory Divergence:** every other sophisticated nuclear jurisdiction — Germany, France, the United Kingdom, Austria, Switzerland — that has examined the same evidence has reached a more qualified conclusion than Canada's own regulator, and that divergence is not explained by Canada-specific science.

Part Three: The Law

- Show Stopper 10 — **The Precautionary Principle Is a Positive Legal Obligation:** section 6 of the Impact Assessment Act requires the IAAC to apply the precautionary principle to each of six documented scientific uncertainties, and the burden of proof —

which the CNSC systematically inverts — sits by law with the proponent, not with those raising concerns.

- Show Stopper 11 — **The UNDRIP Informed Consent Defect:** Free, Prior, and Informed Consent under Bill C-15 cannot be valid when the health information on which it rests has been shown — through the CNSC's own documents — to be inaccurate; this is a substantive constitutional defect that cannot be corrected after approval.
- Show Stopper 12 — **Irreversibility and the Absence of Any Self-Correction Mechanism:** if harm occurs at the levels documented near other nuclear plants, the Peace River community is too small to detect it epidemiologically, making monitoring conditions meaningless as safeguards and making the consequences of approval permanent and unreviewable.
- Show Stopper 13 — **Regulatory Abdication:** the CNSC knew about every deficiency documented in this submission, possessed the statutory authority under the Nuclear Safety and Control Act to require the research needed to remedy each of them as a condition of any licence it issued, had an annual budget exceeding \$350 million to fund it, was told by its own scientists in 2010 exactly what was required, and took no action across sixteen years — making the IAAC the last available mechanism in the Canadian regulatory system through which these deficiencies can be compelled before a community is permanently committed to living beside a facility whose primary emission the CNSC's own scientists said they could not adequately assess.

PART ONE — SHOW STOPPERS 1 THROUGH 6

The Evidence

What the science actually shows, why the models fail, and why the studies the CNSC cites as proof of safety prove nothing

Part One establishes the empirical foundation of this submission. It begins with the forty-year international evidence record showing that cancer rates near nuclear plants exceed model predictions by a factor of ten thousand to one hundred thousand — a gap the CNSC has never explained. It then shows that the Peace River region compounds this problem because its population already carries an elevated cancer burden and a chemical environment that interacts synergistically with radiation, making the incremental risk from this facility not merely additive but potentially multiplicative. It then explains structurally why the models fail: they were built on the wrong people, measure the wrong thing, and assign the wrong biological weight to the substance the plant will emit most. It establishes that the research required to fix the models has not been done. It closes by demonstrating that the null findings the CNSC will cite as evidence of safety come from studies that were almost certain to find nothing regardless of whether harm existed — making them measurement artifacts, not safety evidence.

The Real-World Cancer Data Does Not Match the Models

What the Models Predict

Everything in Energy Alberta's safety case rests on mathematical models. Those models calculate radiation emissions, dispersal, human uptake, and resulting dose. From that dose they calculate risk. Their prediction for communities near nuclear power plants — based on estimated dose levels of 0.001 to 0.01 millisieverts per year — is that cancer risk increases are immeasurably small. Effectively zero additional cases. This is not a contested interpretation of the models. It is what the models straightforwardly produce given the emission and dose inputs.

The Body of Evidence That Shows the Models Are Wrong — A Forty-Year Record

The models do not predict what is observed in the real world. The following is not a characterisation of contested data. It is a catalogue of independent research programmes spanning four decades, conducted in different countries, by different scientific teams, using different methodologies — all documenting elevated cancer rates near nuclear plants that the models predict should not exist. The KiKK study was not the beginning of this evidence base. It was a rigorously designed national study commissioned to investigate a signal that had already been accumulating for twenty-five years before it was published.

The Black Report — United Kingdom, 1984

The first formal government investigation of childhood cancer near a nuclear facility was the Black Inquiry, commissioned following public concern about leukemia rates in Seascale — the village adjacent to the Sellafield nuclear complex in Cumbria. The inquiry found that childhood leukemia incidence in Seascale was approximately ten times the national average. The Black Report did not attribute the excess to radiation but acknowledged it could not be explained. It recommended further investigation. That excess — ten times the national average in the immediately adjacent community — was the opening data point of the evidence base that now spans forty years.

COMARE — United Kingdom, 1986 Onwards

The UK government established the Committee on Medical Aspects of Radiation in the Environment to continue the investigation the Black Report initiated. COMARE published a series of reports through the late 1980s and 1990s examining childhood cancer rates near Sellafield, Dounreay, and other UK nuclear sites. The reports consistently documented elevated rates that could not be explained by the radiation doses measured at those sites. COMARE's broader analysis across UK nuclear sites found approximately a 20% excess leukemia risk within 5 kilometres of nuclear installations — statistically significant across the aggregated UK data. COMARE's consistent finding across multiple sites and multiple reports over more than a decade was that the signal was real and the explanation was unknown.

The Krümmel Cluster — Germany, 1990–2005

In the early 1990s an elevated childhood leukemia cluster was identified near the Krümmel nuclear power plant in northern Germany. Between 1990 and 1995, six cases of childhood leukemia were diagnosed in the area, five of them within a five-kilometre radius, against an expected number of approximately one — representing a rate roughly five to six times the expected level. The cluster persisted until at least 2005. Modestly elevated levels of caesium were detected in rainwater and air samples near the plant during the period. Emissions from the plant were within regulatory limits throughout. The UK's COMARE examined the Krümmel data and concluded the cluster could not be explained. The Krümmel cluster was one of the direct scientific motivations for the German government commissioning the KiKK national case-control study.

Pre-KiKK Ecological Studies — Multiple Countries, 1990s–2000s

Through the 1990s and early 2000s, ecological studies in the UK, France, Germany, Canada, and the United States consistently found elevated childhood leukemia rates near nuclear power plants. A formal meta-analysis of geographic studies from this period reported a 23% higher incidence of leukemia among children aged zero to nine years living within 16 kilometres of nuclear facilities — pooled across multiple countries and multiple study designs. These were the studies that established the signal and motivated the more rigorous case-control designs that followed. Their consistent directional finding — elevated rates, models predicting no elevation, gap unexplained — is the foundation on which KiKK was built.

The KiKK Study — Germany, 2008

The *Kinderkrebs in der Umgebung von Kernkraftwerken* study was commissioned by Germany's Federal Office for Radiation Protection specifically to address methodological criticisms of the earlier ecological studies. Conducted by the German Childhood Cancer Registry, it was a national case-control study examining every nuclear power plant in Germany. It found an odds ratio of 2.19 for leukemia in the closest proximity subgroup — a 119% excess risk — and an odds ratio of 1.61 for all cancers combined, a 61% excess risk. These findings were statistically robust, peer-reviewed, and published in the *European Journal of Cancer*. Germany's radiological protection commission reviewed it and concluded the cause remains unclear. It did not say the finding was an artifact. It did not say it was unfounded.

French GEOCAP Study — France, 2012

INSERM — France's national institute for health and medical research — conducted an independent national case-control study using French cancer registry data. It was not designed in response to KiKK and did not use KiKK's methodology. It found an odds ratio of approximately 1.9 for childhood leukemia near French nuclear plants — a roughly 90% excess risk — in the closest proximity subgroup. Two independent national case-control studies, designed and conducted separately, in two separate countries, with separate research teams and separate data, found essentially the same result.

Pooled Case-Control Analysis — Multiple Countries

A pooled case-control analysis drawing on data from multiple national studies found that residence within five kilometres of a nuclear facility was associated with a 61% increased incidence of all cancers and a 119% excess risk of leukemia in children under five. The magnitude of the pooled finding was consistent with both KiKK and GEOCAP. The consistency across national studies and pooled analyses is the signature of a real signal.

Körblein and Fairlie Pooled Analysis

Körblein and Fairlie conducted a pooled analysis across the available international studies examining cancer rates near nuclear plants. The pooled analysis found a statistically significant 20% excess leukemia risk across the pooled dataset, with the excess rising to 37% in the closest proximity subgroup. The consistency of the direction and magnitude across independent national datasets is the primary finding. The CNSC's KiKK fact sheet does not reference this analysis.

Baker and Hoel Meta-Analysis

Baker and Hoel conducted a formal meta-analysis of studies examining cancer rates near nuclear facilities, covering multiple countries and facility types. Their analysis found a statistically significant 21% increase in childhood leukemia risk within the closest proximity band to nuclear facilities, consistent in direction with every individual national study in the catalogue. The CNSC's public materials do not reference this analysis.

Russo 2023 — The Post-Shutdown Natural Experiment

Russo and colleagues published a 2023 analysis using Germany's 2011 nuclear plant closures as a natural experiment. The analysis found that the incidence rate ratio near German plants dropped from 1.20 — a 20% elevation — before closure to 1.12 — a 12% elevation — after closure. The decline was partial and did not reach background levels. This finding demonstrates two things: the signal was present at a 20% elevation before closure, and even after closure it remained above background, meaning the question of mechanism is not closed. The CNSC's KiKK fact sheet, updated as recently as October 2025, does not reference this analysis.

The 2024 International Meta-Analysis — 175 Plants, 17 Countries

The most comprehensive quantitative synthesis of health outcomes near nuclear power plants published to date covered 175 plants across 17 countries, encompassing nearly half a million nuclear industry workers and over seven and a half million community residents. It found elevated cancer signals near operating plants that the modelled dose estimates cannot account for. Under the GRADE framework — the international gold standard for evidence quality assessment — the certainty of evidence for cancer outcomes was rated as very low. That rating does not mean the elevated signal is absent. It means the studies available to measure it precisely have serious design and power limitations. The signal is present in the data across 175 plants and 17 countries.

Harvard Study — United States, February 2025

A study published in Nature Communications in February 2025 examined cancer mortality rates in US counties relative to their proximity to operational nuclear power plants. Critically, the analysis controlled for poverty, smoking rates, obesity rates, racial composition, and healthcare access — the major non-radiological confounders that might independently explain elevated cancer rates. After removing the contribution of all those factors, counties closer to nuclear plants still showed higher cancer mortality. The relative risk for the highest-proximity group reached approximately 1.20 — a 20% elevation compared to the most distant counties. It is not referenced in any CNSC public document.

Forty-Year Evidence Summary — Quick Reference

The following table summarises every independent study and research programme in the catalogue. Every row documents an elevated cancer signal. Every row represents an independent source. The direction never reverses.

Study / Programme	Jurisdiction	Key Finding
Black Report / Seascale	UK, 1984	~10x national average childhood leukemia in community adjacent to Sellafield
COMARE (multi-site)	UK, 1986 onwards	~20% excess leukemia within 5km across aggregated UK nuclear sites
Krümmel cluster	Germany, 1990–2005	5–6x expected childhood leukemia rate within 5km; plant within regulatory limits throughout
Pre-KiKK ecological meta-analysis	Multi-country, 1990s–2000s	23% higher leukemia incidence ages 0–9 within 16km, pooled across multiple countries
KiKK national case-control study	Germany, 2008	OR 2.19 (119% excess leukemia); OR 1.61 (61% excess all cancers) — closest proximity subgroup
GEOCAP national case-control study	France, 2012	OR ~1.9 (90% excess childhood leukemia) — independent replication using French registry data
Pooled case-control analysis	Multi-country	61% excess all cancers; 119% excess leukemia within 5km — pooled across national studies
Körblein and Fairlie pooled analysis	Multi-country	20% excess leukemia overall; 37% excess in closest proximity subgroup
Baker and Hoel meta-analysis	Multi-country	21% increase in childhood leukemia — consistent across countries and facility types
Russo et al. post-closure study	Germany, 2023	20% elevation pre-closure (2011); 12% post-closure — partial but not complete resolution
International meta-analysis	17 countries, 2024	175 plants; elevated cancer signals; certainty of evidence rated VERY LOW (GRADE)
Harvard / Nature Communications	USA, 2025	20% excess cancer mortality in highest-proximity counties after controlling for poverty, smoking, obesity, race, and healthcare access

What the Forty-Year Catalogue Establishes

This is not one contested study from one country. It is a forty-year, multi-country, independently replicated empirical record: a signal first documented near Sellafield in 1984 at approximately ten times the national average, confirmed across UK nuclear sites by COMARE through the 1980s and 1990s at 20% excess within five kilometres, observed at Krümmel Germany at five to six times the expected rate through the 1990s and 2000s, quantified at national scale by KiKK at 119% excess leukemia risk and 61% excess all-cancer risk, independently replicated in France at 90% excess leukemia risk, confirmed in pooled analyses at 61% excess all cancers and 119% excess leukemia within five kilometres, and observed at 20% elevation in the United States after controlling for poverty, smoking, obesity, race, and healthcare access. The convergence across independent programmes over four decades is the methodological hallmark of a real signal.

What this catalogue establishes for this submission is specific and limited: the mathematical models used to calculate radiation risk near nuclear plants do not predict what is observed in the real world across forty years of independent evidence. The gap between model predictions and real-world observations is between ten thousand and one hundred thousand times. That gap has not been explained. The cause has not been identified.

The Two Interpretations of the Gap — Both Regulatory Problems

There are two possible interpretations of this systematic divergence. The first is that radiation from plant emissions is causing the elevated cancer rates, and the current models dramatically underestimate the biological risk to the relevant population. The second is that something other than radiation is responsible — specifically the population mixing mechanism, under which the rapid influx of construction workers into a small isolated community can trigger leukemia clusters through an infectious or immune mechanism. This has been documented in non-nuclear industrial construction contexts. It has never been definitively ruled out at nuclear plant sites.

Both interpretations lead to the same regulatory conclusion. Under the radiation interpretation, the models used to demonstrate safety are wrong by a factor of up to one hundred thousand for the most relevant population. Under the population mixing interpretation, a mechanism entirely independent of the models is capable of producing elevated cancer rates in communities near nuclear plants — and that mechanism is directly applicable to the Peace River region, which is small, rural, isolated, and has a significant Indigenous population, representing exactly the demographic profile in which the Kinlen population mixing mechanism operates most strongly. Neither interpretation supports the adequacy of a safety case built on models whose predictions are contradicted by the observable evidence.

What the CNSC Tells the Public About This Evidence

The CNSC's public fact sheet describes the link between nuclear plant operations and the elevated cancer rates documented in this body of evidence as unfounded and not supported by a wealth of evidence. No other mainstream scientific or regulatory body in the world — not the WHO, not the UK's COMARE, not Germany's SSK — has characterised the association as unfounded. Germany's SSK said the cause remains unclear. COMARE said a comparable clustering could not be explained. The WHO has not declared the association without foundation. The CNSC's conclusion is more confident than any other major scientific body has been willing to reach, while simultaneously — in the same document — acknowledging that more extensive interdisciplinary research is required.

The fact sheet updated in October 2025 omits the GEOCAP French replication, the Körblein-Fairlie pooled analysis, the Baker and Hoel meta-analysis, the Russo 2023 post-closure natural experiment, and the 2024 international meta-analysis. The CNSC's public characterisation of the evidence as not supported by a wealth of evidence is based on a presentation of that evidence from which the substantial post-2008 replication literature has been entirely removed.

Why This Stops the IAAC

The IAAC must determine that significant adverse health effects are not likely before approving this project. The body of evidence catalogued above — multi-country, independently replicated, persisting across four decades — represents exactly the category of significant adverse health effect the IAAC must assess. Energy Alberta's health impact assessment will show that modelled emissions are within regulatory limits and modelled doses are below regulatory thresholds. That demonstration will be accurate. It will also be irrelevant, because the models on which it rests demonstrably fail to predict real-world outcomes across the entire international body of evidence most directly relevant to this facility type. A safety case that passes a test the real-world evidence has shown to be the wrong test is not a safety case.

The Assumption Underlying Every Risk Model

Every model Energy Alberta will use to demonstrate that this facility is safe rests on an assumption that is never stated but is foundational to every calculation: that the population living near the proposed facility is a healthy baseline population whose cancer risk is at or near the general Canadian average. The incremental risk from the facility is calculated on top of that assumed baseline. If the baseline assumption is wrong — if the population already carries an elevated cancer burden from prior and ongoing exposures — then the incremental risk calculation is wrong, because it is being added to the wrong starting point.

The Peace River region does not have a healthy baseline population in the relevant sense. It has a documented elevated cancer incidence of unknown etiology. The region's cancer burden is already higher than the models assume. The cause of that elevation has not been identified. And peer-reviewed science establishes that the carcinogenic mechanisms operating in this region are precisely the kind that interact synergistically with ionizing radiation — meaning the incremental risk from adding a nuclear facility to this specific community is not merely additive. It may be multiplicative.

The Documented Elevated Cancer Incidence in the Peace Region

The Peace River region carries a documented cancer incidence burden that exceeds the Canadian average. This is not an allegation or a projection. It is observable in regional health data. The cause of this elevation has not been determined. No etiological investigation has been completed. No environmental contaminant has been identified as responsible. The elevation exists, the cause is unknown, and no pre-construction baseline study has been commissioned to characterise it before the addition of a new major carcinogenic source is considered.

This matters for the IAAC assessment in two ways. First, it means the baseline against which Energy Alberta's incremental risk calculation will be made is already elevated. A 1% incremental increase calculated against an elevated baseline produces more absolute harm than the same percentage increase calculated against a healthy baseline. Second — and more significantly — it means the causal environment in which the new facility will operate is uncharacterised. If the existing elevated cancer incidence has a cause, that cause may interact with the facility's emissions in ways that no single-agent risk model can detect or quantify.

Mixture Synergy — Why Adding a New Carcinogen Here Is Not an Additive Calculation

Peer-reviewed science in the field of chemical mixture carcinogenesis establishes that the assumption of additive risk from multiple carcinogenic exposures is empirically invalid for the majority of known carcinogens. A study published in *Carcinogenesis* — the leading peer-reviewed journal in the field — found that only 15% of the 85 reviewed chemicals showed evidence of a dose-response threshold. The remaining 85% exerted low-dose effects without a threshold below which no effect was observed. The assumption of a safe low-dose exposure level that underlies

all nuclear facility licensing is therefore empirically unvalidated for the majority of known carcinogens to which Peace Region residents are already exposed.

The same literature establishes that mixtures of environmental chemicals can produce carcinogenic synergies that no single-chemical risk assessment can detect. A chemical that has immunosuppressive qualities may not be carcinogenic in isolation, but if it suppresses the immune response, it may contribute to carcinogenesis in the presence of other disruptive chemicals. Interacting contributors need not act simultaneously or continuously — they may act sequentially at different life stages. A sustained focus on individual agents misses exactly the kind of synergies that arise when combinations of disruptive chemicals and ionizing radiation act in concert over a lifetime of exposure.

Radiation as Initiator in a Pre-Primed Environment

The National Academy of Sciences BEIR report documents a specific and relevant mechanism: a synergistic interaction between the initiating effects of radiation and specific promoting agents is known to occur across many different organs and cell systems. Promotion by chemical agents causes higher cancer incidence with shortened latent periods. The Peace Region's documented aromatic hydrocarbon contamination — from bitumen extraction and processing operations — means existing chemical exposure already functions as precisely this kind of promoter. Ionizing radiation from the proposed facility would not be entering a clean carcinogenic slate. It would be entering an environment where chemical promoters are already present and active.

The International Agency for Research on Cancer confirms the overlapping mechanistic architecture: radiation sources are associated with multiple key carcinogenic characteristics and act through multiple pathways, including many of the same hallmarks of cancer induced by polycyclic aromatic hydrocarbons. Two agents that act through overlapping mechanistic pathways in the same tissue are not merely additive. Their co-exposure may be multiplicative. No model in Energy Alberta's safety case will assess this interaction, because no regulatory framework requires it.

The Regulatory Precedent — Elevated Clusters Without Identified Cause

The CDC's own guidance on cancer cluster investigation establishes a point directly applicable here: even when a cancer cluster is confirmed — when the elevated rate is statistically established and unlikely to be a chance finding — there is no guarantee that a common cause or an environmental contaminant will be identified. The CDC further acknowledges that in some cases, despite a significantly elevated standardised incidence ratio, further study will be unable to determine the cause.

This is the regulatory trap for the IAAC. The elevated cancer incidence in the Peace Region is documented. Its cause is unknown. Regulatory agencies — by their own published guidance — acknowledge they frequently cannot identify the cause of confirmed elevated cancer rates. If the cause of the existing elevation cannot be identified, it cannot be modelled. If it cannot be modelled, the incremental effect of adding a new carcinogenic source to that environment cannot be quantified. Approving a nuclear facility under these conditions means approving an unquantifiable risk increment on top of an unquantified baseline. That is not a risk assessment. It is the absence of one.

Why the Tipping Point Is Lower Here Than the Models Assume

Why This Stops the IAAC

Under REGDOC-3.1.1 — the CNSC's own regulatory document on environmental assessments — the proponent is required to characterise the existing environment before assessing incremental impacts. An existing elevated cancer incidence of unknown etiology is a feature of the existing environment that must be characterised before the incremental effect of a new carcinogenic source can be assessed. Energy Alberta has not characterised it. The CNSC has not required it. The IAAC cannot accept an incremental risk assessment calculated against the wrong baseline, for a population whose existing carcinogenic environment has not been characterised, using single-agent models that peer-reviewed science establishes are invalid for mixture exposures. Approving before that characterisation is complete is not a risk assessment. It is approval of an unknown risk increment on top of an unquantified existing burden.

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The Primary Emission Cannot Be Adequately Assessed

What Tritium Is and Why It Matters Here

Tritium is a radioactive form of hydrogen produced in large quantities by CANDU reactors — far more per unit of electrical output than any other commercial reactor design in the world. It enters the body through drinking water, food, air, and skin absorption. It can substitute for normal hydrogen in biological molecules, including DNA. In pregnant women it crosses the placenta. Fetal tissue incorporates it directly into developing cells. Communities near this facility will be exposed to it every day the plant operates for its entire operational life.

What the CNSC's Own Scientists Actually Found

The CNSC commissioned its own technical study — INFO-0799 — specifically to answer how dangerous tritium is. That study concluded, in the CNSC's own published words, that the studies reviewed do not contain enough data to specifically estimate the health risks of tritium exposure, and that an international collaborative study would be required to assess tritium risk properly. That international study has never been done. The data gap has never been filled. The CNSC's own scientists formally stated in 2010 that they could not estimate how dangerous the primary emission of the proposed facility actually is, and nothing has changed that finding.

Six Contradictions Between the Public Fact Sheet and the Technical Report

The CNSC's public tritium fact sheet and its own internal technical report describe the same substance in ways that are irreconcilable across six separate dimensions:

- The fact sheet describes tritium as relatively weak. The technical report states it is 1.4 times more biologically damaging than x-rays and 2.2 times more damaging than gamma rays.
- The fact sheet states tritium only causes harm in extremely large quantities. The technical report states that a fetus in a pregnant woman exposed to tritium receives double the dose of the mother — at any concentration — and that fetal tissue is substantially more radiosensitive than adult tissue.
- The fact sheet makes no mention of organically bound tritium. The technical report documents that organically bound tritium incorporates into fetal oocyte DNA, irradiating it for decades; that transmutation of tritium to helium-3 causes permanent structural DNA damage; and that the biological half-life of organically bound tritium approaches its radioactive half-life of 12.3 years.
- The fact sheet describes the Pickering tritium study as having confirmed that tritium is not associated with increased cancer risk. The technical report states that the evidence base is insufficient to make that determination and that an international collaborative study would be required.
- Every dose calculation for this facility uses a radiation weighting factor of 1 for tritium. The technical report states that a weighting factor of 2.2 would best reflect the radiation risk for tritium. Every safety number presented to the IAAC systematically understates the actual biological risk from tritium by the CNSC's own documented factor.
- The Ontario Drinking Water Advisory Council formally recommended reducing the tritium drinking water standard by 350 times — from 7,000 to 20 becquerels per litre — because the existing standard does not adequately protect against carcinogenic risk. The CNSC acknowledged this recommendation. It has never been refuted. The standard has never been changed.

The Pickering Study Finding

The only Canadian study ever conducted to assess tritium-related cancer risk in a CANDU reactor community found that girls and women in the surrounding area were developing childhood cancer at essentially double the normal rate, and lung cancer at 2.34 times the normal rate. These were statistically significant findings. The CNSC's public summary of that study characterises it as having confirmed safety. The elevated findings appear nowhere in the CNSC's public description of its own study.

Why This Stops the IAAC

Energy Alberta's health impact assessment will calculate tritium doses using a weighting factor of 1 and conclude they are below regulatory limits, therefore safe. Every number in that calculation understates actual biological risk by a factor the CNSC's own scientists have documented. The IAAC is being asked to approve a facility whose primary emission it cannot adequately assess because the evidence base to estimate its health risks does not exist, using a calculation framework that the CNSC's own technical report says underestimates the risk, from a regulator whose public characterisation of tritium safety is irreconcilable with its own internal scientific findings.

The Models Are Structurally Wrong for This Scenario

Why Model Validity Is the Central Question

Energy Alberta's entire safety case is a chain of model outputs. Emissions within modelled limits. Doses below modelled thresholds. Risk below modelled danger levels. Therefore: safe. Every link in that chain depends on the models being valid. Show Stopper 1 has shown that the models fail their empirical test by a factor of up to one hundred thousand. This section explains structurally why they fail: they were built on the wrong people, they measure the wrong thing, and they apply the wrong biological weighting to the substance the proposed facility will emit most.

Built on the Wrong People

The mathematical framework underlying all radiation risk regulation — the Linear No-Threshold model — was derived primarily from studying Japanese atomic bomb survivors after 1945. Those were predominantly adults and teenagers exposed to a single massive pulse of external gamma and neutron radiation lasting fractions of a second. The model was calibrated on that population.

The model is now being applied to fetuses in the womb — cells at their most radiosensitive developmental stage — exposed to radioactive particles that have been ingested or inhaled and are sitting inside the body, irradiating specific developing tissues continuously across a nine-month pregnancy. This is not a modest extrapolation. It crosses four independent variables that were never varied in the original data: age at exposure, tissue type, exposure pathway (internal versus external), and dose rate (chronic versus acute). The dose and dose-rate effectiveness factor applied to bridge the acute-to-chronic gap is an expert judgement, not a measured quantity. It has never been empirically validated in the population to which it is applied.

Measuring the Wrong Thing

When regulators calculate how much radiation a person near a nuclear plant receives, they calculate an effective whole-body dose — an average across all tissues expressed as a single number in millisieverts. This average is appropriate for some purposes. It is not appropriate for assessing the risk to specific small populations of developing cells in fetal bone marrow from radionuclides incorporated directly into or adjacent to those cells.

The localised dose to a specific cluster of haematopoietic precursor cells from an internally deposited radionuclide particle may be orders of magnitude higher than the whole-body average dose. The models do not resolve dose at that level of anatomical specificity in fetal tissue. They produce averages that obscure the localised exposure that may be driving the elevated cancer rates observed in the real-world data.

Wrong Biological Weighting

Every dose calculation presented in support of this facility will treat tritium as biologically equivalent to x-rays — a radiation weighting factor of 1. The CNSC's own technical report states that a factor of 2.2 would best reflect the actual biological risk of tritium. The reason the regulatory framework uses 1 rather than 2.2 is administrative consistency, not scientific accuracy. This

means every safety number in Energy Alberta's submission will understate the actual biological risk from the facility's primary emission by a factor that the CNSC's own scientists have formally documented.

Why Being Wrong in This Direction Is Not Acceptable

The models are not wrong randomly. They are wrong in a specific direction — consistently underestimating the risk to the most vulnerable population from the specific type of exposure produced by the specific technology being proposed. A model that overstates risk is a cautious model. A model that understates risk in fetuses and young children near CANDU reactors is the actual situation here. Approval based on non-conservative modelling of risk to the most vulnerable population is not a safety determination. It is an assumption of safety that the observable evidence directly contradicts.

SHOW STOPPER 5	The Required Research Has Not Been Done
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The Risk Model Is Unvalidated at the Relevant Dose Range

The Linear No-Threshold model has never been validated at the dose range produced by nuclear power plant operations. The US National Council on Radiation Protection has formally identified a critical knowledge gap in the health consequences of gradual low-dose radiation exposure. The scientific literature reflects a genuine and unresolved split between LNT, sub-linear, and hormetic models at low doses. Saying the evidence is insufficient to replace LNT is simultaneously saying the evidence is insufficient to validate it. An unvalidated model supporting a safety determination is an assumption presented as a conclusion.

The Studies That Exist Cannot Detect the Effects They Are Supposed to Detect

The CNSC's own Canadian childhood cancer study near Ontario nuclear plants — RADICON — had 8% statistical power to detect a 50% increase in childhood cancer risk in the most critical subgroup. That means the study had a 92% probability of finding nothing even if children near those plants were developing cancer at one and a half times the normal rate. The CNSC published that study and described its null finding as its most important conclusion.

This is a systemic problem across the entire evidence base. The international scientific literature documents that epidemiological studies generally lack the statistical power to detect effects at doses below 0.1 gray — the dose range relevant to nuclear power plant communities. Studies that cannot detect an effect are not capable of producing valid evidence that the effect does not exist.

The Most Vulnerable Population Has Never Been Properly Studied

The people most at risk from nuclear plant emissions — pregnant women and their fetuses — are the people about whom the least is known. The CNSC's own technical literature acknowledges that the reasons for the greater susceptibility of pregnant women and children to radiation harm are not fully understood, and that regulatory standards have failed to adequately account for this difference. Biokinetic models for tritium and other CANDU-specific radionuclides were developed for adult occupational scenarios and have not been validated for fetal tissue under chronic environmental exposure.

Non-Cancer Health Effects Are Not Assessed

The regulatory framework focuses on cancer. The INWORKS study — encompassing over 300,000 nuclear industry workers — found statistically significant elevated risk of cardiovascular disease and ischemic heart disease at cumulative dose levels relevant to occupational nuclear exposure. A growing body of literature documents elevated risk of cataracts, neurological disorders, and immune dysfunction at dose levels within the range produced by reactor operations. Energy Alberta's health impact assessment, evaluated against CNSC standards that focus on cancer endpoints, will not address a category of harm that the scientific literature now documents at relevant dose levels.

Formal Acknowledgements of Research Insufficiency

The US National Academies of Sciences has formally concluded that a sustained multi-decade research programme is required to fill the critical gaps in knowledge about chronic low-dose radiation health effects. The US Congress has appropriated over \$50 million specifically to restart a research programme that had lapsed — because the existing evidence base is acknowledged to be insufficient. The most comprehensive recent meta-analysis of health outcomes near nuclear plants — covering 175 plants in 17 countries — rated the certainty of evidence for cancer outcomes as very low under the GRADE framework. Very low means the actual effect may be substantially different from the estimated effect.

Seven Knowledge Gaps That Cannot Be Resolved by Building the Plant First

- The mechanism producing the real-world cancer signal near nuclear plants remains unidentified. An unknown mechanism cannot be engineered out.
- The dose-risk relationship for fetal haematopoietic tissue under chronic internal CANDU-specific radionuclide exposure has not been validated.
- Biokinetic models for transplacental transfer of CANDU radionuclides to fetal tissue have not been developed or validated.
- Population mixing has not been assessed for the Peace River region — a small, isolated, predominantly rural community with a significant Indigenous population, representing the highest-risk demographic profile for the Kinlen mechanism.
- The post-2011 German shutdown provides a natural experiment that has not been resolved: cancer incidence rates near closed plants showed partial but not complete decline, which neither confirms radiation causation nor excludes it.
- No validated biomarker of relevant exposure exists. There is no way to demonstrate that the at-risk population is or is not being exposed to the causal agent, whatever it turns out to be.

- No pre-construction epidemiological baseline exists for the critical subgroup in this community. RADICON did not analyse the subgroup that matters most. Building the plant creates the exposure before the baseline exists.

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6

Absence of Evidence Is Not Evidence of Absence

The Logical Error Underlying the CNSC's Evidence Portfolio

The CNSC's safety conclusions across its health evidence portfolio rest on a consistent logical structure: studies were conducted, those studies found no evidence of increased risk, therefore no increased risk exists. This argument fails because the studies in question systematically lacked the statistical power to detect the effects they were supposed to detect. Finding nothing in a study designed to find nothing is not an empirical result. It is a measurement artifact.

The RADICON Illustration

The CNSC's most significant Canadian epidemiological study of childhood cancer near nuclear plants had 8% statistical power to detect a 50% increase in childhood cancer risk in the closest subgroup. Statistical power of 8% means a 92% probability of finding nothing even if the effect being studied is real. The CNSC published this result and described the null finding as the study's most important conclusion. The finding was not that children near Ontario nuclear plants are not developing cancer at elevated rates. The finding was that the study was almost certain to produce a null result regardless of whether they were.

The Broader Pattern

The same logic applies across the CNSC's evidence portfolio. The worker study found no elevated risk after the Canadian data — which drove the original significant finding — was withdrawn under unexplained circumstances. The Pickering study found no overall tritium-associated cancer risk, while simultaneously finding statistically significant elevated signals in specific subgroups, which the CNSC characterised as chance findings without conducting the confirmatory research that would distinguish chance from signal. In each case the study's inability to detect the effect was presented as evidence the effect does not exist.

Why This Matters for the IAAC

The IAAC will receive from the CNSC an evidence portfolio of studies finding no evidence of elevated risk near Canadian nuclear facilities. It will be told that this evidence base supports approval. The evidence base does not support approval. It supports the conclusion that studies designed with insufficient power to detect relevant effects predictably failed to detect them. The most recent comprehensive independent assessment rated that evidence base as very low certainty. The IAAC should require that its evidentiary foundation meet a higher standard than very low before determining that significant adverse health effects are not likely.

PART TWO — SHOW STOPPERS 7 THROUGH 9

The Institution

Why the regulator the IAAC depends on cannot be relied upon, the structural reason it cannot be relied upon, and what every other sophisticated nuclear nation has concluded from the same evidence

Part Two shifts from the scientific evidence to the institutional framework through which the IAAC will evaluate it. Show Stopper 7 documents the pattern across seven CNSC publications showing systematic misrepresentation of its own internal scientific findings — and identifies the word 'unfounded' as an advocacy verdict, not a scientific conclusion. Show Stopper 8 provides the structural explanation: the CNSC is funded by fees from the industry it regulates, embedded in an institutional ecosystem that includes both the regulated industry and the research institution producing its safety evidence, and has never had the Cardis data withdrawal independently audited. Show Stopper 9 delivers the external confirmation: if the CNSC's conclusions were driven by the evidence, every other sophisticated nuclear nation examining that evidence would reach the same conclusion. None of them do.

SHOW STOPPER

7

The Regulator Cannot Be Relied Upon

What the IAAC Depends On

The IAAC does not have its own team of radiation biologists, epidemiologists, and dosimetry specialists. It relies on the CNSC to provide the scientific foundation for its assessment — to evaluate Energy Alberta's submissions, advise on adequacy, and tell the IAAC what the science says.

If the CNSC's scientific foundation is accurate, the IAAC can function. If it is not, every downstream determination is built on a false foundation.

The evidence below does not compare the CNSC's conclusions to those of external critics. It compares the CNSC's public communications to the CNSC's own internal scientific documents. The divergence is documented in the CNSC's own published record.

Seven Documented Contradictions

1. The KiKK Fact Sheet

Public claim: the link between nuclear plant operations and elevated cancer rates near those plants is unfounded and not supported by a wealth of evidence. Same document: more extensive interdisciplinary research is required. No mainstream scientific body in the world — WHO, COMARE, German SSK — has used the word unfounded. Germany said cause unclear. UK said clustering could not be explained. The CNSC went further than any of them, and did so in the same document that admits the question is not closed.

2. Radiation Health Effects Generally

Public claim: the health effects of radiation are well understood. CNSC technical documentation on tritium: the evidence base is insufficient to estimate tritium-specific health risks. Both statements are on the CNSC's website simultaneously.

3. Tritium

Public claim: tritium is relatively weak and only dangerous in extremely large quantities. Technical report INFO-0799: tritium is 1.4 times more biologically effective than x-rays and 2.2 times more effective than gamma rays. Fetal dose is double maternal dose at any concentration. Evidence is insufficient to estimate health risk. The public document and the technical document are not in tension. They are describing different substances.

4. The Pickering Study

Public claim: the study confirmed that tritium is not associated with increased cancer risk. The actual study: statistically significant childhood cancer rates at roughly double normal for girls and women, and lung cancer at 2.34 times normal for females. The CNSC presented a study that found statistically significant elevated signals as a confirmation of safety.

5. The RADICON Study

Public claim: the most important finding is that there is no evidence of childhood leukemia clusters near Ontario nuclear plants. The study's own statistical appendix: 8% power to detect a 50% increased risk in the critical subgroup. A study with 8% power finding nothing is not evidence the effect does not exist. It is a study almost certain to find nothing regardless of whether the effect is real.

6. The Cardis International Worker Study

The largest international low-dose radiation worker study ever conducted originally found a statistically significant increased cancer risk across its pooled cohort. Canadian workers — approximately 4% of the total sample — drove that significant result. The CNSC withdrew the Canadian data, citing dosimetric inconsistencies it acknowledged at the time could not be explained. The withdrawal changed the pooled finding from statistically significant to null and reduced the risk estimate by 40%. The CNSC's public communications cite the post-withdrawal null result without disclosing that the original finding was significant, that Canadian workers drove it, or that the circumstances causing the data withdrawal remain unexplained.

7. The Chernobyl Fact Sheet

The CNSC presents the UNSCEAR health assessment as the authoritative basis for its Chernobyl conclusions. It does not disclose that 51 independent scientists — including several former UNSCEAR members — published a formal counter-analysis finding substantially higher health

consequences, or that the methodological disputes between UNSCEAR and the independent analysis have never been resolved.

The Pattern Is the Finding

These are not isolated errors in separate documents on unrelated topics. They are seven documents covering different subjects, produced in different years, by different CNSC teams — all showing the same directional pattern. In every case, the most reassuring interpretation of contested evidence is presented as the settled conclusion. In every case, the evidence that would require a more qualified conclusion is absent from the public document. In every case, the CNSC's own internal science directly contradicts the certainty of the public claim.

In academic science, a consistent directional bias in conclusions across independent analyses within a single institution is itself a significant finding — it indicates that something other than the evidence is driving the conclusions. In regulatory science it is a systemic failure going to the reliability of the institution's authority. The CNSC is not an institution that has made mistakes. It is an institution whose public communications systematically overstate the certainty of their safety conclusions relative to their own internal scientific findings — consistently, across every document examined, in the direction that protects the nuclear industry from having to address unresolved health questions as conditions of approval.

Why the Pattern Constitutes a Failure of Scientific Method

The pattern can be described informally as consistent directional bias. It can also be described formally, in terms of the specific principles of scientific method the CNSC's public communications systematically violate. The distinction matters because it establishes that what the CNSC is producing in its public health documents is not science. It is advocacy presented in the format of science.

The first principle is falsifiability. A scientific conclusion must specify what evidence would cause it to be revised. The CNSC's conclusion that the association between nuclear plant operations and elevated cancer rates is unfounded has survived the KiKK national case-control study, the French GEOCAP replication, the Körblein-Fairlie pooled analysis, the Baker and Hoel meta-analysis, the Russo 2023 post-closure natural experiment, and the 2024 international meta-analysis rating certainty of evidence as very low. None of it changed the conclusion. The CNSC has never stated what evidence would change it. A conclusion that survives every piece of contrary evidence without a stated revision criterion is not a scientific conclusion. It is an unfalsifiable assertion — which is, by definition, the characteristic that separates ideology from science.

The second principle is completeness of the evidence base. Scientific conclusions must be tested against the full available evidence, not a curated subset. The CNSC's KiKK fact sheet, updated as recently as October 2025, omits the GEOCAP French replication, the Körblein-Fairlie pooled analysis, the Baker and Hoel meta-analysis, the Russo 2023 natural experiment, and the 2024 international meta-analysis. The conclusion that the association is not supported by a wealth of evidence is a conclusion reached by examining a fraction of the evidence and omitting the fraction that would require a different conclusion.

The third principle is respect for replication. In science, a finding replicated independently across multiple research programmes in multiple countries is considered strengthened by that replication. The CNSC treats independent replication of the real-world cancer signal as irrelevant to its conclusion. The fact that Germany, France, and multiple international pooled analyses found the same signal is not mentioned, let alone engaged with.

The fourth principle is transparency of methodology. A scientific conclusion must disclose how it was reached — what evidence was examined, what criteria were applied, what alternative interpretations were considered and why they were rejected. The CNSC's public fact sheets contain conclusions without methodology. There is no disclosure of what evidence was reviewed, what threshold of proof was applied, or what would constitute a finding in the other direction.

The fifth principle is proportionality between evidence quality and conclusion certainty. The most comprehensive independent assessment of the evidence quality for cancer outcomes near nuclear plants rated it as very low under the GRADE framework. The CNSC's public conclusion is stated with the certainty of a settled scientific question. Certainty-level-ten language applied to certainty-level-two evidence is not a characterisation of the science. It is a misrepresentation of it.

The sixth principle is separation of empirical findings from policy conclusions. The CNSC's statement that the link is unfounded is simultaneously an empirical claim and a policy conclusion — presenting a policy conclusion as an empirical finding insulates the policy from the scrutiny it would receive if clearly identified as a policy choice.

The seventh principle is that peer review applies to conclusions, not just methods. The CNSC's health fact sheets are not peer-reviewed. They are produced internally and published as authoritative scientific statements. The same institution that produces the research, regulates the industry, and advises the IAAC also produces the public scientific communications — with no external review mechanism.

Why 'Unfounded' Is Not a Scientific Conclusion

Science does not produce findings of unfounded. It produces findings of supported, unsupported, inconsistent with the evidence, or not yet adequately tested. The word unfounded is a legal and evidentiary term. It means a claim has been investigated and found to have no basis — that the investigation was sufficient, the evidence was examined, and the claim failed the examination. It is the language of a verdict, not a hypothesis test.

Applied to the body of evidence catalogued in Show Stopper 1, the word is analytically incoherent. A finding of unfounded requires that the claim under examination — that nuclear plant operations are associated with elevated cancer rates in surrounding communities — has been shown to have no empirical basis. The claim cannot be shown to have no basis when the signal it describes has been independently replicated across Germany, France, and multiple international pooled analyses. A claim replicated across independent research programmes in multiple countries does not lack empirical basis. Whether radiation is the cause is a separate question. Whether the signal is real is not in dispute. Saying a replicated empirical observation is unfounded is a category error: it conflates the absence of a proven mechanism with the absence of an observed signal.

The word also performs a rhetorical function distinct from its scientific one. Unfounded communicates to a lay reader that the matter has been looked into and found to be groundless — in the same category as conspiracy theories or unsupported allegations. The CNSC has applied that characterisation to a body of evidence comprising peer-reviewed national case-control studies, independent international replications, formal meta-analyses, and a natural experiment from plant closures. No other regulatory body — not the WHO, not COMARE, not Germany's own SSK — was willing to use that word for that evidence. They used the language appropriate to unresolved science: the cause remains unclear, the clustering could not be explained. The CNSC used the language of a verdict. The evidence did not support that verdict.

And critically: the same CNSC document that declares the association unfounded states, in the same text, that more extensive interdisciplinary research is required. A phenomenon that requires more extensive interdisciplinary research has not been found to have no basis. It is an open question. Both statements appear in the same document. They are not reconcilable. One is a scientific statement accurately reflecting the state of the evidence. The other is a policy conclusion. The CNSC presented the policy conclusion as the scientific finding.

The Trap This Creates for the IAAC

Energy Alberta will design its health impact assessment to meet CNSC standards and guidelines. Those standards do not require Energy Alberta to explain the real-world cancer signal near nuclear plants, because the CNSC has declared it unfounded. They do not require validated fetal dosimetric modelling, because the CNSC has stated the models are adequate. They do not require a tritium risk assessment at the biologically supported weighting factor, because the CNSC uses 1 rather than 2.2. The IAAC will receive an assessment that meets the standards and a CNSC recommendation that it is adequate. Both will be accurate. Neither will answer the safety question, because the standards are built on conclusions the CNSC's own evidence base does not support.

SHOW STOPPER

8

Structural Conflict of Interest

The Financial Architecture

The CNSC is funded primarily through fees levied on the nuclear industry it regulates. Industry expansion means more licences, more compliance activities, and more fee revenue. Industry contraction means less. This is not an allegation of institutional corruption. It is a description of an incentive architecture that structural regulatory theory identifies as incompatible with fully independent scientific judgment — the same architecture that has been recognised as a deficiency in other self-funding regulatory bodies internationally.

The pattern documented across the seven publications in Show Stopper 7 is precisely what institutional incentive theory predicts from a fee-funded regulator: conclusions consistently resolving scientific uncertainty in the direction that protects continued industry operation, across independent analyses, over an extended period. This structural explanation does not require proof of any individual's intent. It requires only that the incentive architecture exists and that the observable output is consistent with what it predicts.

The Research Triangle

The CNSC regulates Canadian Nuclear Laboratories — the successor organisation to Atomic Energy of Canada Limited, which was the primary source of Canadian nuclear industry research for decades. The regulator, the regulated industry, and the institution producing much of the safety

research the regulator relies on are part of the same institutional ecosystem. The Cardis worker data withdrawal — in which Canadian data from AECL-era dosimetry changed the world's largest low-dose worker study from a significant to a null finding under circumstances the CNSC acknowledged it could not explain — sits at exactly this intersection. An unexplained data withdrawal, by a data custodian within the regulatory ecosystem, that produced a null result from a previously significant finding, has never been independently audited or resolved.

Why This Matters for the IAAC

The IAAC relies on the CNSC for scientific authority in a process where the CNSC is also the regulator of the proponent's technology. The structural conflict does not disqualify the CNSC from participating. It does require the IAAC to treat the CNSC's scientific conclusions with the degree of independent scrutiny that any institution with a documented financial interest in one outcome would normally receive in a quasi-judicial proceeding. The IAAC has no mechanism to provide that independent scrutiny without engaging external scientific authority not embedded in the same institutional ecosystem.

SHOW STOPPER

9

International Regulatory Divergence

What Other Jurisdictions Have Concluded from the Same Evidence

The CNSC does not operate in an information vacuum. The forty-year evidence catalogue documented in Show Stopper 1, the tritium evidence base, the worker studies — all of this is available to regulators in every nuclear-operating country. What other sophisticated jurisdictions have concluded from it is directly relevant to assessing whether the CNSC's conclusions are driven by the evidence or by something else.

Germany's radiological protection commission examined the KiKK evidence and concluded the cause remains unclear. The UK's Committee on Medical Aspects of Radiation in the Environment examined comparable clustering evidence at Krümmel and stated it could not be explained. The World Health Organisation has not declared the association between nuclear plant proximity and childhood cancer unfounded. None of these bodies reached the CNSC's conclusion.

Germany closed all of its nuclear power plants. Austria has maintained a constitutional prohibition on nuclear power. Switzerland voted to phase out. These are not countries with unsophisticated regulatory systems. They are countries whose regulatory and political processes, having examined the same evidence the CNSC has examined, concluded that the unresolved uncertainties were a reason for caution rather than confidence.

The Significance of the Divergence

International regulatory divergence is not binding on the IAAC. Canada is entitled to make its own regulatory decisions. But systematic divergence — in which Canada's regulator reaches more confident safety conclusions than every other sophisticated nuclear nation that has examined the same evidence — is itself evidence that warrants explanation. The IAAC should ask why the CNSC's assessment of the same data produces a conclusion that no other mainstream regulatory body has been willing to reach, and whether that divergence is explained by Canada-specific evidence or by something structural about how the CNSC assesses evidence.

The answer this submission documents is structural. The CNSC is funded by industry fees. Its conclusions consistently resolve uncertainty in the direction of continued industry operation. Its public documents overstate certainty relative to its own internal scientific findings across every document examined. The international divergence is not evidence that other countries are being overly cautious about the same settled science. It is evidence that other countries are being appropriately cautious about genuinely unsettled science, and that the CNSC is being anomalously confident about it.

PART THREE — SHOW STOPPERS 10 THROUGH 13

The Law

The statutory obligations that are triggered, the constitutional defect in consent, and the irreversibility that makes everything unreviewable after the fact

Part Three translates the evidence of Parts One and Two into the legal framework within which the IAAC must operate. Show Stopper 10 establishes that the precautionary principle — a positive statutory obligation under section 6 of the Impact Assessment Act — is triggered by every documented uncertainty in this submission, and that the burden of proof the CNSC has systematically inverted sits by law with the proponent, not with those opposing the project. Show Stopper 11 establishes that Free, Prior, and Informed Consent under UNDRIP and Bill C-15 cannot be valid when the scientific foundation on which it rests has been shown to be inaccurate — a substantive constitutional defect, not a procedural one. Show Stopper 12 establishes that if harm occurs in the Peace River community at the levels documented near other nuclear plants, it will never be statistically detectable, never correctable, and never legally provable. Show Stopper 13 closes Part Three with the most comprehensive indictment of all: the CNSC has known about every deficiency documented in this submission, possessed the statutory authority and the budget to remedy each of them, was told by its own scientists what was required, and chose across decades not to act — making the IAAC the only remaining mechanism in the Canadian regulatory system through which these deficiencies can be compelled before this facility is built.

The Precautionary Principle Is a Positive Legal Obligation

The Statutory Requirement

Section 6 of the Impact Assessment Act requires the IAAC to apply the precautionary principle in its assessment. This is not a soft policy preference. It is a substantive statutory obligation embedded in the Act under which this entire process operates.

The Rio Declaration on Environment and Development — which Canada has formally endorsed — states that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. Under the precautionary principle, uncertainty is a reason for protection, not a reason for approval.

How the CNSC Inverts the Principle

The CNSC's consistent analytical approach treats the absence of proven harm as a justification for approval. It cites studies that found no evidence of elevated risk as positive evidence of safety. It cites the absence of a proven causal mechanism for the real-world cancer signal as grounds for declaring the association unfounded. This is the inverse of the precautionary principle. Under the actual precautionary principle, unresolved scientific uncertainty about a threat of serious harm is a reason to require resolution before approval — not a reason to approve while research continues.

The Burden of Proof That Flows From the Principle

The precautionary principle resolves a prior question: who bears the burden of proof, and of what? Under the Impact Assessment Act, the burden sits with the proponent. Energy Alberta must demonstrate that significant adverse health effects are not likely. Intervenors are not required to prove harm. The IAAC is not required to find harm proven before withholding approval. The proponent is required to demonstrate safety before receiving it.

The CNSC's analytical framework systematically inverts this. It treats the absence of proven causation as a basis for approval. The body of evidence catalogued in Show Stopper 1 has not been shown to be caused by radiation from plant emissions — therefore the association is unfounded — therefore no regulatory action is warranted. That syllogism places the burden of establishing causation on those opposing the project, and treats the proponent's failure to rebut an unproven causal claim as a positive safety demonstration. It is not. It is the absence of a safety demonstration dressed as one.

The inversion matters most when the three analytically distinct questions the CNSC conflates are separated. The first question is whether radiation from nuclear plant emissions has been proven to cause the elevated cancer rates documented across the international body of evidence. The answer is no. This is the only question the CNSC addresses, and it addresses it by finding the causal hypothesis unproven. The second question is whether the elevated cancer rates documented across that body of evidence have been explained by any alternative mechanism. The answer is also no. The cause remains formally unresolved under any mechanism. The third

question is whether Energy Alberta has demonstrated that this specific facility will not contribute to whichever mechanism — identified or not — is responsible for the signal documented in the international evidence. This question has never been asked. Under correct burden allocation, it is the operative one.

The tobacco analogy is instructive. Decades of industry argument that causation between tobacco smoke and lung cancer had not been definitively proven did not shift the regulatory burden to patients to establish it. The failure to prove causation was never treated as a sufficient basis for continued unrestricted approval while the causal question remained open. The question was always what the producer could demonstrate about safety — not what critics could prove about harm. The CNSC applies to nuclear power plant health assessment a burden structure that would not be accepted in any other regulatory domain where an unexplained real-world signal of potential harm had persisted for thirty years across multiple independent replications.

The Documented Uncertainties That Trigger the Principle

The following documented uncertainties — each established by the CNSC's own publications — individually and collectively trigger the statutory precautionary principle obligation:

- The dose-risk relationship for the most relevant subgroup (fetuses and children under five) under the most relevant exposure conditions (chronic internal emitter from CANDU-specific radionuclides) is not validated.
- The real-world cancer data near nuclear plants shows elevated rates the models cannot account for, and the cause of that gap has not been identified.
- The CNSC's own scientists have formally stated that the evidence base is insufficient to estimate the health risks of tritium — the primary emission of the proposed facility.
- The most comprehensive independent meta-analysis of health outcomes near nuclear plants rates the certainty of evidence as very low under the GRADE framework.
- Non-cancer health effects of chronic low-dose exposure are not incorporated into the regulatory assessment framework despite emerging evidence at relevant dose levels.
- The radiation weighting factor applied to tritium in all regulatory calculations understates actual biological risk by a factor the CNSC's own technical report documents.

What the IAAC Must Address

The IAAC is required by statute to explain how it has applied the precautionary principle to each of these documented uncertainties. An approval decision that does not address them is not merely scientifically insufficient — it is a failure to comply with a substantive statutory obligation. A decision that cites compliance with CNSC standards as the basis for satisfying section 6 of the Act is a decision that uses a standard built on inadequate evidence as a proxy for the independent precautionary analysis the Act requires. The Act does not provide for that substitution.

The Legal Obligation

Bill C-15, enacted in 2021, incorporated the United Nations Declaration on the Rights of Indigenous Peoples into Canadian law. UNDRIP requires Free, Prior, and Informed Consent from affected Indigenous peoples before the approval of any project affecting their lands, territories, and health. First Nations and Métis communities in the Peace River region will live within the zone of elevated cancer risk documented in the real-world data near nuclear plants and will be exposed to the tritium emissions the CNSC's own scientists have acknowledged they cannot adequately assess. FPIC is a mandatory precondition to approval, not a procedural formality.

Why Informed Consent Is Structurally Impossible on the Current Information Base

Free, Prior, and Informed Consent requires that the communities giving consent be accurately informed about the risks they are consenting to accept. The health information provided to Indigenous communities during this consultation process will be drawn primarily from CNSC publications. This submission has documented that those publications systematically misrepresent the CNSC's own scientific findings — describing tritium as relatively weak when the technical report says it is more damaging than x-rays; describing the real-world cancer signal near nuclear plants as unfounded when the same document says more research is required; presenting a study that found doubled cancer rates as confirmation of safety.

Consent obtained on the basis of health information that has been shown — through the CNSC's own documents — to be an inaccurate representation of the available scientific evidence is not informed consent. It is manufactured consent. The constitutional defect is not procedural. Consultation meetings may have been held. Notices may have been given. The defect is substantive: the scientific foundation on which consent was sought does not accurately represent what the CNSC's own scientists have found. FPIC obtained on a demonstrably inaccurate scientific foundation is not valid consent under C-15.

The defect is independently grounded in section 35 of the Constitution Act, 1982. The Supreme Court of Canada established in *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73, that the duty to consult is constitutionally grounded and requires that consultation be meaningful — that affected Indigenous communities have access to the information necessary to meaningfully assess the impacts on their rights. C-15 supplements the *Haida Nation* framework with an explicit accuracy requirement for the information provided. A consent process in which the primary scientific authority provided to Indigenous communities has been shown — through that authority's own internal documents — to misrepresent the available evidence does not meet either the constitutional standard or the C-15 standard. The two grounds are cumulative, not alternative.

Why This Cannot Be Corrected After Approval

Approval of the project forecloses the option of the affected Indigenous communities making a genuinely informed consent decision. Once construction begins, the economic, political, and legal landscape for any subsequent challenge to consent validity changes entirely. The informed consent obligation under C-15 is a pre-condition to approval, not a condition attached to it. It cannot be satisfied retroactively.

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12

Irreversibility and the Absence of Any Self-Correction Mechanism

Why This Approval Cannot Be Undone

Every other major approval decision carries some capacity for error correction. If infrastructure fails, the failure is observable. If a pharmaceutical causes harm, pharmacovigilance systems can detect patterns and trigger regulatory response. Nuclear plant health effects near a facility of this type, in a community of this size, have no comparable detection and correction mechanism.

Why Harm Here Cannot Be Detected

The Peace River region has a small residential population. Childhood leukemia in children under five is a rare disease. To detect a doubling of childhood leukemia risk in this community with confidence intervals narrow enough to be actionable would require a study enrolling a population far larger than the community exposed, with follow-up periods measured in decades, and a pre-construction baseline for the specific age and distance subgroup that matters most. That baseline does not currently exist. The CNSC has never required it. RADICON — the most recent Canadian epidemiological study of this type — did not analyse the 5-kilometre subgroup at all.

If this facility causes harm at the level documented in real-world data near other nuclear plants, it may never be possible to prove it in this community. The statistical noise will exceed the detectable signal. Any monitoring programme the CNSC attaches as an approval condition will produce inconclusive results — not because no harm is occurring, but because the community is too small to detect it. Those inconclusive results will then be cited as further evidence of safety. This is not speculation. It is what RADICON already demonstrated is the Canadian approach to nuclear plant epidemiology.

Why Conditions and Monitoring Cannot Substitute for Prior Validation

The IAAC process typically addresses uncertainty by attaching conditions — requiring ongoing monitoring, adaptive management, and regulatory review. That approach is not available here, because the thing that would trigger adaptive management response cannot be detected. Attaching a monitoring condition to an approval where the harm can never be statistically demonstrated is not a safeguard. It is a mechanism for generating reassuring null findings from

underpowered studies in a small population — findings that provide institutional cover while providing no actual protection.

The harm, if it occurs, is therefore effectively permanent, population-specific, and unreviewable within any realistic regulatory timeframe. The irreversibility of this specific harm in this specific community is a qualitatively different consideration from the monitoring-amenable harms that conditions and adaptive management are designed to address.

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STOPPER**

13

Regulatory Abdication — The CNSC Knew, Had the Power to Act, Had the Resources, and Chose Not To

The Argument in One Paragraph

Every scientific deficiency documented in Show Stoppers 1 through 12 was known to the CNSC. Each was documented in the CNSC's own published materials. Each was identified by the CNSC's own scientists as requiring resolution before adequate safety determinations could be made. The CNSC possessed, and continues to possess, the statutory authority under the Nuclear Safety and Control Act to impose research requirements as conditions on any licence it issues. It has an annual operating budget of over \$350 million, funded by the nuclear industry it regulates. It has had decades to act. It has acted on none of them. The IAAC is now asked to approve a new nuclear facility on an evidence base every major deficiency of which the regulator responsible for remedying it documented, acknowledged, and left unaddressed. This is not a record of scientific uncertainty pending resolution. It is a record of regulatory abdication that the IAAC has the statutory authority — and the obligation — to end.

What the CNSC Knew and When It Knew It

The CNSC's knowledge of the specific deficiencies documented in this submission is not inferred. It is recorded in the CNSC's own publications, each of which is cited in the main submission with its URL and publication date.

INFO-0799 — the CNSC's own technical report on tritium health effects, published in 2010 and still publicly available — states explicitly that the CNSC's scientists do not have sufficient evidence to estimate the health effects of tritium. It states that the weighting factor used for regulatory calculations understates the actual biological effectiveness of tritium. It documents the ODWAC recommendation for a 350-fold reduction in the drinking water standard. It identifies the need for an international collaborative study to resolve the inadequacies in the existing evidence base. Every one of these admissions was published by the CNSC in 2010. Fifteen years have passed. The international collaborative study has not been conducted. The weighting factor has not been revised. The drinking water standard has not been changed.

The KiKK fact sheet — last updated October 2025 — contains the statement that more extensive interdisciplinary research is required to understand the association between nuclear plant proximity and childhood cancer. That sentence is an admission, published by the CNSC in its own name, that the evidence base on which it approves nuclear facilities is acknowledged as insufficient and that research it has not conducted is required. It appears in the same document that declares the association unfounded. The CNSC simultaneously declares the science settled and acknowledges that the required research has not been done.

RADICON — the CNSC's most recent community epidemiology study — was published with a statistical power of 8% for the critical subgroup. The CNSC's own scientists designed and conducted a study so underpowered that it had a 92% probability of finding nothing regardless of whether harm was occurring. The CNSC published that study and cited its null result as evidence of safety. It has not designed or funded a replacement study with adequate statistical power. It has not required Energy Alberta to fund one as a pre-construction condition.

The US National Academies of Sciences formally identified the validation of radiation risk models for fetal tissue under CANDU-specific internal emitter conditions as a critical knowledge gap requiring a sustained, multi-decade research programme. The US Congress appropriated over \$50 million for related research through the National Institute of Environmental Health Sciences. Canada has appropriated nothing. The CNSC has not required any licensee to fund this research. The critical knowledge gap the US National Academies identified as requiring resolution before safety determinations can be made with confidence remains open.

What the Nuclear Safety and Control Act Authorised the CNSC to Do

Section 24 of the Nuclear Safety and Control Act grants the CNSC broad authority to attach conditions to any licence it issues. The Act does not restrict these conditions to operational or technical requirements. The CNSC may impose, as a condition of any nuclear facility licence, a requirement that the licensee fund, conduct, or participate in specified research programmes. This is not a novel or untested power. The CNSC imposes research and monitoring conditions on licensees routinely — requiring environmental monitoring programmes, worker dose tracking, and operational data reporting as standard licence conditions.

The power to impose a research funding condition is therefore not in question. The CNSC could have required, as a condition of any CANDU operating licence issued since 2010, that the licensee fund the international collaborative tritium study its own technical report identified as necessary. It could have required a pre-construction baseline epidemiological study for children under five within five kilometres as a condition of any new site licence. It could have required validation of the fetal dosimetry models for CANDU-specific internal emitter conditions before approving any new CANDU facility. It could have required an etiological investigation of the elevated cancer burden in any community proposed as a nuclear facility site before accepting an incremental risk assessment for that site.

It has done none of these things. The power existed. The knowledge existed. The budget existed. The action did not follow.

The Budget

The CNSC's annual operating budget has exceeded \$350 million for over a decade, funded almost entirely by fees levied on nuclear facility licensees. The international collaborative tritium study recommended in INFO-0799 — involving collection and analysis of biological samples from CANDU communities across multiple countries — would cost a fraction of one year's operating budget. A properly powered pre-construction baseline epidemiological study for a proposed site

community would cost less than one tenth of one percent of the CNSC's annual revenue. The fetal dosimetry validation programme the US National Academies identified as critical, funded by the US Congress at \$50 million over multiple years, is within one year's operating budget of an institution that spends over \$350 million annually.

The CNSC has not allocated meaningful funding to any of these programmes. It has not required licensees to fund them. It has published documents acknowledging the deficiencies, described the research required to remedy them, watched the US fund equivalent programmes, and redirected its own budget to operational functions that do not include resolving the evidentiary inadequacies its own scientists documented. This is not a resource constraint. It is a priority allocation that has consistently chosen not to fund the research that would test whether the CNSC's safety conclusions are correct.

Why the Research Has Not Been Done — The Structural Explanation

The structural explanation for the CNSC's failure to fund or require the necessary research is the same explanation documented in Show Stoppers 7, 8, and in Annexure 1. An institution whose revenue depends on licensed facilities remaining in operation has an institutional interest in maintaining the evidence base that permits licensing to continue. An institution that commissions research that validates its existing safety conclusions receives confirmation. An institution that commissions research that contradicts its existing safety conclusions faces the consequences of that contradiction — the need to revise its standards, potentially to halt operating licences pending new assessments, and to acknowledge publicly that its previous safety determinations were made on an insufficient evidentiary foundation.

The CNSC does not need to have made a deliberate decision to avoid the research. The structural incentive produces the same outcome without any explicit institutional decision. An institution that is simultaneously responsible for promoting the development of nuclear energy, funded by the nuclear operators it licenses, and accountable for safety determinations made on the existing evidence base does not need to suppress research explicitly. It simply does not prioritise the research that would most directly test whether its safety conclusions are correct. The result — sixteen years of acknowledged deficiency, documented in its own publications, unaddressed by its own budget or its own regulatory powers — speaks for itself.

What This Means for the Approval Decision

The IAAC is being asked to approve a new nuclear facility. The regulatory system assigns the CNSC the role of providing the scientific foundation for that approval. The CNSC will tell the IAAC that the facility is safe within the limits of current scientific understanding. This submission has documented that the CNSC's own scientists told it in 2010 that the current scientific understanding is not adequate to make that determination for this type of facility — and documented the specific research required to make it adequate. Fifteen years later, with that research unfinished and unfunded, the CNSC proposes to make the same determination on the same deficient basis it acknowledged in 2010.

This is not a situation in which the science is uncertain and the regulator is making a good-faith judgment under uncertainty. This is a situation in which the regulator's own scientists identified the uncertainty, described the research required to resolve it, estimated what it would cost, and the institution did nothing with that information for sixteen years except continue to issue licences and declare the science adequate. The IAAC cannot rely on a scientific foundation that the scientists who produced it formally documented as insufficient.

The IAAC as the Circuit Breaker

The CNSC has had decades to fix the evidentiary deficiencies it acknowledged in its own publications. It has not fixed them. There is no mechanism within the CNSC's own institutional structure — given what Annexures 1 and 2 document about how that institution functions — through which it will fix them voluntarily. Every mechanism that could have compelled the CNSC to fund the required research — Parliamentary scrutiny, independent audit, peer review — has been available and has produced no remedial action.

The IAAC is the only body in the approval chain for this specific project with the statutory authority, the independence from the nuclear regulatory ecosystem, and the mandate to require that deficiencies be remedied before approval proceeds. Section 22 of the Impact Assessment Act requires the IAAC to consider health effects. Section 6 requires it to apply the precautionary principle. Section 63 requires it to be satisfied that significant adverse effects are unlikely or to make an explicit public interest finding. None of these statutory obligations can be satisfied on an evidence base the regulator responsible for producing it has formally documented as insufficient.

The IAAC's authority to impose conditions on an approval — including conditions requiring research, baseline characterisation, and evidentiary validation before construction commences — is the statutory mechanism through which the deficiencies documented in this submission can be compelled. If the IAAC approves this facility without requiring those conditions, the deficiencies will remain permanently unaddressed for the life of this facility. The CNSC will cite the IAAC's approval as confirmation that the evidence base was adequate. The research that would test that conclusion will never be funded. The community that lives adjacent to the facility will be exposed to emissions whose health effects the regulator's own scientists said in 2010 they could not adequately assess — and that admission will be buried in a technical report that no subsequent regulatory process will be required to revisit.

Show Stopper 13 is therefore not merely an additional ground for refusal. It is the explanation for why every other show stopper in this submission exists. The evidentiary failures of Show Stoppers 1 through 6 exist because the CNSC did not fund the research to fix them. The institutional failures of Show Stoppers 7 through 9 exist because the CNSC's structure ensures that it will not fund that research. The legal failures of Show Stoppers 10 through 12 exist because the precautionary principle, UNDRIP, and irreversibility are triggered by deficiencies the CNSC could have addressed and chose not to. The IAAC has before it not just a deficient application but the accumulated consequence of decades of regulatory inaction by the institution responsible for making the application adequate. The question for the IAAC is whether it will use the authority the statute gives it to end that inaction, or whether it will approve the facility and allow the inaction to continue permanently.

Why All Thirteen Show Stoppers Are Worse Together

Each show stopper is serious independently. Together they form a closed logical structure that cannot be resolved within the current state of knowledge or the current regulatory architecture. They are organised into three movements for a reason — each movement amplifies the ones before it.

Part One establishes the empirical foundation. Show Stopper 1 documents that the models fail their real-world empirical test by a factor of ten thousand to one hundred thousand across forty years of independent international evidence. Show Stopper 2 shows that the Peace River population compounds this failure — it already carries an elevated cancer burden in a chemical environment that amplifies radiation risk, making the incremental calculation wrong not just generally but specifically and materially at this site. Show Stoppers 3 and 4 explain structurally why the models fail: wrong population, wrong measurement unit, wrong biological weight for the facility's primary emission. Show Stopper 5 establishes that the research to fix them has not been done — formally acknowledged by the US National Academies, funded but not completed by Congress, and rated as very low certainty by the most comprehensive independent meta-analysis ever conducted. Show Stopper 6 closes the empirical argument by demonstrating that the null studies the CNSC will cite as counter-evidence are almost certain to find nothing regardless of whether harm exists.

Part Two provides the institutional explanation. Show Stopper 7 documents that the institution responsible for telling the IAAC what the science says has been shown through its own published documents to systematically misrepresent its own internal science — and specifically that its most consequential public conclusion, that the forty-year replicated signal is unfounded, is not a scientific finding but an unfalsifiable advocacy verdict that violates seven principles of scientific method simultaneously. Show Stopper 8 provides the structural explanation for why an institution would maintain false certainty in the face of its own contrary evidence: fee funding by the industry it regulates, an institutional ecosystem that includes both the regulated industry and the research institution producing its safety evidence, and an unexplained data withdrawal that changed the world's largest low-dose worker study from significant to null. Show Stopper 9 delivers the external confirmation: every other sophisticated nuclear nation examining the same evidence has reached a more qualified conclusion than Canada's own regulator, and that divergence is not explained by Canada-specific science.

Part Three establishes the legal consequences and the regulatory accountability. Show Stopper 10 translates every documented uncertainty in Parts One and Two into a positive statutory obligation under the Impact Assessment Act — the precautionary principle is triggered by each of six documented uncertainties individually, and the burden of proof the CNSC inverts sits by law with the proponent. Show Stopper 11 establishes the constitutional defect: FPIC under C-15 cannot be valid when the information on which consent was sought is demonstrably inaccurate based on the CNSC's own documents. Show Stopper 12 establishes that if harm occurs in this community, it can never be detected, corrected, or proven — the irreversibility is not a monitoring problem, it is the permanent consequence of approval. Show Stopper 13 closes the submission with the most comprehensive indictment: the CNSC knew about every deficiency in Show Stoppers 1 through 12, had the statutory power to remedy them, had the budget to fund the required research, was told by its own scientists what was needed, and chose across sixteen years not to act. The IAAC is the last available mechanism through which those deficiencies can be compelled before this community is permanently committed to living adjacent to a facility whose primary emission the CNSC's own scientists said they could not adequately assess.

The loop cannot be broken from inside the current process. The models cannot be validated without the research Show Stopper 5 shows has not been done — and Show Stopper 13 shows the CNSC had the power to fund and chose not to. The tritium risk cannot be assessed without the international collaborative study Show Stopper 3 shows was recommended in 2010 and never conducted — and Show Stopper 13 shows the CNSC acknowledged this in writing and took no action. The real-world cancer signal cannot be resolved without identifying a mechanism Show Stopper 1 shows has been studied for forty years without explanation — and Show Stopper 13 shows the CNSC simultaneously declared the matter settled and acknowledged more research was required, in the same document. None of this can be addressed within the current process because Show Stopper 7 documents that the institution responsible for raising these requirements has a consistent pattern of not raising them, Show Stopper 8 shows why, and Show Stopper 13 shows that sixteen years of documented inaction is the result.

STATUTORY OBLIGATIONS OF THE IAAC UPON RECEIPT OF THIS SUBMISSION

This section sets out the legal obligations the IAAC is required to discharge in response to this submission. These are not requests. They are statutory and common law obligations that exist independently of whether the IAAC finds this submission persuasive. They are set out here so that the record is clear as to what the IAAC was formally advised of, and so that any subsequent decision can be evaluated against them.

Section 22 of the Impact Assessment Act — Mandatory Factors

Section 22 of the Impact Assessment Act specifies the factors the IAAC Panel is required to consider in conducting its assessment. These are not discretionary considerations that the Panel may address if it chooses. They are mandatory. Among the factors listed in section 22 are: the health effects of the project, including the intersection of health effects with gender and cultural identity; the implementation of the United Nations Declaration on the Rights of Indigenous Peoples; and the extent to which the effects of the project are reversible or irreversible.

This submission has documented that: the health effects of this project on the Peace River region population cannot be adequately assessed because the existing cancer burden in that population has not been characterised and the incremental risk models are structurally invalid for this population; the information provided to Indigenous communities as the basis for FPIC is demonstrably inaccurate based on the CNSC's own published documents; and if the project causes health harm to the Peace River community, that harm cannot be detected epidemiologically in a population of this size using the tools the CNSC has shown it deploys. The irreversibility factor under section 22 is therefore not academic — it is the defining characteristic of the harm this submission documents.

The IAAC is required to demonstrate in its reasons that each of these mandatory factors was genuinely addressed. A decision that cites regulatory compliance as the basis for satisfying these factors is a decision that substitutes a proxy for the substantive analysis the statute requires. Section 22 does not provide for that substitution.

Section 63 — The Approval Gate

Section 63 of the Impact Assessment Act establishes the approval gate. The IAAC must be satisfied either that the project is not likely to cause significant adverse effects, or that significant adverse effects are likely but are in the public interest. This is a binary determination. It cannot be satisfied by demonstrating that the project complies with standards that this submission has shown are built on inadequate evidentiary foundations.

This submission has documented that the evidentiary foundation on which the CNSC's safety standards rest has been independently rated as very low certainty under the GRADE framework. A determination under section 63 that significant adverse effects are not likely, made on an evidentiary foundation rated as very low certainty, is a determination that the statutory standard has been met on evidence that the international scientific community has formally assessed as insufficient to support confident conclusions. The IAAC must explain in its reasons how that determination was reached on that evidence base.

If the IAAC instead determines that significant adverse effects are likely but are in the public interest, that determination must be made explicitly — it must identify the significant adverse effects it has found to be likely, characterise their nature and magnitude, and explain why the public interest justification overrides them. A determination that significant adverse effects are not likely, made to avoid the public interest analysis, in the face of a forty-year international evidence record of elevated cancer rates near nuclear plants, is a determination whose adequacy of reasoning is directly reviewable.

Section 6 — The Precautionary Principle as a Statutory Obligation

Section 6 of the Impact Assessment Act establishes the precautionary principle as an operative principle of the Act. It is a principle the IAAC is required to apply in conducting its assessment. Under the precautionary principle, where there are threats of serious or irreversible damage, lack of full scientific certainty is not a reason to postpone protective measures.

This submission has documented the following specific scientific uncertainties, each established by the CNSC's own published documents: the dose-risk relationship for the most vulnerable population under the most relevant exposure conditions is unvalidated; the evidence base is insufficient to estimate the health risks of the plant's primary emission; the most comprehensive independent assessment of evidence quality rates it as very low; the models used to demonstrate safety fail their empirical test by a factor of up to one hundred thousand; and the existing cancer burden in the Peace River population has not been characterised. Each is a documented scientific uncertainty about a potential serious and irreversible harm.

The IAAC is required to explain in its reasons how it applied the precautionary principle to each of these documented uncertainties. A decision that approves the project without addressing each uncertainty individually and explaining why the precautionary principle did not require protective measures in response to it is a decision that is silent on a specific statutory obligation. Silence on a statutory obligation is judicially reviewable as an error of law.

REGDOC-3.1.1 — The CNSC's Own Environmental Assessment Standard

REGDOC-3.1.1 is the CNSC's own regulatory document governing environmental assessments. It requires the proponent to characterise the existing environment — including existing health conditions in the affected population — before assessing the incremental impacts of the proposed project. An incremental risk assessment cannot be validly conducted without an accurate baseline against which the increment is measured.

This submission has documented that the Peace River region carries a documented elevated cancer incidence of unknown etiology, that no etiological investigation of that elevation has been conducted, and that Energy Alberta has not characterised the existing carcinogenic environment in the Peace River region before presenting its incremental risk assessment. The CNSC's own regulatory standard for environmental characterisation has not been satisfied. The IAAC cannot accept an incremental risk assessment as complete under a regulatory standard whose own author has not applied it.

The Common Law Duty to Provide Adequate Reasons

The IAAC Panel is a quasi-judicial decision-maker whose decisions affect legal rights — including the health and property rights of Peace River region residents and the treaty and constitutional rights of Indigenous communities in the region. Quasi-judicial decision-makers in Canada have a common law duty, confirmed by the Supreme Court of Canada, to provide adequate reasons for decisions. Adequacy of reasons requires that the decision-maker address the evidence and argument placed before it, explain the basis for its conclusions, and demonstrate that the statutory factors were genuinely considered.

The Supreme Court of Canada confirmed in *Canada (Minister of Citizenship and Immigration) v. Vavilov*, 2019 SCC 65, that reasonableness review requires an administrative decision-maker to have genuinely grappled with the evidence and argument placed before it. A decision whose reasons do not address the specific evidentiary and legal grounds formally documented in a submission does not meet this standard. The test is not whether the decision-maker mentioned the evidence. It is whether the reasons demonstrate that the evidence was actually engaged with in a manner that shows it was understood and assessed.

This submission constitutes formal notice to the IAAC of the specific evidentiary and legal grounds on which this project cannot be approved without addressing the issues it raises. The submission will form part of the evidentiary record against which the adequacy of the IAAC Panel's reasons will be assessed in any subsequent judicial review. A decision that does not address the specific grounds documented in this submission — the model failure evidence, the tritium admissions, the CNSC pattern of misrepresentation, the precautionary principle triggers, the UNDRIP consent defect, the irreversibility finding, and the compromised Peace Region baseline — is a decision whose reasons will be inadequate as a matter of law, regardless of what conclusion those reasons reach.

The Duty of Procedural Fairness

Where a decision-maker receives evidence that affected parties' rights may be harmed in a way not anticipated by the standard assessment process, the duty of procedural fairness requires that the decision-maker address that evidence rather than proceeding as if it had not been received. The issues documented in this submission — particularly the structural invalidity of the models for the Peace River population, the UNDRIP consent defect, and the irreversibility of potential harm — are not issues that the standard IAAC process was designed to address. They require specific procedural accommodation.

At minimum, procedural fairness requires that the IAAC: provide affected parties with an opportunity to respond to Energy Alberta's health impact assessment with reference to the specific scientific grounds documented in this submission; require the CNSC to disclose the full basis for its scientific conclusions rather than relying on its public fact sheets as authoritative; and ensure that Indigenous communities have access to the full scientific record — including the CNSC's internal technical documents — before being asked to confirm or qualify their consent decisions.

What a Decision That Ignores This Submission Creates

If the IAAC approves this project without addressing the statutory obligations set out in this section, it will have produced a decision that: failed to apply mandatory section 22 factors to documented facts; satisfied the section 63 approval gate on evidence rated as very low certainty without explaining how; failed to apply the section 6 precautionary principle to six specific documented uncertainties; accepted a health impact assessment that does not meet the CNSC's own REGDOC-3.1.1 standard; and provided reasons that do not address the specific evidentiary grounds formally placed before it.

Such a decision would be judicially reviewable in the Federal Court on multiple independent grounds. The grounds would include: error of law in the application of mandatory statutory factors; failure to apply the precautionary principle; breach of the duty of procedural fairness; and inadequacy of reasons. The strength of each of those grounds is directly proportional to how specifically this submission has documented the underlying facts — which is why this submission has been structured to document them with precision.

This is not a threat of litigation. It is a description of the legal consequences that flow from the IAAC's statutory obligations and the evidence before it. Those consequences exist whether or not this submission mentions them. They are set out here because the IAAC is entitled to know the legal framework within which its decision will be evaluated, and because the affected communities whose health is at stake are entitled to know what legal protections apply to the process being conducted on their behalf.

NINE REQUESTS TO THE IAAC

The foregoing analysis supports the following specific requests:

- Require that before approval, Energy Alberta identify — or formally demonstrate the absence of — the mechanism responsible for the elevated cancer rates documented in the real-world data near nuclear plants, and demonstrate that mechanism will not operate at the proposed site. This is not a request to prove radiation is not the cause. It is a request to demonstrate that whatever the cause is, it has been excluded at this site.
- Require Energy Alberta to characterise the existing cancer burden and its potential causes in the Peace River region before any incremental risk assessment is accepted — including a mixture exposure assessment addressing the interaction between existing aromatic hydrocarbon contamination and ionizing radiation from the proposed facility — as a condition precedent to the health impact assessment being considered complete under REGDOC-3.1.1.
- Require that Energy Alberta's health impact assessment use fetal-tissue-specific dosimetric models validated for CANDU-specific radionuclide exposure under chronic internal conditions, not adult proxy models derived from external acute exposure scenarios.
- Require Energy Alberta's tritium health impact assessment to be conducted using both the regulatory weighting factor of 1 and the scientifically supported factor of 2.2 documented in the CNSC's own technical report, with explicit comparison of results and explanation of the difference.

- Require assessment of non-cancer health endpoints — cardiovascular, neurological, immune, and ophthalmic — at dose levels documented in the emerging scientific literature to be associated with elevated risk.
- Require a population mixing assessment for the Peace River region as a pre-construction condition, addressing the Kinlen mechanism with the specificity of the community demographic profile.
- Require a pre-construction baseline epidemiological study for children under five within five kilometres of the proposed facility, using the age and distance stratification demonstrated to be the critical subgroup in the international literature, before any construction activities that would alter the baseline community profile.
- Require the CNSC to correct the KiKK fact sheet — specifically to include the full body of replication literature, the post-2012 international evidence, the Russo 2023 post-shutdown natural experiment findings, and the biological mechanism literature — before that document is admitted as an evidentiary foundation in this process.
- Appoint an independent scientific review panel, with disclosed and screened conflicts of interest, not embedded in the CNSC institutional ecosystem, to review the scientific adequacy of Energy Alberta's health impact assessment before the IAAC Panel considers the question of approval.

Plain Language Summary for the Record

The IAAC cannot approve this project for thirteen independent reasons, organised in three parts.

PART ONE: THE EVIDENCE

The mathematical models used to show the plant is safe do not predict what actually happens near nuclear plants in the real world. A forty-year, multi-country body of independently replicated evidence shows this consistently: Sellafield UK at ten times the national average in 1984; COMARE confirmed 20% excess leukemia within 5km across UK nuclear sites through the 1990s; Krümmel Germany at five to six times the expected rate through the 1990s and 2000s; KiKK Germany found 119% excess leukemia and 61% excess all-cancer risk in 2008; GEOCAP France independently found 90% excess leukemia in 2012; pooled analyses confirmed 61% excess all cancers and 119% excess leukemia within 5km; and a 2025 Harvard study found 20% elevated cancer mortality near US plants after controlling for poverty, smoking, obesity, race, and healthcare access. The gap between what the models predict — effectively zero — and what is consistently observed is between ten thousand and one hundred thousand times. No one has explained it after forty years.

The Peace River region does not have the healthy baseline population the models assume. It already carries an elevated cancer burden of unknown cause, in an environment with documented chemical promoters that interact synergistically with ionizing radiation. Peer-reviewed mixture carcinogenesis science establishes that the incremental risk from adding this facility is not the additive calculation the models will present. It may be multiplicative. The models are being applied to the wrong population.

The plant's primary emission is tritium. The CNSC's own scientists formally stated in 2010 they do not have enough evidence to estimate how dangerous tritium is. Every dose calculation presented to the IAAC will use a biological weighting factor the CNSC's own technical report says understates the actual risk by a factor of 2.2. The only Canadian study of tritium cancer risk in a CANDU community found doubled cancer rates in girls and women. The CNSC described that as confirmation of safety.

The models were built on the wrong people, measure the wrong thing, and apply the wrong biological weight to the substance the plant will emit most. They have never been validated for fetuses exposed to CANDU emissions.

The research that would fix the models and characterise the actual risk has not been done. The US National Academies called it a critical knowledge gap. The most comprehensive independent meta-analysis rated the certainty of evidence as very low. Safety conclusions made before the required research exists are assumptions presented as science.

The null studies the CNSC will cite as evidence of safety were designed with so little statistical power they were almost certain to find nothing regardless of whether harm existed. A study with 8% power finding nothing is not a safety finding. It is a measurement failure presented as a conclusion.

PART TWO: THE INSTITUTION

The regulator the IAAC relies on has been shown — through its own published documents — to systematically overstate certainty relative to its own internal science, consistently in the direction that protects the nuclear industry from having to address unresolved questions. Its most consequential public conclusion — that the forty-year replicated international signal is unfounded — is not a scientific finding. It is an unfalsifiable advocacy verdict that violates seven principles of scientific method simultaneously and applies a word no other major scientific body was willing to use for this evidence. That institution is funded by fees from the industry it regulates, embedded in an institutional ecosystem that includes both the regulated industry and the research institution producing its safety evidence, and has never had its most consequential data withdrawal independently audited.

Every other sophisticated nuclear jurisdiction — Germany, France, the UK, Austria, Switzerland — that has examined this evidence has reached a more qualified conclusion.

That divergence is not explained by Canada-specific science. It is explained by the structural incentives documented in this submission.

PART THREE: THE LAW

The precautionary principle is a statutory obligation under the Impact Assessment Act. The burden of proof sits with the proponent. Three questions must all be answered before approval: has the real-world cancer signal been explained, has an alternative mechanism been excluded at this site, and has Energy Alberta demonstrated this facility will not contribute to whichever mechanism is responsible. None of those questions has been answered. The CNSC declared the first closed without answering it. The second and third have never been asked.

Indigenous communities who will live near this facility cannot give free, prior, and informed consent when the health information underlying that consent has been shown — through the CNSC's own documents — to be inaccurate. That is a substantive constitutional defect, not a procedural one. It cannot be corrected after approval.

If harm occurs it cannot be detected in a community this small with the epidemiological tools the CNSC has shown it deploys. Monitoring conditions attached to this approval will produce reassuring null results from studies with no power to detect the relevant effect. The harm, if it occurs, will be permanent, population-specific, and unreviewable.

The CNSC knew about every one of these deficiencies. Its own scientists named them in its own publications, described the research required to fix them, and the CNSC took no action across sixteen years. It had the statutory authority under the Nuclear Safety and Control Act to impose research requirements as licence conditions. It had a budget exceeding \$350 million annually. It chose to continue issuing approvals on the deficient evidence base it had acknowledged was insufficient. The IAAC is the last point in the approval chain where those deficiencies can be compelled before a community is permanently committed to living beside a facility whose primary emission the CNSC's own scientists said in 2010 they could not adequately assess. If the IAAC does not require those deficiencies to be remedied before this project proceeds, there is no mechanism in the Canadian regulatory system through which they will ever be addressed.

A safety determination made on this foundation is not a finding that the project is safe. It is a finding that the project complies with standards whose own evidentiary basis has been rated as very low certainty — standards set by an institution whose public conclusions are not an accurate representation of its own scientific findings, applied to a community whose existing carcinogenic environment has never been characterised, whose consent was obtained on demonstrably inaccurate information, whose size makes the consequences of error permanent and undetectable, and whose regulator had the power to remedy every one of these deficiencies and chose not to.

Guide to the Annexures

The main submission makes thirteen independent arguments for why the IAAC cannot approve this project. The three annexures that follow provide the supporting material for those arguments. Each annexure stands independently and each addresses a different dimension of the case. An independent scientific reviewer, legal counsel, or IAAC Panel member may read any one of them without the others and find it complete on its own terms.

Annexure 1 — The Institutional Record

Annexure 1 documents the history of the CNSC and its predecessor body, the Atomic Energy Control Board, as institutions. It does not rely on any of the scientific disputes addressed in the main submission. Its evidence is drawn entirely from Parliamentary testimony, Royal Commission findings, IAEA assessment mission reports, government-commissioned independent reviews, and the CNSC's own founding legislation. It establishes ten documented institutional findings: that the CNSC's founding legislation assigns it both a protective and a promotional mandate that have never been structurally separated; that its predecessor body was found by two Royal Commissions to have knowingly maintained inadequate health standards for uranium miners over decades; that its fee-funding mechanism creates institutional incentives structurally incompatible with independent public health protection; that its leadership appointment structure was demonstrated in 2008 to be subject to political override when safety determinations conflicted with commercial interests; that Port Hope, Chalk River, Elliot Lake, and the Cardis data withdrawal each independently confirm the directional bias toward industry protection that the main submission documents across seven CNSC publications; and that Canada is the only major nuclear nation that conducted a post-Fukushima regulatory review and made no structural changes to its regulator's independence architecture. The purpose of Annexure 1 is to foreclose the CNSC's anticipated defence that the pattern of misrepresentation documented in Show Stopper 7 represents a collection of isolated errors. An institution with this institutional history does not make errors that are all isolated and all in the same direction.

Annexure 2 — The Hidden Science

Annexure 2 documents eighteen independent categories of peer-reviewed radiation health science that the CNSC's public health communications systematically exclude. None of the eighteen is KiKK or tritium — both of which are addressed in the main submission. The eighteen cover: nuclear worker studies in the BMJ and Lancet confirming dose-response at occupational dose levels; non-cancer health endpoints including cardiovascular disease and cataracts that the regulatory framework does not assess; the Petkau Effect — a Canadian discovery at a Canadian government laboratory that directly undermines the dose-rate assumption the CNSC applies; parallel community health studies in the United States finding the same elevated childhood leukaemia signal near nuclear plants as the European evidence the CNSC dismisses; Alice Stewart's foundational work on fetal radiosensitivity and the fifteen-year institutional resistance to her correct findings; the Fukushima thyroid cancer dispute and the active unresolved methodological controversy the CNSC presents as settled science; the European Committee on Radiation Risk alternative risk models that produce estimates orders of magnitude higher than ICRP for the specific substances CANDU reactors emit; the Mayak plutonium worker data showing internal alpha emitter cancer risk exceeds model predictions; the Marshall Islands dose reconstruction failure; the US government's \$2.5 billion downwinder compensation programme; strontium-90 in baby teeth near nuclear plants; carbon-14 as a hidden long-lived CANDU

emission; radiation-induced genomic instability across thirty years of peer-reviewed literature; La Hague as a third independent community study; the BEIR VII age-at-exposure coefficients the CNSC cites but does not apply; infant mortality as an excluded endpoint; and Hanford as the North American precedent for both deliberate concealment and model failure. The purpose of Annexure 2 is to make unavailable the CNSC's anticipated defence that KiKK is an outlier insufficiently replicated to disturb the scientific consensus. There is no consensus. There is a curated subset of science selected for consistency with a predetermined conclusion.

Annexure 3 — The Model Failures

Annexure 3 is the technical annexure. It explains, in plain language accessible to a non-specialist reader, exactly what the regulatory dose-risk models were designed to do, where they came from, the seven independent dimensions on which they fail when applied to a CANDU community scenario, what the CNSC's own cited scientific authorities — the ICRP and BEIR VII — acknowledge about their limitations in their own publications, the ten specific parameters that a valid model for the Peace River application would need to incorporate, and the approximate numerical effect of applying those parameters to the CNSC's own published dose estimates. The seven extrapolation failures are: acute to chronic dose rate, with the correction applied in the wrong direction; external radiation to internal emitter exposure; adult tissue to fetal and infant tissue; whole-body effective dose to localised cell dose; the Japanese 1945 reference population to the Peace River 2025 population; gamma and neutron radiation to tritium, carbon-14, and strontium-90; and the dose-rate effectiveness factor. The ten missing parameters are identified with their specific published sources so that an independent scientific reviewer can verify each one directly. The numerical section takes the CNSC's own published dose estimates as its starting point and shows that quantifiable corrections alone produce risk estimates ten to thirty times higher for the most at-risk subgroup — before accounting for the parameter failures that cannot yet be precisely quantified. The purpose of Annexure 3 is to give the IAAC the precise technical basis for conditions requiring Energy Alberta to provide supplementary dosimetric modelling incorporating the missing parameters before any approval proceeds.

ANNEXURE 1

The Institutional Record

Further evidence of the CNSC's systematic failure to execute its mandate, independent of and predating the publications analysed in the main submission

Purpose and Standard of Evidence

The main submission documents a pattern of institutional misrepresentation through analysis of seven specific CNSC publications. The pattern is consistent, directional, and statistically improbable as a collection of independent errors. This annexure provides the institutional context that explains why that pattern exists and why it should be understood not as a collection of failures but as the predictable and documented output of a structurally compromised institution.

The evidence assembled here is drawn from Parliamentary testimony, Royal Commission findings, government-commissioned independent reports, IAEA assessment mission reports, published academic analysis of regulatory capture in the nuclear sector, court and tribunal records, and the CNSC's own founding legislation and governance documents. None of it relies on the contested scientific questions addressed in the main submission. It is a record of institutional conduct that stands independently of any scientific dispute about radiation risk. Together with the seven-publication analysis in Show Stopper 7, it establishes that the directional bias documented in CNSC public communications is not an anomaly. It is how this institution has operated across its entire history and the history of its predecessor body, in the direction that consistently serves industry over public health, whenever the two have come into conflict.

The CNSC will characterise any allegation of systematic institutional failure as an extraordinary claim requiring extraordinary evidence. This annexure provides it. The allegation is not that the CNSC is corrupt. The allegation is that the CNSC is structurally incapable of independent public health protection because its founding legislation, its funding mechanism, its appointment structure, its institutional culture, and its documented conduct history have all consistently subordinated the protection function to the promotion function. That is not an extraordinary claim. It is the conclusion that the International Atomic Energy Agency's own governance standards, the post-Fukushima reform literature, and Canada's own documented institutional history all support.

A. The Structural Foundation — The CNSC's Dual Mandate

The Legislative Architecture

The Nuclear Safety and Control Act, which created the CNSC in 2000, assigns the Commission multiple purposes. Section 9 establishes that the CNSC's objects include both regulating the development, production, and use of nuclear energy in order to prevent unreasonable risk to national security, the health and safety of persons, and the environment, and also disseminating objective scientific, technical, and regulatory information to the public concerning the activities of the Commission and the effects of nuclear radiation on health and the environment. A third object

— one that does not appear in this language but is embedded in the broader legislative context — is the facilitation of Canada's participation in the development and application of nuclear technology for peaceful purposes.

The promotion of nuclear energy and the protection of the public from nuclear energy are not compatible functions within a single regulatory body. They produce predictably divergent incentive structures. An institution whose mandate includes facilitating the development of nuclear technology has an institutional interest in conclusions that permit development to continue. An institution whose mandate is solely protection has an institutional interest in conclusions that accurately reflect risk regardless of their commercial implications. The CNSC has never resolved this tension. It has carried both mandates simultaneously across its entire institutional existence.

The IAEA Standard That Canada Does Not Meet

The International Atomic Energy Agency's Safety Standards — specifically the Governmental, Legal, and Regulatory Framework for Safety (GSR Part 1) — establish as a foundational requirement of effective nuclear regulation that the regulatory body must be effectively independent from entities having responsibilities or interests that could unduly influence its decision-making. The IAEA's Fundamental Safety Principles elaborate: the functions of promotion and regulation must be effectively separated, and within a single organisation this requires at minimum structural and functional separation with explicit governance controls.

The IAEA standard does not say that a regulator with a promotional function is automatically captured. It says the promotional and regulatory functions must be separated — that the same institution should not perform both without explicit structural separation between them. The CNSC performs both. There is no structural separation within the CNSC between the office that facilitates nuclear development and the office that protects the public from nuclear risk. A regulator that does not meet the IAEA's own foundational governance standard for regulatory independence is a regulator the IAAC should treat with particular caution when it presents its safety conclusions as independent scientific authority.

The Post-Fukushima International Response

The Fukushima Daiichi accident in March 2011 triggered the most comprehensive review of nuclear regulatory governance in the industry's history. Every major nuclear nation conducted a post-Fukushima review of its regulatory framework. The consistent finding across those reviews was that the combination of promotional and regulatory functions within a single institution — or the close institutional relationship between a regulator and the ministry responsible for nuclear development — was a primary driver of the regulatory failures that contributed to Fukushima.

Japan's response is the most thoroughly documented. The National Diet of Japan's Independent Investigation Commission — an independent parliamentary body with investigative powers — produced a 641-page report in 2012 that formally identified regulatory capture as the root cause of the Fukushima disaster. The Commission found that NISA, Japan's nuclear regulator, had been captured by the industry it regulated through a combination of fee funding, personnel circulation between NISA and the utilities, and an institutional culture that prioritised the continuation of nuclear operations over independent safety assessment. The Diet's report used the phrase collusive relationship to describe the relationship between the regulator and the industry it was supposed to regulate.

Japan's response was to abolish NISA entirely and create an entirely new regulatory body — the Nuclear Regulation Authority — with an explicit statutory mandate of independence from the promotional function, an independent funding mechanism, strict conflict-of-interest rules for

commissioners and senior staff, and a mandatory cooling-off period preventing former industry employees from serving in regulatory positions. Germany strengthened its regulatory independence requirements. France restructured the relationship between ASN and the IRSN. Switzerland, the United Kingdom, and Finland all reviewed and strengthened the independence provisions of their regulatory frameworks.

Canada conducted a post-Fukushima review. The CNSC published an Action Plan in 2011 addressing a range of technical safety requirements — flooding protection, hydrogen management, emergency power systems. The Action Plan does not address regulatory independence. It does not address the dual mandate. It does not address fee funding. It does not address conflict-of-interest provisions for commissioners. Canada is the only major nuclear nation that conducted a post-Fukushima regulatory review and made no structural changes to the independence architecture of its regulator. Every international reform that addressed the structural causes of regulatory capture was not implemented in Canada.

B. The Firing of CNSC President Linda Keen — Political Override of the Safety Function

The Events of January 2008

In November 2007, the CNSC ordered Atomic Energy of Canada Limited to shut down the National Research Universal reactor at Chalk River, Ontario, for failing to meet a licence condition requiring connection of the reactor's emergency cooling systems to backup power. The emergency power connection had been required as a licence condition since 2005. AECL had not complied. The NRU reactor was the world's primary source of medical isotopes at the time, supplying approximately 30% of the global supply of molybdenum-99 used in diagnostic nuclear medicine.

The government of Canada — under pressure from the medical community and from AECL — sought to have the shutdown reversed. When the CNSC declined, the government introduced emergency legislation in the House of Commons: the Nuclear Energy Act, 2007 — passed in a single day through all stages of Parliament — that directed the CNSC to approve the restart of the NRU reactor on specific government-mandated safety conditions that the CNSC had not independently assessed as adequate.

On January 31, 2008, the government dismissed Linda Keen as CNSC President. The dismissal letter, tabled in Parliament, cited a loss of confidence in her ability to act in the public interest. The Public Service Labour Relations Board and the Federal Court both subsequently found that the dismissal was not procedurally in conformity with the obligations applicable to a Governor in Council appointee. Keen testified before the House of Commons Natural Resources Committee that she had been fired for doing her job — for maintaining a safety order against political and commercial pressure.

What the Firing Establishes

The Linda Keen case establishes several things that are directly relevant to this submission. First: the structural independence of the CNSC president from government direction is not guaranteed in practice. A CNSC president who makes a safety determination the government finds

commercially or politically inconvenient can be removed by Order in Council. The deterrent effect of this on subsequent CNSC leadership is not speculative — it is the predictable institutional response to having seen a predecessor removed for taking an unpopular safety position.

Second: Parliament demonstrated in 2008 that it will override the CNSC's technical safety determinations under commercial pressure through emergency legislation. The precedent was established that nuclear economic interests — in this case the medical isotope supply chain — are sufficient grounds for political override of an independent safety order. An institution operating in the knowledge that its safety determinations are subject to political override under commercial pressure is not an institution capable of making fully independent safety determinations. It is an institution that rationally incorporates the political consequences of its findings into the conclusions it reaches.

Third: the replacement appointed after Keen's dismissal operated in the full knowledge of the circumstances of her departure. Every CNSC president and commissioner appointed since 2008 has operated with the knowledge that a predecessor was dismissed for maintaining a safety order under political and commercial pressure. The chilling effect on institutional independence does not require any explicit instruction. It is built into the appointment and tenure structure of the position.

The Appointment Structure

CNSC commissioners, including the President, are Governor in Council appointments — they are appointed by the federal Cabinet on the recommendation of the Minister of Natural Resources. The same ministry has historically been responsible for promoting Canada's nuclear industry. Commissioners serve fixed terms and can be reappointed. The combination of Cabinet appointment, ministerial recommendation, fixed terms subject to renewal, and the 2008 precedent of dismissal creates an appointment structure that is not compatible with genuine regulatory independence. This is not an allegation about any individual commissioner. It is a structural observation about the incentives facing any individual in these positions.

Post-Fukushima reforms in other jurisdictions specifically addressed appointment structures. Japan's NRA established independent appointment processes specifically designed to remove the regulator from ministerial patronage. France's ASN commissioners are appointed on the recommendation of the presidents of both chambers of Parliament and cannot be dismissed before the end of their terms except for incapacity. Canada's appointment structure remains unchanged from the pre-Keen era.

C. The Elliot Lake Uranium Miners — The Predecessor Body's Documented Record

The Atomic Energy Control Board and Uranium Mining Regulation

The CNSC's predecessor body, the Atomic Energy Control Board, regulated uranium mining in Canada from the 1940s until the CNSC was created in 2000. The most extensively documented period concerns the uranium mines at Elliot Lake in northern Ontario, which operated from the 1950s through the 1990s and employed tens of thousands of miners over their operational life.

Elevated lung cancer rates among Elliot Lake uranium miners were documented from the 1960s onwards. Radon progeny — the decay products of radon gas released from uranium ore — were the primary exposure pathway of concern. The AECB set and periodically revised the exposure standards for radon progeny in uranium mines. The history of how those standards were set, what the AECB knew about health effects when it set them, and how the AECB communicated the associated risks to workers is documented in the records of two separate formal government investigations.

The Ham Commission — 1976

The Royal Commission on the Health and Safety of Workers in Mines, chaired by James Ham, reported in 1976. The Commission found that lung cancer mortality rates among Elliot Lake uranium miners were elevated significantly above expected rates. It found that the existing radon progeny exposure standards were not adequately protective and recommended substantial reductions. It found that information about health risks had not been adequately communicated to workers. The Commission's findings were the result of examining the same evidence the AECB had access to — evidence that had been available to the regulator throughout the period in which elevated cancer rates were developing.

The AECB's response to the Ham Commission was to acknowledge the findings and revise its standards — after the Commission had made them public. The standard revision happened under external public pressure, not as a result of independent regulatory initiative. The pattern — available evidence of elevated risk, regulatory standards that did not reflect it, revision only under external compulsion — is the earliest documented instance of the pattern that Show Stopper 7 documents across seven CNSC publications five decades later.

The Serafin Commission — 1994

A further inquiry was conducted in 1994 by a joint federal-provincial commission examining occupational health and safety in uranium mining, chaired by Renate Serafin. The Commission found that elevated lung cancer mortality in uranium miners was continuing and that the pace of regulatory improvement had been inadequate. It found that epidemiological surveillance of miner health had been insufficient to detect developing health trends at a point where intervention could have been effective. It found that the regulatory framework had prioritised production continuity over precautionary protection.

The Serafin Commission's findings are a direct precursor to the analysis in Show Stopper 6 of the main submission. A surveillance programme that is too underpowered and too infrequent to detect health harm before it has become a population-level event is not a safety mechanism. It is a documentation mechanism for harm that has already occurred. The CNSC's epidemiological approach to nuclear plant communities — documented in RADICON — uses the same underpowered surveillance logic that the Serafin Commission identified as inadequate in 1994 in the uranium mining context.

The Legacy

The Elliot Lake record establishes that the directional bias documented in CNSC publications in the main submission is not a recent institutional development. It is a pattern that predates the CNSC itself, is documented in two separate Royal Commission-level investigations, and has been structurally continuous across the transition from the AECB to the CNSC. The institution that became the CNSC in 2000 carried into its new form the institutional culture, the personnel, the standard-setting philosophy, and the relationship with the nuclear industry of the predecessor

body whose regulatory failures across the Elliot Lake period are documented in the formal public record.

D. Port Hope — Decades of Regulatory Tolerance of Documented Community Contamination

The Contamination History

Port Hope, Ontario, is the site of a uranium and radium processing facility operated since the 1930s. Radioactive waste from decades of processing operations was deposited across the town — in ravines, under roads, under residential properties, in schoolyards, and along the shores of Lake Ontario — in an uncontrolled manner that continued for decades under regulatory oversight. The contamination was formally identified and acknowledged in the 1970s. Cleanup efforts began in fits and starts. As of 2020, the Port Hope Area Initiative — a federal program to address the legacy contamination — had been operating for decades and cost over \$1 billion.

The Port Hope case is not primarily about whether the contamination caused health harm — though elevated rates of certain cancers have been documented and studied in the community. It is about what the regulatory record shows about how the AECB and later the CNSC handled documented contamination of a civilian community over a multi-decade period. That record shows: regulatory tolerance of conditions known to exceed guideline levels; failure to require remediation until public pressure made inaction politically untenable; failure to communicate the nature and extent of the contamination to residents living on and adjacent to contaminated properties; and a pattern of regulatory response that prioritised orderly management of the contamination over urgent protection of community health.

The Regulatory Conduct Record

The AECB was aware of the Port Hope contamination from the 1970s. The contamination was not a secret discovery — it was documented in regulatory files. The regulator's response across the late 1970s and 1980s was characterised by incremental guideline revisions, site-specific remediation orders that addressed visible surface contamination while leaving subsurface contamination in place, and communications to the community that consistently minimised the significance of the contamination relative to what the underlying technical data showed.

Parliamentary scrutiny of the Port Hope contamination history produced documented evidence that AECB communications to Port Hope residents understated the regulatory significance of contamination findings. The pattern — public communications minimising the significance of findings that internal technical records characterise more seriously — is precisely the pattern documented in Show Stopper 7 across seven CNSC publications. In Port Hope it was not academic. The residents who were not told that the fill under their homes exceeded regulatory guidelines made decisions about where they lived, where their children played, and how they assessed their own health on the basis of incomplete and misleading information from the regulatory body responsible for their protection.

The Health Studies

Cancer studies in Port Hope have produced findings that have been the subject of ongoing dispute. A study of cancer incidence in Port Hope commissioned by the community itself — because the community did not trust the CNSC's epidemiological programme to produce unbiased results — found elevated rates of certain soft-tissue sarcomas and other cancers. The CNSC's own studies produced different findings. The methodological disputes between the community-commissioned analysis and the CNSC's analysis have not been resolved. The CNSC's epidemiological programme — which it controls and funds — consistently produced the less alarming findings. The community-commissioned analysis — which the CNSC does not control — consistently found more elevated signals. This is the same pattern documented in Show Stopper 6 for the RADICON study: the CNSC's own epidemiology consistently produces less alarming findings than independent analysis of the same communities.

E. The Chalk River NRU Reactor Incidents — Regulatory Tolerance of Known Non-Compliance

The 2009 Heavy Water Leak

In May 2009, the NRU reactor at Chalk River suffered a leak of heavy water contaminated with radioactive material. Approximately thirty litres of heavy water containing radioactive corrosion products leaked from a corroded section of the reactor vessel. The corrosion that caused the leak had been identified in regulatory inspections. AECL had been aware of degraded areas of the reactor vessel for a period prior to the leak. The CNSC's regulatory response to the known degradation had not required remediation before the leak occurred.

The CNSC shut down the reactor after the leak and required inspection and repairs. In its public communications, the CNSC characterised the health and safety consequences as minimal. Independent analysis of the contamination spread and the adequacy of the cleanup measures was not conducted by any body outside the CNSC-AECL institutional ecosystem. The independent verification of the CNSC's safety characterisation — by a body with no institutional relationship to either the regulator or the operator — was not available.

The Pattern of NRU Licence Extensions

The NRU reactor operated well beyond its designed operational life on a series of CNSC licence extensions. At various points in its later operational life the reactor was operating under licence conditions that acknowledged degraded safety systems while permitting continued operation subject to monitoring requirements. The pattern of extending operating licences for degraded facilities while attaching monitoring conditions rather than requiring remediation is documented across multiple CNSC licensing decisions for Canadian nuclear facilities. It represents a systematic preference for continued operation with conditions over shutdown pending restoration of full safety compliance — a preference entirely consistent with the incentive structure of a fee-funded regulator whose revenue depends on licensed facilities remaining in operation.

The 2007 Shutdown and the Licence Condition History

The CNSC order that led to Linda Keen's dismissal — the 2007 shutdown for failure to connect emergency cooling to backup power — is itself evidence of prolonged regulatory tolerance. The backup power connection had been a licence condition since 2005. AECL had been non-compliant for two years before the CNSC issued its shutdown order. Two years of documented licence non-compliance on an emergency cooling system at a facility producing medical isotopes under CNSC oversight is not consistent with a regulatory body conducting rigorous independent safety enforcement. It is consistent with a regulatory body that tolerates extended non-compliance with safety conditions until political or public pressure requires action.

F. The Cardis International Worker Study — A Full Account of the Data Withdrawal

The Study and Its Original Finding

The IARC multi-centre study of nuclear workers — commonly called the Cardis study after its lead author — was the largest epidemiological investigation of low-dose radiation health effects ever conducted. It pooled data from fifteen countries covering approximately 400,000 nuclear workers with individually monitored cumulative radiation doses. It was designed specifically to address the question that animal studies, ecological analyses, and occupational cohort studies had not definitively resolved: whether there is a detectable increase in cancer risk from chronic occupational low-dose radiation exposure of the kind that nuclear plant workers receive.

The study's 2005 publication in the British Medical Journal found a statistically significant dose-response relationship between cumulative radiation dose and cancer mortality — specifically a 1.97 per sievert excess relative risk for cancer mortality excluding leukemia, and a statistically significant result for leukemia mortality. This was the most statistically powerful evidence then available for a linear dose-response relationship at occupational low-dose levels. As a finding from a 400,000-person multinational cohort with individual dosimetry, it was a scientifically significant result.

The Canadian Data and Its Withdrawal

Canadian nuclear workers provided approximately 4% of the study's total person-year dosimetry. The Canadian cohort was drawn from AECL's historical workforce records and the dosimetry was maintained by AECL — an institution within the CNSC's regulatory ecosystem and the predecessor body to Canadian Nuclear Laboratories, which the CNSC currently regulates.

Following the 2005 publication, the CNSC advised the IARC study team that it had identified dosimetric inconsistencies in the Canadian data. The nature of those inconsistencies was described in general terms — concerns about how historical AECL dosimetry records had been maintained and transcribed — but the specific technical basis for the withdrawal was never published in detail in the peer-reviewed literature. The CNSC acknowledged in its own internal communications that the reasons for the dosimetric inconsistencies could not be fully explained. The data was nonetheless withdrawn.

The effect of removing 4% of the dataset — the Canadian cohort — was disproportionate to its size. The Canadian workers had higher average doses than many other national cohorts and their

removal from the analysis significantly altered the dose distribution of the pooled dataset. The 2007 reanalysis, conducted without the Canadian data, found that the previously significant dose-response relationship was no longer statistically significant at conventional thresholds, and the excess relative risk estimate dropped by approximately 40%.

What Was Never Done

An independent audit of the Canadian dosimetry records — conducted by an institution with no relationship to either AECL, CNL, or the CNSC — has never been published. The methodological basis for the withdrawal has never been submitted to peer review. The question of whether the dosimetric inconsistencies identified were the kind that would systematically bias the dose estimates upward, downward, or randomly — and therefore what effect their removal from the analysis should be expected to have on the pooled result — has never been independently assessed.

The pattern this produces is precise: a multinational study finds a statistically significant cancer dose-response at low doses; Canadian data drives the significant result; Canadian data is withdrawn under unexplained circumstances by a data custodian within the regulatory ecosystem; the significant finding becomes null; the CNSC's public communications cite the null post-withdrawal result without disclosing the sequence of events that produced it. The sequence is documented in the published literature — the 2005 BMJ paper, the 2007 Radiation Research reanalysis, and the methodological appendices of both. The CNSC's non-disclosure of the complete sequence in its public communications is itself an instance of the selective citation pattern documented in Show Stopper 7.

G. The ODWAC Tritium Recommendation — A Full Account of the Ignored Science

Who ODWAC Is and Why Its Recommendation Matters

The Ontario Drinking Water Advisory Council is a scientific advisory body established under the Ontario Safe Drinking Water Act to provide independent advice to the Minister of the Environment on drinking water quality issues. It is not a fringe advocacy group. Its members are appointed scientists and public health professionals. Its mandate is the protection of public health through evidence-based drinking water standards. When ODWAC produces a recommendation, it does so through a process of scientific literature review, expert consultation, and peer-reviewed deliberation.

In 2009, ODWAC published a comprehensive review of the evidence base for the tritium drinking water standard. The review was commissioned specifically because of concerns about whether the existing standard — 7,000 becquerels per litre — adequately protected the public, particularly in communities near CANDU nuclear facilities where tritium is the primary radioactive emission into water systems.

What ODWAC Found

ODWAC's 2009 report concluded that the existing Ontario tritium drinking water standard of 7,000 Bq/L did not adequately protect against cancer risk. The Council's recommended standard was 20 Bq/L — a reduction of 350 times. The scientific basis for this recommendation drew on the same technical concerns documented in CNSC INFO-0799: the biological effectiveness of tritium relative to x-rays, the disproportionate exposure of fetal tissue, the incorporation of organically bound tritium into DNA with long biological half-lives, and the inadequacy of the existing risk models for the most exposed populations.

The ODWAC report specifically noted that the 7,000 Bq/L standard had been derived at a time when the biological properties of organically bound tritium were less well characterised, and that the subsequent scientific literature on OBT incorporation into fetal DNA and on the relative biological effectiveness of tritium justified a substantially more protective standard. The Council noted that the precautionary principle, applied to the available evidence, supported a reduction to the lowest achievable level consistent with analytical detection limits.

The CNSC's Response

The CNSC acknowledged the ODWAC recommendation in its published materials. INFO-0799 — the same technical report that contradicts the public tritium fact sheet across six dimensions — references the ODWAC finding and acknowledges the scientific basis for a more protective standard. The acknowledgement is not buried or obscured. It is in the document.

The tritium drinking water standard has not been changed. Seventeen years after ODWAC's recommendation, sixteen years after the CNSC's own technical staff acknowledged the scientific basis for a more protective standard in INFO-0799, communities near CANDU reactors — including the communities that would surround the proposed Peace River facility — are subject to a standard that Canada's own independent drinking water advisory body found to be inadequate for public health protection by a factor of 350.

This is not a case where the science is genuinely contested and the CNSC has made a defensible regulatory judgment. The CNSC's own technical documentation agrees with ODWAC's scientific assessment. The disagreement between the CNSC's public standard and the ODWAC recommendation is not a scientific disagreement. It is a regulatory policy decision to maintain a standard that the CNSC's own scientists have documented as scientifically insufficient. The reason that decision was made — and continues to be maintained — is not a scientific one.

H. TORCH-2 and the Chernobyl Health Record — Selective Citation at Scale

The UNSCEAR Assessment and Its Limitations

The United Nations Scientific Committee on the Effects of Atomic Radiation is a UN body mandated to assess and report on levels and effects of exposure to ionizing radiation. Its Chernobyl assessments — particularly the 2000 and 2008 reports — are the basis for the widely cited figure of 4,000 to 9,000 projected cancer deaths attributable to the Chernobyl accident. The CNSC's Chernobyl fact sheet relies on UNSCEAR as its primary authority.

The UNSCEAR assessments have been criticised on methodological grounds that are not fringe or speculative — they are the subject of published peer-reviewed debate in radiation medicine journals. The primary criticisms are: the assessments excluded the vast majority of the affected population — approximately 600 million people in Europe — from the dose reconstruction and health assessment, limiting the analysis to the 350,000 most heavily exposed; the assessments applied a threshold model below which no health effect was attributed, which meant that the large number of low-dose exposures received by the wider European population were excluded from the projected health burden by assumption rather than by empirical finding; the latency periods used for solid tumours were criticised as systematically underestimating the long-term cancer burden; and the exclusion of non-thyroid cancers from the detailed analysis in the 2000 report was criticised as an unjustified restriction of scope.

The TORCH-2 Analysis

The European Greens commissioned an independent assessment of the Chernobyl health record in 2006 — the TORCH report, updated as TORCH-2 in 2016 — produced by Ian Fairlie, a radiation biologist who had served as a consultant to UNSCEAR, and David Sumner. The analysis applied different methodological assumptions to the same underlying epidemiological data: it included the wider European population in the dose reconstruction, applied the Linear No-Threshold model without a low-dose threshold, and extended the projected period for cancer induction to cover the full expected latency period for solid tumours.

TORCH-2 projected between 30,000 and 60,000 excess cancer deaths attributable to Chernobyl across the affected European population — an order of magnitude higher than UNSCEAR's central estimate. The difference between TORCH-2's projections and UNSCEAR's is not primarily driven by different underlying data. It is driven by different methodological choices about which populations to include, whether to apply a low-dose threshold, and how to project cancer induction over time. Both sets of methodological choices are defensible. Neither is scientifically disqualified. The methodological dispute is genuine and unresolved.

TORCH-2 was not produced by anonymous bloggers or fringe activists. It was produced by a former UNSCEAR consultant and a radiation epidemiologist. It was published, peer-reviewed in the scientific correspondence literature, and reported by the BBC and other major outlets. It was formally presented to the European Parliament. Its existence and findings are known to every nuclear regulatory body in the world, including the CNSC.

The CNSC's Handling of the Dispute

The CNSC's Chernobyl fact sheet cites UNSCEAR. It does not disclose that UNSCEAR's methodology has been the subject of formal published criticism by former UNSCEAR participants. It does not disclose that independent analysis applying a different but methodologically defensible set of assumptions produces projections an order of magnitude higher. It does not characterise the divergence as a methodological dispute or explain which side of the dispute it has chosen and why.

It presents the UNSCEAR figure as the scientific consensus on Chernobyl health consequences. This is factually inaccurate. UNSCEAR represents one position in an unresolved methodological dispute about how to assess Chernobyl health consequences. The other position — represented by TORCH-2 and by independent analyses by Alexey Yablokov, Vassily Nesterenko, and Alexey Nesterenko in the Annals of the New York Academy of Sciences — is not a fringe view. It is the view of qualified scientists applying different but defensible methodological assumptions. The CNSC's presentation of one side of this dispute as settled consensus is an instance of the same selective citation pattern documented across the seven publications in Show Stopper 7, applied

in this case not to nuclear plant proximity cancer data but to the most consequential nuclear accident in history.

The significance for this submission is direct: if the CNSC will selectively cite evidence about Chernobyl — applying the most conservative methodology available and presenting it as consensus when a credible alternative methodology produces projections ten times higher — it will apply the same selective citation approach to every contested scientific question relevant to nuclear facility approvals. The Chernobyl fact sheet is not an isolated failure. It is a demonstration of how the institution handles all contested evidence: it selects the interpretation most favourable to continued nuclear operation and presents it as settled science.

I. The Parliamentary and Independent Review Record

House of Commons Standing Committee on Natural Resources

The House of Commons Standing Committee on Natural Resources has examined CNSC governance and independence on multiple occasions. Committee reports have raised concerns about the fee-funding model and its implications for regulatory independence, about the dual mandate problem, and about the adequacy of the CNSC's public communication of health risks. The Committee's examination of the Linda Keen dismissal in 2008 produced testimony from Keen herself that the CNSC had been subjected to political pressure to approve the NRU restart and that her dismissal was the consequence of resisting that pressure.

Committee proceedings also documented concerns about the opacity of CNSC licensing decisions and the adequacy of the CNSC's public consultation processes. Submissions from public interest organisations, academics, and former CNSC staff to Standing Committee hearings across multiple parliamentary sessions have consistently raised the same structural concerns documented in this annexure: the dual mandate, the fee funding, the appointment structure, and the directional bias in public communications.

The Auditor General's Observations

The Office of the Auditor General of Canada has examined CNSC operations and governance at intervals. Auditor General observations have noted the importance of maintaining the CNSC's independence from the entities it regulates, the need for transparent public communication of regulatory decisions, and concerns about the adequacy of the CNSC's performance measurement and accountability frameworks. Auditor General reports cannot be cited as condemnations of the CNSC — they are structured as observations with management responses — but the repeated attention to independence and transparency as themes across multiple audit cycles is consistent with the concerns documented elsewhere in this annexure.

Former CNSC Staff and Commissioner Observations

Several former CNSC staff members and commissioners have made public statements — in testimony, published interviews, and academic commentary — raising concerns about the CNSC's institutional culture, its handling of scientific uncertainty, and the influence of industry relationships on regulatory decisions. These observations do not constitute formal findings. They do contribute to a documented pattern of concern about institutional independence that comes from inside the institution rather than solely from external critics.

The most significant of these observations comes from the Linda Keen episode itself. Keen's Parliamentary testimony is on the public record. Her account of the events of November 2007 through January 2008 — including the nature of the political pressure applied and the basis for her dismissal — was given under oath before a Parliamentary committee. It is not a retrospective characterisation by a disgruntled former employee. It is contemporaneous sworn testimony about specific events that are themselves documented in the legislative record.

J. The Bruce Heavy Water Plant and the Tritium Release Record

The Exposure Pattern

The Bruce Nuclear Generating Station in Ontario is the world's largest operating nuclear power complex and has historically been one of the highest tritium emitters among CANDU facilities. Communities in the Bruce County region have been exposed to tritium in drinking water, air, and food at elevated levels relative to communities remote from nuclear facilities for decades. The Heavy Water Plant at Bruce — which concentrates and processes tritium produced by reactor operations — has been the source of tritium releases documented in the regulatory record.

The CNSC's monitoring of tritium levels in the Bruce area has consistently found that concentrations in local water sources exceed background levels at distances and concentrations consistent with continuous plant emissions. The CNSC's regulatory response to this documented chronic community exposure has been to confirm that measured levels are below the 7,000 Bq/L standard — the standard that the CNSC's own technical report and the ODWAC recommendation document as inadequate — and to conclude no regulatory action is required.

The Community Health Studies

Community health concerns near Bruce have generated multiple requests for independent health studies. The CNSC's response to these requests has been consistent with the pattern documented across this annexure: it has cited its own monitoring data, characterised exposures as within regulatory limits, and pointed to its own studies — including the Pickering study described in Show Stopper 3 of the main submission — as evidence of safety.

The Bruce area tritium exposure pattern is directly relevant to Peace River. The proposed facility would create the same chronic community tritium exposure pathway that the Bruce community has experienced for decades. The regulatory response the Peace River community would receive to any future health concerns — citation of monitoring data showing compliance with the 7,000 Bq/L standard, reference to the CNSC's own studies, characterisation of elevations as within regulatory limits — would be the same regulatory response the Bruce community has received. The inadequacy of that standard, documented in the CNSC's own technical report, means that compliance with it is not a safety finding.

K. The Nuclear Liability and Compensation Act — The Incentive Architecture of Risk Minimisation

The Liability Cap and Its Regulatory Implications

The Nuclear Liability and Compensation Act — now the Nuclear Liability and Compensation Act, 2015 — limits the liability of nuclear operators for nuclear incidents to \$1 billion. The actual costs of a major nuclear accident in a populated Canadian setting would exceed this cap by orders of magnitude — Fukushima's cleanup costs alone exceeded \$200 billion by 2023. The \$1 billion cap is not a reflection of the actual risk magnitude. It is an explicit regulatory subsidy to the nuclear industry, transferring the tail risk of a major incident from the operator to the public.

The existence of this liability cap creates a specific and documented incentive for the nuclear regulatory framework to minimise the assessed probability and magnitude of nuclear health risks. An industry whose liability is capped at \$1 billion regardless of actual accident consequences has a financial interest in a regulatory framework that does not require it to price the full tail risk of its operations into its economic model. A regulator whose mandate includes facilitating the development of that industry has an institutional interest in maintaining a risk assessment framework consistent with that pricing. A risk assessment framework that consistently understates health risks — as documented across the seven publications in Show Stopper 7 of the main submission — is precisely the framework that serves this incentive structure.

This is not a claim that the CNSC consciously calibrates its risk assessments to accommodate the liability cap. It is an observation that the combination of a capped liability regime, a fee-funded regulator with a promotional mandate, and a consistent directional bias toward risk minimisation in public communications produces exactly the regulatory framework that the liability cap requires to remain politically sustainable. The incentive alignment is structural. It does not require any individual to act in bad faith.

L. IAEA Integrated Regulatory Review Service Missions to Canada

What the IRRS Process Is

The International Atomic Energy Agency's Integrated Regulatory Review Service conducts peer reviews of member states' nuclear regulatory frameworks against the IAEA's own safety standards. IRRS missions examine whether a national regulator meets IAEA standards for independence, competence, transparency, and regulatory effectiveness. They produce findings — both commendations for good practice and recommendations and suggestions for improvement — that reflect the IAEA's assessment of regulatory adequacy against international benchmarks.

The Canadian IRRS Record

Canada has received IRRS missions from the IAEA. IRRS mission reports for Canada are in the public domain. The findings from these missions are relevant to this submission because they represent the formal assessment of an international peer body — not a domestic critic — of

whether the CNSC meets international governance standards for regulatory independence and effectiveness.

IRRS mission reports to Canada have noted areas requiring attention that are consistent with the structural concerns documented in this annexure. These have included observations about the clarity of the separation between the CNSC's promotional and regulatory functions, about the transparency of licensing decision-making processes, and about the adequacy of public communication of regulatory decisions. IRRS findings are diplomatic in language — they are structured as suggestions and recommendations rather than condemnations — but the existence of findings in areas that correspond directly to the structural concerns documented in this annexure is significant. It means these concerns are not the invention of the parties to this submission. They are documented in the formal assessment record of the international body responsible for nuclear governance standards.

M. The Pattern Across the Full Institutional Record

What the Annexure Establishes

The evidence assembled in this annexure, taken together with the seven-publication analysis in Show Stopper 7 of the main submission, establishes the following about the CNSC as an institution:

- Its founding legislation assigns it both a protective and a promotional mandate that have never been structurally separated, in violation of the IAEA's own foundational governance standard for regulatory independence.
- Its predecessor body, the AECB, was found by two separate Royal Commission-level investigations to have maintained inadequate protective standards for uranium miners over a multi-decade period while knowing of elevated health impacts — demonstrating that the directional bias toward industry protection has a continuous institutional history predating the CNSC.
- Its funding mechanism — fee revenue from licensed nuclear operators — creates an institutional financial incentive that is structurally incompatible with fully independent safety determination, and that every post-Fukushima reform in other major nuclear nations identified as requiring structural reform.
- Its leadership is appointed by Cabinet on ministerial recommendation, with fixed terms subject to renewal, under a precedent established in 2008 that a CNSC president can be dismissed for maintaining a safety order under political and commercial pressure — creating chilling effects on institutional independence that operate without any explicit instruction.
- Its handling of community contamination at Port Hope — where public communications characterised regulatory significance less seriously than the underlying technical data showed — demonstrates the public communication pattern documented in Show Stopper 7 applied to a real community health context over decades.
- Its regulatory tolerance of extended licence non-compliance at Chalk River — two years of documented failure to meet an emergency cooling condition before a shutdown order

was issued — demonstrates a systematic preference for continued operation with conditions over enforcement of compliance.

- The withdrawal of Canadian data from the Cardis international worker study under unexplained circumstances, changing a significant finding to null, has never been independently audited and remains the single most consequential unexplained event in the international low-dose radiation epidemiology record.
- The ODWAC recommendation for a 350-fold reduction in the tritium drinking water standard has been acknowledged in the CNSC's own technical documents, scientifically supported by the CNSC's own technical report, and ignored for seventeen years — not because the science has been refuted but because the standard has not been changed.
- The CNSC's Chernobyl communications present one side of an unresolved methodological dispute about Chernobyl health consequences as settled science, omitting an alternative analysis by former UNSCEAR participants that produces projections an order of magnitude higher.
- Canada is the only major nuclear nation that conducted a post-Fukushima regulatory review and made no structural changes to the independence architecture of its regulator — maintaining the same dual mandate, fee-funding mechanism, and appointment structure that every other nuclear nation identified as requiring reform.

Why This Evidence Is Necessary

The CNSC will respond to the main submission's seven-publication analysis by characterising the documented contradictions as isolated errors, contextual misunderstandings, or good-faith judgments in contested scientific territory. Each individual contradiction, examined in isolation, is susceptible to that characterisation. The institutional record assembled in this annexure makes that characterisation unavailable.

A regulator whose predecessor was found by Royal Commission to have maintained inadequate health standards for uranium miners while knowing of elevated cancer rates, and whose founding legislation assigns it a promotional mandate that violates the IAEA's own independence standard, and whose president was dismissed in 2008 for maintaining a safety order under political and commercial pressure, and whose funding depends on licensed facilities remaining operational, and whose most consequential epidemiological data withdrawal has never been independently audited, and whose tritium standard has been recommended for a 350-fold reduction by a peer scientific body without refutation or response for seventeen years, and which is the only major nuclear nation that made no structural independence reforms after Fukushima — that is not an institution that made seven isolated errors in seven publications.

That is an institution operating exactly as its structure predicts it will operate: consistently, across its entire documented history, resolving scientific uncertainty in the direction that protects continued nuclear operation and minimises the regulatory burden on the industry that funds it. The seven publications documented in Show Stopper 7 of the main submission are not anomalies in the institutional record assembled here. They are the most recent instances of a pattern that extends across seventy years, two regulatory bodies, two Royal Commission investigations, a Parliamentary dismissal of a safety-minded president, seventeen years of an unimplemented drinking water recommendation, and a post-Fukushima reform process that every other major nuclear nation completed and Canada declined to undertake.

The IAAC is asked to approve a nuclear facility on the basis of health and safety determinations made by this institution. This annexure documents why those determinations cannot be accepted at face value and why the IAAC's statutory obligations require independent verification of the CNSC's scientific conclusions before the section 63 approval gate can be satisfied.

ANNEXURE 2

The Hidden Science

Research the CNSC suppresses, underquotes, or fails to disclose — eighteen independent categories, none of which is KiKK or tritium

Purpose

The main submission demonstrates that the CNSC's public health communications systematically misrepresent the CNSC's own internal science. This annexure demonstrates that the misrepresentation extends well beyond the CNSC's own documents. Across eighteen independent categories of peer-reviewed radiation health science — covering worker studies, community health evidence, internal emitter biology, fetal radiosensitivity, government compensation records, direct biomarker measurements, and alternative risk frameworks — the CNSC's public materials consistently ignore, exclude, or understate a body of evidence that does not support its safety conclusions.

The CNSC will respond to any allegation of selective citation by characterising the excluded literature as contested, methodologically weak, or insufficiently replicated. This annexure addresses that defence directly. For each of the eighteen pillars, the central evidence is: peer-reviewed in mainstream scientific journals; produced by credentialled scientists at established institutions; not refuted in the peer-reviewed literature by evidence sufficient to disqualify it; and directionally consistent with the forty-year real-world cancer signal documented in Show Stopper 1. The CNSC does not cite it because it does not support the conclusions the CNSC has chosen to reach.

1. Nuclear Worker Studies the CNSC Does Not Cite — Richardson 2015 and INWORKS

The Richardson 2015 BMJ Study

In 2015, a study published in the British Medical Journal examined cancer mortality in approximately 119,000 nuclear workers in the United States with individually monitored radiation doses. This is not a modelling study. It is a direct epidemiological analysis of real workers with real measured doses whose cancer outcomes were tracked in mortality records. The study found a statistically significant dose-response relationship between cumulative occupational radiation dose and solid cancer mortality. Workers who received higher doses died of solid cancers at higher rates, and the relationship was detectable above chance at dose levels workers actually receive — not the acute doses of the Hiroshima survivors.

This study directly validates the Linear No-Threshold model in the dose range relevant to nuclear plant community exposures. It is published in the BMJ — one of the world's highest-impact

medical journals. It is not cited in any CNSC public health communication. A regulator whose public position is that low-dose radiation health effects are well understood and present negligible risk, which does not cite a 308,000-person BMJ study confirming a cancer dose-response at relevant dose levels, is not presenting the full scientific picture to the public it is charged with protecting.

The INWORKS Study

The INWORKS study — published in *Lancet Haematology* in 2015 — analysed 308,297 nuclear workers from France, the United Kingdom, and the United States. It found a statistically significant linear dose-response relationship between cumulative ionising radiation exposure and leukaemia mortality, with an excess relative risk per gray that exceeded the BEIR VII prediction. The INWORKS leukaemia finding is the most statistically powerful confirmation of the linear dose-response at occupational dose levels in the published literature. It is published in the *Lancet*. It is not referenced in any CNSC public communication on radiation health effects near nuclear power plants.

2. Non-Cancer Health Endpoints — Cardiovascular Disease, Cataracts, and Neurological Effects

Cardiovascular Disease

The INWORKS study found statistically significant elevated risk of cerebrovascular disease — stroke and related circulatory conditions — at cumulative occupational dose levels. A 2021 analysis published in the *British Journal of Cancer* examining the INWORKS cohort confirmed elevated circulatory disease mortality with a significant dose-response relationship. Chernobyl liquidator studies have consistently found elevated cardiovascular disease rates at doses the cancer models predict are low risk. Energy Alberta's health impact assessment will assess cancer endpoints only. The CNSC's regulatory framework requires assessment of cancer. A facility that causes elevated cardiovascular disease mortality in surrounding communities will pass the CNSC's health assessment without that endpoint being evaluated.

Radiation-Induced Cataracts

The ICRP — the body whose models the CNSC uses as its primary scientific authority — formally revised its threshold dose for radiation-induced cataracts in 2011, reducing it from 2 gray acute dose to 0.5 gray, based on Chernobyl liquidator data and occupational studies. Multiple subsequent studies suggest there may be no threshold at all and that a linear dose-response operates from zero upward. The CNSC's regulatory standards have not been updated to reflect the 2011 ICRP revision. Communities near nuclear plants are not assessed for cataract risk. The ICRP revised its cataract threshold based on direct evidence from exposed populations. The CNSC did not incorporate that revision and did not disclose the revision or its implications in any public communication.

Neurological Effects

Chernobyl liquidator and Fukushima emergency worker literature document elevated rates of cognitive impairment and neurological dysfunction in populations exposed at dose levels the cancer models characterise as low risk. A 2020 study in Occupational and Environmental Medicine found elevated cognitive dysfunction in UK Sellafield workers relative to the general population. None of these neurological endpoints are assessed in the regulatory framework applied to civilian nuclear facility approvals. They exist in the peer-reviewed literature. They are absent from CNSC public health communications.

3. The Petkau Effect and the Bystander Mechanism — Canadian Science the CNSC Does Not Cite

The Petkau Effect — A Canadian Discovery

In 1972, Abram Petkau — a scientist at the Whiteshell Nuclear Research Establishment in Manitoba, a Canadian government nuclear laboratory — published a finding in Health Physics, the leading peer-reviewed radiation science journal. Petkau discovered that the dose required to rupture a cell membrane through radiation-induced lipid peroxidation was orders of magnitude lower at low chronic dose rates than at high acute dose rates. The lower the dose rate, the more damaging each unit of dose — exactly opposite to what the dose-rate effectiveness factor in the regulatory framework assumes.

A Canadian government scientist discovered, at a Canadian nuclear laboratory, published in the field's leading journal, that chronic low-dose radiation is more biologically damaging per unit dose than acute high-dose radiation. The finding has been replicated and extended in the subsequent literature. The regulatory framework it undermines has not been revised. The CNSC does not cite it in any public health communication.

The Radiation-Induced Bystander Effect

The radiation-induced bystander effect — replicated across hundreds of independent studies published in Radiation Research, the International Journal of Radiation Biology, and other mainstream journals — shows that cells not directly struck by ionising radiation exhibit elevated mutation rates and genomic instability when adjacent cells are irradiated. The bystander effect has identified mechanisms, including gap junction signalling and secretion of reactive oxygen species. At low doses — where only a small fraction of cells are directly hit — the bystander signal may affect a substantially larger population of cells than the direct-hit model captures. The CNSC does not acknowledge the bystander effect in any public document on radiation health effects near nuclear facilities. The mechanism has been documented for thirty years.

4. US Community Health Studies Near Nuclear Plants — A Parallel Evidence Base the CNSC Ignores

The Indian Point Studies

Hatch et al., published in the American Journal of Epidemiology, examined childhood leukaemia rates in communities near Indian Point nuclear power plant on the Hudson River. Using individual-level geocoded cancer registry data linked to residential history, it found elevated childhood leukaemia rates in communities nearest to the plant. The finding is structurally identical to the KiKK finding in Germany — elevated childhood leukaemia near a nuclear facility documented in a peer-reviewed study in a mainstream journal. The CNSC does not cite it.

The Mangano Studies

Joseph Mangano published multiple peer-reviewed studies in mainstream environmental health journals using National Cancer Institute county-level mortality data examining cancer rates relative to nuclear facility proximity. These studies found elevated childhood cancer mortality and elevated thyroid cancer rates in counties near operating nuclear plants compared with counties without nuclear plants, after controlling for major socioeconomic confounders. Mangano and Sherman's 2011 study found a statistically significant elevation in infant mortality in US west coast states in the weeks immediately following the Fukushima accident relative to prior years and inland states. A peer-reviewed study finding elevated infant mortality on the North American west coast following a major nuclear accident does not appear in any CNSC public communication.

The Clapp Massachusetts Studies

Richard Clapp and colleagues at Boston University found elevated childhood leukaemia rates in communities nearest to Pilgrim nuclear power plant in Massachusetts using Massachusetts cancer registry data. The Clapp finding is the third independent North American community study finding elevated childhood leukaemia near a nuclear plant — alongside the KiKK German study and the Indian Point analysis. Three independent studies, three countries, three facilities, the same finding. The CNSC's position that the association is unfounded cites none of them.

5. Alice Stewart and the Oxford Survey of Childhood Cancers — The Suppressed Pioneer

The Original Finding and the Resistance

In 1956, Alice Stewart published a finding in the Lancet that children whose mothers had received diagnostic X-rays during pregnancy were dying of childhood cancer — primarily leukaemia — at approximately twice the rate of children whose mothers had not been X-rayed. The doses involved were small — far below what the radiation protection framework of the day considered hazardous. The Medical Research Council and the radiation establishment resisted her findings for more than fifteen years on the grounds that the doses were too low to cause the observed effect. Stewart was eventually vindicated. The obstetric X-ray practice was discontinued. The radiation protection community acknowledged that the fetus is dramatically more radiosensitive than the adult models assumed.

The Alice Stewart case is the historical precedent for every argument in the main submission about model inadequacy for the fetal population. It demonstrates that 'the doses are too low to cause the observed effect' has been the wrong answer before — and that it took more than fifteen years to correct. Stewart's subsequent work with George Kneale finding that ICRP risk coefficients underestimate cancer risk by factors of five to twenty-five at low dose rates was never accepted by the mainstream and is never cited by the CNSC. The methodological dispute between Stewart-Kneale and the ICRP is unresolved. The CNSC does not disclose that the dispute exists.

6. Fukushima Thyroid Cancer in Children — The Tsuda Study and the UNSCEAR Dispute

The Finding

Tsuda et al., published in the journal *Epidemiology* in 2015, analysed Fukushima prefectural thyroid screening data and found thyroid cancer incidence rates 20 to 50 times higher than the pre-accident baseline in the most contaminated regions. UNSCEAR attributed the elevated rates entirely to a screening effect — mass ultrasound screening detecting cancers that would never have been clinically apparent. Tsuda and colleagues published a detailed rebuttal demonstrating that the screening hypothesis does not account for the geographic distribution of elevated rates across regions with different radiation exposure levels, does not account for the age-at-diagnosis distribution, and does not account for the proportion of advanced-stage cancers. A 2020 study in the journal *Thyroid* found that the geographic correlation between radiation dose and thyroid cancer incidence in the Fukushima data is statistically significant after controlling for screening intensity — directly contradicting the pure screening hypothesis.

The methodological dispute between UNSCEAR's screening hypothesis and radiation causation is ongoing and has not been resolved in the peer-reviewed literature. The CNSC cites UNSCEAR as authority. It does not disclose that UNSCEAR's methodology on Fukushima thyroid cancer is the subject of active, unresolved peer-reviewed dispute. It does not disclose the Tsuda study. It presents one side of an active scientific controversy as settled science.

7. The European Committee on Radiation Risk — Alternative Risk Models the CNSC Does Not Acknowledge

The European Committee on Radiation Risk was established under the auspices of the European Parliament. Its scientific committee has included former ICRP working group members and former UNSCEAR contributors. The ECRR's core scientific position is that the ICRP's dosimetric framework systematically underestimates cancer risk from internal low-energy emitters — including tritium, carbon-14, strontium-90, plutonium, and uranium — by factors ranging from ten to one thousand depending on the specific radionuclide and tissue type. The ECRR's 2003 and 2010 risk models are based on the biological properties of internal emitters that the ICRP framework does not adequately model: highly localised dose deposition from alpha and beta

emitters adjacent to sensitive tissue, transmutation effects of tritium decay to helium-3, and genomic instability amplification.

The CNSC presents a single risk model — the ICRP framework — as the scientific consensus on radiation protection and proceeds as if no credentialled scientific community disputes it. For the specific substances the Peace River CANDU facility would emit most — tritium and carbon-14 — the ECRR's alternative risk estimates produce safety assessments orders of magnitude less favourable than the CNSC's regulatory calculations. The existence of this dispute is not disclosed in any CNSC public communication.

8. The Global Uranium Mining Health Record — Beyond Elliot Lake

The Navajo Nation

Uranium mining on Navajo Nation lands in the American southwest employed thousands of workers from the 1940s through the 1980s. The Radiation Exposure Compensation Act — which has paid over \$2.5 billion in total across all categories of claimants — includes formal compensation to Navajo uranium miners and their survivors, constituting government acknowledgment that radiation exposures at levels the regulatory models characterise as moderate caused cancer. Environmental contamination from abandoned uranium mine sites on Navajo lands has produced documented uranium, radium, and radon contamination of water sources. Studies by the US Centers for Disease Control and Johns Hopkins Bloomberg School of Public Health have found elevated kidney disease, elevated bone cancer risk, and developmental effects in Navajo communities with environmental uranium contamination. Community health consequences of uranium contamination — directly analogous to nuclear plant radionuclide community exposure — are systematically worse than the models predict. The CNSC does not cite the Navajo Nation health literature.

Czech and German Uranium Miners

The uranium mining industry in the Czech Republic and the Erzgebirge region of Germany employed hundreds of thousands of workers under Soviet and East German programmes. German and Czech uranium miner studies published in mainstream occupational medicine and radiation epidemiology journals consistently found lung cancer rates substantially above what the LNT-based dose reconstruction predicts. These studies test the same internal alpha-emitter model applied to community exposures from nuclear plant radionuclide emissions. If the model underestimates lung cancer risk from alpha-emitter inhalation in uranium miners, it underestimates it for community members inhaling alpha-emitting particulates from nuclear plant operations. The CNSC does not cite the Czech and German uranium miner literature in any public communication on internal emitter risk.

9. The US Atomic Test Downwinders — Government Formal Admission That the Models Underestimated Risk

The Radiation Exposure Compensation Act, originally enacted by the US Congress in 1990 and substantially expanded since, provides formal compensation to civilians who developed specified cancers after living downwind of the Nevada Test Site during above-ground nuclear weapons testing. As of 2023 the programme has paid over \$2.5 billion in compensation to more than 40,000 claimants. The programme operates on a presumption of causation: if a claimant lived in a designated downwind county during a designated period and has developed one of the specified cancers, the government presumes radiation exposure caused the cancer. The designated counties and specified cancers were determined by analysis of the dose reconstruction and dose-response relationship — the same methodology the CNSC uses to assert that nuclear plant community exposures present negligible risk.

The US government formally determined that the dose-cancer relationship for downwinder populations justified a presumption of causation for tens of thousands of cancer cases at dose levels regulatory models characterise as low risk. If CNSC models were accurate, the US government has overpaid billions of dollars in cancer compensation to people whose cancers were not caused by radiation. If the compensation framework is correctly calibrated, CNSC models underestimate cancer risk from chronic population exposure to nuclear fallout — which is chemically and physically comparable to reactor emissions. The CNSC has not acknowledged the RECA programme's implications for its risk models in any public communication.

10. Strontium-90 in Baby Teeth — Direct Biological Measurement of Childhood Radioactive Contamination Near Nuclear Plants

Why Baby Teeth Matter

Strontium-90 is a fission product produced by both nuclear weapons and nuclear reactor operations. The body cannot distinguish it from calcium. When ingested, it deposits in bones and teeth, irradiating the bone marrow from within the bone matrix. Bone marrow is where leukaemia originates. Baby teeth form during the period of highest bone marrow sensitivity — early childhood — and preserve a permanent record of the strontium-90 incorporated during that developmental window. This is not a modelled estimate. It is a direct physical measurement of radioactive contamination actually incorporated into the bodies of children near nuclear facilities.

The Tooth Fairy Project

The Tooth Fairy Project, conducted by Jay Gould and Joseph Mangano from 1998 onwards, collected baby teeth from children near operating nuclear plants and from control communities, measured strontium-90 concentrations, and compared them. The results, published in peer-reviewed environmental health journals, found statistically significant elevated strontium-90 concentrations in the teeth of children near operating nuclear facilities compared with children in control communities. The CNSC's regulatory framework calculates modelled strontium-90 doses to surrounding communities and concludes they are within acceptable limits. The Tooth Fairy

Project found that actual strontium-90 accumulation in children's bone tissue near nuclear plants exceeds what background comparison shows. A regulator that ignores direct biological measurements of radioactive contamination in children's bones in favour of modelled estimates is a regulator that has chosen its models over its measurements. The CNSC does not cite the Tooth Fairy Project literature.

11. Carbon-14 from CANDU Reactors — The Hidden Long-Lived Emission

The Biological Hazard

Carbon-14 is produced in CANDU reactors through neutron activation of nitrogen in heavy water — in substantially larger quantities per unit of electrical output than light water reactors. Carbon is the elemental building block of all organic molecules including DNA. Carbon-14 incorporates into DNA through the same biochemical pathways that incorporate stable carbon-12. Its radioactive half-life is 5,730 years. Its biological half-life in organically bound form approaches its radioactive half-life. Once incorporated into DNA, carbon-14 remains there, irradiating from within the molecular structure of the DNA helix, for the life of the organism.

Transmutation Damage

When carbon-14 decays, it transmutes to nitrogen-14. A carbon atom in a DNA molecule that becomes nitrogen is no longer chemically compatible with the molecular structure of which it was part — the covalent bond breaks, severing the DNA strand at that point regardless of whether the emitted beta particle causes further damage. Transmutation damage is irreparable by normal cellular repair mechanisms because the damage is not a broken bond that can be reconnected — it is a change in the atomic identity of a molecular component. The CNSC's public communications about CANDU reactor emissions focus almost entirely on tritium. Carbon-14 receives no meaningful discussion in any CNSC public health communication despite being produced in large quantities by CANDU operations, having a half-life 450 times longer than tritium, incorporating directly into DNA, and causing irreparable transmutation damage that cellular repair cannot address.

12. Radiation-Induced Genomic Instability — Three Decades of Peer-Reviewed Science the CNSC Does Not Acknowledge

Radiation-induced genomic instability — replicated across hundreds of independent experiments published in *Radiation Research*, the *International Journal of Radiation Biology*, and *Carcinogenesis* — is the phenomenon by which ionising radiation causes elevated mutation rates not only in the directly irradiated cell but in its descendants across multiple subsequent generations of cell division. A cell that is irradiated passes on a state of genomic instability to its daughter cells, producing elevated spontaneous mutation rates in a clone of cells tracing its lineage to the originally irradiated cell. The instability persists across dozens of cell generations

and has been demonstrated in vitro, in vivo in animal models, and in epidemiological studies of radiation-exposed populations.

The Linear No-Threshold model counts cancer risk by counting initial ionisation events — DNA hits. RIGI means that a single DNA hit can initiate an expanding clone of genomically unstable cells, each at elevated cancer risk. The cancer risk from a given dose is therefore not simply proportional to the number of initial hits — it includes the amplified risk from the instability cascade initiated by each hit. A risk framework that does not incorporate RIGI systematically underestimates cancer risk at low doses. The CNSC's public health communications on radiation risk near nuclear power plants do not mention RIGI. Three decades of documented, replicated, peer-reviewed science. Not one citation in any CNSC public document.

13. La Hague — A Third Independent Study Finding Elevated Childhood Leukaemia Near a Nuclear Facility

The La Hague nuclear fuel reprocessing facility in Normandy, France, is the world's largest nuclear reprocessing plant. In 1997, Pobel and Viel published a case-control study in the British Medical Journal finding that children who had played on local beaches where radioactive discharges from La Hague could be contacted had a substantially elevated risk of childhood leukaemia compared with children who had not. The dose estimates from the beach exposure, calculated using standard regulatory models, predicted negligible risk. The real-world finding contradicted the model prediction in the same direction and with the same magnitude as KiKK and GEOCAP.

The CNSC's position that the association between nuclear facility proximity and elevated childhood leukaemia is unfounded requires dismissing KiKK Germany, GEOCAP France, the La Hague BMJ study, the Indian Point finding, and the Clapp Massachusetts finding — five independent studies, three countries. The CNSC cites none of them except KiKK, which it dismisses. The La Hague BMJ study does not appear in any CNSC public document.

14. The Mayak Plutonium Workers — Real-World Internal Alpha Emitter Cancer Risk Exceeds Model Predictions

The Mayak Production Association in the southern Urals was the Soviet Union's first plutonium production complex. Workers were exposed to plutonium — an internal alpha emitter — across a range of doses, and their health outcomes have been tracked for decades by the Southern Urals Biophysics Institute in collaboration with western researchers. Findings published in Radiation Research, the British Journal of Cancer, and the International Journal of Epidemiology are consistent: lung cancer, liver cancer, and bone cancer risks observed in workers with documented plutonium body burdens are substantially higher than the ICRP's internal dosimetry model predicts — by factors of between two and ten depending on the tissue and the study.

The model that predicts negligible risk from internal alpha emitter contamination at low body burdens is the same model applied to assess health risk to CANDU communities from internal alpha emitter exposure. The Mayak data is the most direct available test of whether that model is accurate in real human populations. It consistently shows the model underestimates cancer risk. The CNSC does not cite the Mayak alpha-emitter carcinogenesis literature in any public communication on internal emitter risk from CANDU operations.

15. The Marshall Islands — A Government Dose Reconstruction That Failed Its Empirical Test

The United States conducted 67 nuclear weapons tests in the Marshall Islands between 1946 and 1958. The US government conducted detailed dose reconstructions for affected populations using the same dosimetric methodology applied in regulatory nuclear facility assessments. Those reconstructions predicted health outcomes. The actual outcomes — documented by the US National Cancer Institute and the Republic of the Marshall Islands Nuclear Claims Tribunal — significantly exceeded the predictions. Thyroid cancer rates in Rongelap atoll residents substantially exceeded predicted rates. Leukaemia rates exceeded predictions. Solid tumour excess was broader and larger than predicted. The Marshall Islands Nuclear Claims Tribunal found that the US government's own dose reconstruction underestimated the health consequences of the testing programme and awarded compensation exceeding what the dose-based liability estimates had projected.

The Marshall Islands is a controlled natural experiment in dose reconstruction validity at a population scale: the US government conducted a dose reconstruction, predicted health outcomes, and the real outcomes were worse. The failure of dose reconstruction to predict real-world outcomes in the Marshall Islands is the most direct available evidence that the dosimetric methodology underlying the CNSC's safety assessments underestimates real-world health consequences. The CNSC does not cite the Marshall Islands dose reconstruction failure in any public document on radiation risk assessment.

16. Children's Radiosensitivity — What BEIR VII and UNSCEAR Actually Say and What the CNSC Applies

The CNSC cites BEIR VII as a primary scientific authority. BEIR VII itself provides age-at-exposure risk coefficients showing that radiation exposure in the first decade of life carries cancer risk two to ten times higher than the same dose received in adulthood, depending on tissue type. For leukaemia — the cancer most consistently elevated in children near nuclear plants across the forty-year evidence record — BEIR VII's age-at-exposure multipliers are among the largest. UNSCEAR's 2006 report provides similar coefficients. Both reports acknowledge that children are substantially more radiosensitive than adults and that this difference is large enough to be of regulatory significance.

The CNSC's community dose assessments calculate effective dose using population-average risk coefficients. They do not apply BEIR VII's age-at-exposure multipliers to the subgroup most at risk — children under ten within five kilometres. The health impact assessment Energy Alberta will present to the IAAC will use population-average risk coefficients that the CNSC's own cited authorities document as substantially underestimating the risk to the population group the forty-year real-world evidence record identifies as the primary risk group. A regulator that cites BEIR VII while not requiring application of BEIR VII's own age-at-exposure coefficients to the most exposed age group is not fully applying the science it claims as its foundation.

17. Infant Mortality Near Nuclear Plants — A Health Endpoint the Regulatory Framework Does Not Assess

Mangano and Sherman's peer-reviewed studies in environmental health journals found elevated post-neonatal mortality rates in US counties near operating nuclear plants compared with matched control counties after controlling for socioeconomic predictors, and elevated infant mortality on the US west coast in the weeks immediately following the Fukushima accident relative to prior years and to inland states. The studies have been critiqued on methodological grounds — the ecological study design and multiple comparisons problem are legitimate limitations. They have not been retracted. A peer-reviewed finding of elevated infant mortality near nuclear plants and following nuclear accident fallout is a finding that exists in the scientific literature. The CNSC's regulatory framework does not assess infant mortality as a health endpoint at all. The first year of life — the period of highest vulnerability to environmental exposures of any post-birth developmental stage — is entirely excluded from the protection analysis applied to nuclear facility approvals. The literature documenting potential elevated infant mortality near nuclear plants does not appear in any CNSC public health communication.

18. The Hanford Downwinders — Deliberate Releases, Suppressed Data, and a Health Record That Exceeded Predictions

The Green Run and the Declassification Record

In December 1949, the US Army conducted a deliberate release of approximately 5,500 to 8,000 curies of radioactive iodine-131 from the Hanford Site in Washington State as part of a classified experiment. The release was classified Top Secret. Communities downwind — including Spokane, Walla Walla, and the Yakima Valley — received fallout without warning or disclosure. The Green Run experiment was declassified following Freedom of Information Act litigation in the 1980s. Declassified documents showed that Hanford management had conducted the release knowing that downwind communities would receive significant doses, and had prioritised the weapons intelligence value of the experiment over the health of the downwind civilian population. The decision was deliberate. The concealment lasted four decades.

The Health Record and the Model Failure

Independent health studies of Hanford downwinder communities by the Fred Hutchinson Cancer Research Center found elevated thyroid disease rates in communities with the highest documented iodine-131 fallout exposure. The CDC's Hanford Thyroid Disease Study conducted a dose reconstruction and predicted thyroid disease rates. The actual thyroid disease rates documented in downwinder communities exceeded the CDC's predictions — the same pattern of real-world health outcomes exceeding dose-reconstruction predictions documented in the Marshall Islands, near nuclear plants in Kikk and GEOCAP, and in the Mayak worker cohort. The CNSC's public communications do not mention Hanford. They do not discuss the Green Run. They do not acknowledge that a North American nuclear facility deliberately exposed civilian communities to iodine-131 fallout and concealed it for four decades, and that the health outcomes exceeded the model predictions. A regulatory body presenting nuclear facility health assessment as settled and trustworthy science while never acknowledging the most significant deliberate civilian radiation exposure event in North American history is not giving the IAAC the full picture.

Summary: What Eighteen Pillars Establish

The eighteen pillars documented in this annexure establish a single, simple conclusion: the CNSC's public health communications do not reflect the full body of peer-reviewed radiation health science. They reflect a curated subset — selected for consistency with the safety conclusions the CNSC has chosen to maintain, and excluding every significant body of evidence that would require those conclusions to be qualified.

The excluded literature is not fringe science. It includes studies published in the BMJ, the Lancet, Lancet Haematology, Epidemiology, the American Journal of Epidemiology, Radiation Research, the International Journal of Radiation Biology, Carcinogenesis, Nature Communications, the British Journal of Cancer, and Thyroid. It includes findings replicated independently in Germany, France, the United Kingdom, the United States, Russia, Japan, and the Marshall Islands. It includes the formal compensation programmes of the United States government paying over \$2.5 billion for cancers caused by radiation exposures the regulatory models characterise as low risk. It includes direct biological measurements of radioactive contamination in children's bones near nuclear plants. It includes a Canadian scientific discovery — the Petkau Effect — made at a Canadian government nuclear laboratory, published in the field's leading journal, that directly undermines a key assumption in the CNSC's regulatory framework.

The CNSC's response will be that each piece of excluded evidence is individually contested or methodologically limited. For some of the eighteen pillars, that critique has partial validity. For none of them does it justify complete exclusion from public health communications about nuclear facility risks. A regulator whose public health communications exclude the Richardson BMJ study, the INWORKS Lancet study, the BEIR VII age-at-exposure coefficients, the Tooth Fairy strontium-90 measurements, the La Hague BMJ case-control study, the Mayak alpha-emitter dose-response, the Marshall Islands dose reconstruction failure, the Petkau Effect, the genomic instability literature, and the US government's formal downwinder compensation framework — while maintaining that the association between nuclear plant proximity and elevated childhood cancer is unfounded — is not producing an evidence-based public health assessment. It is producing an institutional advocacy document in the format of a scientific communication.

The IAAC cannot approve the Peace River nuclear facility on the basis of health and safety determinations produced by an institution that selectively excludes from its public scientific communications every significant body of peer-reviewed evidence that does not support its conclusions. That is not what the section 63 approval gate requires. It requires a genuine safety determination. This annexure documents why the determinations the CNSC will present do not meet that standard.

ANNEXURE 3

The Model Failures

A technical account of where the regulatory dose-risk models came from, what they were designed to do, every dimension on which they fail for this application, and the parameters that would be required to make them valid

Purpose and Structure

The main submission establishes that the regulatory models fail their real-world empirical test — that the gap between what they predict and what forty years of international evidence observes is between ten thousand and one hundred thousand times. This annexure explains the technical reasons for that failure. It is structured in five sections. Section A documents where the models came from and what they were designed to do. Section B identifies the seven independent dimensions on which those models fail when applied to a CANDU community scenario. Section C presents the ICRP's own published acknowledgments of model limitations that the CNSC does not disclose. Section D specifies the parameters that a valid model for the Peace River application would need to incorporate. Section E translates the model failures into approximate numerical terms — showing what changes in the risk calculation if the missing parameters are applied.

This annexure is written for a reader without specialist radiation physics training. Every technical concept is explained in plain language before the evidence for it is presented. The scientific sources are identified by publication and author so that an independent scientific reviewer appointed by the IAAC can verify each claim directly. The purpose is not to produce a rival dose assessment — it is to demonstrate with precision what is absent from the assessments the CNSC will present, and to give the IAAC the technical basis for requiring those absences to be remedied before approval proceeds.

A. Where the Models Came From — The Hiroshima and Nagasaki Foundation

The Life Span Study

The dose-risk models used in every nuclear facility health impact assessment in Canada — including the assessment Energy Alberta will present for the Peace River facility — descend from a single source: the Life Span Study of survivors of the atomic bombings of Hiroshima and Nagasaki in August 1945. The study, conducted by the Atomic Bomb Casualty Commission from 1950 and continued by the Radiation Effects Research Foundation from 1975, tracked approximately 120,000 survivors and their descendants over more than seven decades. It is the largest and longest-running study of radiation health effects ever conducted and has produced most of what the international radiation protection community formally accepts as the quantitative basis for radiation risk estimation.

The Life Span Study is an extraordinary scientific achievement. It is also a dataset with very specific characteristics that define both what it can tell us and what it cannot. Understanding those characteristics is essential to understanding why the models derived from it are not valid for the specific scenario this submission concerns.

The Characteristics of the Hiroshima and Nagasaki Dataset

The Hiroshima and Nagasaki survivors were exposed in August 1945. The exposure was instantaneous — a matter of seconds for the direct radiation from the detonation. It was external — radiation striking the body from outside, not radionuclides taken into the body through breathing, eating, or drinking. It was primarily gamma radiation and neutrons — high-energy, penetrating radiation that deposits dose relatively uniformly across the body. The dose was acute — the entire lifetime dose received in a single brief exposure. The survivors were overwhelmingly adults — the median age of the study population at the time of bombing was approximately 35 years. They were a Japanese population in the 1940s, living through the aftermath of the Second World War, with no pre-exposure cancer registry baseline and a documented healthy survivor bias — those most severely exposed died immediately and are not in the study population.

These characteristics are not incidental features of the dataset. They are its defining properties. Every one of them is different, in a scientifically important way, from the exposure scenario relevant to a community living near a CANDU reactor in the Peace River region of Alberta in the twenty-first century.

B. The Seven Extrapolation Failures — Every Dimension on Which the Models Are Wrong for This Application

Applying the Hiroshima and Nagasaki models to a CANDU community scenario requires making extrapolations across seven independent dimensions simultaneously. Each extrapolation introduces uncertainty. None of them has been validated by direct empirical measurement in the relevant population. All seven operate in the same direction — each one causes the model to underestimate risk relative to what would be observed if the correct population-specific parameters were available. The cumulative effect of seven simultaneous underestimations in the same direction is the ten-thousand to one-hundred-thousand-fold gap between model predictions and real-world observations documented in Show Stopper 1.

Extrapolation Failure 1 — Acute Dose to Chronic Dose

The Hiroshima and Nagasaki survivors received their entire radiation dose in a single instant. The regulatory framework applies a dose-rate effectiveness factor — a mathematical adjustment — to convert the acute-dose risk estimates from the Life Span Study into chronic-dose risk estimates for communities receiving small doses continuously over years and decades. The dose-rate effectiveness factor used by the ICRP and the CNSC is 2 — meaning the models assume that chronic low-dose radiation is half as biologically effective per unit dose as acute high-dose radiation.

This assumption is contradicted by two independent bodies of peer-reviewed science. First, the Petkau Effect — documented at the Whiteshell Nuclear Research Establishment in Manitoba in 1972 and published in *Health Physics* — demonstrated that low chronic doses of radiation are

more biologically damaging per unit dose to cell membranes than high acute doses through a lipid peroxidation mechanism involving superoxide free radicals. Second, the radiation-induced bystander effect — replicated across hundreds of studies over thirty years — demonstrates that low-dose chronic irradiation produces a disproportionately large biological response relative to the number of direct ionisation events. Both findings suggest the dose-rate correction should operate in the opposite direction to the one the CNSC applies: chronic low-dose exposure may be more dangerous per unit dose than the Life Span Study data predicts, not less. The CNSC applies a factor of 2 reduction. The published science suggests the correction may need to run in the opposite direction by a comparable or larger factor.

Extrapolation Failure 2 — External Radiation to Internal Emitters

The Hiroshima and Nagasaki survivors were exposed to external radiation — gamma rays and neutrons striking the body from outside. A CANDU community's primary radiation exposure pathway is internal: tritium dissolved in drinking water and inhaled from air is absorbed into the body and circulates through blood and tissue; carbon-14 is incorporated directly into organic molecules including DNA; strontium-90 ingested with food deposits in bone adjacent to bone marrow; iodine-131 concentrates in the thyroid gland.

Internal emitters are fundamentally different from external radiation in their biological effects. An external radiation source irradiates tissue from a distance — the dose is distributed across a volume of tissue proportional to the body's cross-section. An internal emitter lodged in or adjacent to a specific tissue irradiates that tissue — and only that tissue — continuously, at very close range, from the point of deposition. The dose to the immediately adjacent cells may be orders of magnitude higher than the whole-body average dose calculation suggests, because the whole-body average calculation distributes the energy of a localised emitter across the entire body mass.

Alpha-emitting internal particles — plutonium, polonium, radium — deposit all their energy within a few cell diameters of the particle itself. The cells immediately adjacent to an alpha-emitting particle receive a very high localised dose while the whole-body average dose calculation may show a negligible number. Strontium-90, a beta emitter that deposits in bone, irradiates the bone marrow cells immediately adjacent to the bone surface — where the haematopoietic stem cells that give rise to leukaemia originate — at a localised dose that the whole-body effective dose calculation does not capture. The CNSC's dose assessments use whole-body effective dose methodology applied to internal emitter exposures. This is not an appropriate methodology for the exposure pathway that CANDU communities experience.

Extrapolation Failure 3 — Adult Tissue to Fetal and Infant Tissue

The Life Span Study population was predominantly adult at the time of exposure. The regulatory risk coefficients derived from that population are applied in CANDU community assessments to estimate risk for all age groups — including fetuses in the womb and infants in the first year of life. This extrapolation is not valid.

The biological basis for age-dependent radiosensitivity is well established. Rapidly dividing cells are more radiosensitive than slowly dividing cells because the DNA replication machinery is more exposed during cell division and because repair mechanisms are less reliable in rapidly dividing cell populations. The fetus in the first trimester — when organogenesis is occurring — has a cell division rate orders of magnitude higher than an adult's resting tissue. Fetal haematopoietic stem cells — the cells in which leukaemia originates — are dividing rapidly throughout the second and third trimester to establish the bone marrow architecture the child will carry for life. The radiosensitivity of these cells is not comparable to adult haematopoietic tissue.

Alice Stewart's Oxford Survey of Childhood Cancers — published in the Lancet in 1956 — demonstrated that prenatal X-ray exposure at doses far below those considered hazardous for adults doubles childhood leukaemia risk. The BEIR VII report provides age-at-exposure risk multipliers showing that exposure in the first decade of life carries cancer risk two to ten times higher than adult exposure depending on tissue type — and for the tissues most relevant to the leukaemia signal observed near nuclear plants, the multipliers are at the high end of this range. The CNSC's community dose assessments do not apply these multipliers. They use population-average risk coefficients that include adults, who are substantially less sensitive than the population group — children under five — that the real-world evidence record identifies as the primary risk group near nuclear plants.

Extrapolation Failure 4 — Whole-Body Effective Dose to Localised Cell Dose

Effective dose is a mathematical construct. It takes the dose absorbed by each organ and tissue in the body, multiplies each by a tissue weighting factor reflecting that tissue's relative contribution to total cancer risk, and sums them to produce a single number representing the whole-body cancer risk equivalent. This construct is useful for comparing the risks of different radiation exposure scenarios that affect different organs — it is the appropriate tool for comparing the risk of a chest X-ray with the risk of a bone scan, for example.

It is not an appropriate tool for assessing the cancer risk from a radionuclide that concentrates in a specific tissue and irradiates the cells of that tissue from within at close range. When strontium-90 deposits in bone and irradiates bone marrow stem cells at a localised dose rate, the relevant quantity for cancer risk assessment is the dose to those specific cells — not the whole-body effective dose, in which the strontium-90's energy is mathematically distributed across the entire body mass including organs and tissues it never reaches. The whole-body effective dose calculation for an internal beta emitter deposited in bone systematically underestimates the dose to the specific cell population at risk of leukaemia by a factor proportional to the ratio of whole-body mass to the mass of the target cell population. For bone marrow stem cells — which represent a tiny fraction of total body mass — that ratio may be very large.

The same argument applies to tritium concentrated in fetal tissue, to carbon-14 incorporated into specific DNA sequences, and to iodine-131 concentrated in the thyroid gland of a child with higher thyroid uptake than an adult. The effective dose framework is being applied to scenarios for which it was not designed and in which it systematically underestimates risk to the cell populations actually at risk.

Extrapolation Failure 5 — The Japanese 1945 Population to the Peace River 2025 Population

The risk coefficients derived from the Life Span Study represent average cancer risk for a Japanese adult population exposed in 1945. Applying those coefficients to the Peace River region population in 2025 requires assuming that the baseline cancer risk, the background carcinogen exposure, the diet, the genetic susceptibility profile, and the pre-existing health conditions of the two populations are comparable. This assumption is not examined in any CNSC document.

The Peace River region carries a documented elevated cancer burden of unknown etiology — documented in the main submission as Show Stopper 2. The Life Span Study population was not carrying a pre-existing elevated cancer burden from an existing carcinogen exposure at the time of their radiation exposure. The Peace River population is. The mixture carcinogenesis literature — published in Carcinogenesis, the leading journal in the field — establishes that eighty-five percent of carcinogens show no dose-response threshold and that mixtures of carcinogens

produce synergistic effects that no single-agent model captures. The BEIR report establishes radiation as a cancer initiator that is amplified by chemical promoters. The Peace River region's documented aromatic hydrocarbon burden from bitumen operations — precisely the class of chemical promoters the BEIR report identifies — means that the incremental cancer risk from adding ionising radiation to this specific population's existing carcinogen exposure is not the additive calculation the Life Span Study-derived models produce. It may be substantially multiplicative.

The specific demographic profile of the Peace River population adds a further extrapolation problem. The region has a significant Indigenous population with a documented history of disproportionate environmental carcinogen exposure, reduced access to early detection and treatment services, and a cultural relationship to the land — including consumption of locally harvested food and water — that produces higher per-capita exposure to any environmental contaminant than the general population average the models assume. The models are not parameterised for this population. They were never intended to be.

Extrapolation Failure 6 — Gamma and Neutron Radiation to Tritium, Carbon-14, and Strontium-90

The Life Span Study population was exposed primarily to gamma radiation and neutrons — the radiation types produced by nuclear weapon detonation. Gamma radiation is high-energy electromagnetic radiation that penetrates the body uniformly. Neutrons are high-energy particles that interact with atomic nuclei. The biological effectiveness of these radiation types is what the ICRP's radiation weighting factors were calibrated to reflect.

CANDU reactors emit a fundamentally different mixture of radionuclides, each with different radiation types and different biological effectiveness. Tritium emits a low-energy beta particle — an electron travelling a very short distance in tissue, depositing all its energy within a few micrometres. The CNSC assigns tritium a radiation weighting factor of 1, identical to gamma radiation, on the basis that both are low-LET radiation. The CNSC's own technical report INFO-0799 states that a weighting factor of 2.2 would best reflect the actual biological effectiveness of tritium based on the published radiobiological literature. Carbon-14 emits a beta particle and additionally undergoes transmutation to nitrogen upon decay — a chemical change that severs any DNA molecule in which it is incorporated regardless of the radiation dose delivered. Strontium-90 is a beta emitter that chemically mimics calcium and deposits in bone, irradiating bone marrow at close range. Iodine-131 concentrates in the thyroid, delivering a highly localised internal dose to a small, specific tissue.

Each of these radionuclides has a biological behaviour — a route of entry into the body, a tissue distribution pattern, an effective dose rate to the target cell population, and a biological repair context — that is categorically different from the external gamma and neutron exposure on which the Life Span Study risk coefficients are based. Applying the same risk coefficient to all of them, on the basis that they are all low-LET radiation, ignores every dimension of biological behaviour that determines their actual carcinogenic potency.

Extrapolation Failure 7 — The Dose-Rate Effectiveness Factor Applied in the Wrong Direction

The dose-rate effectiveness factor is the most consequential single adjustment applied in translating Life Span Study risk estimates to CANDU community risk assessments. The ICRP uses a factor of 2 to reduce the risk estimate for chronic low-dose exposure relative to the acute-dose Life Span Study finding — the assumption being that cells have more time to repair radiation

damage when dose is delivered slowly, so chronic exposure is less harmful per unit dose than acute exposure.

The peer-reviewed literature contains two independent bodies of evidence suggesting this adjustment is wrong in its direction for the specific scenario of chronic internal low-energy emitter exposure. First, the Petkau Effect demonstrates that the free radical mechanism of low-dose chronic membrane damage is more efficient at low dose rates than at high dose rates — the dose-rate relationship runs in the opposite direction to the ICRP assumption for this specific biological mechanism. Second, the radiation-induced genomic instability literature demonstrates that low-dose chronic exposure produces heritable genomic instability in exposed cell populations — an amplification mechanism that operates independently of direct DNA hits and is not captured in models calibrated to acute-dose data. Third, the bystander effect means that even cells not directly irradiated exhibit elevated mutation rates when adjacent cells receive chronic low-dose irradiation — expanding the effective target cell population beyond what the direct-hit model calculates.

The practical consequence is that the CNSC's DERF-adjusted risk estimates for chronic community exposure near a CANDU reactor may be wrong in two compounding ways: the direction of the dose-rate correction may be reversed for the relevant biological mechanisms, and the effective target population is larger than the direct-hit model assumes. The combination of these two errors, both operating in the direction of underestimating risk, contributes materially to the gap between model predictions and real-world observations.

C. The ICRP's Own Acknowledged Limitations — The CNSC's Cited Authority Against Itself

ICRP Publication 103 — 2007

ICRP Publication 103 is the current foundational document of the international radiation protection framework — the document the CNSC cites as the scientific basis for its regulatory standards. Publication 103 contains the following statement, which the CNSC does not reproduce in any public communication: 'Effective dose is intended for use as a protection quantity and for prospective dose assessment; it is not recommended for epidemiological evaluations, nor should it be used for detailed specific retrospective investigations of individual exposure and risk.' This is the ICRP saying explicitly that effective dose — the quantity used in every CNSC community dose assessment — is not appropriate for the precise purpose the CNSC uses it for: assessing cancer risk to individuals in specific communities.

Publication 103 further acknowledges that tissue weighting factors represent averages over sex and over a reference population with a defined age distribution, and that applying them to specific populations — children, for example, or Indigenous communities with specific dietary patterns — introduces uncertainties the framework does not quantify. It acknowledges that the risk coefficients are derived primarily from Japanese atomic bomb survivors and that the extrapolation to other populations is subject to uncertainty. It acknowledges that the models do not adequately address internal emitter exposures involving particles that deposit dose highly non-uniformly in tissue. Each of these acknowledged limitations is directly applicable to the Peace River CANDU

scenario. None of them is disclosed by the CNSC in its public communications about the safety of nuclear plants.

ICRP Publication 118 — 2012

ICRP Publication 118 revised the threshold dose for radiation-induced cataracts from 2 gray to 0.5 gray, based on Chernobyl liquidator data and occupational radiation studies showing lens opacities at doses substantially below the previous threshold. The publication acknowledges evidence suggesting there may be no threshold at all for cataract induction and that a linear dose-response from zero dose may better fit the available data. This is the ICRP formally revising a threshold downward — toward greater sensitivity and lower dose thresholds — based on real-world evidence from an exposed population showing effects at lower doses than the models predicted. The CNSC's regulatory standards have not been updated to reflect this revision. It is not disclosed in any CNSC public communication on nuclear facility community health effects.

ICRP Publication 60 — 1991 Admission on Internal Emitters

ICRP Publication 60 — the predecessor to Publication 103 — acknowledged that the dosimetric models for internal emitters involving high-LET alpha and beta particles depositing dose in small volumes of tissue are subject to substantial uncertainty because the relevant biological target volumes are small and the dose is highly non-uniform. The ICRP's internal dosimetry task group produced a series of publications through the 1990s acknowledging that the microdosimetric complexities of internal alpha and beta emitters were not adequately captured in the effective dose framework. These acknowledgments predate the CNSC's use of the same framework for CANDU community assessments. They establish that the scientific body whose work the CNSC cites as authority for its safety calculations acknowledged those calculations were inadequate for internal emitter scenarios — before the CNSC used them for precisely that purpose.

BEIR VII — 2006 Admission on Extrapolation Uncertainty

BEIR VII — the National Academies' Biological Effects of Ionising Radiation report that the CNSC also cites — states explicitly that the uncertainty range on its low-dose risk estimates spans approximately a factor of ten in either direction at the lowest doses assessed. It states that the models cannot exclude the possibility that the actual risk is zero at low doses, but equally cannot exclude the possibility that it is substantially higher than the central estimate. It states that the age-at-exposure multipliers documented in the report — showing two to ten times higher risk for childhood exposure — represent genuine biological differences that should be incorporated into assessments of populations with significant proportions of children. The CNSC cites BEIR VII. It does not apply BEIR VII's own uncertainty range to its risk assessments, does not disclose the factor-of-ten uncertainty in either direction, and does not apply BEIR VII's own age-at-exposure multipliers to the most at-risk age group.

D. What Valid Models for This Application Would Need to Include — The Missing Parameters

A dosimetric risk model valid for assessing the health impact of the proposed Peace River CANDU facility on the surrounding community would need to incorporate the following parameters. Each is supported by published peer-reviewed science identified below. None is incorporated in the

regulatory models the CNSC will use. The IAAC can use this section directly as the basis for conditions requiring Energy Alberta to provide supplementary modelling incorporating each parameter before approval is granted.

Parameter 1 — Age-Specific Tissue Weighting Factors for Children Under Ten

The BEIR VII report provides age-at-exposure risk multipliers showing that cancer risk per unit dose for children under ten is substantially higher than the population-average risk coefficient for all cancer types. For leukaemia specifically — the cancer most consistently elevated near nuclear plants in the forty-year real-world evidence record — the childhood multiplier is at the high end of the reported range. A valid risk assessment for the Peace River community would apply these age-specific multipliers to the child population within five kilometres of the facility rather than using population-average coefficients. Source: BEIR VII, Committee on the Biological Effects of Ionising Radiation, National Academies of Sciences, 2006, Table 12-3.

Parameter 2 — Tritium Biological Weighting Factor of 2.2

The CNSC's own technical report INFO-0799 states that a radiation weighting factor of 2.2 for tritium would best reflect the radiation risk for tritium based on the published radiobiological literature. Every current regulatory calculation uses a weighting factor of 1 — the same value used for gamma radiation. Applying the factor the CNSC's own scientists documented as scientifically appropriate would increase all tritium-specific dose and risk estimates by a factor of 2.2. A valid model for this application would present risk estimates using both $wR=1$ and $wR=2.2$ with explicit comparison and justification for the chosen value. Source: CNSC INFO-0799, Health Effects, Dosimetry, Regulation and Environmental Transport of Tritium, 2010, Section 3.4.

Parameter 3 — Organically Bound Tritium Biokinetics for Fetal Tissue

Tritium exists in two forms in the body: tissue-free water tritium, which has a biological half-life of approximately ten days and is cleared relatively quickly; and organically bound tritium, which incorporates into organic molecules including DNA and has a biological half-life approaching its radioactive half-life of 12.3 years in stable structures. INFO-0799 documents that OBT incorporates into fetal oocyte DNA — the eggs a female fetus is developing in the second trimester, which she will carry for her entire reproductive life. A valid model for this application would use OBT-specific biokinetic parameters for the fetal population rather than the whole-body tritium biokinetic model, and would explicitly account for the long-term irradiation of the female fetal germ-line from OBT incorporation. Source: CNSC INFO-0799, 2010, Section 4.2; Balonov et al., Journal of Radiological Protection, 1993.

Parameter 4 — Fetal Dose Multiplier for Pregnant Women

INFO-0799 documents that a fetus in a pregnant woman exposed to tritium at any concentration receives approximately double the dose of the mother, because tritium readily crosses the placental barrier and the fetus has a higher tissue water content and a higher metabolic rate than the mother. A valid model for this application would calculate fetal dose separately from maternal dose for all tritium exposure pathways and present fetal dose estimates with the age-specific risk multipliers for the fetal tissue types most at risk. Source: CNSC INFO-0799, 2010, Section 4.1; Harrison and Khursheed, Journal of Radiological Protection, 2002.

Parameter 5 — Carbon-14 Transmutation Damage Modelling

Carbon-14 decay produces transmutation damage — the conversion of a carbon atom in a DNA molecule to nitrogen, severing the molecular bond at that site regardless of whether the emitted beta particle causes further ionisation damage. This damage is not captured in any standard dose-risk calculation because it is not a radiation dose effect — it is a chemical change in a DNA molecule caused by radioactive decay within the molecule itself. A valid model for this application would quantify the carbon-14 transmutation damage rate to DNA in tissues where carbon-14 is incorporated from CANDU emissions, separately from and in addition to the beta dose calculation. Source: Straume and Carsten, Health Physics, 1993; ICRP Publication 38, Radionuclide Transformations, 1983.

Parameter 6 — Strontium-90 Localised Bone Marrow Dose

Strontium-90 deposits in bone at the bone surface, adjacent to the bone marrow compartment where haematopoietic stem cells reside. The relevant dose quantity for leukaemia risk assessment is not the whole-body effective dose from strontium-90 but the localised dose to the bone marrow stem cells in the endosteal layer of bone — the thin layer of cells at the bone-marrow interface. ICRP Publication 70 provides dosimetric models for bone surface and bone marrow dose from radionuclides depositing in bone. A valid model for this application would calculate bone marrow endosteal cell dose from strontium-90 separately from effective dose and apply leukaemia-specific risk coefficients to that localised dose. Source: ICRP Publication 70, Basic Anatomical and Physiological Data for Use in Radiological Protection, 1995.

Parameter 7 — Population Mixing Correction for Peace River

The Kinlen population mixing hypothesis — developed by Leo Kinlen at Oxford and published across multiple peer-reviewed studies from 1988 onwards — proposes that elevated childhood leukaemia near nuclear plants may result from the introduction of a novel infection into an immunologically naive rural population during plant construction and operation, triggering an abnormal immune response that initiates leukaemia in susceptible children. Whether or not this mechanism is ultimately confirmed as the cause of the observed elevations, it is a mechanism that is specifically potentiated by three characteristics: a small, isolated, rural community; a significant proportion of Indigenous residents with limited prior exposure to urban infections; and a large influx of construction workers from outside the region. The Peace River region has all three characteristics. A valid model for this application would include a population mixing assessment quantifying the degree of mixing expected during construction and early operation phases and assessing whether the Peace River community profile meets the high-risk criteria identified in the Kinlen literature. Source: Kinlen, British Medical Journal, 1988; Kinlen et al., British Medical Journal, 1993; Alexander et al., British Journal of Cancer, 1990.

Parameter 8 — Mixture Interaction Factor for Existing Petrochemical Carcinogen Burden

The Peace River region's documented exposure to aromatic hydrocarbons, polycyclic aromatic hydrocarbons, and other petrochemical carcinogens from bitumen operations creates a synergistic risk context for ionising radiation exposure that is not captured in additive dose-risk calculations. The BEIR report's two-stage clonal expansion model of carcinogenesis identifies ionising radiation as a cancer initiator whose effect is amplified by chemical promoters — of which PAHs are a well-documented class. The mixture carcinogenesis literature published in Carcinogenesis documents that eighty-five percent of carcinogens show no dose-response threshold and that carcinogen mixtures produce synergies that exceed the sum of individual effects. A valid model for this application would incorporate a qualitative assessment of the

radiation-promoter interaction at the Peace River site and would present an uncertainty range on the incremental risk estimate that accounts for the possibility of synergistic rather than additive effects. Source: Goodman et al., *Carcinogenesis*, 1999; BEIR VI, *Health Effects of Exposure to Radon*, National Academies, 1999.

Parameter 9 — Bystander Effect Amplification at Low Community Doses

The radiation-induced bystander effect — replicated across hundreds of peer-reviewed studies — demonstrates that cells adjacent to directly irradiated cells exhibit elevated mutation rates through signalling mechanisms including gap junctions and extracellular reactive oxygen species. At the low dose levels relevant to nuclear plant community exposures — where only a small fraction of cells receive direct ionisation events — the bystander signal may affect a cell population substantially larger than the directly irradiated population. A valid model for this application would incorporate a bystander effect correction factor for the low-dose chronic exposure scenario, acknowledging that the effective target cell population for cancer initiation is larger than the direct-hit model calculates. Source: Nagasawa and Little, *Cancer Research*, 1992; Mothersill and Seymour, *Radiation Research*, 1997; Morgan, *Human and Experimental Toxicology*, 2003.

Parameter 10 — Pre-Existing Elevated Cancer Burden as Baseline Correction

REGDOC-3.1.1 — the CNSC's own environmental assessment standard — requires characterisation of the existing environment before incremental risk assessment. The existing environment in the Peace River region includes a documented elevated cancer incidence of unknown etiology that has not been characterised etiologically. A valid incremental risk model for this application cannot treat the Peace River region as having a normal baseline cancer incidence. It would need to: document the existing cancer incidence by type, age group, and geographic distribution within the proposed assessment zone; assess the possible etiological contributions of existing environmental carcinogens; and calculate the incremental risk from the proposed facility above the actual elevated baseline rather than above the provincial or national average. An incremental risk assessment that uses the wrong baseline starting point produces a wrong risk estimate regardless of the accuracy of any other parameter.

E. The Numbers — What Changes When the Missing Parameters Are Applied

The Starting Point — The CNSC's Published Dose Estimate

The CNSC's regulatory framework requires nuclear facility operators to demonstrate that the dose to the most exposed member of the public at the facility boundary does not exceed 1 millisievert per year — the public dose limit. In practice, CANDU facilities consistently report calculated doses at the facility boundary of between 0.01 and 0.05 millisieverts per year — one to five percent of the regulatory limit. These figures are presented as the basis for safety conclusions. They appear to be very small compared with background radiation of approximately 1.8 millisieverts per year from natural sources in Canada. The impression conveyed is that the facility adds a negligible increment to existing exposure.

The following analysis takes these published dose estimates as the starting point and applies the missing parameters in sequence to show what the risk estimate changes to when the model is corrected for the specific population most at risk. It is not a full dosimetric assessment — it is an order-of-magnitude illustration of the cumulative effect of the model corrections documented in Section D.

Step 1 — Apply the Age-Specific Risk Multiplier for Children Under Five

The CNSC's published dose-to-risk conversion uses a population-average cancer risk coefficient of approximately 0.05 per sievert — five percent excess cancer risk per sievert of effective dose, averaged across all ages and both sexes. BEIR VII's age-at-exposure multipliers for leukaemia in children under five are approximately three to five times the adult value depending on sex and the specific study. Applying a conservative multiplier of three to the population-average coefficient for the child population most at risk — children under five within five kilometres — changes the risk coefficient from 0.05 to approximately 0.15 per sievert for this subgroup.

Step 2 — Apply the Tritium Weighting Factor of 2.2

Tritium is the primary radionuclide emitted by CANDU reactors. A significant proportion of the calculated effective dose at the facility boundary derives from tritium. Replacing the weighting factor of 1 with the value of 2.2 documented in INFO-0799 as scientifically appropriate increases the tritium-specific dose contribution by a factor of 2.2. If tritium represents, conservatively, half of the effective dose at the facility boundary — a fraction consistent with published CANDU emission profiles — the total effective dose from tritium alone increases by a factor of approximately 1.6 when the corrected weighting factor is applied.

Step 3 — Apply the Fetal Dose Multiplier for Tritium

INFO-0799 documents that the fetal dose from tritium is approximately double the maternal dose at any exposure concentration. A pregnant woman living within five kilometres of the facility who receives the calculated facility boundary dose of 0.03 millisieverts per year carries a fetus receiving approximately 0.06 millisieverts per year from tritium alone — before any other correction is applied. This doubling applies on top of the corrected weighting factor and the age-specific risk multiplier.

Step 4 — Correct for OBT Incorporation into Fetal Germ-Line DNA

The biological half-life of organically bound tritium incorporated into stable molecular structures — including fetal oocyte DNA — approaches the radioactive half-life of 12.3 years. A female fetus whose oocyte DNA incorporates tritium during the second trimester carries the incorporated OBT for decades, irradiating the germ-line cells that will produce her own children. The effective cumulative dose from long-residence OBT in fetal oocyte DNA substantially exceeds what a single-year dose calculation captures. The CNSC's dose calculations use the tissue-free water tritium biological half-life of approximately ten days — the short residence form — and do not separately calculate the long-residence OBT component in fetal germ-line tissue.

Step 5 — Correct for Elevated Baseline

The Peace River region's documented elevated cancer incidence means the incremental risk from the facility is added to an already-elevated baseline. If the existing cancer incidence in the region is, conservatively, twenty percent above the provincial average — consistent with documented elevated rates in comparable northern Alberta communities — the effective risk to the population from an incremental radiation exposure is not calculated against a normal-baseline population.

The incremental fraction of attributable cases that the facility adds to an already-elevated baseline is not the same as the incremental fraction added to a normal baseline, because the synergistic interaction between radiation and existing carcinogens means the combined risk is not simply additive.

The Cumulative Effect

Applying these corrections in sequence — age-specific risk multiplier of three for children under five, tritium weighting factor of 2.2, fetal dose doubling, OBT long-residence germ-line component, and elevated baseline correction — produces a risk estimate for the most exposed subgroup that is between ten and thirty times higher than the CNSC's published whole-population effective dose calculation suggests. This is not the ten-thousand-to-one-hundred-thousand-fold gap documented in Show Stopper 1 — which reflects the gap between model predictions and real-world observed outcomes across the entire forty-year evidence record. It is the gap that results from correcting the most directly quantifiable parameter errors in the model when applied to the most at-risk subgroup.

The residual gap — between the corrected model estimate and the real-world observed outcomes — represents the contribution of the parameters that cannot yet be precisely quantified: the bystander effect amplification, the mixture synergy with existing carcinogens, the population mixing mechanism, the carbon-14 transmutation damage, and the full OBT germ-line dose. The fact that quantifiable corrections alone account for a factor of ten to thirty in risk underestimation, while still leaving a large unexplained residual gap against real-world data, is itself evidence that the model failures are not minor calibration issues. They are structural inadequacies whose cumulative effect is to render the published risk estimates unreliable as a basis for approval decisions.

F. Summary — What the Model Failures Establish and What the IAAC Should Require

The technical analysis in this annexure establishes that the health impact assessment Energy Alberta will present to the IAAC is built on a dosimetric framework that: was derived from a dataset with fundamentally different exposure characteristics from those relevant to this application; applies corrections for chronic dose rate in a direction the published science does not support; uses a biological weighting factor for the primary emission that the CNSC's own scientists documented as understating actual risk; does not apply the age-specific risk multipliers from its own cited authorities to the most at-risk age group; does not separately assess fetal dose for the primary emission; does not account for transmutation damage from carbon-14; does not calculate localised bone marrow dose from strontium-90 separately from whole-body effective dose; does not incorporate a population mixing assessment; and treats the Peace River region as having a normal baseline cancer incidence when it demonstrably does not.

Each of these deficiencies is independently documentable. Each is correctable — not by abandoning the regulatory framework but by supplementing it with the specific parameters the published science identifies as necessary for this scenario. The IAAC should require, as a condition of any further assessment proceeding, that Energy Alberta provide supplementary dosimetric modelling incorporating each of the ten parameters identified in Section D, with

transparent disclosure of the effect of each parameter on the final risk estimate and a comparison between the corrected estimates and the standard model output.

This requirement is not unreasonable or novel. It is the application of science that already exists to a model that has not incorporated it. The cost of producing the supplementary modelling is trivial compared with the cost of constructing the facility. The consequence of not requiring it is that the approval decision will be made on risk estimates that understate the actual risk to the most vulnerable population by a factor that the evidence in this annexure documents as between ten and thirty for the quantifiable corrections alone — and potentially much larger when the non-quantifiable contributions of the remaining parameter failures are considered.

A facility approved on the basis of a risk estimate that is wrong by a factor of ten to thirty for the population group most at risk, in a community too small to detect the resulting harm epidemiologically, adjacent to a region carrying an existing elevated cancer burden in a petrochemical environment that amplifies radiation risk, is not a facility that has been assessed. It is a facility that has been assumed safe because the model used to assess it was not designed for the scenario it was asked to evaluate.

IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project

SS
14

The HIA Scope Defect: A Cancer Risk Assessment Labelled as a Health Impact Assessment

Source: G4SR6 Paper 1 (Non-Oncological Health Endpoints Excluded from CANDU HIAs)

INSERT
AFTER

SS13 — insert SS14 as the next full show stopper in Part Three: The Law

SS14 is a statutory scope argument. It does not require acceptance of any epidemiological finding in SS1–SS13.

The Argument

Health impact assessments for CANDU nuclear facilities in Canada evaluate cancer risk as the primary, and in practice the sole, quantitative health endpoint. Dose calculations are performed for routine radionuclide releases, incremental cancer risk is computed using the LNT model, and the resulting figure — typically expressed as a fraction of background cancer risk — is used to conclude that routine releases do not pose an unreasonable health hazard. The structure reflects the historical prioritisation of stochastic cancer risk in radiological protection frameworks. It does not reflect the current state of the peer-reviewed literature and it does not satisfy the statutory mandate under which CANDU HIAs are submitted to IAAC review.

The Six Excluded Endpoint Categories

The peer-reviewed literature documents the following non-oncological health endpoints from chronic low-dose ionising radiation exposure, none of which are routinely assessed in CANDU HIAs:

- **Cardiovascular Disease:** The INWORKS study of over 300,000 nuclear workers across France, the UK, and the United States reported a statistically significant association between cumulative radiation dose and circulatory disease mortality. LSS cohort follow-up shows excess cardiovascular mortality at doses as low as 0.5 Sv. A 2023 meta-analysis of occupational radiation exposure studies found consistent elevated relative risk for ischaemic heart disease and cerebrovascular disease across multiple independent cohorts. The evidence base now exceeds the evidence base that was available for cancer when cancer was incorporated as the primary endpoint.
- **Neurological and Neurodevelopmental Effects:** In utero radiation exposure is an established cause of intellectual disability above 100 mGy during the period of peak sensitivity at 8-15 weeks of

gestational age. Animal studies document neurodevelopmental effects from prenatal OBT exposure at dose rates comparable to those produced by chronic environmental tritium contamination, including reduced brain weight, altered neuronal density, and impaired spatial learning. CNSC INFO-0799 acknowledges the animal neurodevelopmental data but does not incorporate it into human health impact assessment frameworks.

- **Immune System Dysregulation:** Chronic low-dose ionising radiation has documented effects on immune function, including reduced lymphocyte count, altered natural killer cell activity, and dysregulation of inflammatory cytokine expression, in occupational cohorts at cumulative doses in the range of 50-200 mSv. Immune dysregulation is relevant both as a direct health outcome and as a potential mechanism for the childhood leukemia signal: childhood leukemia is fundamentally a disease of immune system failure in haematopoietic progenitor cells. An HIA that does not assess immune endpoints cannot claim to have assessed the pathway most directly relevant to the primary observed health signal.
- **Ophthalmic Effects:** The ICRP reviewed evidence of radiation-induced lens opacity at doses substantially lower than the previously assumed threshold, prompting a reduction of the occupational eye lens dose limit from 150 mSv per year to 20 mSv per year in 2012. Posterior subcapsular cataracts — the specific type associated with radiation exposure — are progressive, debilitating, and occur in a working-age population. No CANDU HIA quantifies ophthalmic risk despite the ICRP's own revised guidance.
- **Adverse Reproductive and Developmental Outcomes:** Beyond cancer and neurodevelopmental effects, chronic low-dose radiation has been associated with reduced sperm count, increased miscarriage rates, and intrauterine growth restriction in occupational and environmental exposure studies. For communities near a CANDU facility, where women of reproductive age may receive continuous low-level tritium exposure across multiple pregnancies spanning decades of facility operation, the cumulative reproductive health profile has never been assessed in any Canadian environmental review.
- **Mixture and Interaction Effects:** The peer-reviewed literature on mixture toxicology documents that carcinogenic and genotoxic effects of radiation and chemical co-exposures are in many cases synergistic rather than additive — the radiation effect is amplified in the presence of chemical promoters. For the Peace River region of northern Alberta, the background chemical carcinogen burden from bitumen extraction and pipeline operations represents precisely the mixture synergy environment identified in the literature. No CNSC regulatory framework requires mixture interaction assessment as a component of CANDU HIA.

The Statutory Argument

The Nuclear Safety and Control Act mandates that the CNSC regulate nuclear activities in Canada to protect the health and safety of persons. The mandate is not limited to cancer protection. The Impact Assessment Act requires consideration of health effects as a factor in environmental assessment — not cancer effects, but health effects. The Guidelines for Canadian Drinking Water Quality cover a range of health endpoints; tritium guidelines are set with reference to the full health effects literature, not cancer alone.

A CANDU HIA that evaluates cancer and no other endpoint is not a complete assessment of the health effects of routine releases under any of these statutory frameworks. It is a cancer risk assessment labelled as a health impact assessment. For purposes of IAAC review, the distinction is legally material: a Review Panel evaluating whether a project is in the public interest, including health impacts, cannot rely on an assessment that addresses one of seven documented health endpoint categories and presents that assessment as complete.

CANDU HIAs assess cancer. Six additional endpoint categories have peer-reviewed evidence of association with chronic low-dose radiation. The statutory mandate covers health of persons, not cancer in persons. A fraction of the required assessment, labelled the whole, does not satisfy the statutory mandate.

What the IAAC Must Require

The IAAC should require, as a condition of accepting the health impact assessment as adequate for review purposes: that the HIA scope be defined to include all endpoint categories for which peer-reviewed evidence of association with chronic low-dose ionising radiation exists; that for endpoints where dose-response relationships are uncertain, the HIA present a qualitative assessment of relevant population subgroups and a conservative upper-bound estimate rather than excluding the endpoint; that a mixture interaction assessment be conducted for the Peace River site given its documented chemical carcinogen background; and that the cancer risk estimate be presented alongside the acknowledged uncertainty from the LNT model structural failures identified in SS4 of the main complaint.

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IAAC COMPLAINT

Energy Alberta Peace River Nuclear Power Project

SS
15

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	
Publication	Lancet Haematology, August 2024
DOI	10.1016/S2352-3026(24)00240-0
Cohort	309,932 individually monitored nuclear workers; France, UK, USA
Key finding	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.
CNSC coefficient	None for myelodysplastic syndrome. Leukemia coefficient in use predates this finding.
CNSC response	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	
Publication	European Journal of Epidemiology, November 2024
DOI	10.1007/s10654-024-01178-6
Cohort	309,932 workers; same INWORKS cohort
Key finding	Radiation-associated excess cancer risk persists for decades after exposure ends. Younger age at first exposure produces longer-duration excess risk.
CNSC model	Health consequences modelled as arising during the operating period. Risk treated as diminishing after decommissioning.
CNSC response	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.

Study 3 — INWORKS Site-Specific Cancers and Low-Dose Slope	
Publication	American Journal of Epidemiology, May 2025
DOI	10.1093/aje/kwae256
Cohort	309,932 workers; 28,089 solid cancer deaths
Key finding	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.
CNSC claim	LNT is conservative at low doses — it overestimates risk below regulatory limits.
CNSC response	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.

Study 4 — Harvard Massachusetts Cancer Incidence	
Publication	Environmental Health, December 2025
Authors	Alwadi, Koutrakis et al.
Key finding	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.
Limitation	Geographic proximity used as exposure proxy, not individual dosimetry. Acknowledged.
CNSC framework	Predicts no detectable cancer signal in populations receiving authorised exposures.
CNSC response	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	
Publication	Nature Communications, February 23, 2026
DOI	10.1038/s41467-026-69285-4
Authors	Alwadi, Alahmad, Vieira, Landrigan, Christiani, Koutrakis et al.
Key finding	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.
Limitation	Geographic proximity used as exposure proxy, not individual dosimetry. Acknowledged.
Peace River	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.
Publication date	Seven days before IAAC process resumed March 2, 2026.
CNSC response	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	
Publication	International Journal of Molecular Sciences, March 4, 2025
DOI	10.3390/ijms26052269
Key finding	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.
CNSC instrument	Heritable effects coefficient captures classical DNA sequence mutation only. Epigenetic pathway not included.
CNSC response	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.

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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.

IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project — Registry #89430

SHOW
STOPPER

16

The Rights Hierarchy and the Regulatory Vacancy

The CNSC has no standard for harm, no instrument to measure it, and no constitutional permission to price the right to life

This Show Stopper makes a three-part argument, each part independently sufficient to require the Panel to find that the CNSC’s submission does not answer the question the Impact Assessment Act requires to be answered.

Part 1 establishes that the CNSC has never defined a standard for unacceptable harm and that its framework — ALARA and dose compliance thresholds — is structurally incapable of producing a determination of unacceptability.

Part 2 establishes that the CNSC’s monitoring framework cannot detect harm to the host community even if it occurs.

Part 3 establishes that the constitutional and human rights framework independently prohibits the result the CNSC’s framework would produce, and that every comparable jurisdiction has built what Canada has not. Part 4 states what the Panel must find and do.

The cumulative logic is as follows: the CNSC cannot define harm, cannot detect harm, and even if it could do both, the legal and constitutional framework prohibits the answer it would give. There is no level at which deference to the CNSC is appropriate in this proceeding.

The CNSC has built a framework for pricing harm. It has built no framework for deciding when harm is unacceptable. That omission is not technical. It is structural. And the right to life — the supreme right from which no derogation is permitted even in armed conflict — cannot be priced.

PART 1: NO STANDARD — THE CNSC HAS NEVER DEFINED UNACCEPTABLE HARM

1.1 What the CNSC Framework Does

The Canadian Nuclear Safety Commission administers a radiation harm framework drawn from ICRP Publication 103 and implemented through REGDOC-2.7.1. Its operative mechanism is ALARA — “as low as reasonably achievable” — supported by the alpha value, a monetary figure per person-sievert of dose averted, used to determine whether the cost of harm prevention is proportionate to the benefit. At the CNSC’s current alpha value and using its 5%/Sv cancer risk coefficient, the framework implies a price per authorised cancer death of between \$400,000 and \$2,000,000 CAD.

This framework answers one question with precision: at what cost per unit of harm reduction is further prevention no longer required? It is a cost-benefit optimisation tool. Within its domain it operates consistently. What it cannot do is answer a categorically different question: at what level of harm does harm become unacceptable regardless of the cost of avoidance?

1.2 ALARA Is Not a Harm Standard

ALARA is an optimisation instruction. It directs licensees to reduce doses to the lowest level achievable having regard to social and economic factors. ALARA operates entirely within whatever harm level the proponent proposes. It never asks whether the proposed harm level is acceptable — it asks only how far below that level it is cost-effective to go. A framework that optimises within a proposed ceiling but never evaluates the ceiling is not a harm standard. It is a cost-effectiveness calculation.

The consequence is structural: ALARA cannot produce a regulatory refusal. No CNSC licensing decision has ever been refused on the ground that projected harm to the host community exceeded an acceptable level, because ALARA has no mechanism for that outcome. A facility that imposes 500 additional cancers on the host community over 60 years of operation, each individual case below the alpha value threshold for prevention, passes the ALARA test in full. The ALARA mechanism never asks: is 500 additional cancers in this community an acceptable outcome? That question has no place in the framework.

1.3 Dose Limits Are Not Harm Standards

The dose limits in REGDOC-2.7.1 — 1 mSv per year effective dose for members of the public — are administrative compliance thresholds, not determinations of acceptable harm. They trigger investigation and reporting obligations. They do not represent a finding that harm below the threshold is acceptable or that harm above it is unacceptable.

The CNSC has confirmed this explicitly in its own regulatory documentation. CNSC REGDOC-2.9.2 states that exceeding a licensed release limit “does not necessarily imply an unreasonable risk to the environment or to the health and safety of persons.” If exceeding a licensed limit does not necessarily imply unreasonable risk, then the limit is not the point at which risk becomes unreasonable. No category of harm is definitionally impermissible under the CNSC’s framework. The CNSC has stated this in its own regulatory document.

1.4 The Structural Absence of a Harm Ceiling

The CNSC has operated as Canada’s nuclear regulator for over two decades. It has licensed dozens of nuclear facilities. It has published extensive guidance on how to price harm. It has published nothing on how to decide when harm is too great to price. There is no CNSC regulatory document, guide, or published decision that identifies a harm ceiling — a level at which harm becomes categorically impermissible regardless of economic offset.

This absence is not accidental. A regulator that had genuinely internalised a mandate to protect the health of persons would, over decades of operation, inevitably confront the question: at what level does harm exceed what this mandate permits? The CNSC has not answered it. The institutional reason is transparent: the CNSC recovers the majority of its operating costs from fees levied on the licensees it regulates. It cannot afford, institutionally, to build a tool that sometimes refuses licences.

The CNSC’s treatment of the INWORKS evidence illustrates the pattern. In 2023, the CNSC acknowledged publicly that INWORKS showed the risk of radiation-induced solid cancer mortality may be higher than previously reported. It drew no operational consequence. Through three further confirmatory papers published between August 2024 and May 2025, the CNSC remained silent. Its public information page has not been updated since April 2024. This is not scientific caution. It is the documented behaviour of an institution protecting a position from evidence that challenges it.

The consequence for this Review Panel is not merely that the CNSC’s projections may be 3 to 6 times too low. It is that the Panel is being asked to evaluate the public interest in health effects using projections produced by an institution that has declined to engage with the science that challenges them, for structural reasons that have nothing to do with the science.

1.5 Concessions on the Record: Federal Court and IAEA

CARN v BWXT Nuclear Energy Canada Inc (2022 FC 849) — The CNSC’s Courtroom Admission

In *CARN v BWXT Nuclear Energy Canada Inc*, 2022 FC 849, the CNSC stated in open court that the international benefits-outweigh-harm standard — IAEA Safety Fundamentals SF-1 Principle 4 — is not a legal obligation in Canada. The CNSC does not apply a justification test requiring it to weigh benefits against harm before authorising a nuclear facility. This is not an inference from conduct. It is the CNSC’s own statement of its own standard, made on the record before the Federal Court.

The Federal Court in *CARN* dismissed the challenge on the basis that the Commission had found “no serious or irreversible damages” — a factual finding based on CNSC science. That finding is unavailable in this proceeding. Peace River presents a materially different factual picture: documented above-average cancer incidence of unknown aetiology; INWORKS 2023–2025 confirming chronic low-dose radiation effects at the dose levels Peace River residents will receive; and Harvard/Nature Communications (2026) documenting approximately 6,400 cancer deaths per year statistically associated with residence within 30 kilometres of operating nuclear facilities — the exact distance at which Peace River sits.

IAEA IRRS 2019 and 2024 — International Finding of Non-Compliance

The IAEA conducted Integrated Regulatory Review Service missions to Canada in 2019 and 2024. Both missions formally found the CNSC non-compliant. The 2019 IRRS Final Report found that dose constraints are not explicitly established for all Class I nuclear facilities and that radiation protection regulations are not in accordance with IAEA GSR Part 3. The 2024 follow-up found the same deficiencies unresolved five years later.

Canada formally rejected IAEA Suggestion S1 — which recommended implementing the justification principle — stating: “Not accepted ... Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada.” This is not a defence of adequacy. It is a concession of deliberate divergence from the international standard, confirmed on the record across two review cycles.

The CNSC’s authorised harm doctrine does not merely lack a threshold for unacceptable harm. It has been structurally organised to avoid developing one. A regulator funded by the industry it licences cannot afford to build a tool that sometimes says no. The result is a framework that has replaced the statutory obligation of adequate protection with a pricing mechanism whose outputs it is structurally motivated never to question. That is not regulation. That is regulatory capture operationalised as health protection.

PART 2: NO MEASUREMENT — THE CNSC’S MONITORING FRAMEWORK CANNOT DETECT HARM

2.1 What the CNSC’s Monitoring Framework Measures

The CNSC requires licensed nuclear facilities to maintain environmental monitoring programmes. These programmes measure radionuclide concentrations in air, water, soil, sediment, and biota. They are compliance instruments: they verify that radionuclide releases remain within licensed limits. They are not health instruments.

The monitoring framework includes no requirement for epidemiological surveillance of the host community. There is no regulatory obligation on any CNSC-licensed facility to track cancer incidence, cancer mortality, or other health outcomes in the surrounding population. There is no programme, standard, or methodology within the CNSC’s regulatory architecture for detecting whether the health of a host community has changed as a result of facility operation.

2.2 The Monitoring Framework Has Demonstrably Failed to Detect Harm

The Harvard T.H. Chan School of Public Health, in a study published in Nature Communications on 23 February 2026, found statistically significant associations between residential proximity to nuclear power facilities and cancer mortality at the population level, documenting approximately 6,400 cancer deaths per year associated with nuclear facility proximity. The Peace River site places the facility at 30 kilometres from the town — the boundary at which the study’s proximity effects were measured.

This finding was not produced by the CNSC. It was not produced under any CNSC monitoring requirement. It was produced by external researchers using publicly available national mortality registry data. The CNSC’s environmental monitoring programme, operating at every licensed Canadian facility, generated no equivalent finding. It was not designed to. This is a structural observation: the CNSC’s monitoring framework is incapable of detecting population-level health effects that are nevertheless detectable using standard epidemiological methods applied to publicly available data.

2.3 The IAEA Standard Requires More

IAEA Safety Guide RS-G-1.8 on environmental and source monitoring requires that monitoring programmes be designed to detect actual impacts on people and the environment, not merely to verify compliance with release authorisations. The CNSC’s monitoring framework does not meet this standard. The IAEA’s 2019 and 2024 IRRS missions found deficiencies in the CNSC’s environmental monitoring framework that remained unresolved across both review cycles.

2.4 The Peace River Baseline Makes the Measurement Gap Acute

The Peace River region has documented above-average cancer incidence of unknown aetiology. An incremental risk assessment applied to a community with an elevated baseline produces a systematically understated absolute risk. Where the cause of the existing elevation is unknown, there is no basis for assuming that a new carcinogenic source will not contribute to it. The proponent’s IAAC submission does not address the Peace River baseline. It does not acknowledge the elevated cancer incidence. It applies the standard CNSC incremental framework to a non-standard community health situation. Section 22(1) of the Impact Assessment Act requires assessment of health effects on the affected community — the actual community, not a hypothetical average.

The CNSC’s monitoring framework would not have found what the Harvard/Nature Communications study found. It was not designed to find it. Every nuclear facility the CNSC has ever licensed has operated under a monitoring regime that could not have detected the population-level harm that external science has now documented. That is not a gap in the data. It is a gap in the regulator’s architecture — a structural choice to monitor compliance rather than to measure harm. The Panel cannot fill that gap by deferring to the regulator that created it.

PART 3: THE RIGHTS HIERARCHY — NO CONSTITUTIONAL PERMISSION TO PRICE THE RIGHT TO LIFE

Parts 1 and 2 establish that the CNSC’s submission does not answer the section 22(1) question on purely administrative and statutory grounds. Part 3 establishes an independent and additional ground. Even if the CNSC had a harm standard and an adequate measurement framework, the result that framework would produce — pricing cancer deaths against economic benefit and authorising harm when the cost of prevention exceeds the alpha value — is constitutionally impermissible. The rights hierarchy is not a supplement to Parts 1 and 2. It is a separate and independently sufficient basis for the Panel’s findings.

3.1 The Three Rights

Right 1 — The Right to Life of Peace River Residents

The right to life of the persons who live in and around Peace River is not a balanceable interest. It is the supreme right in the international legal order. ICCPR Article 6(1) declares:

Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life.

Article 4(2) of the ICCPR then states, in terms that admit no ambiguity:

No derogation from Article 6 ... may be made under this provision.

The UN Human Rights Committee’s General Comment 36 (2018) confirms the right to life is “the supreme right from which no derogation is permitted even in situations of armed conflict.” Even war cannot suspend the right to life. A commercial energy project cannot override what war cannot. Canada is a state party to the ICCPR. Canadian courts use the ICCPR as an authoritative interpretive aid for Charter rights including section 7 (*Baker v Canada*; *Suresh v Canada*).

Right 2 — The Right to Operate a Nuclear Facility for Economic Profit (Energy Alberta)

Energy Alberta holds no right to construct or operate a nuclear power facility. It holds a business interest — a contingent commercial expectation subject to licensing approval it has not yet received. A commercial licence to operate an industrial facility that will impose involuntary cancer risk on a neighbouring population is not a right in any relevant sense. It is a permission granted by the state conditional on meeting standards the state has established. Energy Alberta’s commercial interest cannot constitute a reason to lower the standards against which it is assessed. The ICESCR does not protect commercial profits as a human right.

Right 3 — The State’s Right to Regulate and to Impose Incidental Harm

The state has a real and legitimate right to regulate industrial activities, including nuclear facilities. This right includes the capacity to authorise activities that impose incidental harm on individuals, provided the harm is proportionate, necessary, the least restrictive means available, and accompanied by adequate protection. It is not unlimited. Charter section 7 — as interpreted in *Bedford* (2013) and *Carter* (2015) — establishes that the state may not deprive a person of life, liberty or security of the person except in accordance with principles of fundamental justice. Those principles include proportionality and the

prohibition on purely utilitarian reasoning. A framework that prices cancer deaths and authorises harm when cost of prevention exceeds the alpha value is utilitarian calculus applied to the right to life. It does not satisfy the principles of fundamental justice.

3.2 The WHO Constitution and the Right to Health

The Constitution of the World Health Organization, in force since 1948, declares:

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

The UN Committee on Economic, Social and Cultural Rights confirmed in General Comment 14 (2000) that the right to health includes the freedom “to be free from non-consensual interference.” Peace River residents do not consent to their exposure. They have not been consulted on the acceptability of the harm level. They receive no compensation. They bear the harm while others receive the benefit. This is the structure of non-consensual interference with health that the WHO Constitution identifies as a violation of a fundamental right.

3.3 The Hierarchy Stated

- The right to life of Peace River residents is the supreme right. It is non-derogable. It cannot be balanced against commercial interest. It cannot be priced.
- The state’s right to regulate is real and legitimate but bounded. It may impose proportionate, necessary, minimally harmful measures in the public interest. It may not establish a market for harm with no ceiling.
- Energy Alberta’s commercial interest is a licensed privilege. It is not a right. It is subordinate to every tier above it.

No improvement to the CNSC’s methodology could cure this hierarchy problem. The CNSC could increase the alpha value tenfold, update its risk coefficients to reflect INWORKS, and add epigenetic harm to its model — and it would still be operating a pricing framework. A pricing framework applied to the right to life is constitutionally impermissible regardless of the price set.

3.4 The Mathur Framing: Charter Section 7 as a Negative Rights Argument

Charter section 7 protects the right to life and requires that any deprivation comply with the principles of fundamental justice. The critical doctrinal development is *Mathur v Ontario* (2024 ONCA 762), in which the Ontario Court of Appeal unanimously held that where government has voluntarily assumed a statutory obligation, it is constitutionally bound to discharge that obligation in a Charter-compliant manner. The Supreme Court of Canada denied leave to appeal on 1 May 2025. *Mathur* is settled leading authority.

The *Mathur* framework applies directly. The CNSC was created by statute to prevent unreasonable risk to health. Having filed IAEA compliance action plans and accepted IRRS recommendations, it has voluntarily assumed obligations. Under *Mathur*, the CNSC is constitutionally bound to discharge its mandate in a Charter-compliant manner. The question is not whether the state has a positive duty to build a harm ceiling. It is whether the CNSC’s existing framework — no harm ceiling, no justification test, ALARA with economic balancing, and a documented pattern of silence in the face of contradicting science — discharges that mandate in compliance with section 7.

It does not. The CNSC framework is arbitrary under *Bedford*: no rational connection between the stated objective of adequate health protection and a mechanism that can never identify inadequacy. It is overbroad: it applies to Peace River residents who have not consented and whose above-average cancer incidence places them in a categorically vulnerable position. It is grossly disproportionate: the health impact

documented by INWORKS, Harvard, and Nature Communications is grossly disproportionate to any regulatory efficiency interest served by the pricing mechanism.

3.5 The CEPA 2023 Statutory Right to a Healthy Environment

The 2023 amendments to the Canadian Environmental Protection Act, section 2(1)(a.2), provide that every individual in Canada has the right to live in a healthy environment. Canada thereby joined 156 UN member states recognising this right in domestic law. CNSC-regulated activities fall under the NSCA rather than CEPA directly, but the CNSC cannot operate as though the right to a healthy environment does not exist. A public interest determination that authorises demonstrable harm, from a regulator with no harm standard and no measurement framework, cannot be reconciled with a statutory right to a healthy environment that the same Parliament enacted three years ago.

3.6 What the Comparative Analysis Confirms

The CNSC's absence of a harm ceiling is not required by the ICRP framework and is not shared by any major comparable jurisdiction. Every jurisdiction analysed in Appendix 6 draws on the same ICRP Publication 103 from which the CNSC draws its methodology. None concluded that the framework prohibits a harm ceiling. All of them built one.

- **United Kingdom:** Individual risk exceeding 10^{-4} /yr is intolerable regardless of benefit. No cost-benefit calculation applies in the unacceptable region.
- **Netherlands:** Maximum permissible individual risk of 10^{-6} /yr is a hard legal ceiling embedded in statute.
- **Finland:** Government-set hard limit of 0.1 mSv/yr that STUK cannot modify or trade against economic factors.
- **European Union:** EU BSS Directive requires dose constraints as a ceiling concept for all member states, implemented from the same ICRP framework the CNSC uses.

The CNSC is not an outlier because the science has not produced a ceiling. It is an outlier because it chose not to build one. The 2024 NRC decision to remove QHOs from its advanced reactor framework is the only comparable movement in the CNSC's direction, and the NRC's own Advisory Committee on Reactor Safeguards has identified that removal as a regulatory capture event.

The Review Panel's statutory obligation is not to find the price at which Peace River residents' cancer deaths are acceptable. It is to determine whether the project's health effects are in the public interest — which requires the analytical capacity to find that they are not. The CNSC's framework cannot produce that finding. The rights hierarchy requires that someone in this process can.

PART 4: WHAT THE PANEL MUST FIND AND DO

4.1 Finding on the Standard Gap — From Part 1

The Panel must find that the CNSC has not established a standard for unacceptable harm and that its projections therefore cannot constitute a determination that the health effects of this project are acceptable under section 22(1) of the Impact Assessment Act. Projecting licence compliance is not the same as assessing whether health effects on the affected community are acceptable. The Panel must require the proponent to commission an independent harm assessment applying a defined and publicly justified standard of unacceptable harm — equivalent to at least one of the harm ceiling standards operating in comparable jurisdictions — before proceeding to the public interest determination under sections 60 to 63.

4.2 Finding on the Measurement Gap — From Part 2

The Panel must find that the CNSC's environmental monitoring framework is not designed to detect health harm in the host community, that it has demonstrably failed to detect population-level harm that external epidemiology has now documented at comparable facilities, and that the proponent's submission does not characterise the actual health condition of the Peace River community or account for its documented above-average cancer incidence.

The Panel must require, as a mandatory condition of any positive public interest finding, that the proponent establish and fund an independent epidemiological surveillance programme for the Peace River host community, with independent reporting to Health Canada — not to the CNSC — at defined intervals.

4.3 Finding on the Rights Hierarchy — From Part 3

The Panel must find that the right to life of Peace River residents is non-derogable under ICCPR Article 6 and that no public interest determination under sections 60 to 63 can be grounded in a framework that prices cancer deaths against economic benefit. The Panel must find that the CNSC's authorised harm doctrine, as confirmed by the CNSC's own courtroom admission in *CARN v BWXT* (2022 FC 849), is incompatible with the Charter section 7 principles of fundamental justice as articulated in *Bedford, Carter, and Mathur*.

4.4 The Dispositive Finding

The Panel must find that the CNSC's submission to this proceeding does not answer the question that section 22(1) of the Impact Assessment Act requires to be answered. The CNSC has assessed dose compliance. Section 22(1) requires assessment of health effects on the affected community. Those are not the same question.

Until an independent body, operating with a defined harm standard, a community health measurement framework, and a constitutionally compliant harm ceiling, provides a genuine assessment of health effects on the Peace River community, the Panel has no evidentiary basis for a positive public interest finding on the health effects dimension of section 22(1). The Panel must so find, and must decline to proceed to the sections 60 to 63 public interest determination on health grounds until that assessment is before it.

The CNSC's submission answers the wrong question with great precision. It tells the Panel that the facility will comply with licence conditions. It does not tell the Panel whether the people of Peace River will be harmed. It has never built a framework capable of answering that question. The Panel's obligation under the Impact Assessment Act is to the people of Peace River, not to the adequacy of the CNSC's process. Where the regulator's process cannot answer the statutory question, the Panel must say so.

APPENDIX 1: STATUTORY AND CONSTITUTIONAL PROVISIONS

The following provisions independently prohibit the Review Panel from treating the CNSC’s projections as a sufficient basis for the health assessment the statute requires.

A1.1 IAA Section 22(1) — Health Effects as a Mandatory Assessment Factor

Section 22(1) requires assessment of health effects on the affected communities. The CNSC framework does not assess health effects. It prices them. Assessment answers: what harm will occur, to whom, at what magnitude, with what certainty? Pricing answers: what is the harm worth in dollars? Substituting a pricing output for an assessment output does not discharge the section 22 obligation. It evades it. Licence compliance is a necessary condition of lawful operation; it is not a proxy for health effects on a specific community.

A1.2 IAA Sections 60–63 — The Public Interest Gate

Sections 60 to 63 require a public interest determination having regard to the assessment report. A positive determination on health grounds requires that health effects have been assessed and found acceptable. Where the assessing body has no harm standard and no measurement framework, the public interest gate cannot lawfully be opened on health grounds. The statutory gate becomes operationally empty if the only health assessment tool available can never produce a refusal.

A1.3 IAA Section 6(2) — Mandatory Precautionary Principle

Section 6(2) requires application of the precautionary principle. The CNSC inverts this: it uses scientific uncertainty about radiation harm as justification for the least precautionary available coefficient — the DDREF=2 assumption, which INWORKS directly contradicts with an empirical DDREF of approximately 0.7. The Review Panel, bound by section 6(2), cannot adopt projections produced through an inverted precautionary framework without itself violating the mandatory statutory obligation.

A1.4 IAA Section 6(3)(b) — Scientific Integrity

Section 6(3)(b) requires adherence to principles of scientific integrity, honesty, objectivity, thoroughness and accuracy. The CNSC’s documented pattern — acknowledging that INWORKS shows higher risk than its coefficients reflect, drawing no consequence, and remaining silent through three further confirmatory papers — is irreconcilable with thoroughness and accuracy. A Review Panel that relies on CNSC projections without independently engaging with this record inherits a scientific integrity failure the statute prohibits.

A1.5 Nuclear Safety and Control Act Section 9 — “Adequate Protection”

The CNSC’s mandate requires “adequate protection of the health and safety of persons.” Adequacy implies a standard of sufficiency — some level of protection that qualifies, and some level that does not. A pricing framework with no ceiling cannot satisfy an adequacy standard, because adequacy requires the capacity to distinguish when protection has fallen below the threshold. The CNSC framework has replaced the adequacy standard with a pricing mechanism that never produces a determination of inadequacy.

A1.6 Vavilov (2019) — Administrative Reasonableness

Vavilov requires that administrative decision-makers genuinely grapple with evidence that contradicts their conclusions. The CNSC acknowledged that INWORKS shows higher risk than its coefficients reflect, then drew no consequence. Under Vavilov, a decision that acknowledges contradicting evidence and fails to engage with it is unreasonable. The Review Panel, applying Vavilov to the CNSC’s record, cannot simply adopt the CNSC’s projections without itself producing an unreasonable report.

A1.7 Charter Section 7 — Mathur Framing

The CNSC was created by statute to prevent unreasonable risk. Having filed IAEA compliance action plans, it has voluntarily assumed obligations. Under *Mathur v Ontario* (2024 ONCA 762, SCC denied leave 1 May 2025), the CNSC is constitutionally bound to discharge its mandate in a Charter-compliant manner. The framework fails all three Bedford-Carter principles: it is arbitrary (no rational connection between health protection and a mechanism incapable of identifying inadequacy), overbroad (applies to non-consenting residents in an already-elevated-risk community), and grossly disproportionate (the health impact is wholly disproportionate to any regulatory efficiency interest).

A1.8 UNDRIP Act 2021 — FPIC (Kebaowek, 2025 FC 319)

Free, prior and informed consent requires that information be accurate. CNSC projections that are 3 to 6 times too low do not constitute a sufficient basis for informed consent. In *Kebaowek First Nation v Canadian Nuclear Laboratories* (2025 FC 319), Justice Gascon held that UNDRIP is part of Canadian law and that the CNSC erred by failing to consider UNDRIP when assessing adequacy of Crown consultation — rendering the CNSC’s approval both unreasonable and incorrect. FPIC is judicially enforceable. Any consultation conducted without the INWORKS 2023–2025 data and the Harvard/Nature Communications 2026 population-level data must be regarded as legally deficient. *Kebaowek* is on appeal to the Federal Court of Appeal (argued October 2025).

A1.9 Canadian Environmental Protection Act 2023 — Right to a Healthy Environment

CEPA 2023, section 2(1)(a.2), provides that every individual in Canada has the right to live in a healthy environment. While CNSC-regulated activities fall under the NSCA rather than CEPA directly, where the IAA precautionary obligation, the Charter principles of fundamental justice, the ICCPR non-derogable right to life, and CEPA’s statutory right to a healthy environment all converge on the same conclusion — that a framework with no harm ceiling is legally deficient — the Panel is not confronting a contested legal position. It is confronting a convergence of statutory, constitutional, and international legal obligations.

A1.10 Baker v Canada and Suresh v Canada — ICCPR as Charter Interpretive Aid

Baker [1999] 2 SCR 817 and *Suresh* 2002 SCC 1 establish that the ICCPR is available as an authoritative interpretive aid when construing Charter section 7. The values underlying the Charter are presumed consistent with Canada’s international human rights obligations. ICCPR Article 6’s non-derogable right to life, including the positive obligation to protect life from foreseeable risk, informs the content of section 7.

APPENDIX 2: LEGAL MECHANISMS FOR IMPOSING HARM — AND WHAT THE CNSC FRAMEWORK FAILS

Law permits harm to be imposed through recognised mechanisms, each containing structural constraints the CNSC framework systematically omits. Three constraints appear in every mechanism: consent or compensation for the person bearing harm; a ceiling — a concept of “too much harm”; and proportionality. The CNSC framework contains none of these.

A2.1 Charter Section 1 — The Oakes Test

A Charter infringement can be justified if the means are proportionate: rationally connected, minimally impairing, and proportionate between effect and objective. The CNSC framework fails minimal impairment because it prices harm rather than minimising it — it does not require the least harmful technically feasible approach, only the approach whose marginal cost does not exceed the alpha value. It fails the proportionality balance because, with no ceiling, there is no mechanism for finding that the health cost is excessive relative to the energy policy objective.

A2.2 Expropriation

Lawful expropriation requires public purpose, legal authority, and fair compensation. The CNSC authorises a taking of health security from Peace River residents — involuntary imposition of elevated cancer risk on people who will receive no compensation. The expropriation framework requires compensation. The CNSC framework provides none.

A2.3 Necessity

The necessity doctrine permits harm when there is no reasonable alternative, the harm caused is less than the harm avoided, and the response is proportionate. The CNSC framework never assesses necessity. It does not require the proponent to demonstrate that nuclear generation is the only means of achieving the energy objective, or that the least harmful nuclear siting option has been selected.

A2.4 Strict Liability in Tort: Rylands v Fletcher

At common law, an operator who brings dangerous material onto land in a non-natural use, and who causes damage when that material escapes, is strictly liable to those harmed — whether or not the operator was negligent: *Rylands v Fletcher* (1868) LR 3 HL 330. Canadian courts have applied this rule. All four elements are present: radioactive materials brought onto site in non-natural quantities; non-natural land use; planned escape via licensed atmospheric and aqueous discharges into the Peace and Smoky River systems; and damage documented by *Harvard/Nature Communications* (2026) at exactly the 30km proximity of the proposed site.

A CNSC licence converts strict common law liability into regulatory permission, extinguishing Peace River residents’ *Rylands* action rights. A regulatory permission that provides no equivalent to the strict liability regime it displaces — no harm ceiling, no justification requirement, no mechanism for refusal — is not a legally coherent substitution. The residents bear the harm; the regulator provides no redress; the operator bears no tortious liability.

A2.5 The Precautionary Principle

Where harm is potentially serious and irreversible, the precautionary principle requires that uncertainty trigger precaution rather than permission. The CNSC inverts this: uncertainty about low-dose radiation harm is used to justify the least precautionary available coefficient. Under IAA s.6(2) and the PCO Framework for the Application of Precaution (2003), the burden of proof shifts to those proposing the

activity. The CNSC's silence on the INWORKS evidence is not a neutral regulatory posture. It is a breach of the mandatory statutory obligation.

A2.6 European Court of Human Rights — Positive State Duty to Regulate Environmental Risk

The ECtHR's jurisprudence under Articles 2 and 8 is highly persuasive authority in Canadian courts interpreting Charter provisions. In *Guerra v Italy* (1998), the Court found a violation of Article 8 where the state failed to provide communities near an industrial facility with information about health risks. In *López Ostra v Spain* (1994), the Court held severe environmental pollution could constitute an Article 8 violation and that the state had a positive obligation to take reasonable measures to secure the right. In *Fadeyeva v Russia* (2005), the Court found a violation where the state failed to regulate emissions to a level compatible with residents' health. In *Taşkin v Turkey* (2004), the Court required that environmental decisions affecting communities be preceded by an adequate assessment process genuinely weighing the interests of those at risk.

The common principle: the right to life and the right to private life impose on states a positive duty to put in place a regulatory framework that effectively protects those rights from interference by third parties. A state that licences nuclear facilities under a framework with no harm ceiling and no mechanism for refusal has not fulfilled its positive obligation.

The Three Missing Constraints

- **Consent or compensation:** The person bearing the harm must either consent or be compensated. The CNSC framework provides neither for Peace River residents.
- **A ceiling:** Every legal mechanism has a concept of harm that is “too much” — a level above which the mechanism no longer applies. The CNSC framework has no ceiling.
- **Proportionality:** The harm imposed must be the least available means of achieving the legitimate objective. The CNSC framework requires only that harm not exceed what can be optimised within the ALARA cost-benefit structure.

The absence of all three constraints in a single regulatory framework is the structural signature of a framework designed to produce licensing outcomes, not to protect health.

APPENDIX 3: SUPPLEMENTARY LEGAL AND REGULATORY MATTERS

A3.1 REGDOC-2.9.2 — The CNSC’s Own Structural Admission

CNSC REGDOC-2.9.2 states that exceeding a licensed release limit “does not necessarily imply an unreasonable risk to the environment or to the health and safety of persons.” This is the structural absence of a harm ceiling confirmed in the CNSC’s own primary regulatory documentation.

A3.2 Canada’s Formal Rejection of the IAEA Justification Principle

When the IAEA recommended through Suggestion S1 that Canada implement the justification principle, Canada formally rejected it: “Not accepted ... Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada.” The divergence from the international standard is not inadvertent. It is a deliberate policy choice, made explicitly on the record, to apply a standard the IAEA has identified as non-compliant.

A3.3 Standing: Energy Probe v Canada (AG) (1989 ONCA)

The Ontario Court of Appeal confirmed that an organisation representing persons affected by nuclear risk has standing to raise Charter section 7 arguments without requiring proof of actual injury. The risk itself — the imposition of involuntary cancer risk on a non-consenting population — is sufficient for standing. Rights-based arguments in this submission are properly before the Panel without the Panel being required to find that harm has already occurred.

A3.4 Operation Dismantle v The Queen (1985 SCC) — Obiter on Unacceptable Risk

In Operation Dismantle, Justice Wilson acknowledged in obiter that government action creating an unacceptable risk to the public could in principle constitute a Charter violation. The challenge failed on speculativeness. The present case is distinguishable: the causal chain between operating a CANDU reactor at 30 kilometres from a community of 30,000 people and increased cancer incidence in that community is not speculative. It is documented in peer-reviewed literature applying standard epidemiological methods to national registry data.

A3.5 ODWAC 2009 Tritium Recommendation and CNSC Non-Implementation

In 2009, ODWAC recommended reducing the Canadian tritium drinking water guideline from 7,000 Bq/L to 20 Bq/L — a reduction of 350 times. The CNSC has not implemented the recommendation over fifteen years. CANDU reactors are the primary source of tritium in Canadian waterways. The CNSC’s non-implementation is a specific documented instance of the broader pattern: the CNSC declines to update its standards in response to evidence that those standards are inadequate.

A3.6 Suresh v Canada (AG) — ICCPR as Charter Interpretive Aid

In Suresh [2002] 1 SCR 3, the Supreme Court of Canada confirmed that the ICCPR is available as an authoritative interpretive aid for Charter section 7. ICCPR Article 6’s non-derogable right to life — including the obligation to protect life from foreseeable risk — informs the content of section 7. A framework that authorises involuntary cancer risk without consent, without compensation, without a harm ceiling, and in the face of science showing material underestimation does not satisfy a section 7 obligation interpreted in light of the ICCPR’s non-derogable standard.

APPENDIX 4: THE ALPHA VALUE MECHANISM — ALARA AS PRICING

A4.1 What the Alpha Value Is

The alpha value is a monetary figure representing the cost per person-sievert of collective dose that a licensee is expected to incur in order to achieve dose reduction. If the cost of a dose-reduction measure exceeds the alpha value multiplied by the collective dose reduction achievable, the measure is deemed not reasonably achievable and is not required. The alpha value in the Canadian nuclear regulatory context is in the range of CAD \$1 million to \$2 million per person-sievert. At a nominal cancer risk coefficient of approximately 5% per sievert, one person-sievert implies approximately 0.05 statistical cancers. The alpha value therefore implies a willingness to pay of approximately \$20 million to \$40 million per statistical cancer avoided. This is the price at which a cancer is deemed too expensive to prevent. That is not a protection standard. It is a pricing mechanism.

A4.2 Why It Cannot Produce a Refusal

The alpha value mechanism evaluates whether individual dose-reduction measures are cost-effective. It does not evaluate whether the aggregate harm of the proposed facility — the total cancer burden on the host community over the facility's lifetime — is acceptable. Those are categorically different questions. A facility that imposes 500 additional cancers over 60 years of operation, each individual case below the alpha value threshold for prevention, passes the ALARA test in full. The mechanism would never ask: is 500 additional cancers in this community an acceptable outcome?

A4.3 The Alpha Value Is Set Without Community Consent or Independent Review

The alpha value was not set by Parliament, by an independent tribunal, or through a process involving affected communities. It is an administratively determined figure drawn from ICRP guidance and applied by the CNSC, which is funded by the industry it licences. The affected community at Peace River has had no role in setting the figure, no mechanism for challenging it, and no right of appeal against a licensing decision made on its basis.

A4.4 The 3 to 6 Times Underestimate Compounds the Pricing Problem

The CNSC's implied chronic excess relative risk is approximately 0.185 per gray (the ICRP LSS acute coefficient of 0.37/Gy divided by DDREF 2). The INWORKS 2023 central chronic ERR is 0.52 per gray — a ratio of approximately 3 to 1. At the low-dose slope reported in the 2025 American Journal of Epidemiology paper, the ratio approaches 6 to 1. The alpha value pricing mechanism is therefore operating on a systematically understated harm estimate: the actual cost per cancer of the proposed facility is 3 to 6 times higher than the CNSC's calculations reflect. A pricing mechanism that underprices the harm it authorises by a factor of 3 to 6 is not performing the function it claims to perform.

APPENDIX 5: THE PEACE RIVER CANCER BASELINE

A5.1 Documented Above-Average Cancer Incidence

The Peace River region of northern Alberta has documented cancer incidence rates that exceed provincial and national averages across multiple cancer types. Alberta Health Services' cancer registry data and the Canadian Cancer Society's provincial reporting have identified elevated rates in the Peace Country health zone for cancers including colorectal, lung, and certain haematological malignancies. The elevation is statistically significant and has been noted in provincial health planning documents. The cause is unknown. No environmental exposure, lifestyle factor, or demographic characteristic has been identified as a sufficient explanation for the observed elevation.

A5.2 Why Unknown Aetiology Requires Precaution, Not Indifference

The standard regulatory response to an above-average cancer baseline of unknown aetiology, when a new carcinogenic exposure is proposed for the same community, is heightened scrutiny. Where the cause of the existing elevation is unknown, there is no basis for assuming that the new exposure will not contribute to it, will not interact with whatever is causing it, or will not tip a community already at elevated risk further into harm. IAA section 6(2) and the PCO Precaution Framework (2003) require that scientific uncertainty trigger precaution, not permission.

A5.3 The Proponent's IAAC Submission Does Not Address the Baseline

The proponent's submission applies a standard incremental risk assessment framework. It projects the incremental dose against a reference population and estimates the incremental cancer risk. It does not characterise the actual health status of the Peace River community. It does not acknowledge the documented above-average cancer incidence. It does not adjust the risk assessment to account for a host community already carrying an elevated cancer burden. Section 22(1) requires assessment of health effects on the actual affected community — not a hypothetical average.

A5.4 The 30-Kilometre Proximity Effect

The Harvard/Nature Communications February 2026 study identified statistically significant population-level cancer mortality effects associated with residential proximity to nuclear power facilities, measurable at the 30-kilometre boundary — the exact distance between the proposed facility site and the town of Peace River. The study population of approximately 30,000 residents within that radius is squarely within the proximity effect documented in the literature. The proximity effect is an observation of what has actually happened to populations living near comparable facilities. Applying it to Peace River does not require extrapolation. The proponent's submission does not address the Harvard study. The CNSC's framework has no mechanism for incorporating population-level observational epidemiology of this kind into a licensing assessment.

APPENDIX 6: COMPARATIVE HARM CEILING STANDARDS

The following comparative analysis establishes that the CNSC's absence of a harm ceiling is not required by the ICRP framework and is not shared by any major comparable jurisdiction. All jurisdictions below draw on the same ICRP Publication 103 from which the CNSC draws its methodology. None concluded the framework prohibits a harm ceiling. All of them built one.

A6.1 United Kingdom — Three-Tier Tolerability Framework

The UK Health and Safety Executive's Tolerability of Risk framework (TOR 1988, revised 1992; R2P2 2001) defines three regions. The Unacceptable Region: individual risk of death exceeding 10^{-4} /yr is intolerable regardless of benefit. No cost-benefit analysis applies. The Tolerable-if-ALARP Region: risk between 10^{-4} and 10^{-6} /yr is tolerable only if reduced as low as reasonably practicable. The Broadly Acceptable Region: below 10^{-6} /yr, no further reduction is required. The critical feature is that the unacceptable ceiling is absolute: no economic argument overrides it, and no ALARP calculation applies above it.

A6.2 The Netherlands — Maximum Permissible Risk as Legal Requirement

The Dutch Premises for Risk Management (1989), embedded in legislation, sets a maximum permissible individual risk of 10^{-6} /yr as a hard legal ceiling. This is not a target or guideline. Facilities that cannot demonstrate compliance cannot be authorised. The framework explicitly distinguishes between risks that are categorically impermissible and risks subject to further optimisation. The CNSC makes no equivalent distinction.

A6.3 Finland — Government-Set Hard Limit, Regulator Independence Preserved

The Finnish Government, not STUK, sets the radiation dose limit for members of the public: 0.1 mSv/yr effective dose. STUK cannot override it and cannot trade it against economic factors. This is the structural answer to the capture problem: the government sets the ceiling, and the regulator operates within it. The CNSC, by contrast, sets its own risk acceptability criteria, administers them, and is funded by the industry it licences. There is no external check on the CNSC's determination of acceptable harm.

A6.4 European Union — Dose Constraints as a Ceiling Concept

The EU Basic Safety Standards Directive (2013/59/Euratom) requires dose constraints for all planned exposure situations across all 27 member states. Dose constraints are source-related restrictions established before optimisation begins. ALARA-equivalent optimisation occurs below the constraint, not in lieu of it. The Directive implements the dose constraint concept from ICRP Publication 103 — the same framework from which the CNSC draws its methodology. The IAEA's 2019 and 2024 IRRS missions to Canada found the CNSC non-compliant specifically on this point.

A6.5 The United States — A Cautionary Example

The US Nuclear Regulatory Commission established Quantitative Health Objectives (QHOs) in 1986, limiting individual risk of latent cancer fatality to approximately 2×10^{-6} /yr. In 2024, the NRC removed QHOs from its proposed Part 53 advanced reactor rule following explicit industry lobbying, creating a framework that now shares the CNSC's structural deficiency. The NRC's own Advisory Committee on Reactor Safeguards identified this removal as a regression. It demonstrates the institutional dynamic: when regulators are under industry pressure to accelerate licensing, the harm ceiling is the element systematically weakened first, because it is the element most capable of producing a refusal.

APPENDIX 7: INWORKS 2023–2025 — WHAT THE STUDIES FOUND AND WHAT THE CNSC HAS NOT UPDATED

A7.1 The INWORKS Cohort

The INWORKS study is a pooled international cohort of approximately 308,000 nuclear industry workers from France, the United Kingdom, and the United States, monitored for radiation dose and followed for mortality outcomes. It is the largest and most comprehensive study of chronic low-dose radiation exposure and health outcomes in existence. The cohort is uniquely relevant to civilian population exposures because it documents the effects of protracted low-dose exposure over years and decades — the exposure profile that members of the public near a nuclear facility receive — rather than the acute high-dose exposures documented in the Life Span Study on which most regulatory risk coefficients are based.

A7.2 INWORKS 2023 (BMJ) — The Primary Finding

The primary INWORKS publication in the British Medical Journal (Leuraud et al., 2023, doi: 10.1136/bmj-2022-074520) reported strong evidence of positive associations between cumulative protracted low-dose radiation exposure and risk of death from solid cancers and leukaemia. The excess relative risk for solid cancer mortality was approximately 0.52 per gray. The CNSC’s implied chronic ERR is approximately 0.185 per gray (ICRP LSS acute coefficient 0.37/Gy divided by DDREF 2). The ratio is approximately 3 to 1.

The CNSC acknowledged the 2023 INWORKS findings on its website, describing them as showing “strong evidence of positive associations between chronic low-dose radiation exposure and risk of death from leukaemia, all solid cancers combined.” It simultaneously stated that “there is no immediate action needed.” The CNSC has not updated its risk projection methodology in response.

A7.3 INWORKS Haematological Cancers (Lancet Haematology, August 2024)

The August 2024 Lancet Haematology publication (doi: 10.1016/S2352-3026(24)00240-0) reported an excess relative risk for leukaemia mortality of 2.68 per gray, and documented for the first time a statistically significant dose-response association for myelodysplastic syndrome (MDS) — a haematological precursor condition not previously captured in occupational radiation risk assessments. The CNSC has not acknowledged the August 2024 Lancet Haematology publication in its public communications as of the date of this submission.

A7.4 INWORKS Temporal Variation (European Journal of Epidemiology, November 2024)

The November 2024 EJE publication (doi: 10.1007/s10654-024-01178-6) reported that excess cancer risk in the INWORKS cohort persists for decades after the period of occupational exposure ends. The proposed facility would operate for 60 years. The temporal INWORKS finding indicates that cancer risk attributable to those doses would continue to manifest for decades after closure. The total lifetime cancer burden on the Peace River community therefore extends substantially beyond the facility’s operating period. No CNSC assessment before this Panel accounts for the post-operational cancer manifestation period identified in the 2024 temporal analysis.

A7.5 INWORKS Low-Dose Slope (American Journal of Epidemiology, May 2025)

The May 2025 AJE publication (doi: 10.1093/aje/kwae256) found that the cancer risk slope in the 0 to 100 mGy range — the range most relevant to long-term community exposure — is approximately twice the slope observed at higher doses. The CNSC’s application of DDREF=2 embeds the assumption that chronic low-dose exposures are less harmful per unit of dose than acute high-dose exposures. The 2025 AJE finding

indicates the opposite: in the dose range relevant to community exposure, risk per unit of dose is higher. The CNSC's projections for Peace River residents are therefore between 3 and 6 times too low.

A7.6 The CNSC's Non-Response

The CNSC has not updated its risk projection methodology in response to any of the four INWORKS publications between 2023 and 2025. Its INWORKS webpage, last modified April 2024, reflects only the 2023 BMJ finding. Its submission to this Panel applies risk coefficients derived from the pre-INWORKS evidence base. It does not acknowledge the 2024 or 2025 INWORKS publications. Under Vavilov, an administrative decision-maker that acknowledges evidence contradicting its conclusions and draws no consequence from it produces an unreasonable decision. The CNSC has acknowledged in its own words that INWORKS 2023 provides strong evidence of associations between chronic low-dose exposure and cancer mortality. Its methodology is unchanged. That is the Vavilov problem stated in primary regulatory documentation.

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IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project — Registry #89430

March 2026

SHOW
STOPPER

17

HARM QUANTUM FRAMEWORK

SAFETY: GAS POWER GENERATION OVERTOOK NUCLEAR

The CNSC has operated for 34 years without the analytical tools its mandate requires. When those tools are built honestly, gas generation with carbon capture overtakes nuclear on every harm metric that matters to the Peace River community. The Panel cannot make a public interest determination without them.

INTRODUCTION

This submission does not oppose electricity generation. It does not ask the Panel to prefer inaction over development. It asks the Panel to require honest comparison before irreversible commitment.

Energy Alberta proposes to site four CANDU MONARK reactors 30 kilometres north of Peace River and to operate them for 60 years. That proposal rests on a comparative proposition — that nuclear is the better option for Alberta's electricity needs. The Canadian Nuclear Safety Commission has endorsed that proposition using the only analytical tools it has: dose-compliance monitoring, ALARA optimisation, and a lifecycle carbon figure. This submission demonstrates that those tools cannot answer the comparative question the Impact Assessment Act requires the Panel to answer.

The submission advances three propositions in sequence.

The first is that natural gas generation with carbon capture and storage is a genuine, technically credible, commercially available alternative to the proposed nuclear facility — not a distant aspiration. Current commercial CCS technology captures 85 to 95 percent of emissions at operational gas plants. When gas is deployed not as a baseload competitor to nuclear but as the flexible complement to Alberta's expanding renewable generation — covering peak demand for 20 to 25 percent of operating hours while wind and solar carry the remainder — the system's weighted carbon intensity approaches nuclear's lifecycle figure. The harm profile of that system is qualitatively different from nuclear in every dimension that matters to the Peace River community: no concentrated involuntary cancer risk, no tritium in the Peace and Smoky Rivers, no spent fuel requiring management across geological time, and no infrastructure that cannot be shut down and removed. The proponent has not modelled this system. The CNSC has not required it to.

The second proposition is that the comparison between nuclear and gas has never been conducted honestly, because the harm literature for the two technologies has been built on asymmetric foundations. The mortality data for gas and fossil fuel generation rests on six decades of epidemiological surveillance covering hundreds of millions of people across dozens of independent research programs. The mortality data for nuclear normal operation rests on dose-compliance monitoring that measures whether operators are within regulatory limits — not whether those limits protect community health. When independent researchers apply standard epidemiological methods to nuclear host communities, they find what the regulatory monitoring was designed not to find: elevated cancer incidence extending to 30 kilometres from facility boundaries, haematological malignancies in nuclear workers at 3 to 6 times the risk implied by the CNSC's dose-risk coefficients, and cancer mortality signals that dose-compliance models predict should not exist. The comparison routinely cited to establish nuclear's safety advantage — deaths per terawatt-hour — counts zero chronic normal-operation cancer deaths for nuclear in the entire history of commercial nuclear power, not because none have occurred, but because no tracking system has ever been built to find them. Absence of measurement is not evidence of safety.

The third proposition is the most consequential. The Canadian Nuclear Safety Commission has operated since its establishment in 1997 with an explicit statutory mandate under section 9 of the Nuclear Safety and Control Act to protect the health and safety of persons. In 34 years it has not built epidemiological surveillance of nuclear host communities. It has not developed a harm quantum framework — a methodology for expressing nuclear's total health burden per unit of energy delivered in terms that are genuinely comparable to the harm literature for alternative technologies. Every serious international regulatory body and scientific organisation that has attempted a genuine comparative harm assessment has acknowledged the gap between what their frameworks can measure and what they need to measure. The CNSC has not acknowledged the gap. It has treated the absence of a complete nuclear harm dataset as confirmation that the harm is low, and presented that treatment to this Panel as a health effects determination under section 22(1) of the Impact Assessment Act.

It is not.

The CNSC's own analytical framework, when its limitations are honestly mapped, demonstrates that a harm quantum framework is not a theoretical refinement — it is a prerequisite for the comparison the IAA requires. When that framework is built, even on the incomplete data currently available, gas generation with CCS deployed flexibly alongside Alberta's renewable capacity overtakes nuclear on the harm metrics that matter to an identifiable community bearing involuntary concentrated risk. As CCS technology continues on its demonstrated improvement trajectory across the 60-year operating life of the proposed facility, that advantage widens further and becomes irreversible.

The Panel is therefore asked to find that no public interest determination on health grounds can be made on the current evidentiary record, and to require that a harm quantum assessment meeting the criteria set out in Part 6 of this submission be placed before the Panel before the review proceeds to sections 60 to 63 of the Impact Assessment Act.

PART 1 — THE RESEARCH IS NOT COMPARABLE

Why the standard comparison between nuclear and gas is built on unequal foundations.

1.1 What We Actually Know About Gas Harm

When a gas-fired power plant operates, it releases nitrogen oxides and fine particles into the air. These pollutants cause lung disease, heart disease, stroke, and cancer in people who breathe them over many years. Scientists have been measuring this relationship for more than 60 years. They have studied hundreds of millions of people across dozens of countries, using multiple independent research methods, with results that consistently agree with each other. The World Health Organization estimates that approximately 8 million people die worldwide each year from air pollution, with fossil fuel combustion the dominant cause.

The harm figures for gas generation are derived from this enormous body of replicated, peer-reviewed, independently verified epidemiology. The uncertainty ranges are honestly disclosed. The data is current, comprehensive, and continues to be updated.

1.2 What We Actually Know About Nuclear Harm

This is where the comparison breaks down — not because nuclear is necessarily safe, but because nobody has built the systems needed to find out whether it is.

Nuclear regulatory systems around the world, including Canada's, monitor whether nuclear facilities are keeping radioactive releases within permitted limits. This is a compliance system. It measures whether operators are following the rules. It does not measure what is happening to the health of the people who live nearby.

No jurisdiction in the world requires nuclear operators to conduct epidemiological surveillance — systematic, ongoing measurement of whether cancer rates in communities near nuclear facilities are higher than they would otherwise be. When independent researchers who are not part of the nuclear regulatory system conduct this surveillance using ordinary public health methods, they consistently find health signals that the regulatory monitoring was designed not to detect.

The six studies the CNSC has not addressed: *Harvard/Nature Communications (2026) found elevated cancer mortality extending to 30 kilometres from US nuclear facilities. INWORKS (2023–2025) found cancer and leukaemia risk in nuclear workers at 3 to 6 times the level the CNSC's risk coefficients predict. KiKK (2007, Germany) and its subsequent European replications found elevated childhood leukaemia near nuclear facilities. A 2025 study found epigenetic changes — alterations to how genes are expressed — in populations near nuclear facilities that appear to be heritable.*

1.3 The Deaths-Per-Terawatt-Hour Problem

The most commonly cited comparison between energy sources uses a figure called deaths per terawatt-hour — an estimate of how many people die to produce each unit of electricity. Nuclear typically comes out looking very safe in these comparisons, with figures far lower than coal, oil, or gas.

These figures are published by Our World in Data, drawing on studies by the United Nations Economic Commission for Europe and others. They are widely cited by nuclear proponents and by the CNSC itself.

What the CNSC does not tell the Panel is what Our World in Data explicitly states in its own methodology notes: the nuclear death rate counts deaths from accidents — Chernobyl and Fukushima — and zero chronic normal-operation cancer deaths. The reason the chronic death count is zero is not that no chronic deaths have occurred. It is that the counting system does not exist.

Our World in Data: 'The figures we reference on accidents from nuclear, solar and wind are based on the most comprehensive figures we have to date. However, they are imperfect, and no timely dataset tracking these accidents exists. This is a key gap in our understanding of the safety of energy sources.'

The same source acknowledges that the fossil fuel death rates used in the comparison undercount by a factor of 4 to 9 — meaning the real death toll from gas may be substantially higher than the figures used. That acknowledgement applies equally to a comparison that already excludes nuclear's chronic deaths entirely.

The Panel is therefore asked to consider this: the comparison that shows nuclear as safer than gas is a comparison between a figure derived from six decades of active epidemiological surveillance on one side, and a figure derived from accident counts with zero chronic deaths recorded on the other. This is not a scientific finding. It is an artefact of asymmetric measurement investment.

Finding 1: The harm literature for gas is complete. The harm literature for nuclear normal operation is structurally absent. No honest comparison can be drawn until both sides of the ledger are built on equivalent foundations.

PART 2 — THE SYSTEM COMPARISON

Why comparing nuclear against standalone gas misses the actual choice Alberta faces.

2.1 The Wrong Comparison

The proponent and the CNSC compare nuclear power against gas-fired generation as though they are direct substitutes — two baseload technologies, each running around the clock, each supplying Alberta's electricity. On that comparison, nuclear has genuine advantages on carbon emissions and on some harm metrics.

That is not the choice Alberta actually faces.

Alberta's electricity grid is changing fundamentally. Wind and solar generation are expanding rapidly because they are now cheaper to build and operate than any thermal generation. The Alberta Electric System Operator's own long-term planning scenarios project that renewables will supply the large majority of Alberta's electricity within the operating lifetime of any facility approved today. In that grid, the role for gas is not baseload — it is backup. Gas runs when the wind is not blowing and the sun is not shining, filling the gap that renewables cannot cover in that hour.

2.2 The System Nuclear Competes With

The correct comparison for this submission is not nuclear versus gas. It is nuclear versus a system that would deliver the same energy services to Alberta: renewables carrying 75 to 80 percent of generation, with gas on carbon capture and storage providing flexible backup for the remaining 20 to 25 percent of hours when renewables fall short.

The carbon mathematics of this system are straightforward. Wind and solar generation produce approximately 5 to 10 grams of carbon dioxide per kilowatt-hour over their full lifecycle — essentially zero during operation. Gas with 95 percent carbon capture produces approximately 90 grams per kilowatt-hour. If gas runs for only 20 percent of the time while renewables cover the rest, the system's weighted average carbon intensity works out to approximately 24 grams per kilowatt-hour.

Nuclear's lifecycle figure is approximately 10 to 15 grams per kilowatt-hour.

The renewables-plus-gas system and nuclear are therefore in the same carbon neighbourhood. They are not equivalent on harm.

2.3 Why Nuclear Cannot Flex

A nuclear power plant cannot turn up and down in response to grid conditions the way a gas plant can. Nuclear requires very high utilisation — running at 90 to 95 percent of its capacity almost all the time — to cover the enormous capital cost of construction over its operating life. If the plant runs at 50 percent utilisation because renewables are supplying the other half of demand, the economics collapse.

This is not a temporary problem. It is structural. The more renewables Alberta adds to the grid — which AESO expects to happen continuously — the harder it becomes for nuclear to run at the utilisation rates it requires. A nuclear plant that cannot flex with the grid is a stranded asset risk. A gas plant that runs 20 percent of the time when needed, and sits idle the rest, is exactly what a high-renewables grid requires.

The proponent has not addressed this structural incompatibility in its IAAC submission. The CNSC has not required it to.

2.4 The Harm Profile Is Qualitatively Different

Even setting carbon aside, the harm profiles of the two systems are categorically different in ways that matter profoundly to the Peace River community.

Gas harm from the backup system described above is primarily harm from climate change — the residual carbon emissions that 95 percent capture does not prevent. That harm is distributed globally, across all of humanity, in proportion to each person's share of the climate burden. It is not concentrated on Peace River.

Nuclear harm — to the extent it can be estimated honestly, given the measurement gaps in Part 1 — falls on the people who live near the facility. The Harvard/Nature Communications 2026 study found elevated cancer mortality within 30 kilometres of nuclear facilities. Peace River is within that radius. The harm is involuntary, concentrated, and falls on an identifiable community that receives no particular benefit from the electricity produced. Alberta's grid serves the whole province; Peace River bears the risk.

For gas-fired backup at Peace River specifically, the air quality concern that drives urban gas harm statistics largely disappears. Peace River is a rural community in open terrain with excellent atmospheric dispersion. Fine particles and nitrogen oxides from a gas plant operating 20 to 25 percent of the time in this environment would disperse across a large low-population airshed. The population-level air quality mortality from that scenario at this specific location is negligible.

Finding 2: The relevant comparison is a renewables-plus-gas system against nuclear, not standalone gas against nuclear. On that comparison, nuclear's carbon advantage largely disappears. Its harm profile — concentrated, involuntary, borne by an identifiable community — remains fundamentally different from the diffuse global harm of residual gas emissions.

PART 3 — THE TECHNOLOGY TRAJECTORY

Why gas with carbon capture will overtake nuclear during the operating life of any facility approved today.

3.1 The Current Snapshot Is Not the Relevant Comparison

Any facility the Panel approves today will still be operating in 2085. The nuclear plant will be seeking licence renewal around that date. The gas-plus-CCS system competing with it will have had 60 years of technological development.

The proponent's submission compares 2026 technology for nuclear against 2026 technology for gas. This is not a lifecycle analysis. It is a snapshot comparison applied to a 60-year decision. The Panel should treat it accordingly.

3.2 The Carbon Capture Improvement Curve

Carbon capture technology has improved substantially since its first commercial applications. Early post-combustion capture systems in the 1990s achieved capture rates around 70 percent. Current operational systems at gas-fired power plants achieve 85 to 95 percent. Pilot-scale systems using oxyfuel combustion and second-stage capture are demonstrating 98 to 99 percent capture rates in controlled conditions.

This trajectory mirrors the technology learning curves seen in other energy technologies. Solar photovoltaic module prices fell by 99 percent over 40 years. Wind energy costs fell by 70 percent in a decade. Each of these improvements happened because engineers applied cumulative learning to a technology that governments and markets had decided to develop. Carbon capture is now receiving that level of investment and attention.

There is no known physical barrier preventing CCS from reaching 99 percent capture at commercial scale within the operating lifetime of a nuclear facility approved today. The question is not whether — it is when.

3.3 What the Trajectory Means for the Harm Comparison

If gas-plus-CCS reaches 99 percent capture within 20 to 30 years — well within the proposed facility's 60-year operating life — then the residual carbon emissions from the flexible backup system described in Part 2 become negligible. A system that produces 99 percent fewer carbon emissions than unabated gas, running for only 20 percent of total hours, has a lifecycle carbon intensity of approximately 2 to 5 grams per kilowatt-hour.

That is better than nuclear.

At that point, the case for nuclear on harm grounds collapses entirely. The proposed facility would be a 60-year commitment to a technology whose harm profile is worse than its alternative in carbon terms, worse in community concentration terms, and irreversible — you cannot decommission a CANDU reactor quickly, cheaply, or without leaving a residual waste management obligation that extends for thousands of years.

3.4 The Proponent Has Not Modelled This

A genuine public interest analysis for a 60-year infrastructure commitment requires a 60-year harm comparison. The proponent has not provided one. It has compared technologies as they exist today and presented that comparison as a lifecycle assessment.

The CNSC has not required the proponent to model the technology trajectory. It has accepted the snapshot comparison without question.

Finding 3: The comparison between nuclear and gas-plus-CCS must be conducted across the full operating life of the proposed facility — 60 years. On a 60-year trajectory, CCS technology improvement is expected to eliminate gas's remaining carbon disadvantage. The proponent has not modelled this. The Panel cannot determine the long-term public interest without it.

PART 4 — HOW OTHER REGULATORS HANDLE THIS

Every serious jurisdiction that has attempted genuine harm comparison has acknowledged the gap — none has closed it.

4.1 The United Kingdom: A Hard Ceiling the CNSC Lacks

The United Kingdom developed the most carefully considered nuclear risk framework in the world following the Sizewell B Public Inquiry in the 1980s. The inquiry inspector asked the Health and Safety Executive to formulate and publish guidelines on tolerable levels of individual and societal risk from nuclear power stations. The resulting framework — the Tolerability of Risk, or TOR — set out a three-tier structure that has since been adopted by regulators in many industries beyond nuclear.

The TOR framework works as follows. At the bottom is a level of risk so low that it is broadly acceptable — regulators need not ask operators to do more.

At the top is a level of risk so high that it is intolerable under any circumstances — no amount of benefit justification permits proceeding. In the middle is a zone where risk is tolerable only if it has been reduced as low as reasonably practicable.

The critical point for this submission is the intolerable ceiling. The UK framework sets the line for members of the public who have risk imposed on them in the wider interest of society at 1 in 10,000 per year — above which no licence may be granted regardless of the economic benefits. The CNSC framework has no equivalent ceiling. ALARA, the CNSC's optimisation tool, can always be satisfied by demonstrating that further reduction would cost too much. There is no level of risk the CNSC framework defines as categorically unacceptable.

Even the UK's best framework, however, applies this structure to accident risk — the risk that something goes wrong and radioactive material escapes. It does not apply to chronic normal-operation community cancer from routine permitted releases. That gap has never been closed anywhere.

4.2 The United States: Safety Goals That Miss the Point

The US Nuclear Regulatory Commission established its Safety Goal Policy Statement in 1986. The NRC set two quantitative health objectives: the cancer risk to people living near a nuclear plant from plant operation should not exceed one-tenth of one percent of the background cancer risk from all other causes.

In theory this sounds rigorous — nuclear should not be a significant addition to the risks people already face. In practice, researchers have shown that the NRC's own safety goals would have been satisfied by Fukushima — the largest nuclear accident outside the Soviet Union — because no measurable increase in cancer rates above baseline was detected in the Japanese population.

The NRC's own researchers subsequently noted that the goals failed to capture societal risk — the disruption, displacement, property loss, and community destruction that a major nuclear event produces even when nobody dies from radiation. The NRC has also never resolved a gap identified in 1999: its safety goals use a 10-mile radius around nuclear plants, but the environmental analyses it requires use a 50-mile radius. The Harvard/Nature Communications 2026 study found harm extending to 30 kilometres — inside the 50-mile radius and outside the 10-mile one.

Like the UK framework, the NRC safety goals address accident scenarios. They do not address chronic normal-operation community health.

4.3 The European Union: The Closest Attempt — and the Acknowledged Failure

The most ambitious attempt to apply a 'do no significant harm' standard to nuclear power was conducted by the European Commission for its Taxonomy Regulation — the EU's framework for classifying economic activities as environmentally sustainable for investment purposes.

The Commission asked its Joint Research Centre to conduct a comprehensive technical assessment of whether nuclear energy meets the do-no-significant-harm criteria. The JRC concluded that no science-based evidence was found that nuclear energy does more harm to human health or the environment than other technologies already classified as sustainable.

Three separate expert bodies were asked to review that conclusion.

Two provided qualified support. The third — Germany's Federal Office for Radiation Protection, BASE — concluded that the inclusion of nuclear was not technically tenable, because the technical screening criteria presented do not prove that nuclear energy meets the DNSH criteria. An Austrian government-commissioned meta-study specifically identified the INWORKS Lancet Haematology finding — one of the six studies addressed in Show Stopper 15 — as undermining the JRC's conclusion.

The EU then included nuclear in its taxonomy anyway, on policy grounds. That is a political decision available to elected governments. It is not a decision available to a quasi-judicial Review Panel bound by section 22(1) of the Impact Assessment Act to determine likely health effects on an evidentiary basis.

4.4 The UNECE Lifecycle Assessment: Best Available — and Explicitly Incomplete

The UN Economic Commission for Europe published in 2022 the most comprehensive lifecycle assessment ever conducted for nuclear power by an international body. It assessed nuclear across 13 environmental and health impact categories including ionising radiation, human toxicity, cancer, and non-cancer health effects.

The UNECE found that nuclear had low impacts across most categories, broadly comparable to wind and solar. It also explicitly acknowledged that growing evidence of ionising radiation emissions over the lifecycle of other technologies had been published but data had not been collected for those technologies in the study. More fundamentally, the UNECE LCA used modelled dose estimates based on known emission pathways — not epidemiological surveillance of actual health outcomes in communities.

The modelled estimates embed the dose-risk coefficients that the INWORKS 2023-2025 findings have shown are 3 to 6 times too low.

4.5 The Universal Finding

Having examined every major regulatory jurisdiction and every major international comparative assessment, the finding is unambiguous: no jurisdiction in the world has built a harm quantum framework that compares nuclear against its alternatives using consistent methodology applied to both, adjusted for known underestimation in dose-risk coefficients, and including chronic normal-operation community cancer mortality measured epidemiologically rather than modelled from compliance data.

The CNSC has not built it. The UK has not built it. The US has not built it. The EU tried and acknowledged its attempt was incomplete. The UNECE tried and explicitly noted the missing data.

The Panel sits at a unique position in this global regulatory history. The Impact Assessment Act does not allow the Panel to proceed on incomplete evidence by pointing to the fact that every other jurisdiction has proceeded on equally incomplete evidence. Section 22(1) requires the Panel to consider the health effects of the proposed project.

That determination cannot be made on data that every serious analyst agrees is structurally absent.

Finding 4: No jurisdiction in the world has the tools to conduct the comparison the IAA requires. The CNSC is not an outlier in lacking these tools — but it is the body that has operated for 34 years with a statutory mandate to protect community health near nuclear facilities and has chosen not to build them. That choice is the subject of Part 5.

PART 5 — THE CNSC'S 34-YEAR FAILURE

What the CNSC was required to do, what it chose not to do, and why the Panel now bears the consequence.

5.1 What the Mandate Requires

The Canadian Nuclear Safety Commission was established in 1997 under the Nuclear Safety and Control Act. Section 9 of that Act states that the purposes of the Commission include protecting the health and safety of persons and protecting the environment in relation to the development, production, and use of nuclear energy.

Protecting health is not a background aspiration. It is the primary statutory purpose for which the CNSC exists. The entire apparatus of nuclear regulation in Canada — the licensing process, the monitoring requirements, the dose limits, the ALARA framework — is supposed to be in service of that purpose.

5.2 The Choice That Was Made

In 34 years, the CNSC has built a monitoring system that measures whether nuclear operators are complying with permitted limits for radioactive releases. It has not built a system that measures whether the communities living near licensed nuclear facilities are experiencing elevated rates of cancer, cardiovascular disease, infant mortality, or any other health outcome.

This is a choice. Epidemiological surveillance of host communities is not technically difficult. Public health agencies conduct it routinely for other environmental exposures. The data required — cancer registry records cross-referenced against distance from nuclear facilities — exists in provincial health systems. The CNSC has never required nuclear operators to fund or participate in it. It has never conducted it independently. It has produced no research program to investigate whether its dose limits, derived from the linear no-threshold model with assumptions that the INWORKS findings have now challenged, are actually protecting community health.

5.3 The Evidence the CNSC Has Ignored

The CNSC was not operating in an information vacuum. Evidence of harm from chronic low-dose radiation exposure near nuclear facilities has been accumulating in the peer-reviewed literature for decades.

The KiKK study, published in 2007 in Germany, found a statistically significant increase in childhood leukaemia near nuclear power plants. Multiple subsequent European studies found similar signals.

The CNSC published a fact sheet dismissing KiKK's relevance to Canada — a document that misrepresented the study's findings in ways this submission addresses in Show Stopper 15.

The INWORKS study, the largest occupational radiation epidemiology study ever conducted covering over 300,000 nuclear workers across three countries, published findings between 2023 and 2025 showing cancer and leukaemia risk at 3 to 6 times the level the CNSC's dose-risk coefficients predict. The CNSC has not updated its dose-risk methodology in response. It has issued no health advisory. It has conducted no retrospective review of prior dose assessments at Canadian nuclear facilities.

The Harvard/Nature Communications study published in February 2026 found elevated cancer mortality in populations within 30 kilometres of nuclear facilities across the United States. Peace River is within that radius from the proposed site. The CNSC has not addressed this finding in its contribution to the IAAC process.

5.4 The Consequence: The Panel Bears the Gap

The CNSC's 34-year failure to build the analytical tools its mandate requires has produced a specific, concrete consequence for this Panel: the Panel now has before it a proposal for a 60-year, 4,800-megawatt nuclear facility that will affect the health of 30,000 people in Peace River and the surrounding region, and the Panel cannot make the health effects determination section 22(1) requires because the evidence does not exist to make it.

That evidence does not exist because the body charged with producing it — the CNSC — chose not to produce it. The Panel is not being asked to compensate for a resource constraint or an honest regulatory gap. It is being asked to approve a project whose health case rests on the product of a 34-year institutional avoidance of the question.

The CNSC's approach is additionally self-serving in a structural sense. It operates as nuclear regulator, nuclear promoter, and the primary technical advisor to the IAAC process simultaneously. When it certifies that the health evidence is sufficient to proceed, it is certifying the adequacy of its own work. The IAEA's Integrated Regulatory Review Service missions to Canada in 2019 and 2024 found the CNSC non-compliant with international standards in specific areas affecting this assessment — a finding the CNSC has not disclosed to the Panel.

Finding 5: The CNSC has operated for 34 years with a statutory mandate to protect community health near nuclear facilities and has systematically chosen not to build the tools required to discharge that mandate. The analytical deficit the Panel now faces is the direct consequence of that choice. The Panel cannot remedy the CNSC's failure by proceeding on incomplete evidence.

PART 6 — WHAT THE PANEL MUST FIND

The Panel's obligation under the Impact Assessment Act and the minimum evidentiary requirements before any public interest determination.

6.1 What the Act Requires

Section 22(1) of the Impact Assessment Act requires the Review Panel to take into account the health and social conditions of the affected populations. Section 6(2) establishes the precautionary principle as a guiding consideration: where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation.

These provisions read together establish an affirmative obligation.

The Panel is not permitted to treat the absence of a complete health harm dataset as permission to proceed. Where scientific certainty is lacking and the potential harm is serious and irreversible, the precautionary principle requires the Panel to demand the evidence before approving the activity — not to approve the activity and defer evidence-gathering to later.

Nuclear cancer risk imposed on an identifiable community of 30,000 people over 60 years is serious. It is irreversible — once the facility is built and operating, the affected population cannot consent or withdraw consent on an ongoing basis. The evidence needed to assess it does not exist. These conditions precisely describe the circumstances section 6(2) is designed to address.

6.2 The Three Conditions That Cannot Be Met

Before any positive public interest determination can be made on health grounds in this proceeding, the evidentiary record must include:

- **A comparative harm quantum assessment.** The proponent must submit a methodology that quantifies harm per terawatt-hour for the proposed nuclear facility and for the counterfactual system — renewables plus gas with CCS — using consistent methodology applied to both. The assessment must use dose-risk coefficients consistent with the INWORKS 2023-2025 findings, not the CNSC's unrevised methodology. It must include cancer and non-cancer health outcomes, cardiovascular endpoints, infant mortality, and the findings of the Harvard/Nature Communications 2026 study. It must account for the Peace River cancer baseline documented in Show Stopper 15.
- **A 60-year technology trajectory analysis.** The assessment must model the harm comparison across the full operating life of the proposed facility, including the projected improvement in CCS capture rates based on the demonstrated technology learning curve, and the projected growth in Alberta's renewable generation capacity based on AESO's own long-term scenarios.
- **An independent epidemiological surveillance framework.** The assessment must specify how chronic community health outcomes near the proposed facility will be measured during operation — not by dose-compliance monitoring, but by epidemiological surveillance using provincial cancer registry data, with pre-specified statistical power, independent of the CNSC and the proponent.

6.3 The Panel's Options

The Panel has three available paths from this point.

The first is to require the proponent to commission an independent harm quantum assessment meeting the criteria above as a condition of the Panel proceeding to sections 60 to 63 of the IAA. This is the preferred outcome of this submission. It does not predetermine the project. It requires that the comparison be conducted honestly before an irreversible decision is made.

The second is to apply the precautionary principle directly and decline to make a positive public interest finding on health grounds. Where the potential harm is serious, the affected community is identifiable and non-consenting, the harm is irreversible, and the evidence required to assess it has been deliberately withheld by the regulatory body charged with generating it, the precautionary principle does not merely permit a precautionary finding — it requires one.

The third — proceeding to a public interest determination on the current evidentiary record — is not available to the Panel under section 22(1). It would require the Panel to treat the CNSC's dose-compliance monitoring as a substitute for a health effects determination. It would require the Panel to treat the absence of epidemiological surveillance as evidence of community health. It would require the Panel to approve a 60-year, irreversible commitment to a technology whose harm profile, honestly assessed against its alternative, is unknown and potentially far worse than represented. The IAA does not permit this.

6.4 Relief Sought

This submission asks the Panel to find that:

1. The CNSC's ALARA-based dose-compliance framework is structurally incapable of producing the health effects determination required by IAA section 22(1) and cannot substitute for it.
2. The standard deaths-per-terawatt-hour comparison between nuclear and gas is methodologically inadequate for the Panel's purposes because it counts zero chronic normal-operation deaths for nuclear and has been acknowledged by its own authors to be based on incomplete data.
3. The relevant comparison for this proceeding is a renewables-plus-gas-CCS system against nuclear, not standalone gas against nuclear, and the proponent has not submitted that comparison.
4. The CNSC has failed for 34 years to build the epidemiological surveillance and harm quantum framework its statutory mandate requires, and the Panel cannot remedy that failure by proceeding on the resulting incomplete evidence.
5. The Panel cannot proceed to sections 60 to 63 of the IAA until the proponent has submitted a harm quantum assessment meeting the criteria in section 6.2 of this submission, including a 60-year technology trajectory analysis and an independent epidemiological surveillance framework.

6.5 Appendices

This submission is supported with the following Appendices:

Appendix A — The Deaths/TWh Methodology and Its Limits

Appendix B — System Carbon Intensity Calculation

Appendix C — CCS Technology Learning Curve

Appendix D — International Regulatory Framework Comparison Table

Appendix E — The Six Studies and Their Regulatory Implications

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APPENDIX A — TECHNICAL NOTE: THE DEATHS/TWH METHODOLOGY AND ITS LIMITS

For scientific and technical reviewers. This appendix provides the quantitative basis for the methodology critique in Part 1.

A.1 The Source Data

The deaths-per-terawatt-hour figures widely cited in nuclear comparisons derive primarily from two sources: Markandya and Wilkinson (2007) in *The Lancet*, and Sovacool et al. (2016) in the *Journal of Cleaner Production*. These figures are aggregated and presented by Our World in Data (Ritchie, 2020) and have been adopted in the UNECE 2022 Lifecycle Assessment and multiple other international comparative studies.

The gas figure (approximately 2.8 deaths per TWh) derives from Markandya and Wilkinson's analysis of European power plant mortality from air pollution — specifically PM2.5 and NOx endpoints — calibrated to European population density and health status. The nuclear figure (approximately 0.03 deaths per TWh) derives from Sovacool et al.'s accident database divided by cumulative global nuclear production from 1965 to 2021 (approximately 96,876 TWh), with a total death attribution of approximately 4,000 deaths from Chernobyl and Fukushima combined.

A.2 What the Nuclear Figure Excludes

The nuclear deaths-per-TWh figure excludes, by construction, all of the following:

- Chronic normal-operation cancer mortality from routine permitted releases — excluded because no epidemiological surveillance system has ever been built to measure this category
- Non-cancer health endpoints including cardiovascular disease, infant mortality, and developmental effects — excluded from all nuclear mortality accounting, though the ACS/Hansen/Kharecha (2013) study noted that for nuclear power such illnesses are approximately 3 times higher than the mortality factors used
- Epigenetic and transgenerational effects documented in the 2025 IJMS study (DOI: 10.3390/ijms26052269) — no regulatory framework anywhere has attempted to quantify this category
- The temporal tail of INWORKS-identified cancer risk — the EJE November 2024 study found latency effects extending decades beyond exposure, meaning cancers attributable to operational doses continue manifesting long after facility closure; no lifecycle accounting captures this

A.3 The INWORKS Correction Factor

The CNSC's dose-risk coefficients derive from the Life Span Study (LSS) of atomic bomb survivors, applying a Dose and Dose Rate Effectiveness Factor (DDREF) of 2 to extrapolate from acute high-dose exposure to chronic low-dose exposure. The implied chronic excess relative risk (ERR) per Gy under this approach is approximately 0.185.

INWORKS 2023 found a chronic ERR of 0.52 per Gy (central estimate) for all solid cancers. At the low-dose range specifically relevant to nuclear workers and host communities (0 to 100 mGy),

the INWORKS ERR rises to approximately 1.04 per Gy, consistent with an empirical DDREF of approximately 0.7 rather than 2. The CNSC risk coefficients therefore underestimate chronic low-dose cancer risk by a factor of approximately 3 to 6.

Application of the corrected ERR to nuclear operations systematically increases the chronic mortality estimate. The magnitude of that increase cannot be calculated with precision because the underlying epidemiological surveillance data does not exist — precisely the gap this submission identifies.

A.4 The Fossil Fuel Undercount Acknowledgement

Our World in Data explicitly acknowledges that its gas and coal death rates undercount actual mortality by a factor of 4 to 9, based on the gap between Markandya-Wilkinson figures and WHO/IHME global burden of disease estimates. The actual global death rate from coal-fired generation may therefore be between 93 and 224 deaths per TWh. The OWID gas figure of approximately 2.8 deaths per TWh correspondingly understates actual mortality.

The direction of this correction — upward for fossil fuels — is in the opposite direction from the nuclear correction needed. Both corrections move the comparison away from the standard narrative of nuclear being dramatically safer than gas. The corrected fossil fuel figures are at least known and bounded. The corrected nuclear figures cannot be calculated because the surveillance data does not exist.

APPENDIX B — TECHNICAL NOTE: SYSTEM CARBON INTENSITY CALCULATION

For scientific and technical reviewers. This appendix provides the quantitative basis for the system comparison in Part 2.

B.1 Input Parameters

Lifecycle carbon intensity figures are drawn from the IPCC AR5 Working Group III (2014), the UNECE Lifecycle Assessment (2022), and the NREL Lifecycle GHG Emissions study (2021).

Technology	Lifecycle gCO ₂ eq/kWh (median)	Source
Nuclear (CANDU)	10–15	UNECE 2022; IPCC AR5
Wind (onshore)	7–11	IPCC AR5; NREL 2021
Solar PV	20–50	IPCC AR5; NREL 2021
Gas CCGT unabated	410–650	UNECE 2022
Gas CCGT + 95% CCS	70–110	UNECE 2022; IEA 2024
Gas CCGT + 99% CCS (projected)	15–25	Trajectory extrapolation

B.2 System Weighted Average Calculation

For a system supplying 4,800 MW of equivalent generation (matching the proposed nuclear capacity) using 80% renewables and 20% gas-with-CCS at 95% capture rate:

$$\text{System } gCO_2eq/kWh = (0.80 \times 9) + (0.20 \times 90) = 7.2 + 18 = 25.2 \text{ } gCO_2eq/kWh$$

With 99% CCS capture (projected within 30 years on current trajectory):

$$\text{System } gCO_2eq/kWh = (0.80 \times 9) + (0.20 \times 20) = 7.2 + 4 = 11.2 \text{ } gCO_2eq/kWh$$

Nuclear lifecycle median: 12.5 gCO₂eq/kWh.

The near-term system (95% CCS) produces approximately twice nuclear's carbon footprint. The projected system (99% CCS within the facility's operating life) is essentially equivalent. Neither figure accounts for the harm distribution difference — nuclear harm concentrated on Peace River versus gas harm distributed globally.

APPENDIX C — TECHNICAL NOTE: CCS TECHNOLOGY LEARNING CURVE

For scientific and technical reviewers. This appendix provides the evidentiary basis for the technology trajectory argument in Part 3.

C.1 Demonstrated CCS Performance Milestones

- Sleipner (Norway, operational 1996): geological CO₂ storage in saline aquifer, 1 Mt/year, demonstrating long-term viability of storage
- Boundary Dam (Saskatchewan, 2014): first post-combustion CCS on coal-fired power; design capture 90%, reported operational average 40–60% — a cautionary case on the gap between design and operation
- Quest (Alberta, 2015): Shell oil sands CCS, 1 Mt/year CO₂ captured and stored; demonstrated that large-scale capture is operationally achievable in Canadian conditions
- Sleipner and Illinois (pure CO₂ streams): 95–96% capture demonstrated — noting that these process pure industrial CO₂ rather than flue gas, which is more concentrated and easier to capture
- Second-generation post-combustion and oxyfuel pilot systems (2020–2025): 98–99% capture demonstrated at pilot scale

C.2 Learning Rate and Projection

Technology learning rates for CCS are documented in IEA (2020), IPCC AR6, and the Global CCS Institute (2023). Post-combustion capture costs have declined approximately 30 to 50 percent from early commercial systems to current deployments. Capture efficiency has improved from approximately 70 percent to 85 to 95 percent operational over the same period.

The proposed facility has a 60-year operating licence — approximately 2026 to 2086. The CCS technology learning curve on current trajectory projects 99 percent capture becoming commercially available within 20 to 30 years, placing it within the first half of the proposed facility's operating life. This is a projection, not a certainty. The Panel should require the proponent to model this trajectory and its sensitivity to different assumptions, using the same rigour applied to its nuclear construction cost and operational life assumptions.

C.3 Methane Leakage

The lifecycle carbon intensity of gas-plus-CCS depends on the methane leakage rate across the supply chain. Methane is a potent greenhouse gas — approximately 80 times more warming than CO₂ over a 20-year timeframe. A methane leakage rate of 1 percent from wellhead to combustion increases the effective lifecycle carbon intensity of gas-fired generation by approximately 50 gCO₂eq/kWh on a 20-year basis.

Canadian natural gas has among the lowest documented leakage rates globally — approximately 0.8 to 1.2 percent. Alberta's regulatory framework for methane emissions is among the most stringent in North America. The IEA (2024) Lifecycle Emission Factors database uses a Canadian-specific leakage figure of approximately 1 percent for upstream gas production. The system calculation in Appendix B uses this figure.

APPENDIX D — INTERNATIONAL REGULATORY FRAMEWORK COMPARISON

Comparative table of nuclear harm tolerance frameworks across key jurisdictions.

Jurisdiction	Hard ceiling on public risk	ALARP / ALARA zone	Chronic normal operation covered?	Comparative alternatives required?
UK (HSE/ONR)	10 ⁻⁴ /yr for public (intolerable ceiling)	ALARP between 10 ⁻⁶ and 10 ⁻⁴	NO — applies to accident risk only	Not required
USA (NRC)	0.1% of background cancer risk (QHO)	ALARA below QHO threshold	NO — accident scenarios only	NEPA alternatives analysis required but not harm-quantified
Netherlands (ANVS)	10 ⁻⁶ /yr individual risk (intolerable above 10 ⁻⁴)	ALARA between thresholds	NO — probabilistic accident risk	Environmental assessment required
Finland (STUK)	0.1 mSv/yr government-set dose limit	ALARA standard applies	NO — dose compliance only	Not required
EU (Taxonomy DNSH)	Do No Significant Harm criteria	No equivalent ALARP structure	Partially — BASE found criteria unmet	LCA comparison required; acknowledged incomplete
Canada (CNSC)	NO hard ceiling — ALARA only	ALARA at all times	NO — dose compliance only	Not required; proponent has not provided one

The table above confirms that the CNSC is not an outlier in failing to cover chronic normal-operation community health — no jurisdiction does.

The CNSC is an outlier in having no hard intolerable ceiling for public risk and in not requiring the proponent to submit a comparative harm analysis. The CNSC's framework is the weakest of any jurisdiction examined.

APPENDIX E — THE SIX STUDIES AND THEIR REGULATORY IMPLICATIONS

Cross-reference to Show Stopper 15. Summarises the six studies and their specific implications for the harm quantum framework argument.

E.1 The Six Studies

- **Study 1 — INWORKS Haematological (Lancet Haematology, August 2024. DOI: 10.1016/S2352-3026(24)00240-0):** Strong evidence of positive associations between protracted low-dose radiation exposure and excess leukaemia in nuclear workers. Implications for harm quantum: the CNSC's leukaemia risk coefficients derived from acute-dose LSS data underestimate chronic low-dose risk. Any harm quantum model using CNSC coefficients for haematological malignancy is systematically low.
- **Study 2 — INWORKS Temporal (EJE, November 2024. DOI: 10.1007/s10654-024-01178-6):** Cancer risk persists and manifests decades after the period of radiation exposure. Implications: lifecycle nuclear harm extends beyond operational decommissioning; no existing regulatory framework captures the temporal tail of harm; 60-year operating life assessments undercount by excluding post-closure latent cancers.
- **Study 3 — INWORKS Site-Specific and Low-Dose Slope (AJE, May 2025. DOI: 10.1093/aje/kwae256):** Elevated cancer risk at very low dose ranges specifically, with ERR approximately 1.04/Gy at 0–100 mGy. This is the dose range directly relevant to Peace River community exposures from routine permitted releases. The CNSC's implied ERR of 0.185/Gy is 3 to 6 times lower.
- **Study 4 — Harvard Massachusetts Cancer Incidence (Environmental Health, December 2025, Alwadi, Koutrakis et al.):** Elevated cancer incidence in communities near nuclear facilities in Massachusetts. First direct US epidemiological confirmation of the pattern found in European studies including Kikk.
- **Study 5 — Harvard National Cancer Mortality (Nature Communications, February 2026. DOI: 10.1038/s41467-026-69285-4):** Approximately 6,400 excess cancer deaths per year attributable to proximity to nuclear facilities across the United States, with the proximity effect extending to 30 kilometres. Peace River is within the 30-kilometre radius from the proposed site. This is the most directly applicable study to the proposed facility's specific harm profile.
- **Study 6 — Epigenetic Transgenerational (IJMS, March 2025. DOI: 10.3390/ijms26052269):** Heritable epigenetic alterations found in populations near nuclear facilities. Implications: nuclear harm extends to generations not yet born; no regulatory framework anywhere has attempted to quantify or include this category; a harm quantum model that excludes transgenerational harm systematically understates nuclear's total harm burden.

E.2 The CNSC Response

The CNSC has not updated any methodology, issued any health advisory, or conducted any retrospective assessment in response to any of the six studies listed above. Its ALARA framework, its dose-risk coefficients, its monitoring requirements, and its contribution to the IAAC process all predate these findings and have not been revised to reflect them.

This is not a regulatory body that has considered the evidence and disagrees. This is a regulatory body that has not responded at all.

IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project

March 2026

SHOW
STOPPER
18

The Project Without a Reactor

The Panel is being asked to assess a project whose defining physical parameter — the reactor technology — has not been decided. An assessment of an undefined project is a legal nullity.

17.1 The Indeterminacy on the Record

Energy Alberta filed its Initial Project Description in April 2025 nominating two to four CANDU MONARK reactors. On 21 October 2025 — six months into the IAAC process — it signed a Memorandum of Understanding with Westinghouse to explore deploying AP1000 pressurised water reactors at the same site instead. Its own project website now lists both technologies as “under consideration.” The CNSC’s project page for the Peace River Nuclear Power Project continues to describe the facility as CANDU MONARK.

These are not minor design variations. The CANDU MONARK is a pressurised heavy water reactor fuelled by natural uranium with on-power refuelling. The AP1000 is a pressurised light water reactor requiring enriched uranium with batch refuelling. They produce categorically different radioactive emission profiles, different tritium outputs, different spent fuel compositions and volumes, different accident scenario sets, different emergency planning zone requirements, and different cooling water demands. Every show stopper in this submission — and every finding the Panel will be asked to make on health, environmental, and Indigenous rights grounds — is technology-specific. An assessment conducted across two incompatible technologies is not an assessment of either.

17.2 Neither Technology Has Regulatory Clearance

The CANDU MONARK’s conceptual design was completed only in September 2024. In October 2024, AtkinsRéalis entered a preliminary “special project” with the CNSC — not a Vendor Design Review — to plan what a future VDR might look like. The full design is not expected until 2027. The CNSC has issued no clearance for the CANDU MONARK.

The AP1000 completed Phase 2 of the CNSC’s pre-licensing review in 2013 — twelve years ago, against regulatory standards that have since been substantially updated. It has not completed Phase 3. It has no current CNSC clearance and has never been built in Canada.

The Panel is therefore being asked to assess the environmental, health, and Indigenous rights effects of a facility whose reactor — the facility’s sole source of radiological emissions, its primary water demand driver, and the determinant of its waste profile — has not been chosen and, in the case of the CANDU MONARK, does not yet fully exist.

17.3 The Statutory Trap

Section 18 of the Impact Assessment Act requires a project description sufficient to identify “the physical activities to be carried out.” The reactor is not an ancillary feature. It is the project. The IAAC’s Summary of Issues — published June 2025, after months of review — required detailed assessment of accidents, malfunctions, tritium emissions, spent fuel management, thermal effects, and transboundary impacts. Every one of those assessments is reactor-specific. The IAAC cannot complete them without knowing which reactor is being built.

If the Panel proceeds on the basis of one technology and the proponent subsequently selects the other, the entire evidentiary record — the health impact assessment, the environmental baseline, the accident scenario modelling, the spent fuel projections, the Indigenous consultation on specific risks — is invalidated. The Panel would then face a binary: either reopen the assessment from the beginning, or issue a decision on a project that was never actually assessed. Neither option is lawful.

THE IAAC IS TRAPPED: A positive public interest finding made before the reactor technology is fixed is a decision about a project that does not exist. If the technology later changes, the Panel’s finding cannot lawfully follow it. If the technology does not change but the Panel relied on the wrong technology’s parameters, the assessment was never conducted. There is no path to a lawful positive finding until the proponent fixes a technology and restarts the assessment on that basis.

17.4 What the Panel Must Find and Do

The Panel must find that the proponent’s Initial Project Description does not satisfy section 18 of the Impact Assessment Act because the physical activity — the reactor — is unspecified. The Panel must direct the proponent to select and commit to a single reactor technology and file a revised project description before the assessment proceeds. All baseline studies, health assessments, accident scenario analyses, and Indigenous engagement processes must then be conducted on the basis of the confirmed technology.

No Approved Disposal Pathway for Spent Nuclear Fuel

The project's primary waste stream has no licensed destination. The Panel cannot find the project to be in the public interest when its most dangerous output will remain in the Peace River region indefinitely.

18.1 The Waste Endpoint Does Not Exist

Canada has no operating permanent repository for high-level radioactive waste. The only proposed facility — the Nuclear Waste Management Organization's Deep Geological Repository at Ignace, Ontario — was announced as the selected site in November 2024. Its Initial Project Description was filed with the IAAC on 5 January 2026. The IAAC and CNSC integrated assessment has not begun. Based on comparable international projects, the DGR will not be operational before the 2060s.

The Peace River plant would operate for 70 years, generating spent fuel throughout. A four-unit facility would produce approximately 400–500 tonnes of spent fuel annually — tens of thousands of tonnes over the operating life. The proponent's IPD contains no waste management plan. The IAAC's Summary of Issues (June 2025) explicitly required the proponent to provide one, including “alternate waste storage site, long-term containment, transportation risk, and interjurisdictional responsibility.” None has been provided.

The NWMO has itself acknowledged that new reactor projects generate waste streams that change its inventory projections and may require DGR design modifications. If the AP1000 is chosen, the spent fuel is enriched PWR fuel — a physically different waste type from the CANDU fuel the NWMO's DGR concept is designed for. The disposal problem is therefore compounded by the technology indeterminacy in Show Stopper 17.

18.2 The Transportation Gap

There is no identified transportation corridor between the Peace River site and the Ignace DGR — approximately 3,500 kilometres. No rail line connects the two. No interim storage facility has been sited, licensed, or approved for the Peace River region. Spent fuel generated by the plant will remain at the Peace River site in interim storage — in Treaty 8 territory, on the Peace River watershed — for an indeterminate period extending potentially into the twenty-second century.

18.3 The Statutory and Charter Trap

Section 22(1)(a) of the Impact Assessment Act requires assessment of “changes to the environment” including effects associated with accidents and malfunctions over the full project lifecycle. Spent fuel with no licensed disposal pathway is not a temporary effect. It is a radiological burden on the Peace River watershed and the Treaty 8 territories that will persist for ten thousand years. The precautionary principle under IAA sections 6 and 22 specifically applies to threats that are irreversible even if uncertain.

The Charter dimension is equally direct. Generations of Peace Region Indigenous peoples — who have not consented to this facility and who have formally demanded consultation on this very issue — will live in proximity to interim spent fuel storage with no permanent solution. The right to life under section 7 of the Charter, as interpreted in Carter and Bedford, cannot be satisfied by a framework that defers the waste problem indefinitely to future persons who have no voice in this proceeding.

THE IAAC IS TRAPPED: The Panel cannot make a public interest finding under section 60 of the IAA on a project whose defining waste stream has no approved disposal pathway, no transportation plan, and no interim storage site. If the Panel proceeds, it will be deciding that 70 years of spent fuel accumulation in the Peace River watershed is in the public interest without any evidence that it can ever be safely removed. That is not a finding the Act permits.

18.4 What the Panel Must Find and Do

The Panel must find that the proponent has not satisfied its obligation under section 22(1) to characterise the environmental effects of the project's spent fuel. The Panel must require, as a condition of proceeding, that the proponent provide a complete waste management plan demonstrating: a confirmed interim storage design and site, a licensed transportation pathway, a confirmed DGR acceptance agreement with the NWMO, and a legally binding financial assurance instrument covering the full costs of all three. Until that plan is before the Panel, the public interest gate under sections 60–63 cannot lawfully be opened.

UNESCO World Heritage Site and Transboundary Obligations

The Peace River flows directly to Wood Buffalo National Park, a UNESCO World Heritage Site. The NWT government is formally on record. The Panel cannot proceed without addressing treaty obligations it has no capacity to discharge.

19.1 The Downstream Geography

Wood Buffalo National Park — a UNESCO World Heritage Site since 1983 — straddles the Alberta-NWT border and encompasses 4.5 million hectares. Its defining ecological feature is the Peace-Athabasca Delta, formed by the confluence of the Peace and Athabasca Rivers. The UNESCO inscription is premised on the delta's Outstanding Universal Value. The Peace River flows from the proposed project site directly to this delta. The proposed plant is an upstream Peace River development.

UNESCO's World Heritage Committee has issued a standing instruction, confirmed in its 2015, 2017, and 2019 decisions on Wood Buffalo's state of conservation, that Canada must assess the cumulative impacts of any future upstream Peace River development on the park's Outstanding Universal Value before approving it. This is not a recommendation. It is a formal decision of the treaty body to which Canada is obligated under the World Heritage Convention.

19.2 The NWT Government and Dene Nation Are Formally on Record

On 23 July 2025, the Northwest Territories government wrote formally to the IAAC stating that the draft Impact Statement Guidelines ignore the Alberta-NWT Transboundary Water Agreement — a bilateral instrument obligating both governments to notify each other of developments affecting shared waters. The NWT's letter identifies the project's potential impacts on water quality, water quantity, and air quality as primary concerns.

In November 2025, Dene National Chief George Mackenzie formally demanded meaningful consultation, stating that the Peace River Nuclear Power Project "threatens the integrity of the Mackenzie water basin, a vital resource for our communities." Four First Nations — Beaver First Nation, Dene Tha' First Nation, Little Red River Cree Nation, and Tallcree First Nation — filed joint legal submissions through counsel in October 2025 stating the project would impact their Treaty 8 rights throughout the Peace River Corridor.

The NWT is on a separate electrical grid. It will receive none of the project's benefits. It will receive all of its downstream risks: tritium discharges to the Peace River, thermal pollution affecting fish habitat and ice formation, radioactive contamination pathways to Great Slave Lake and the Mackenzie River Basin in the event of an accident. This asymmetric risk-benefit distribution is the precise scenario that the transboundary notification obligation was designed to address.

19.3 The Treaty Trap

Canada's obligations under the World Heritage Convention are not discretionary inputs to the Panel's deliberations. They are binding treaty commitments. The World Heritage Committee has explicitly required assessment of cumulative impacts of Peace River upstream projects on Wood Buffalo's OUV. An IAAC process that does not discharge this obligation before proceeding to a public interest finding is conducting a legally incomplete review. The Panel has no jurisdiction to waive a treaty obligation.

The Transboundary Water Agreement creates an equally binding procedural obligation. The NWT government has formally documented that it has been ignored. If the Panel issues a positive public interest finding on a record that has not addressed the transboundary notification obligation, the decision is vulnerable to judicial review on treaty grounds independent of all other arguments in this submission.

THE IAAC IS TRAPPED: The Panel cannot find this project to be in the public interest without first satisfying UNESCO's standing instruction on cumulative impacts to Wood Buffalo National Park's Outstanding Universal Value. It also cannot proceed without rectifying the breach of the Alberta-NWT Transboundary Water Agreement that the NWT government has formally documented. Both obligations are treaty-level. Neither can be satisfied by the existing record.

19.4 What the Panel Must Find and Do

The Panel must find that the existing record does not discharge Canada's obligations under the World Heritage Convention with respect to Wood Buffalo National Park. The Panel must require a cumulative effects assessment of the project's impacts on the Peace-Athabasca Delta and the Park's Outstanding Universal Value, conducted in consultation with the World Heritage Centre and IUCN, before proceeding. The Panel must also require the proponent to formally satisfy the Alberta-NWT Transboundary Water Agreement notification obligations, and must provide an opportunity for NWT government and affected NWT Indigenous nations to participate meaningfully in the assessment as affected parties.

The CNSC Does Not Apply the Benefits-Outweigh-Harm Test

The IAEA requires every nuclear facility to be justified: its benefits must outweigh its radiation risks. The CNSC has formally refused to implement this test — on the record, twice, confirmed by international peer review.

20.1 The International Standard the CNSC Has Refused

IAEA Safety Fundamentals SF-1, Principle 4 states: “For facilities and activities to be considered justified, the benefits that they yield must outweigh the radiation risks to which they give rise.” This is the international justification standard. It requires a regulator to determine, before authorising a nuclear facility, that the radiation risks imposed on the public are outweighed by the benefits the facility delivers.

The CNSC does not apply this test. The IAEA’s 2019 Integrated Regulatory Review Service mission formally found: “There is no systematic evaluation of justification for the various practices involving radiation sources in the licensing process.” The mission recommended that the CNSC establish a procedure for systematic justification.

Canada formally rejected that recommendation. The CNSC’s published response states: “Not accepted. Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada.” This is not a defence of substantive adequacy. It is an explicit, on-the-record statement that the benefits-outweigh-harm test is not part of the CNSC’s licensing process. The 2024 IRRS follow-up mission listed this as still unresolved.

20.2 The Federal Court Confirmation

The CNSC confirmed the same position in open court in *CARN v BWXT Nuclear Energy Canada Inc*, 2022 FC 849. The CNSC stated on the record that the IAEA benefits-outweigh-harm justification standard is not a legal obligation in Canada. The Federal Court’s dismissal of that application turned on a factual finding — “no serious or irreversible damages” — that is unavailable in this proceeding. Peace River presents documented above-average cancer incidence of unknown aetiology, INWORKS 2023–2025 confirming chronic low-dose radiation effects at community exposure levels, and Harvard/Nature Communications (2026) documenting approximately 6,400 cancer deaths per year associated with residence within 30 kilometres of operating nuclear facilities.

20.3 The Statutory Trap

The Impact Assessment Act sections 60–63 require the Panel to determine whether the project is in the public interest, having regard to its health and environmental effects. A public interest determination is, at its core, a benefits-versus-harms judgment. The CNSC’s submission to this Panel is the primary health and safety evidence before it. That submission was produced by a body that has formally refused, twice, to apply a benefits-versus-harm test — and has confirmed in Federal Court that it does not do so.

The Panel is therefore in the following position: it must make a benefits-outweigh-harm determination under sections 60–63, but the regulatory body whose technical advice it would normally rely upon for that determination has formally declined to conduct one. The CNSC’s submission tells the Panel that licence conditions will be met. It does not tell the Panel whether the radiation risks to Peace River residents are outweighed by the project’s benefits. That is the dispositive question. It is the question the CNSC will not answer.

THE IAAC IS TRAPPED: The Panel must make a public interest finding. That finding requires a benefits-outweigh-harm analysis. The CNSC has formally refused, on the record and before the Federal Court, to conduct one. The Panel cannot discharge its statutory obligation by deferring to an institution that has structurally excluded the central analytical step the obligation requires.

20.4 What the Panel Must Find and Do

The Panel must find that the CNSC’s submission does not constitute a benefits-outweigh-harm assessment and cannot substitute for one under sections 60–63. The Panel must require an independent justification analysis — applying IAEA SF-1 Principle 4, with explicit comparison of radiation risk to Peace River residents against the benefits of the project — before any public interest finding is made. That analysis must be conducted by a body that applies the international standard the CNSC has refused.

Water Security: No Licence, No Climate Projections, No Baseline

The project will draw from the Peace River for 70–100 years. No water licence exists. No long-term climate hydrology has been assessed. The IAAC explicitly required both. Neither has been provided.

21.1 The Factual Gaps on the Record

The proposed facility would draw cooling water from the Peace River throughout its 70-year operating life. Energy Alberta’s IPD characterises this as approximately 0.2% of mean annual flow. No water licence under Alberta’s Water Act has been applied for. No application exists. The IAAC’s Summary of Issues (June 2025) explicitly required “long-term projections of water quantity and flows in the Peace River watershed based on varying climate change projections to understand whether sufficient water supply will be available to safely support the plant based on a one-hundred-year operating cycle.” That assessment has not been provided.

Cooling water returned to the Peace River is warmer and contains low-level tritium. The thermal effect alters ice formation patterns, affects fish habitat seasonality, and modifies the sediment and temperature regime on which the Peace-Athabasca Delta’s ecology depends. The NWT government specifically flagged these effects in its July 2025 letter to the IAAC. No thermal regime assessment has been provided.

21.2 The Climate and Cumulative Pressure Context

The Peace River’s primary water source is Rocky Mountain snowpack. Climate projections consistently show declining snowpack across western Canada throughout the facility’s operating period. A watershed analysis of the Peace River region, conducted in 2024, identified the Smoky-Wapiti sub-basin — which feeds the Peace — as the most highly allocated sub-basin in the watershed. Alberta’s Water Act was amended in late 2025 to enable inter-basin transfers, which Treaty Chiefs formally opposed as imposing severe impacts on every watershed. The proposed Wonder Valley AI data centre, also in the Peace River region, would add further water demand.

The facility must be able to operate safely when the Peace River is at low flow. Nuclear cooling cannot be interrupted for drought conditions. A facility operating at 4,800 MWe drawing from a drought-stressed river with declining snowpack over a 70–100 year operating period is a water security risk that has not been assessed — and that the IAAC has explicitly said must be.

21.3 The Statutory Trap

Section 22(1)(a) of the IAA requires assessment of changes to the environment over the full project lifecycle. The project lifecycle is 70–100 years. The water assessment provided covers neither that timeframe nor the climate projections that determine whether sufficient water will be available. The NWT government has formally raised the

transboundary water dimension (see Show Stopper 19). Downstream Wood Buffalo National Park depends on Peace River flows for the hydrological dynamics that define its Outstanding Universal Value.

The Panel has been explicitly told by the IAAC's own Summary of Issues that this assessment is required. The proponent has not provided it. The Panel cannot proceed to a public interest determination on a factual record that the IAAC's own preliminary process identified as incomplete.

THE IAAC IS TRAPPED: The IAAC's Summary of Issues told the proponent what was required: long-term water quantity projections under climate scenarios over a 100-year operating cycle. The proponent has not provided them. The Panel cannot find the project's water impact acceptable when the assessment document the IAAC itself required has not been submitted. The omission is not an oversight. It is an unfulfilled mandatory condition of the assessment process.

21.4 What the Panel Must Find and Do

The Panel must find that the proponent has not satisfied its obligations under section 22(1) of the IAA with respect to water security, climate hydrology, or thermal effects. The Panel must require the proponent to provide: a hydrological baseline study for the Peace River at the proposed site; long-term flow projections under low, medium, and high-emission climate scenarios over 100 years; a thermal discharge assessment including effects on ice formation, fish habitat, and downstream flow regime to Wood Buffalo National Park; and a water licence application under Alberta's Water Act with confirmation that a licence can be granted before construction proceeds. None of these can be substituted by the proponent's current self-characterisation.

SUPPLEMENTARY SHOW STOPPERS 23 – 29

*A Formal Submission to the Impact Assessment Agency of Canada
Registry #89430 — Energy Alberta Peace River Nuclear Power Project*

Submitted by: Christofeel Gerhardus Nel
Peace River Region, Alberta — Treaty 8 Territory | March 2026

Technology Indeterminacy: The Project Description Does Not Identify the Designated Project

IAA s. 10 and Physical Activities Regulations r. 7 — uncommitted reactor technology — participation resource depletion

The Statutory Requirement

Section 10(1) of the Impact Assessment Act requires a proponent to provide the Agency with an initial project description that includes the information prescribed by the Physical Activities Regulations. Regulation 7(c) requires identification of the designated project's physical components, including the type and dimensions of permanent structures. Regulation 7(d) requires identification of the physical activities carried out in connection with the project. The project description filed by Energy Alberta in April 2025 named the CANDU MONARK as the proposed reactor technology. No technology commitment has been made since. As of this submission, Energy Alberta's own project page lists two technologies — the CANDU MONARK and the AP1000 — as simultaneously under consideration. The IAA's project description requirements cannot be satisfied by a description that names two mutually exclusive physical configurations.

The reactor is not a component ancillary to this project. The reactor is the project. The technology selection determines the applicable safety case, the radiological source term, the tritium emission profile, the spent fuel volume and isotopic composition, the design basis accident scenarios, the emergency planning zone dimensions, the required cooling water volume, and the applicable CNSC vendor design review status. Without a committed reactor technology, every quantitative element of the project description required by Regulation 7 is either provisional, inapplicable, or contingent on a decision the proponent has not made.

The Parameters That Remain Uncommitted

The following parameters are materially different as between the CANDU MONARK and the AP1000. They are not differences of degree within a common design envelope. They are differences in physical configuration, fuel type, radiological profile, and regulatory basis that affect the substance of every technology-specific assessment the IAAC has required.

- Tritium emissions: CANDU reactors produce tritium through neutron activation of the heavy-water moderator and coolant. Routine annual tritium discharge from a CANDU unit is of the order of 60,000 TBq per reactor per year. The AP1000 is a light-water reactor with no heavy-water circuit; its tritium discharge is approximately 800–1,000 TBq per reactor per year. The two figures differ by roughly two orders of magnitude. Every tritium exposure assessment, every downstream health burden calculation, and every comparison with the CNSC's own Derived Release Limits is specific to one of these values and cannot be transposed to the other.
- Spent fuel volume and composition: CANDU reactors use natural uranium fuel at low burnup, generating approximately 100–130 tonnes of used fuel per reactor per year. AP1000 reactors use enriched uranium fuel at higher burnup, generating approximately 25–30 tonnes per reactor per year for a comparable output. The waste volume is different by a factor of approximately four depending on the technology chosen. The isotopic composition also differs, affecting shielding requirements, transport specifications, and interim storage design.

- Design basis accidents: CANDU accident analysis is conducted against a pressure-tube rupture model with heavy-water release as a primary concern. AP1000 accident analysis uses a passive safety system model with different initiating events, different release fractions, and a different set of design extension conditions. Emergency planning zone dimensions and off-site dose projections prepared under one design basis are not applicable to the other.
- Cooling water demand: The thermal efficiency and heat rejection profile of the two designs differ, directly affecting the quantitative water demand analysis required by the IAAC's own Summary of Issues and the analysis filed in Show Stopper 28.
- Lifecycle CO₂ emissions: The enrichment requirement for AP1000 fuel introduces a processing stage absent from the natural uranium CANDU fuel cycle. Lifecycle carbon accounting differs between the two technologies as a consequence.

The CNSC Regulatory Position

The CNSC has confirmed, as of March 2026, that it has not yet begun a preliminary assessment of the CANDU MONARK — the technology named in Energy Alberta's IPD. A preliminary assessment under the CNSC's pre-licensing vendor design review process is the earliest stage at which the CNSC forms a view on a reactor design's conformance with Canadian requirements. Without that assessment, no CNSC technical basis exists for evaluating the CANDU MONARK against the regulatory requirements applicable to this site.

The AP1000 completed Phase 2 of its CNSC Vendor Design Review in 2013 — thirteen years before this submission. Phase 3 has not been completed. The CNSC has therefore confirmed that neither technology currently identified by the proponent has a completed Canadian regulatory basis.

Resource Depletion Through Uncommitted Technology Revision

The Participant Funding Program operated by the IAAC is designed for a stable project description against which participants can direct bounded research effort. Where the proponent retains the ability to revise the technology basis of its project without formal amendment and without triggering a fresh participation phase, a structural asymmetry is introduced: the proponent bears no cost from each revision, while every cost is borne by participants who must independently re-analyse a changed set of physical parameters.

Each parameter listed above requires an independent technical analysis from source materials — peer-reviewed literature, CNSC regulatory documents, IAEA safety guides, and engineering reference data. None of these analyses can be transposed from a CANDU to an AP1000 basis. The submitter has completed technology-specific analyses on a CANDU MONARK basis across the submissions filed in this proceeding. If the AP1000 is the technology adopted, those analyses are inapplicable and must be repeated in full. The cost of that re-analysis is caused by the proponent's failure to commit to a technology before the assessment commenced — and by the CNSC's failure to require such a commitment as a condition of pre-licensing engagement.

The IAAC's Public Participation Framework describes capacity to participate in an informed manner as a constituent element of meaningful participation. A participant who has exhausted available research resources on superseded parameters does not have equivalent capacity to engage with a changed technology basis from a standing start. The Participant Funding Program has no existing provision to fund re-analysis caused by proponent-initiated technology changes.

What the IAAC Must Find

The Panel cannot make a positive finding under IAA sections 60 to 63 in respect of a project whose defining physical parameter has not been established. Each statutory assessment required under those sections — adverse effects, public interest, contribution to or hindrance of Canada's environmental obligations — is technology-specific. None can be completed for a project described as either a CANDU MONARK or an AP1000.

Before the assessment proceeds to the Impact Statement phase, the Panel must require Energy Alberta to either commit irrevocably to a single named reactor technology and provide an amended project description incorporating all technology-specific parameters required by Regulation 7, or formally adopt a Plant Parameter Envelope methodology that identifies the outer bound of each relevant parameter across all technologies under consideration and commits to assessing the project against those envelope values. The IAAC must make supplementary participant funding available for any fresh comment period that results.

THE IAAC IS TRAPPED:

Cannot complete the statutory assessments under IAA ss. 60–63 for a project whose reactor technology has not been identified. The project description does not satisfy s. 10 and Regulation 7 in the absence of a technology commitment.

Cannot certify the participation record as satisfying the meaningful participation obligation under IAA ss. 6(1)(h), 11, and 27 where participants engaged with CANDU MONARK-specific parameters on the basis of a project description the proponent has subsequently undermined, without formal notice to participants.

CNSC NEGLECTED ITS DUTY:

Confirmed in March 2026 that it has not begun a preliminary assessment of the CANDU MONARK — the technology named in the proponent's IPD. Phase 3 of the AP1000 Vendor Design Review is also incomplete. Neither technology has a completed CNSC regulatory basis.

Did not require a technology commitment or a formally documented Plant Parameter Envelope before pre-licensing engagement commenced. Did not notify the IAAC or participants when the proponent's commercial position changed in October 2025.

PARTICIPATION RESOURCE DEPLETION:

Each unannounced technology revision requires participants to independently repeat a full set of technology-specific analyses: tritium source terms, spent fuel volumes and composition, accident consequence profiles, cooling water demand, and lifecycle emissions. No element of these analyses is transferable between the CANDU MONARK and the AP1000. The cost is borne entirely by participants; the proponent bears none.

The Participant Funding Program contains no provision to fund re-analysis caused by proponent-initiated technology changes. The submitter has personally completed CANDU-

specific analyses across multiple filed submissions that will require full repetition if the AP1000 is adopted.

Nuclear Waste to Nowhere: No Repository, No Transport, No Plan

Nuclear Fuel Waste Act — IAA s. 22(1)(a) full lifecycle — no licensed disposal pathway — spent fuel in Treaty 8 territory indefinitely

The Waste Endpoint Does Not Exist

Canada has no operating permanent repository for high-level radioactive waste. The only proposed facility — the Nuclear Waste Management Organization's Deep Geological Repository at Ignace, Ontario — was selected as the preferred site on 28 November 2024. Its Initial Project Description was filed with the IAAC on 5 January 2026. The IAAC issued its Summary of Issues to the NWMO on 16 February 2026 — twenty-five days before this submission. The integrated IAAC-CNSC assessment for the DGR has not yet begun. The NWMO's own documentation projects operations from the 2040s at the most optimistic estimate, with fuel placement continuing into the 2080s.

A four-unit Peace River facility operating on CANDU parameters would produce approximately 400–500 tonnes of spent fuel annually — tens of thousands of tonnes over a 70-year operating life. The proponent's IPD contains no waste management plan. The IAAC's Summary of Issues of June 2025 explicitly required one, including alternate waste storage site, long-term containment, transportation risk, and interjurisdictional responsibility. None has been provided. If the AP1000 is adopted, spent fuel is enriched pressurised water reactor fuel — physically different from the CANDU fuel the NWMO's DGR concept is designed for, adding a further layer of uncertainty to a disposal pathway that does not yet exist for either fuel type.

The Court Challenge

On 20 December 2024, the Eagle Lake First Nation filed a court challenge to the NWMO's site selection. If the challenge succeeds, the DGR site selection must restart. Even without litigation, the NWMO's timeline assumes uninterrupted regulatory approvals, no further Indigenous consent challenges, and no design complications — none of which can be assumed on the current record.

The Transportation Gap

There is no identified transportation corridor between the Peace River site and the Ignace DGR — approximately 3,500 kilometres by the most direct route. No rail line connects the two. No interim storage facility has been sited, licensed, or approved for the Peace River region. Spent fuel will remain at the Peace River site in interim storage — in Treaty 8 territory, on the Peace River watershed — potentially into the twenty-second century if no permanent solution materialises.

The Statutory and Charter Position

Section 22(1)(a) of the Impact Assessment Act requires assessment of changes to the environment over the full project lifecycle. Spent fuel with no licensed disposal pathway is not a temporary effect. It is a radiological burden that will persist for thousands of years on the site and in the surrounding watershed. The precautionary principle under IAA sections 6 and 22 applies to threats that are irreversible even if uncertain. Generations of Peace Region Indigenous peoples who have not consented to this facility will live in proximity to interim spent fuel storage with no

permanent solution. The right to life and security under Charter section 7, as interpreted in Carter and Bedford, cannot be satisfied by deferring the waste problem indefinitely.

What the IAAC Must Find

The Panel cannot make a public interest finding on a project whose defining waste stream has no approved disposal pathway, no transportation plan, and no interim storage site. The only proposed DGR's regulatory process commenced twenty-five days before this submission and is subject to active litigation. The Panel must require, as a condition of proceeding to the Impact Statement phase, that the proponent provide a complete waste management plan demonstrating: a confirmed interim storage design and approved site, a licensed transportation pathway, a confirmed DGR acceptance agreement with the NWMO, and a legally binding financial assurance instrument covering full costs.

THE IAAC IS TRAPPED:

Cannot make a public interest finding on a project whose defining waste stream has no approved disposal pathway, no transportation plan, and no interim storage site. Proceeding means deciding that 70 years of spent fuel accumulation in Treaty 8 territory is in the public interest on the basis of a disposal plan that does not exist.

Cannot assess the full project lifecycle under IAA s. 22(1)(a) when the waste endpoint — the DGR — is in early pre-licensing, subject to active court challenge, and designed for a fuel type that may not match the reactor the proponent ultimately chooses.

CNSC NEGLECTED ITS DUTY:

Under the Nuclear Fuel Waste Act and CNSC licensing framework, a proponent must demonstrate a credible and fully funded waste management plan before construction is licensed. The CNSC allowed this project to advance to Impact Assessment without requiring the proponent to address foundational waste management gaps: no licensed DGR, no transport corridor, no interim storage site, no financial assurance for Peace River-specific requirements.

Did not flag the Eagle Lake First Nation court challenge to the DGR site selection as a material uncertainty in its IAAC advisory inputs, nor the consequence for the waste pathway if that challenge succeeds.

Canada's World Heritage Obligation: UNESCO Reactive Monitoring Mission Proceeding Concurrently

World Heritage Convention — UNESCO 2023 SOC Decision 4339 — Alberta-NWT Transboundary Water Agreement — August 2026 In Danger assessment

The UNESCO Standing Requirement

Wood Buffalo National Park — a UNESCO World Heritage Site since 1983 and a Ramsar Wetland — encompasses 4.5 million hectares including the Peace-Athabasca Delta, the world's largest inland freshwater delta. The Park's Outstanding Universal Value depends substantially on the hydrological dynamics of the Peace River. The proposed nuclear facility sits upstream on that river.

UNESCO's 2023 State of Conservation Decision (SOC 4339) confirmed that the Park continues to face significant ascertained and potential threats, in particular as a result of changes in the hydrology of the Peace-Athabasca Delta. It explicitly required Canada to ensure that all major development projects in the PAD watershed are subject to federal impact assessments and specifically address potential impacts on the Outstanding Universal Value of the property before approval. It scheduled a UNESCO/IUCN Reactive Monitoring Mission for August 2026 to assess whether the Park should be inscribed on the List of World Heritage in Danger. That mission is proceeding this August. This IAAC assessment is proceeding now, upstream on the same river.

CONCURRENT RISK:

UNESCO's August 2026 Reactive Monitoring Mission will determine whether Wood Buffalo National Park should be placed on the World Heritage In Danger list. This IAAC assessment is proceeding simultaneously upstream on the Peace River. Any positive public interest finding made on a record that does not address UNESCO's standing requirements would be made while Canada is actively under UNESCO's highest conservation alert for the downstream consequence of exactly this type of Peace River development.

The NWT Government and First Nations Formal Record

On 23 July 2025, the Northwest Territories government wrote formally to the IAAC stating that the draft Impact Statement Guidelines ignore the Alberta-NWT Transboundary Water Agreement — a bilateral instrument obligating both governments to notify each other of developments affecting shared waters. The NWT identified water quality, water quantity, and air quality as primary concerns. In November 2025, Dene National Chief George Mackenzie formally demanded meaningful consultation, stating that the project threatens the integrity of the Mackenzie water basin. Four First Nations — Beaver First Nation, Dene Tha', Little Red River Cree Nation, and Tallcree First Nation — filed joint legal submissions in October 2025 documenting impacts on their Treaty 8 rights throughout the Peace River Corridor.

The Northwest Territories is on a separate electrical grid. It receives none of the benefits of this facility. It receives all of the downstream risks: tritium transport through the Peace River, thermal pollution affecting fish habitat and ice formation, and radioactive contamination pathways to Great Slave Lake and the Mackenzie River Basin in the event of an accident beyond design parameters.

The Treaty-Level Obligations

Canada's World Heritage Convention obligations are binding treaty commitments. UNESCO's 2023 SOC Decision explicitly requires all major PAD watershed projects to specifically address OUV impacts before approval. The Transboundary Water Agreement creates a parallel bilateral obligation. The NWT government has formally documented that it has been breached. A positive finding on a record that has not addressed either obligation is vulnerable to judicial review on treaty grounds independent of all other arguments in this submission.

What the IAAC Must Find

The Panel cannot find this project to be in the public interest while UNESCO's August 2026 mission is actively assessing whether Wood Buffalo National Park should be declared In Danger. The Panel must require a cumulative effects assessment of the project's impacts on the Peace-Athabasca Delta and the Park's Outstanding Universal Value, conducted in consultation with the World Heritage Centre and IUCN, timed so its findings can inform the August 2026 UNESCO mission. The Panel must require the proponent to satisfy Transboundary Water Agreement notification obligations and provide the NWT government and affected NWT Indigenous nations with meaningful participation as affected parties.

THE IAAC IS TRAPPED:

Cannot find this project to be in the public interest while UNESCO's August 2026 mission is actively assessing whether Wood Buffalo National Park should be declared In Danger. UNESCO's 2023 SOC Decision explicitly required all PAD watershed projects to address OUV impacts before approval. The record before the Panel does not address them.

Cannot proceed on a record that ignores the Alberta-NWT Transboundary Water Agreement, breach of which has been formally documented by the NWT government. Both obligations are treaty-level and the Panel cannot waive either.

CNSC NEGLECTED ITS DUTY:

Did not flag UNESCO's 2023 SOC Decision standing requirement in its IAAC advisory inputs. Has not produced any assessment of the proposed plant's effects on the Peace-Athabasca Delta or the Park's Outstanding Universal Value, despite UNESCO's explicit requirement that all major PAD watershed projects address these impacts before approval.

Did not require the proponent to address the Transboundary Water Agreement notification obligations in its project description or Environmental Management Plan, and did not notify the IAAC that those obligations had been identified as breached by the NWT government.

The CNSC Has Formally Refused to Determine Whether the Benefits Outweigh the Harm

IAEA SF-1 Principle 4 — IRRS 2019 Suggestion S9, IRRS 2024 unresolved — CARN v BWXT 2022 FC 849 — IAA ss. 60–63 public interest requirement

The International Justification Standard

IAEA Safety Fundamentals SF-1, Principle 4 requires that for nuclear facilities to be authorised, the benefits they yield must outweigh the radiation risks to which they give rise. This is a precondition for licensing, not a post-hoc consideration. It requires a regulator to determine, before authorising a facility, that the radiation risks imposed on the surrounding population are outweighed by the benefits the facility delivers. It is the foundational justification gate in the international nuclear safety architecture.

The CNSC's Refusal — Twice on the International Record

The IAEA's 2019 Integrated Regulatory Review Service mission found that there is no systematic evaluation of justification for practices involving radiation sources in the CNSC's licensing process. It recommended that the CNSC establish a procedure for systematic justification of all facilities. Canada formally rejected the recommendation, publishing on the CNSC's own website: Not accepted. Parliament has given the CNSC the statutory authority to regulate the nuclear industry in Canada. This is not a substantive response to the IAEA's concern. It is a statement that the benefits-outweigh-harm test does not exist in Canada's nuclear licensing process, and that the CNSC will not be creating it.

The IAEA's June 2024 follow-up IRRS confirmed that Suggestion S9 remains open. The outstanding item is explicit justification of facilities and activities whereby radiation risks must be considered in terms of the overall benefit, in line with IAEA safety standards. Five years and two consecutive review cycles have passed. The CNSC has not moved.

The Federal Court Confirmation

The CNSC confirmed the same position in open court in *CARN v BWXT Nuclear Energy Canada Inc*, 2022 FC 849: the IAEA benefits-outweigh-harm justification standard is not a legal obligation in Canada. The Federal Court's dismissal in that case turned on a finding of no serious or irreversible damages — a finding that is not available in this proceeding. Peace River presents documented above-average cancer incidence of unknown aetiology, INWORKS confirming chronic low-dose radiation effects at community exposure levels, and epidemiological evidence from multiple independently replicated studies associating residence near operating nuclear facilities with elevated cancer rates in the closest proximity subgroup.

The Statutory Trap

IAA sections 60 to 63 require the Panel to determine whether this project is in the public interest, having regard to its health and environmental effects. A public interest determination is a benefits-versus-harms judgment. It is precisely the analysis the CNSC has twice refused to conduct. The CNSC's submission to this Panel will tell the Panel that licence conditions will be met and dose limits will be respected. It will not tell the Panel whether the radiation risks imposed on Peace River residents are outweighed by the project's benefits. That is the dispositive question under

sections 60 to 63. The CNSC has institutionally excluded itself from answering it — on the published international record, in Federal Court, and by the consistent structure of its licensing process.

What the IAAC Must Find

The Panel must find that the CNSC's submission does not constitute a benefits-outweigh-harm assessment and cannot substitute for one under sections 60 to 63 of the Act. The Panel must require an independent justification analysis applying IAEA SF-1 Principle 4, conducted by a body that applies the international standard the CNSC has twice formally refused, before any public interest finding is made. The Panel cannot discharge its statutory obligation by deferring to an institution that has structurally excluded the central analytical step that obligation requires.

THE IAAC IS TRAPPED:

Must make a public interest finding under IAA ss. 60–63. That finding requires a benefits-outweigh-harm analysis. The CNSC has formally refused to conduct one twice before the IAEA and confirmed in Federal Court that it does not apply this standard. The Panel cannot discharge its statutory obligation by deferring to an institution that has structurally excluded the central analytical step the obligation requires.

CNSC NEGLECTED ITS DUTY:

Published a formal rejection of the IAEA's 2019 recommendation to establish systematic justification procedures: Not accepted. That published rejection is on the CNSC's own website. The IAEA's 2024 follow-up confirmed the matter remains unresolved. This is an affirmative policy choice, not an implementation gap. No other G7 nuclear regulator has taken this position on the published international record.

Confirmed in Federal Court in 2022 that the benefits-outweigh-harm test is not a legal obligation in Canada. The same regulator is now the primary health and safety evidence source for a Panel that must make a public interest determination using precisely that test.

No Dose Constraint Exists for This Community: IAEA Non-Compliance in 2019 and 2024, Still Unresolved

IAEA GSR Part 3 Requirement 29 — IRRS 2019 Recommendation R2 — IRRS 2024 unresolved — ALARA without a ceiling — elevated Peace River cancer baseline

What a Dose Constraint Is and Why It Matters

A dose constraint under IAEA GSR Part 3 Requirement 29 is a prospective upper bound on the dose to any individual from a specific facility, established before the facility is designed, used as the ceiling within which ALARA optimisation must operate. It is not the same as a regulatory dose limit. It is a facility-specific design target that must be set before engineering decisions are made, so that the proponent designs to a health-protective ceiling rather than toward whatever the regulator will accept at the licensing stage.

Without a dose constraint, ALARA — the CNSC's central optimisation tool — has no fixed ceiling. It optimises toward whatever the proponent proposes, which may be far above the level a properly set constraint would require. For Peace River, with its documented above-average cancer incidence of unknown aetiology, the absence of a ceiling is not merely a procedural gap. It is a substantive health protection failure for the population most at risk.

Found Non-Compliant in 2019. Found Non-Compliant Again in 2024.

The IAEA's 2019 IRRS mission recommended that the CNSC establish public exposure dose constraints for all Class I nuclear facilities. The 2024 IRRS follow-up confirmed that Recommendation R2 remains open, as dose constraints are not established for all Class I nuclear facilities. The Peace River facility is a proposed Class I nuclear facility. No dose constraint has been established for it.

The CNSC's own response to the 2024 IRRS explains its implementation plan: new requirements will apply immediately for all new applications, but with a phased implementation under which the constraint will be phased in within the timeframes for licence renewal. For a new-build project, this means the constraint will not be set until the construction licence application phase — after the facility design has already been substantially fixed. That is the precise reverse of what IAEA GSR Part 3 requires: the constraint must precede the design, not follow it.

The Elevated Baseline Problem

A dose constraint calibrated to average Canadian population health may be wholly inadequate for a community whose cancer incidence is already above the provincial and national baseline. The IAAC's own Summary of Issues required characterisation of the Peace River region's health baseline precisely because it is not average. If no constraint is set before construction design is fixed, the Panel has no basis for evaluating whether the ALARA process will limit dose to Peace River residents to a level compatible with their existing health situation. An ALARA process without a defined endpoint is not a health protection framework. It is an optimisation exercise with no health standard constraining its conclusion.

What the IAAC Must Find

The Panel cannot accept the CNSC's dose projections as adequate health protection for Peace River residents. Those projections are produced by an ALARA framework the IAEA found non-compliant in two consecutive reviews, specifically because it lacks the dose constraint that gives the framework its health-protective function. The CNSC's own implementation plan confirms the constraint will not be set before construction design is fixed.

The Panel must require the CNSC to establish a site-specific dose constraint for the Peace River facility — calibrated to the community's documented elevated cancer baseline — before any positive public interest finding is made on health grounds. This requirement cannot be deferred to the construction licence phase without defeating the purpose of a dose constraint entirely.

THE IAAC IS TRAPPED:

If the Panel accepts the CNSC's dose projections as adequate health protection, it accepts projections from a framework the IAEA found non-compliant in two consecutive reviews specifically because it lacks the dose constraint that bounds them. The CNSC's own plan confirms the constraint will not be set before the construction design is fixed. There is no point at which the Panel can defer to the CNSC on dose management for Peace River without endorsing a framework the world's nuclear safety authority has twice formally found deficient.

CNSC NEGLECTED ITS DUTY:

Found non-compliant by the IAEA on dose constraints in 2019. Found non-compliant again in 2024. Confirmed its own implementation plan defers the constraint to the construction licence phase — after design is fixed — which is the precise reverse of what IAEA GSR Part 3 requires. Has not established a dose constraint for the Peace River facility and has not disclosed to the IAAC that this foundational element of public dose management is absent.

Did not flag the elevated Peace River cancer baseline as a factor requiring a community-specific rather than population-average dose constraint. The existing ALARA framework operates without a ceiling in a community where the starting health position is already above the national average.

Water Security Over a 100-Year Operating Cycle: The Mandatory Assessment Has Not Been Filed

IAA s. 22(1)(a) full lifecycle — Alberta Water Act — IAAC Summary of Issues June 2025 mandatory requirement — Peace River over-allocation — climate hydrology

The Mandatory Assessment That Is Missing

The proposed facility would draw cooling water from the Peace River throughout a 70-year operating life. No water licence under Alberta's Water Act has been applied for. The IAAC's Summary of Issues of June 2025 explicitly required long-term projections of water quantity and flows in the Peace River watershed based on varying climate change projections, to understand whether sufficient water supply will be available to safely support the plant based on a one-hundred-year operating cycle. That assessment has not been provided. The Panel is therefore being asked to assess a project whose most fundamental operating input — water — has not been demonstrated to be available over the operating period the IAAC itself identified as the relevant timeframe.

The Climate and Cumulative Pressure Context

The Peace River's primary water source is Rocky Mountain snowpack. Climate projections for western Canada consistently show declining snowpack over the facility's operating period across all emissions scenarios. The Smoky-Wapiti sub-basin — the Peace River's primary tributary in the project region — is the most highly allocated sub-basin in the entire Peace watershed. Alberta's Water Act was amended in 2025 to enable inter-basin transfers, which Treaty Chiefs formally opposed as imposing severe cumulative impacts on every watershed in the region. The proposed Wonder Valley AI data centre in the same region adds further water demand to the same over-allocated system.

Nuclear cooling cannot be interrupted for drought conditions. A facility operating at up to 4,800 MWe drawing from a drought-stressed, climatically declining, over-allocated river over a 70–100 year operating period is a water security risk the IAAC has itself identified as requiring quantitative assessment. That assessment does not exist.

The Downstream Cascade

Cooling water returned to the Peace River is warmer than ambient and carries low-level tritium, altering ice formation dynamics, fish habitat seasonality, and the sediment and temperature regime on which the Peace-Athabasca Delta depends. Ice jam flooding is the primary mechanism by which the PAD is periodically replenished. UNESCO's 2023 SOC Decision specifically required assessment of changes in the hydrology of the PAD. Thermal discharge effects on ice formation are a direct pathway between this water security show stopper and the UNESCO obligations addressed in Show Stopper 25. Neither assessment exists in the current record.

What the IAAC Must Find

Section 22(1)(a) of the Act requires assessment of changes to the environment over the full project lifecycle. The proponent's water characterisation covers neither the 100-year timeframe the IAAC's own Summary of Issues identified as mandatory nor the climate projections that

determine whether sufficient water will be available across that period. The Panel has been explicitly told by the IAAC's own preliminary process that this assessment is required. The proponent has not provided it. A Panel cannot proceed to a public interest determination on a record that the IAAC's own Summary of Issues identified as factually incomplete in this specific respect.

The Panel must require: a hydrological baseline study for the Peace River at the project site; long-term flow projections under low, medium, and high-emission climate scenarios over 100 years; a thermal discharge assessment including effects on ice formation, fish habitat, and downstream flow to the Peace-Athabasca Delta; and a Water Act licence application or equivalent confirmation that a licence can be obtained before construction proceeds.

THE IAAC IS TRAPPED:

The IAAC's Summary of Issues declared 100-year climate-adjusted water projections a mandatory component of this assessment. The proponent has not provided them. The Peace River is the most over-allocated watershed in Alberta. No water licence exists. Nuclear cooling cannot stop for drought. The Panel cannot find the project's water impacts acceptable when the mandatory assessment the IAAC itself required has not been filed.

Cannot complete the s. 22(1)(a) lifecycle assessment for a project whose primary operating input over a 100-year period has not been demonstrated to be available under the climate scenarios that will govern the back half of that operating period.

CNSC NEGLECTED ITS DUTY:

Did not require the proponent to demonstrate that a Water Act licence can be obtained before recommending the project for Impact Assessment. Did not require the proponent to address the 100-year operating cycle water security assessment that the IAAC's own Summary of Issues identified as mandatory. These are foundational due diligence failures at the pre-licensing stage.

Has not produced any assessment of thermal discharge effects on the Peace-Athabasca Delta ice regime, despite UNESCO's 2023 SOC Decision explicitly requiring assessment of changes to PAD hydrology from Peace River developments, and despite the CNSC's role as the primary environmental technical adviser to the IAAC.

Proponent Technology Revision After Commencement: The Prior Participation Record Cannot Be Rehabilitated

IAA ss. 6(1)(h), 11, 27 — participation conducted on a superseded technology basis — structural invalidity of the planning phase record — FPIC implications

The Legal Proposition

This Show Stopper is analytically independent of Show Stopper 23. It does not depend on a finding that the current project description is deficient under section 10 or Regulation 7. It addresses a prior question: whether the participation record already produced in the planning phase satisfies the IAA's meaningful participation obligation, given that the factual basis on which participants were invited to engage has since been materially altered by the proponent's own commercial conduct.

The distinction matters because it bears directly on the legal status of the Panel's report. If the Panel were to require a technology commitment today and invite further submissions, those submissions would satisfy the meaningful participation obligation going forward. They would not make the prior record valid. A Panel report that rests in part on planning phase submissions addressing a technology the proponent has since moved away from is a report that rests on a participation record built against a project that may not be built.

How the Participation Record Was Built

Energy Alberta filed its Initial Project Description in April 2025 naming the CANDU MONARK as the proposed reactor technology. The IAAC issued its Summary of Issues in June 2025, requiring Energy Alberta to address, among other matters, the management of tritium emissions specific to CANDU heavy-water reactors, the volume and isotopic composition of CANDU spent fuel, CANDU-specific design basis accident consequences, and long-term cooling water demand on CANDU thermal parameters. Participants who responded to those requirements addressed CANDU MONARK parameters because the regulatory process identified those as the parameters requiring assessment. Their submissions were not CANDU-specific by discretion. They were CANDU-specific because that was what the process asked for.

On 21 October 2025, Energy Alberta signed a Memorandum of Understanding with Westinghouse Electric for the AP1000 reactor. This agreement was not disclosed to participants through any formal process notice. No amendment to the project description was filed. No direction was issued by the CNSC or the Agency that existing submissions should be revised or supplemented in light of the changed technology position. The assessment was suspended at Energy Alberta's request in August 2025 and resumed in March 2026 with no technology commitment in place.

The Statutory Obligation and How It Fails

Section 6(1)(h) of the Act declares as a purpose of the legislation that opportunities be provided for meaningful public participation. Sections 11 and 27 require the Agency to ensure that the public is provided with an opportunity to participate meaningfully in the planning phase and in the impact assessment itself. The Agency's Public Participation Framework identifies three constituent elements of meaningful participation: participants must have the information they need; they must have the capacity to participate in an informed manner; and the process must be fair and open.

None of these elements was present for participants who responded to the June 2025 Summary of Issues. Participants did not have the information they needed because the project description named a technology the proponent was simultaneously in commercial negotiations to replace. Participants could not participate in an informed manner because the physical basis of the project was changing while submissions were being prepared. Submissions addressing CANDU tritium emissions, CANDU spent fuel volumes, and CANDU accident scenarios do not influence the assessment of an AP1000 project. The participation right was formally extended; it was substantively expended on a project that may not be built.

Why Subsequent Process Does Not Repair the Prior Record

The planning phase participation record is complete. The Panel cannot re-open the planning phase. Further submissions in the assessment phase will supplement the record but will not remove the planning phase record from it. The Panel's report must account for both. To the extent the report rests on planning phase submissions that addressed a superseded technology, it rests on a participation record that does not satisfy section 11 of the Act. That deficiency is not cured by the quality of subsequent process.

The capacity problem is also not resolved by a further comment period. Participants who directed their available resources toward CANDU-specific analysis during the planning phase do not emerge from that process with equivalent capacity to repeat the same work on an AP1000 basis. The Participant Funding Program issued finite funding for finite phases. The compounding risk is equally relevant: the proponent has not committed to a technology. It retains the ability to revise its position again at any point in the remaining assessment. Each revision depletes participant capacity further. The only mechanism that closes this loop is a Panel-ordered technology commitment before further participation is solicited.

The FPIC Dimension

Section 35 of the Constitution Act and Bill C-15 incorporating UNDRIP require Free, Prior, and Informed Consent from affected Indigenous peoples before the approval of projects affecting their lands and health. Free, Prior, and Informed Consent requires that the information on which consent is based be accurate and complete. Nineteen First Nations and Métis communities are formally listed in the IAAC's Indigenous Engagement and Partnership Plan for this assessment. Consent to a CANDU MONARK project is not, as a matter of law, consent to an AP1000 project. The radiological profiles, waste streams, and site-specific operational impacts differ materially. If the proponent changes technology, the consent basis must be re-established. The current record does not support a finding that any Indigenous consent given during the planning phase remains valid for a project whose physical character may change after that consent was given.

The Plant Parameter Envelope Alternative

OPG's proposed Wesleyville project adopted a Plant Parameter Envelope methodology from the outset of its assessment. Under that approach, OPG identified the outer bound of each relevant parameter across all technologies under consideration and committed to assessing the project against those envelope values. Participants engaging with the Wesleyville process were informed from the first document that they were assessing an envelope, not a named design. Their submissions addressed parameters that remained stable irrespective of the technology eventually selected. Nothing was wasted when the technology was later identified.

Energy Alberta's assessment proceeded on the opposite basis. A technology was named. Technology-specific participation was solicited against that named design. The proponent then entered a commercial agreement suggesting the named design may be replaced, without

adopting an envelope methodology and without notifying participants. The planning phase record was built on parameters that may be superseded. The distinction is not procedural formality. It is the difference between a participation record that remains valid across technology changes and one that does not.

What the IAAC Must Find

The Panel cannot certify the planning phase participation record as satisfying the meaningful participation obligation under IAA sections 6(1)(h), 11, and 27. The record was built against a CANDU MONARK project description that the proponent materially altered through the Westinghouse MOU of October 2025, without formal notice and without adopting a parameter envelope that would have preserved the analytical value of participant submissions.

The Panel must require Energy Alberta to commit to a single named technology — or to formally adopt a documented Plant Parameter Envelope equivalent to the Wesleyville model — before further participation on technology-specific matters is invited. The IAAC must make supplementary participant funding available for a fresh or supplementary comment period. The Panel should recommend that the IAAC establish a policy applicable to all future nuclear impact assessments requiring that no planning phase comment period addressing technology-specific parameters be opened until the proponent has either committed to a named technology or formally adopted a documented Plant Parameter Envelope. The absence of such a policy has created a systemic risk, visible across multiple concurrent Canadian nuclear assessments, that participation records will be built on uncommitted technology descriptions.

THE IAAC IS TRAPPED:

Cannot certify the planning phase participation record as satisfying IAA ss. 6(1)(h), 11, and 27. The record was built against a CANDU MONARK description that the proponent undermined through the Westinghouse MOU without notice to participants. Subsequent process supplements but does not repair the prior record.

Cannot issue a Decision Statement that rests in part on planning phase submissions addressing a project description the proponent has since partially abandoned. Cannot treat any Indigenous consent given during the planning phase as valid for a project whose physical character changes after that consent was given.

CNSC NEGLECTED ITS DUTY:

Did not require a technology commitment before pre-licensing engagement commenced. Did not advise the IAAC when the proponent's commercial position changed materially in October 2025. Confirmed in March 2026 that it has not begun a preliminary assessment of the CANDU MONARK — meaning the CNSC cannot provide a technical basis for the CANDU-specific assessments participants have already completed and filed.

Has not established a pre-licensing engagement policy requiring technology commitment or a documented Plant Parameter Envelope before public participation on technology-specific matters commences, creating a systemic risk of participation record invalidity across multiple concurrent Canadian nuclear assessments.

PARTICIPATION RESOURCE DEPLETION:

The mechanism of resource depletion is structural. The proponent controls the timing and content of technology revisions. Participants do not. Each revision imposes a full independent re-analysis burden across at least five parameter categories with no element transferable from the prior technology. The better-resourced party in this process controls the scope of the research burden imposed on those opposing the project.

The Participant Funding Program has no provision to fund re-analysis caused by proponent-initiated technology changes. Participants who exhausted planning phase resources on CANDU-specific analysis face the choice of repeating that work at personal cost on a changed technology basis, or withdrawing from the assessment. Neither outcome serves the IAA's meaningful participation objective.

IAAC COMPLAINT ADDITIONS

Energy Alberta Peace River Nuclear Power Project — Registry #89430

A Formal Submission to the Impact Assessment Agency of Canada
Registry #89430 — Energy Alberta Peace River Nuclear Power Project

March 2026

SHOW
STOPPER
30

A PROCESS REDUCED TO A MOCKERY

How Energy Alberta treated the Statutory consultation process with disdain, how the CNSC participated and enabled this disdain and how the IAAC allowed it to happen

The Impact Assessment Act does not contemplate a proponent that treats the statutory process as a commercial convenience. It does not contemplate a national nuclear regulator that provides technical evidence to a quasi-judicial panel for determinations it knows its own institutional posture precludes it from supporting. And it does not contemplate an assessment agency that watches both of those things happen while continuing the assessment as though nothing has gone wrong. The Act is built on the assumption that these three things cannot happen simultaneously because the system of statutory obligations, disclosure requirements, and procedural safeguards that the Act establishes would prevent it.

In this proceeding, all three have happened simultaneously. Energy Alberta has treated the process with contempt across seven documented acts. The CNSC has participated in and enabled that contempt by providing a regulatory imprimatur that Energy Alberta's conduct did not deserve and by staying silent when its section 18 disclosure obligations required it to speak. The IAAC has allowed both — watching a proponent make undisclosed technology shifts, ignore mandatory information requirements, and disregard binding treaty obligations, while the Agency's primary technical adviser said nothing, and while the Agency itself continued the assessment.

For the Peace River community — a Treaty 8 community already carrying an elevated and unexplained cancer burden, 30 kilometres from the proposed site — the combined effect of these three institutional failures is not a series of remediable procedural gaps. It is the systematic reduction of the only statutory process designed to protect their health and rights into a proceeding that has the form of an impact assessment and lacks its substance. This Show Stopper documents all three failures, in order, and explains why the process they have jointly produced cannot result in a lawful or defensible outcome.

ENERGY ALBERTA'S SEVEN ACTS OF PROCEDURAL DISDAIN — SUMMARY

Each of the following acts is independently sufficient to invalidate the assessment record. Part One addresses them in full. Parts Two and Three address how the CNSC enabled each act and how the IAAC permitted it.

EA Act 1 — Filing a Project Description for a Technology With No Regulatory Basis

Named the CANDU MONARK in April 2025. At the time of filing the CNSC had not begun even a preliminary VDR assessment of this design. No Canadian regulatory basis existed. Every participant directed their effort toward a project the CNSC had never assessed.

EA Act 2 — Signing a Competing Technology MOU During a Live Assessment Without Notice

Signed a Memorandum of Understanding with Westinghouse Electric for the AP1000 on 21 October 2025, during the live assessment, without filing an amended project description, without notifying participants, and without adopting a Plant Parameter Envelope to preserve the value of existing submissions.

EA Act 3 — Using the Assessment Suspension as Cover for an Undisclosed Technology Shift

Requested the assessment suspension in August 2025, used the suspension to negotiate and sign the Westinghouse MOU in October 2025, and allowed the assessment to resume on 2 March 2026 without any disclosure to participants.

EA Act 4 — Filing Without a Waste Management Plan Despite Explicit Mandatory Requirements

The IAAC's June 2025 Summary of Issues explicitly required a complete waste management plan. Energy Alberta filed nothing. No disposal pathway, no transport plan, no interim storage site, no financial assurance.

EA Act 5 — Filing Without the Mandatory 100-Year Water Security Assessment

The Summary of Issues required 100-year climate-adjusted water projections. Energy Alberta provided a single static flow figure. No Water Act licence application exists. The mandatory assessment does not exist.

EA Act 6 — Ignoring UNESCO Treaty Requirements and the NWT's Formal Transboundary Notification

UNESCO's 2023 SOC 4339 requires OUV impact assessment before approval of any major PAD watershed project. The NWT government formally documented Transboundary Water Agreement breach in July 2025. Energy Alberta addressed neither.

EA Act 7 — Filing a Cancer-Only HIA Against the Wrong Baseline for the Wrong Community

Filed a health impact assessment covering one of seven statutory endpoint categories, against a generic national baseline, for a community whose cancer incidence already exceeds that baseline for reasons that have never been explained.

PART ONE: ENERGY ALBERTA'S SEVEN ACTS OF PROCEDURAL DISDAIN

The Impact Assessment Act establishes a quasi-judicial process that carries legal obligations for every participant. A proponent in this process is not merely providing information — it is a party to a proceeding whose integrity and completeness depend on its candour, its compliance with mandatory requirements, and its respect for the participation rights of every other party. Energy Alberta has met none of these obligations. Across seven documented acts, it has turned the statutory process into a vehicle for commercial advancement while stripping from it the protective content the legislature required.

1.1 Filing a Project Description for a Technology With No Regulatory Basis

Energy Alberta filed its Initial Project Description in April 2025 naming the CANDU MONARK reactor. At the time of filing, the CANDU MONARK had no Vendor Design Review — not even a commenced preliminary assessment — in Canada. AtkinsRéalis had entered only a preliminary 'special project' arrangement in October 2024 to plan what a future VDR might look like. This is the most preliminary stage of pre-licensing engagement imaginable. It produces no regulatory assessment of the design, no source term, no safety case, and no basis for any technical finding the CNSC would make in a Panel submission.

The CNSC confirmed in March 2026 — eleven months after the IPD was filed — that it had not begun a preliminary VDR assessment of the CANDU MONARK. Every participant in the planning phase had, by then, directed months of research effort, including publicly funded Participant Funding Program resources, toward a design the CNSC had never assessed. The project description satisfied the physical form of the section 10 requirement while being substantively hollow: it named a technology for which no Canadian regulatory foundation existed and gave no indication that this was the case.

ENERGY ALBERTA'S CONDUCT:

Named a reactor technology with no Canadian regulatory basis in its project description, without disclosure, directing the entire planning phase toward a design the CNSC had never assessed. The planning phase record built against this project description was built against a regulatory phantom.

1.2 Signing a Competing Technology MOU During a Live Assessment Without Notice

On 21 October 2025, six months into the IAAC process, Energy Alberta signed a Memorandum of Understanding with Westinghouse Electric to explore deploying AP1000 pressurised water reactors at the Peace River site instead of the CANDU MONARK. The CANDU MONARK and the AP1000 are not design variants. They are categorically different configurations: different fuel type, different coolant, different moderator, tritium outputs two orders of magnitude apart, spent fuel volumes differing by a factor of approximately four, incompatible accident scenarios, and different cooling water demands.

Energy Alberta filed no amended project description. It issued no process notice. It did not adopt a Plant Parameter Envelope. It made a commercial decision that retroactively rendered every CANDU-specific submission in the planning phase potentially inapplicable — and made that decision in silence. The participants who had directed their resources toward CANDU tritium volumes, CANDU spent fuel, CANDU accident scenarios, and CANDU dose projections discovered the Westinghouse MOU through sources other than any formal process channel.

ENERGY ALBERTA'S CONDUCT:

Signed a technology MOU with a competing supplier during a live quasi-judicial assessment without amended project description, without participant notice, and without any mechanism to preserve the value of existing submissions. Made the most consequential undisclosed commercial decision in the proceeding's history and left every other participant to absorb the consequences.

1.3 Using the Assessment Suspension as Cover for an Undisclosed Technology Shift

Energy Alberta requested the assessment suspension in August 2025. The suspension ran until March 2026. The Westinghouse MOU was signed in October 2025 — during the suspension. The assessment resumed on 2 March 2026 with the technology indeterminacy unresolved, no process notice issued, and no supplementary participation opportunity offered. The suspension — granted by the IAAC to accommodate the proponent — was used to advance a commercial negotiation that compromised the entire planning phase record, and was used for this purpose without a word to any participant.

Had the Westinghouse MOU been signed while the assessment was running, rather than during a suspension the proponent had itself requested, the commercial nature of the decision and its regulatory consequences would have been immediately visible. The suspension created a regulatory blind spot in which a technology shift could be made without triggering the process obligations that a mid-assessment commercial change would otherwise require.

ENERGY ALBERTA'S CONDUCT:

Used a suspension it had requested to enter a commercial agreement with a competing technology supplier, then allowed the assessment to resume without disclosing the agreement through any formal channel. The suspension mechanism, designed to protect the integrity of the process, was used as cover for the most serious act of non-disclosure in the proceeding.

1.4 Filing Without a Waste Management Plan Despite Explicit Mandatory Requirements

A four-unit CANDU facility would produce approximately 400 to 500 tonnes of spent nuclear fuel annually — tens of thousands of tonnes over a 70-year life. That spent fuel will be radioactively hazardous for tens of thousands of years. Canada has no operating permanent repository. The NWMO's DGR at Ignace is in early pre-licensing, subject to active court challenge, and designed for a fuel type that may not match whatever reactor Energy Alberta ultimately chooses. The IAAC's June 2025 Summary of Issues explicitly required a complete waste management plan including alternate waste storage site, long-term containment, transportation risk, and interjurisdictional responsibility. Energy Alberta has not provided one.

No waste management plan exists. No transportation corridor — approximately 3,500 kilometres between the Peace River site and Ignace, with no connecting rail line — has been identified. No interim storage site in the Peace River region has been proposed. No financial assurance instrument exists. A mandatory requirement declared by the Agency's own process, published in June 2025, was simply ignored. The Panel is being asked to find the project in the public interest for a facility whose most dangerous output has no destination and no management plan.

ENERGY ALBERTA'S CONDUCT:

Ignored a specific, published, mandatory requirement for a complete waste management plan. Filed nothing on waste disposal, transport, interim storage, or financial assurance. The consequence is that the Panel must make a public interest finding about decades of spent nuclear fuel accumulating in Treaty 8 territory with no plan for where it goes or who pays to manage it.

1.5 Filing Without the Mandatory 100-Year Water Security Assessment

The proposed facility would draw non-interruptible cooling water from the Peace River for 70 to 100 years. The Peace River's primary source is Rocky Mountain snowpack projected to decline across all climate scenarios over the second half of this century. The Smoky-Wapiti sub-basin is the most highly allocated sub-basin in the entire Peace watershed. The IAAC's Summary of Issues declared 100-year climate-adjusted water projections mandatory. Energy Alberta characterised water demand as approximately 0.2% of mean annual flow — a single static figure against a static baseline with no climate adjustment, no drought scenario, and no 100-year projection. No Water Act licence application exists.

The cooling water returned to the Peace River is warmer than ambient and carries low-level tritium. Thermal effects alter ice formation dynamics and the sediment regime on which the Peace-Athabasca Delta's ecology depends. Ice jam flooding is the primary mechanism replenishing the Delta. UNESCO specifically required assessment of Peace River hydrology changes. None of this has been addressed.

ENERGY ALBERTA'S CONDUCT:

Ignored a specific, published, mandatory requirement for a 100-year climate-adjusted water security assessment. Filed a single static flow figure. Applied for no Water Act licence. The Panel is being asked to find water impacts acceptable for a non-interruptible 100-year water user on a declining river without the assessment the Agency declared necessary.

1.6 Ignoring UNESCO's Treaty-Level Requirements and the NWT's Formal Transboundary Notification

UNESCO's 2023 SOC 4339 requires that all major PAD watershed projects specifically address impacts on Wood Buffalo National Park's Outstanding Universal Value before approval. This is a binding treaty obligation Canada assumed before this proponent filed a single document. The Northwest Territories government wrote formally to the IAAC on 23 July 2025 documenting breach of the Alberta-NWT Transboundary Water Agreement. Four First Nations filed joint legal submissions in October 2025. The Dene National Chief formally demanded meaningful consultation in November 2025. UNESCO's August 2026 Reactive Monitoring Mission — to determine whether Wood Buffalo should be placed on the World Heritage In Danger list — is proceeding this year.

Energy Alberta has filed no OUV impact assessment. It has not addressed the transboundary breach. It has not responded to the NWT government's formal notification. It has filed a project description for an upstream Peace River development that treats the standing treaty obligations applicable to all upstream Peace River developments as though they do not exist.

ENERGY ALBERTA'S CONDUCT:

Filed a project whose treaty-level obligations — to UNESCO and under the Alberta-NWT Transboundary Water Agreement — were formally placed on the record by a government party and four First Nations. Energy Alberta has addressed none of them. The Panel is being asked to find a project in the public interest that Canada's own treaty partners have formally identified as breaching bilateral and international obligations.

1.7 Filing a Cancer-Only HIA Against the Wrong Baseline for the Wrong Community

The Peace River region carries a documented above-average cancer incidence of unknown aetiology. The IAAC's Summary of Issues required characterisation of the region's health baseline precisely because it is not average. You cannot calculate adequate incremental risk against a baseline you have not established. Energy Alberta's health impact assessment evaluates cancer as the sole quantitative endpoint — excluding cardiovascular disease, neurological and neurodevelopmental effects, immune system dysregulation, ophthalmic effects, adverse reproductive and developmental outcomes, and mixture interaction effects, all of which have peer-reviewed evidence of association with chronic low-dose ionising radiation.

The assessment calculates incremental cancer risk against a generic national baseline rather than the Peace River community's actual health position. It presents this fraction of the required assessment — one endpoint category out of seven, against the wrong baseline — as adequate health protection for a community whose starting health position makes every assumption in the assessment more consequential than it would be anywhere else in Canada.

ENERGY ALBERTA'S CONDUCT:

Filed a health impact assessment covering one of seven statutory endpoint categories, calibrated against a generic national baseline the Agency's own process declared inadequate, for a community whose cancer incidence already exceeds that baseline. This is not a health impact assessment. It is a cancer risk calculation formatted to look like one.

PART TWO: HOW THE CNSC PARTICIPATED IN AND ENABLED ENERGY ALBERTA'S DISDAIN

Energy Alberta's seven acts did not occur in a regulatory vacuum. At every point, the CNSC was a participant in this proceeding — as primary health and safety technical adviser, as pre-licensing engagement authority, and as a federal authority with a statutory disclosure obligation under IAA section 18. At every point, the CNSC had the authority and the obligation to flag what was wrong. At every point, it chose instead to continue providing Energy Alberta with the regulatory imprimatur that its conduct had forfeited.

The CNSC's participation in and enablement of Energy Alberta's disdain for this process takes six forms, each corresponding to one or more of the seven acts documented in Part One.

2.1 Providing Technical Authority for a Technology It Had Never Assessed — Enabling Act 1

When Energy Alberta filed its IPD naming the CANDU MONARK in April 2025, the CNSC knew — because it maintains its own pre-licensing engagement records — that no preliminary VDR assessment of that design had been commenced. It knew that it had no regulatory basis for the safety case submissions that a CNSC advisory

role in a nuclear assessment requires: no source term, no design basis accident scenarios, no tritium emission profile against Canadian standards. It knew, in other words, that it was being asked to serve as primary technical adviser for a facility whose fundamental regulatory assessment did not exist.

It said nothing. It did not advise the Agency that the project description named a technology for which no CNSC regulatory basis existed. It did not recommend that the Agency require a technology commitment or a commenced VDR before the planning phase opened. It assumed its advisory role and allowed eleven months of assessment to proceed on a technical foundation it knew had not been established. The CNSC's silence on the VDR status of the CANDU MONARK is not an oversight. It is the single most consequential undisclosed fact in this proceeding — a fact that only the CNSC possessed and only the CNSC was positioned to disclose.

CNSC'S PARTICIPATION:

Knew that the technology named in the project description had no Canadian regulatory basis. Said nothing to the Agency. Assumed its role as primary technical adviser and allowed the entire planning phase to be conducted against its authority for a design it had never assessed. Every technical submission the CNSC filed in this proceeding rests on a foundation it knew did not exist.

2.2 Staying Silent When Energy Alberta Changed Its Technology — Enabling Acts 2 and 3

The Westinghouse MOU of 21 October 2025 became publicly known. The CNSC's own pre-licensing engagement records showed the AP1000's VDR status: Phase 2 completed in 2013 against substantially outdated regulatory standards, Phase 3 never completed. The CNSC therefore knew, when the Westinghouse MOU was signed, that the proponent had shifted toward a technology that also had no current completed regulatory basis in Canada.

The CNSC had a mandatory obligation under IAA section 18 to provide the Agency with all information in its possession relevant to the assessment. The VDR status of both technologies is directly relevant. The CNSC did not file a section 18 advisory. It did not recommend that the Agency require a technology commitment or an amended project description before the assessment resumed. When the assessment resumed on 2 March 2026, the CNSC resumed its advisory role without disclosing to the Panel that neither technology the proponent had named had a current completed regulatory basis in Canada, and that it could not therefore provide the safety case submissions that the IAAC's acceptance of the CNSC as primary technical adviser assumed it had established.

CNSC'S PARTICIPATION:

Knew the VDR status of both technologies. Was obligated under IAA section 18 to disclose this to the Agency. Disclosed nothing. Allowed the assessment to resume on a technology-indeterminate record while continuing to provide advisory submissions that assumed a regulatory basis for the project that the CNSC knew had not been established for either technology under consideration.

2.3 Submitting Dose Projections From a Framework the IAEA Found Non-Compliant Twice — Independent of Energy Alberta

This failure is not directly caused by Energy Alberta's conduct, but it is integral to the process being a mockery: the CNSC submitted dose projections to this Panel as adequate health protection for a community with a documented above-average cancer incidence without disclosing that the framework producing those projections was found deficient by the IAEA in two consecutive review cycles — 2019 and 2024 — specifically because it lacks the dose constraint that gives the framework its health-protective function. No dose constraint exists for the Peace River facility. The CNSC's own implementation plan defers the constraint to the construction licence phase, after the design is fixed, which is the precise reverse of what IAEA GSR Part 3 Requirement 29 requires.

The Panel is being asked to find adequate health protection on the basis of a dose framework the world's nuclear safety authority has twice declared deficient for lacking the mechanism that would make the projections health-protective. The CNSC submitted those projections without disclosure. That is not a gap in the evidence. It is a

material misrepresentation to a quasi-judicial body of the CNSC's capacity to provide adequate health protection for Peace River residents.

CNSC'S PARTICIPATION:

Submitted dose projections from a framework the IAEA found non-compliant in 2019 and again in 2024 without disclosing these findings to the Panel. Allowed the Panel to treat those projections as adequate health protection on a record from which the one fact that would prevent that treatment — the IAEA's twice-documented finding that the framework lacks its health-protective mechanism — has been withheld.

2.4 Refusing the Benefits-Outweigh-Harm Test While Advising a Panel That Must Apply It — Enabling the Entire Process

IAA sections 60 to 63 require a public interest determination that is, at its core, a benefits-outweigh-harm analysis. The CNSC formally refused to apply this standard: its published response to the IAEA's 2019 Suggestion S9 states 'Not accepted.' It confirmed the same position in Federal Court in *CARN v BWXT*, 2022 FC 849. The 2024 IRRS follow-up confirmed the matter remains unresolved. The CNSC has therefore been providing primary technical evidence to this Panel for a determination it has formally and institutionally refused to make — without disclosing this to the Panel.

This is not a technical gap. It is a structural misrepresentation of the CNSC's role in this proceeding. A regulator that has refused the central analytical step the Panel's statutory obligation requires cannot serve as the primary evidence source for that obligation without disclosing its institutional exclusion of that step. The CNSC has provided submissions to this Panel that invite deference to its technical authority for a public interest determination whose core component the CNSC has formally declined to apply. Energy Alberta's disdain for this process was enabled, in its most fundamental dimension, by a regulator whose submission to the process was itself constructed on a misrepresentation of its capacity.

CNSC'S PARTICIPATION:

Formally refused the benefits-outweigh-harm test on the published international record twice and in Federal Court. Provided primary technical evidence to a Panel whose statutory obligation requires exactly that test. Did not disclose the exclusion. The Panel is being invited to make a public interest determination by deferring to an institution that has structurally excluded itself from answering the question the determination requires. This is the foundational misrepresentation that makes the entire process a mockery.

2.5 Accepting the Cancer-Only HIA It Designed as Adequate — Enabling Act 7

The CNSC designed the Health Impact Assessment framework that limits quantitative assessment to cancer as the sole endpoint. When Energy Alberta filed a cancer-only HIA, it was filing an assessment built against the CNSC's own framework. The CNSC then accepted that assessment as adequate without requiring the six excluded endpoint categories to be addressed — categories for which peer-reviewed evidence of association with chronic low-dose radiation exists and which the statute requires to be assessed. The CNSC designed the inadequacy, the proponent applied it, and the CNSC then certified the result. This circular process — regulator designs inadequate framework, proponent follows it, regulator accepts it as adequate — is not regulatory oversight. It is regulatory capture expressed as methodology.

Between August 2024 and February 2026, six major peer-reviewed studies were published materially challenging the CNSC's regulatory framework — including INWORKS findings the CNSC acknowledged understated risk by a factor of ten to twenty-eight. The CNSC has not acknowledged these studies to the Panel. It has not updated its risk coefficient. It has not disclosed to the Panel that the framework on which every cancer risk finding in this proceeding rests may be wrong by an order of magnitude.

CNSC'S PARTICIPATION:

Designed a cancer-only HIA framework, accepted Energy Alberta's application of it as adequate, and submitted cancer risk estimates to the Panel based on a framework it acknowledged may understate risk by a factor of ten to twenty-eight without disclosing this to the Panel or updating the framework. The CNSC both created the inadequacy in the health assessment and certified that the inadequacy was adequate.

2.6 Failing to Flag Mandatory Assessment Gaps to the Agency — Enabling Acts 4, 5, and 6

The CNSC is not merely a technical adviser in this proceeding. It is a federal authority with an obligation under IAA section 18 to provide the Agency with all information in its possession that is relevant to the assessment. The absence of a waste management plan is directly relevant to whether the CNSC could form the satisfaction required by NSCA section 24 before issuing any licence. The absence of a water security assessment is directly relevant to the environmental assessment the CNSC would conduct as part of its licensing function. UNESCO's 2023 SOC 4339 standing requirement is directly relevant to any environmental assessment of a Peace River facility. The CNSC possessed all of this information and disclosed none of it.

The CNSC did not advise the Agency that the proponent had ignored the mandatory waste management plan requirement. It did not advise the Agency that the 100-year water assessment had not been provided. It did not disclose UNESCO's SOC 4339 requirements or flag the NWT government's formal Transboundary Water Agreement breach notification. On each of the three most consequential gaps in the assessment record, the CNSC — the institution best positioned to identify them — stayed silent, allowing Energy Alberta's ignoring of mandatory requirements to go unremarked and unremedied.

CNSC'S PARTICIPATION:

Had a statutory obligation under IAA section 18 to advise the Agency of the mandatory assessment gaps. Did not. The mandatory waste management plan, the mandatory 100-year water assessment, and UNESCO's standing treaty requirements were each within the CNSC's knowledge and each relevant to the assessment the CNSC was advising. Its silence on all three allowed Energy Alberta's non-compliance to be treated as non-existent.

PART THREE: HOW THE IAAC ALLOWED ENERGY ALBERTA AND THE CNSC TO PROCEED UNCHECKED

The IAAC is not a passive receiver of submissions. It is a statutory body with authority — and obligation — to control the integrity of the process it administers. Under the Impact Assessment Act, the Agency determines the scope of the assessment, sets the information requirements, certifies the participation record, and makes the determinations that allow each phase to advance. The Agency is, in other words, the institution with the power to stop what this submission documents. It has not stopped it. At each critical juncture — when the technology shifted, when the mandatory requirements went unsatisfied, when the treaty obligations were formally placed on the record — the IAAC allowed the process to continue.

3.1 The IAAC Did Not Require a Technology Commitment Before the Planning Phase Opened

IAA section 10 requires a project description satisfying the Physical Activities Regulations before the assessment commences. Regulation 7 requires identification of the physical components of the designated project. The CNSC's pre-licensing framework — and the example of the OPG Wesleyville project, which adopted a Plant Parameter Envelope from the outset precisely to address this problem — established that a technology commitment, or a formal parameter envelope equivalent, is the mechanism through which a nuclear project description satisfies the substantive content of this requirement. The Agency accepted the CANDU MONARK project description without requiring either. It opened the planning phase on a project description whose

technological premise had no regulatory foundation, and it did not require the one condition — a technology commitment — that would have given the planning phase a basis it could have defended.

IAAC'S FAILURE:

Did not require a technology commitment or Plant Parameter Envelope as a condition of accepting the project description. Allowed the planning phase to open on a project description naming a technology for which no Canadian regulatory basis existed. Every subsequent failure in this proceeding traces, in part, to this initial failure to enforce the substantive content of the section 10 requirement.

3.2 The IAAC Did Not Require an Amended Project Description or Supplementary Process After the Westinghouse MOU

The Westinghouse MOU became publicly known. The Agency was formally told — in the submissions that became SS 23 and SS 29 — that the Westinghouse MOU had rendered the project description indeterminate and the planning phase participation record structurally invalid. The Agency had the authority to require an amended project description as a condition of resumption. It had the authority to require a Plant Parameter Envelope. It had the authority to offer participants a supplementary comment period on the technology indeterminacy. It exercised none of these authorities. It allowed the assessment to resume on 2 March 2026 as though the preceding seven months had produced nothing requiring address.

The Agency resumed the assessment knowing — from its own record — that the planning phase submissions addressing CANDU MONARK-specific tritium, CANDU spent fuel, CANDU accidents, and CANDU dose projections were all potentially inapplicable to the project that might actually be built. It allowed the Panel to inherit this record without requiring the proponent to resolve the indeterminacy that its own commercial conduct had created.

IAAC'S FAILURE:

Was formally told that the Westinghouse MOU had compromised the participation record. Had the authority to require an amended project description and supplementary process as conditions of resumption. Did neither. The assessment resumed on a record the Agency knew was technology-indeterminate, without disclosure to participants, without remediation of the planning phase record, and without any acknowledgement that the factual basis of the assessment had materially changed during the suspension it had granted.

3.3 The IAAC Did Not Enforce Its Own Mandatory Requirements

The June 2025 Summary of Issues is the Agency's formal, published declaration of the information it requires before the assessment can advance. It declared three categories of assessment mandatory: a complete waste management plan, 100-year climate-adjusted water projections, and a Peace River health baseline characterisation. None has been provided. The Agency continued the assessment.

There is no ambiguity in the Summary of Issues on these requirements. There is no suggestion that they are aspirational, or that a lesser submission would be acceptable. They are mandatory. The proponent has not satisfied them. The Agency has not required it to. The Panel is now being asked to make a public interest determination — on waste, on water, on health — without the information the Agency's own process formally declared necessary to make those determinations. The Agency has undermined its own process by failing to enforce its own requirements against the proponent to whom those requirements were addressed.

IAAC'S FAILURE:

Issued mandatory requirements in June 2025. Those requirements were not satisfied. The Agency continued the assessment, allowed the planning phase to close, and resumed the Impact Statement phase without any of the mandatory assessments having been filed. The IAAC has told itself — and through the Summary of Issues, the participants — that it cannot make the required findings without this information. It has then proceeded to seek those findings on a record that does not contain it.

3.4 The IAAC Did Not Address Treaty Obligations Formally Placed on Its Record by a Government Party

The NWT government's July 2025 letter formally placed the Transboundary Water Agreement breach on the record of this proceeding. It is not a comment from a private participant. It is a formal notification from a provincial government that the Impact Statement Guidelines do not address a binding bilateral water agreement. Four First Nations filed joint legal submissions in October 2025. UNESCO's 2023 SOC 4339 requires OUV impact assessment before approval of any major PAD watershed project. All of this was formally before the Agency. The Agency did not amend the Impact Statement Guidelines. It did not require Energy Alberta to address the transboundary breach. It did not require an OUV impact assessment.

UNESCO's August 2026 Reactive Monitoring Mission is proceeding this year. If the IAAC's assessment produces a positive public interest finding before that mission reports, Canada will have approved a major Peace River development while simultaneously under UNESCO's highest conservation alert for the downstream consequences of precisely that type of development. The IAAC has been formally advised of this collision. It has not changed course.

IAAC'S FAILURE:

Was formally told by a government party that the Impact Statement Guidelines ignore a binding bilateral water agreement. Was told by UNESCO's treaty record that OUV impact assessment is required before approval. Did not amend the Guidelines. Did not require the assessments. The process is advancing toward a public interest finding that will have been made while treaty-level obligations formally placed before the Agency remain unaddressed.

3.5 The IAAC Accepted the CNSC's Technical Authority Without Requiring Disclosure of Its Limitations

The IAAC accepted the CNSC as its primary technical adviser throughout this proceeding without requiring disclosure of: the VDR status of either technology; the CNSC's two-cycle IAEA dose constraint non-compliance; the CNSC's formal refusal to apply the benefits-outweigh-harm standard; UNESCO's SOC 4339 standing requirement; or the post-2023 INWORKS literature the CNSC acknowledged understates its risk coefficient by a factor of ten to twenty-eight. On each of these, the CNSC was in possession of information the Agency needed to assess the reliability of the technical advice it was receiving, and the Agency had the authority to require its disclosure.

The consequence is a Panel that has received, through its primary technical adviser, an advisory record that presents safety conclusions without their material qualifications, dose projections without their IAEA non-compliance context, and cancer risk estimates on a framework the adviser has privately acknowledged may be wrong by an order of magnitude. The Panel has been deprived of the information it would need to assess the weight it can give the CNSC's evidence. The IAAC had the authority to prevent this and did not exercise it.

IAAC'S FAILURE:

Accepted the CNSC as primary technical adviser without requiring disclosure of the information that would have allowed the Panel and participants to assess the reliability of that advice. The Panel is making its determination on evidence that has been materially qualified by facts the CNSC possessed, was obligated to disclose, and did not disclose — facts the IAAC had the authority to require and did not require.

CONCLUSION: THE COMBINED EFFECT — AN ASSESSMENT THAT IS A MOCKERY OF THE STATUTORY PROCESS

The Impact Assessment Act was designed to ensure that before a community is permanently committed to living beside a major industrial facility, the evidence has been assembled, the risks have been assessed, the affected communities have been genuinely heard, and the decision has been made on a foundation of reliable information. The Act is demanding precisely because the decisions it governs are irreversible. A nuclear facility approved in error cannot be un-approved. A Treaty 8 community harmed in error cannot be un-harmed.

What has happened in this proceeding is the combined product of three institutional failures operating simultaneously. Energy Alberta treated the statutory process as a commercial vehicle — filing an unassessable project description, making undisclosed technology shifts, and ignoring mandatory information requirements. The CNSC enabled every one of these acts: it provided technical authority for a technology it had never assessed, stayed silent when the technology shifted, submitted dose projections from a non-compliant framework without disclosure, refused the central analytical test the Panel must apply, and stayed silent on every mandatory assessment gap. The IAAC allowed both: it opened the planning phase without enforcing substantive section 10 requirements, did not enforce its own mandatory assessments, did not address treaty obligations formally placed on its record, and accepted the CNSC's advisory role without requiring disclosure of the limitations that made that role unreliable.

The result is not a series of remediable procedural deficiencies. It is a process that has been stripped of the protective content the legislature required. The participation record cannot be certified. The mandatory assessments have not been filed. The treaty obligations have not been addressed. The primary technical adviser has withheld the qualifications that would prevent the Panel from relying on it. The proponent's project has not been defined. On this record, no public interest finding the Panel might make could be lawfully sustained. The process must restart — not because the project could never be approved, but because the process through which approval is being sought has been reduced, by the combined conduct of the proponent, the regulator, and the Agency, to a mockery of the statutory process the Parliament of Canada enacted to protect communities like Peace River.