Submissions Received during Public Consultation of
CNSC Discussion Paper DIS-12-02
Process for Establishing Release Limits and Action Levels at Nuclear Facilities

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VIA EMAIL

June 30, 2012

Mr. Mark Dallaire, Director General
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
280 Slater Street
Ottawa, Ontario K1P 5S9

Dear Mr. Dallaire:

Re: Comments on CNSC DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities

AREVA Resources Canada Inc. (AREVA) appreciates the opportunity to comment on the CNSC Discussion Paper DIS-12-02: *Process for Establishing Release Limits and Action Levels at Nuclear Facilities*. AREVA supports the CNSC efforts to develop a more transparent and consistent regulatory framework, and to incorporate existing standards and guides where available. However, substantive further discussion, and further analyses of the impacts the proposed changes may have on the Canadian uranium mining industry are required to advance changes to the regulatory framework.

Accordingly, please find Schedule A attached outlining AREVA's general comments and specific comments for various sections of the document. We look forward to further engagement in this discussion.

Regards,

Tammy Van Lambalgen
Vice President, Regulatory Affairs & General Counsel

Enclosure: Schedule A

AREVA supports the Canadian Nuclear Association submission:

AREVA participated in the development of the *Canadian Nuclear Association (CNA) Member Comments on the Proposed Process for Establishing Release Limits and Action Levels at Nuclear Facilities* and is supportive of the comments presented. The points outlined below reiterate our support from an AREVA perspective.

Rationale for the development of the DIS-12-02 framework:

At AREVA Resources Canada Inc. (AREVA), our environmental policy recognizes that continued economic and social development depend on a healthy environment and incorporates environmental considerations into all company activities to ensure sustainable development. AREVA is committed to continually improve approaches and technology to minimize the effects of its activities on the environment. As you are aware, at our operating, and planned future facilities, AREVA has undertaken extensive programs to characterize treated effluent releases, and has developed management strategies to control such releases to minimize effects to air quality and surface waters and the aquatic environment. These management strategies are supported by contaminant transport and fate modelling which incorporates local hydrological and atmospheric characterization and environmental transfer factors. The management strategies, contaminant transport and fate models, and site characterization data, including baseline data, are described in environmental assessment documentation, and/or in support of licensing applications. The assessments are undertaken in a conservative manner, and are often subject to follow-up programs to verify the accuracy of the assessments and to determine the effectiveness of the management strategies.

AREVA's overarching view on the proposed DIS-12-02 is to question the rationale for the development of this discussion paper. To ensure alignment with ongoing federal regulatory reform, AREVA suggests the CNSC give further consideration to the federal initiative for reduced duplication through recognizing provincial and federal jurisdiction for regulating environmental performance objectives, including the regulatory processes required prior to commencement of an activity, namely the environmental assessment process. When initiating regulatory response, AREVA suggests the adoption of the 2007 Cabinet Directive on streamlining regulation, which promotes regulation development proportional to the type and degree of risk with open, meaningful and balanced consultations at all stages of the regulatory process. We concur with the priority given to risk, as outlined in CNSC policy and the Cabinet Directive. This concept introduces a two tier alternative to the principles outlined in the discussion document, with a primary focus on risk, and a subsequent optimization process with respect to pollution prevention. This approach should be considered in the development of the principles that form the foundation of this Discussion Paper. It is our view that this priority is not reflected in the discussion document, where risk (the clear mandate of the CNSC Environmental Protection Policy) and pollution prevention appear to be given equal consideration. In relation to risk, AREVA notes the findings of the "*2010 Annual Report on Uranium Management Activities"*. This report was prepared under the CNSC/Environment Canada Memorandum of Understanding and clearly states that the uranium mining sector is operating well below established limits and that the uranium mining industry continues to be top performers within the Canadian mining

sector. AREVA believes that the 2010 Annual Report, considered in conjunction with the CNSC 2009 publication, *"Uranium Mining: The Facts on a Well-Regulated Industry*", supports the questioning of rationale for the development of this discussion paper by the CNSC.

Timing of the development of DIS-12-02:

With the on-going substantial changes to the federal regulatory landscape, AREVA believes that the release of DIS-12-02 does not align well with other ongoing federal initiatives or with some aspects of the recently introduced Federal Government "Responsible Resource Development" Bill C-38. The development of DIS-12-02 will need to take into consideration the recent revisions to the Fisheries Act and outcomes of the 10 year review of Metal Mining Effluent Regulations (MMER), and subsequently, evaluate potential jurisdictional implications.

Additionally, Environment Canada (EC), the CNSC and the Canadian Mining Industry, including the uranium mining sector will need extensive collaboration during the MMER 10 year review process. The expectations of stakeholder involvement parallel those implemented in previous initiatives, such as EC's 2002 revision of the 1977 Metal Mining Liquid Effluent Regulations (MMLER), and the EC/CNSC initiative to finalize the Priority Substance List (PSL2) Assessment of Releases of Radionuclides from Nuclear Facilities (Effects on Non-human biota). Such stakeholder consultation processes, when combined with initiatives such as the EC Chemical Management Plan to conduct a national assessment of selenium and selenium compounds, will ensure that potential risks are managed on a national basis, and avoid the introduction of regulatory disparities between the industrial, mining and nuclear industries. The adoption of such stakeholder consultation processes in the past have demonstrated improved outcomes for both industry and the regulatory community.

Regulatory process and lack of stakeholder consultation:

It is noted in the executive summary of DIS-12-02, that the CNSC "with input from stakeholders, has developed a more transparent regulatory framework for environmental protection at nuclear facilities". However, AREVA supports the view expressed in the CNA members comment document, that the CNSC did not adequately involve stakeholders in the early development of the document. AREVA is disappointed with the lack of transparency and consultation by the CNSC during the two years of the internal development of DIS-12-02. AREVA notes in particular the 2007 Federal Government Cabinet Directive on streamlining regulation. The Directive indicates regulation development proportional to the type and degree of risk with open, meaningful and balanced consultations at all stages of the regulatory process. As noted below, AREVA believes that the CSA standards development process may provide an effective forum for developing the process for establishing release limits and action levels, based on the experience with developing other standards in the N288 series.

Potential segregation of Uranium Mining from Canadian mining industry peers:

With regard to regulatory process, we would like to highlight AREVA's view that the CNSC should harmonize its requirements and maintain consistency with the federal and/or provincial regulatory

requirements which apply more broadly to the mining industry. This consideration is particularly relevant to the regulation of hazardous substances, including those in waste rock and tailings, which are common to different sectors of the mining industry. A recent example is associated with RD/GD-370 Management of Uranium Mine Waste Rock and Mill Tailings which, in AREVA's view did not demonstrate sufficient consideration of the similarities between the uranium mining sector and other sectors. The outcome of the process has resulted in the uranium mining and milling sector being held to a higher standard than our Canadian mining industry peers. Such inequities can have economic consequences for Canada, and with respect to DIS-12-02, we look to the CNSC to ensure that such inequities are not introduced as a result of this current initiative.

The principle of approved Environmental Assessments needs to be acknowledged:

A primary consideration in any regulatory initiative addressing environmental protection is the need for such initiatives to respect the outcomes of the environmental assessment processes conducted under the Canadian Environmental Assessment Act, and its predecessor legislation, the federal Environmental Assessment Review Process Guidelines Order (EARPGO). These pieces of legislation have functioned as the primary legislative planning tools supporting sustainable development in Canada. In many cases, such plans have been subject to extensive federal and/or provincial public reviews, have received federal and provincial government approvals to proceed, and have been implemented as planned. Clearly such facilities need to be managed within the context that they were approved to be developed, with appropriate, ongoing consideration of emerging risks. The Discussion document is currently silent on this fundamental principle, which needs to be formally acknowledged.

Further development of regulation should be deferred to the Canadian Standards Association (CSA) Process:

AREVA suggests that further development of the concepts outlined in this discussion document proceed through a collaborative process for inclusion of all potentially interested stakeholders. The CNSC should consider the Canadian Standards Association (CSA) Nuclear Program as an alternative process which would provide adequate stakeholder involvement and ensure that proper consideration is given to the complex issues incorporated into this discussion paper. The CSA process would result in a consistent methodology for establishing limits and action levels and an effective forum to deal with complex details. Resolution of such details frequently requires an intimate knowledge of process trade-offs and potential risks at a nuclear sector level or even a site specific level. The CSA Nuclear Program would provide a process for such knowledge to be considered in any nuclear facility requirements regarding release limits and action levels.

Release Limits:

AREVA disagrees with various aspects of the regulatory framework outlined in Sections 2 and 3 of DIS-12-02. Currently the document would impose the most stringent application of the exposure based release limit (EBRL) and technology based release limit (TBRL) without consideration of cost-benefit analysis or of the necessary distinction between nuclear and hazardous substances. The adoption of sector specific TBRL from other jurisdictions remains unclear, and requires more definition. Currently uranium mines and mills are regulated under the MMER of the Fisheries Act and associated TBRL with monitoring systems in place through the MMER Environmental Effects Monitoring (EEM) and provincial monitoring programs. AREVA recommends that overlap, or duplication be avoided by adopting the existing MMER as the sector specific limit for uranium mines and mills to maintain consistency with the recent Fisheries Act amendments. There must be consideration of previously accepted and approved environmental assessments conducted through ecological and human health risk assessments. The proposed principles and their application risk substantial expenditure for pollution prevention with no significant environmental benefit, and should further be defined taking economic implications into account. Redefining best available technologies does not provide any advantage to performance beyond that which results from the current practice of continual improvements in operating performance.

The discussion paper includes effluent/emission design objectives (EDOs) that acknowledge economics, but remains silent on cost benefit analysis. The discussion paper defines EDOs as design targets well below levels that represent a risk to health and the environment. AREVA is supportive of EDOs for protection of human health and the environment, and currently utilizes EDOs during the initial project planning and environmental assessment processes. The inclusion of EDOs is inappropriate in the context of this document, where the focus should be limited to the process of establishing release limits and action levels.

In AREVA's view, the purpose of the discussion paper should focus on the intent of the regulatory initiative and its broad principles, and therefore should not propose specific limits without adequate consultation. The inclusion of values within the document intended to outline a process for establishing limits undermines the consultation process. There is lack of supporting rationale, data, or cost-benefit analysis for both the predetermined values and the development/application of the proposed process for establishing release limits.

Action Levels:

The proposal for development of action levels is intended for early identification of conditions which may represent a "loss of control" as described in the discussion paper. A statistical approach based on actual or predicted performance is proposed. AREVA supports the concept of using action levels to provide early warning of potentially adverse performance, but does not support the proposed statistical approach. Actions levels established through a statistical method using the 95th percentile of operating performance would be within the upper normal range and not indicative of potential loss

of control. Action levels established within the upper end of the normal operating range will result in excessive reporting and unnecessary public concern. The proposed approach is overly simplistic, evaluates variables independently, and ignores potential optimization trade-offs. These can only be addressed through dialogue with the operator, and as outlined previously, the CSA Nuclear Program can provide a forum to understand the complex metallurgical and chemical processes that need consideration for optimization. It is noted that setting action levels as low as reasonably achievable (ALARA) is more appropriate for internal administrative levels and would reduce the drive for optimization. There is risk of the action levels becoming sector specific release limits through incorporation within the Licence Conditions Handbook (LCH), and the obligation to report exceedances even when there is no loss of control. Given the recent uncertainties with the administrative monetary penalties (AMPs) introduced in the Nuclear Safety and Control Act (NSCA) revision, AREVA recommends further consideration to the development and application of action levels.

Dose Constraints:

AREVA does not support the use of a dose constraint to establish licence limits for uranium mines and mills, and concurs with the rationale contained in Section 2.1 of the document consolidating the CNA member comments. We also wish to draw what appear to be inconsistencies between the current discussion paper and previous CNSC documents to the CNSC's attention.

Dose constraints proposed by the CNSC do not meet the intended concepts of dose constraints and *de mininus* (trivial) doses. Their introduction in this discussion paper seems to contradict the CNSC comments to the ICRP during the development of ICRP Publication 103.

The ICRP defined the term dose constraint as:

> "A prospective and source-related restriction on the individual dose from a source, which provides a basic level of protection for the most highly exposed individuals from a source, and serves as an upper bound on the dose in optimisation of protection for that source. For occupational exposures, the dose constraint is a value of individual dose used to limit the range of options considered in the process of optimisation. For public exposure, the dose constraint is an upper bound on the annual doses that members of the public should receive from the planned operation of any controlled source" (ICRP 103).

According to the discussion paper, the CNSC is proposing that the upper bound of annual doses from an existing operation should be 50 uSv/year; and 10 uSv/year for new facilities.

However, the CNSC has identified in G-129, *Keeping Radiation Exposures and Doses As Low As Reasonably Achievable (ALARA)*, referenced in this discussion paper, that "the CNSC may consider

that an ALARA assessment, beyond the initial analysis, is not required in the following circumstances: …dose to individual members of the public is unlikely to exceed 50 uSv per year."

That is, according to G-129, the CNSC has previously indicated that the lower bound on the optimization process is 50 uSv/year, often referred to as a *de minimus*, or trivial, dose. Given this context, confusion is created about whether a dose of 50 uSv/year is the upper bound for doses to the public, below which optimization should occur, or whether 50 uSv/year is a value below which further significant efforts to reduce dose are not justified.

Within previous comments on the draft ICRP recommendations, the CNSC recommended an evolution in the application of dose constraints: "Furthermore, the recommendation that dose constraints should be established for all regulated activities is seen as an added regulatory and administrative burden on the regulator and licensees. In the end it is not clear what the value added to a properly operated and managed dose control and ALARA program would be. The concept would make regulatory control and applied radiation protection far more complicated".

A further issue is likely to arise from public perception of the use of dose constraints as proposed in the discussion paper. As written, the proposed dose constraint will be a new limit on public dose. AREVA's experience in risk communication with the public is that values proposed by regulators are intended to protect the public and will be broadly perceived as defining the boundary between safe and unsafe. The CNSC's effective lowering of the public dose limit will not be re-assuring to the public.

The discussion paper indicates that the CNSC performed case studies to evaluate the appropriate dose constraint for CNSC-regulated facilities. However, no details are provided and it is not clear whether any case studies extended to uranium mine and mills. To evaluate the applicability of dose constraints to effluents from uranium mines and mills, the CNSC and industry must consider, together, a number of considerations:

- Assessment of radiological impacts is currently conducted through ecological and human health risk assessment modelling for representative members of maximally exposed groups. Exposure scenarios are developed for hypothetically exposed persons using an abundance of conservatism. Applying dose constraints, as a means to conservatively meet dose limits, will further compound conservatism.
- The proposed dose constraints of 0.05 mSv/year and 0.01 mSv/year are less than the variation in local, background radiation exposure. Incremental doses at this level could not be accurately observed or validated.
- AREVA is unaware of the application of dose constraints on treated effluent at the proposed levels in any other mining jurisdictions worldwide. Will Canada's application of the lowest dose constraints in the world reduce Canada's competitiveness for international investment?

- Effluents from naturally occurring radioactive material (NORM) industries, including non-uranium mining peers in Canada, can exceed the dose constraints proposed.
- The marginal cost of dose reduction below the dose limit relative to the benefits of that expense, considering alternative socioeconomic benefits.
- The evaluation criteria used in environmental and human health risk assessments in determining the absence of significant adverse effects, i.e. are public exposures exceeding 50 uSv/year significant?
- The applicability of the constraint to all pathways involving radiological risks.
- The congruency between public radiation exposure during the operational and post-operational periods, i.e. will post-closure public radiation exposure be constrained to a similar level?
- Is the current process of assessment, planning, continuous improvement and adaptive management deficient in protecting public exposures near uranium mines and mills? What problem is being solved by the application of dose constraints in the uranium mining industry?

AREVA appreciates that the CNSC has conducted an evaluation of case studies and provided a paper for discussion, however the topics identified above are not included in the discussion. AREVA recommends that the CNSC undertakes further dialogue with industry stakeholders to rationalize its proposal on dose constraints. As it now stands, AREVA concurs with the CNSC comments to the ICRP on dose constraints: *In the end it is not clear what the value added to a properly operated and managed dose control and ALARA program would be. The concept would make regulatory control and applied radiation protection far more complicated.*

AECL Atomic Energy of Canada Limited
EACL Énergie atomique du Canada limitée

Programs & Nuclear Oversight
Environmental Protection Program

ENVP-ACNO-12-0010-L
EnvP 12-093
UNRESTRICTED

2012 June 29

Mark Dallaire
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COMMENT ON CNSC DISCUSSION PAPER DIS-12-02 "*PROCESS FOR ESTABLISHING RELEASE LIMITS AND ACTION LEVELS AT NUCLEAR FACILITIES*"

Dear Mr. Dallaire,

The purpose of this letter is to provide comments on CNSC's Discussion Paper DIS-12-02 "*Process for Establishing Release Limits and Action Levels at Nuclear Facilities*", which was issued on February 22, 2012.

AECL has operated with Release Limits and Action Levels for many years with its well established Environmental Protection Program at our sites and our radiological and conventional releases pose no risk to the public or environment. Our radiological releases are a very small fraction of the Nuclear Safety Control Act limit of 1 mSv/a. On this basis, it is not clear why changes are being proposed to how these limits are derived.

AECL has several general comments on the discussion paper, which we believe are reflective of the industry as a whole. Additional details are provided in Attachment 1, which was extracted from a paper prepared through the Nuclear Environmental Affairs Committee of COG.

1. Use of the Canadian Standards Association (CSA) Process.

The existing CSA system provides a strong and proven process through which a consensus based methodology could be developed for release limits and action levels. The CSA process has been used extensively and with good success in recent years with the development of:

- CSA N288.4 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills; and,
- N288.5 Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills; and,
- N288.6 Environmental risk assessments at Class I nuclear facilities and uranium mines and mills.

AECL would support an effort using the Canadian Standards Association (CSA) process.

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2. Inclusion of Proposed Limits.

The inclusion of potential or proposed values is not appropriate for a discussion paper which is intended to be about the *process* to be used for establishing these limits. We suggest that it would be more appropriate that the CSA process be used to develop guidance on dose constraints and that they be developed in accordance with a thorough understanding of available international guidance.

3. Public Communication.

The potential introduction of changes (reductions) in release limits and action levels, may lead to more frequent reporting to the CNSC and therefore an increase in public concern. However, the increased reporting will not be due to any reduction in "safety" or increase in "risk". Therefore, any such changes would need to be preceded by a substantial effort of public communication by the CNSC and licensees to make sure that the public has a good understanding of the reporting level changes.

Please feel free to call Christine Gallagher at extension 43203 or myself at extension 44311 if you have any questions.

Yours Truly,

George M. Dolinar,
AECL's Environmental Protection Program Authority

GD/np

Attachment

c:

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ATTACHMENT I

CANDU OWNER GROUP MEMBER COMMENTS ON DIS-12-02

1. **Document Content** - the document title and body indicate that the content is related to process – a process/framework to establish release limits for nuclear substances and hazardous substances and a process to establish action levels. The document does provide a framework for release limits and action levels. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values takes away from consultation to establish a robust framework and pre-empts the outcome of the process.

2. **Regulatory Framework for the control of releases to the environment** - COG members acknowledge the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance.

The framework presented does **not** do that. It is complex, difficult to understand and not transparent with respect to rationale for many of its aspects. One has to wonder why such radical changes are needed when nuclear facility performance is acknowledged by CNSC to be good to very good, and the proposed framework is unlikely to improve it any more. Furthermore it does not recognize that existing regulation for hazardous substances by the provinces and other federal agencies is more than adequate, and that CNSC does not have to add its own regulation in this area (e.g. it could use equivalency/ substitution/ delegation). The following points highlight our major concerns.

Nuclear substances and hazardous substances are intermingled throughout the document. They need to be dealt with separately in the framework. Their methods of regulation are different and combining them makes the framework overly complex and hard to understand. Perhaps some time in the future they could be combined, but at this stage of development they need to be separate. In addition, the proposed framework does not acknowledge existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC.

Six Principles - for establishing release limits and action levels - are not really "principles". They appear to be a method to justify setting the lowest possible release limit.

Principle 1 - We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment. Processes can then be put in place to look at technology-based limits and site specific limits if the exposure-based release limits cannot be met.

Principles 2 and 3 - Sector-specific technology-based release limits and case-specific technology-based release limits - see the two points above.

Principle 4 "Exposure- based release limits" make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be.

Release limits for nuclear substances - The concept of "**dose constraint**" has been used for some time internationally to make sure that individuals in the public are not exposed to more than the accepted safe dose limit of 1 mSv/year where multiple sources exist or may exist in the future. Dose constraints should **not** be used as they are here to set release limits. COG members recognize the international use of **"dose constraint"** as part of the **optimization process** (consistent with ICRP and

IAEA) **only when needed** to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1mSv per year, **not** as a means to set absolute release limits. Setting release limits by selecting an arbitrary dose constraint value of 0.05mSv/year does not make technical sense, is not in keeping with the intended concept of dose constraint and appears to be prescribing a fixed level for ALARA – As Low As Reasonably Achievable, social and economic factors being taken into account. Moreover, it complicates communicating historical good performance since it is not based on risk and not all COG member companies could meet the release limits based on the proposed 0.05 mSv/year dose constraint.

Principle 5 on "effluent/emission design objectives for new facilities" - design objectives have no place in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents, and again, should be related to risk.

Principle 6 – 'Action Levels" – COG members support and would participate in development of a method to set "action levels" taking into account historical operational data. The action levels need to be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a CSA Standard to provide guidance on developing action levels is the COG member preferred venue. Also the setting of action levels needs to be linked to CSA N288.5 (effluent monitoring), such that only streams requiring monitoring would be considered for action levels. COG members have made progress in development of such a method to set action levels based on operational data which could be used as a seed document for a CSA Standard and would like to discuss this with the CNSC.

  - Specific values have not been proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to the statistical internal administrative levels that are currently used by some COG members to identify to station staff circumstances that needed to be looked into - but are not reportable. For a 0.05 mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels for some licencees (5% DRL vs. 10% DRL).
  - A related point is that the Federal Government has recently announced that it will be implementing **administrative penalties** for environmental exceedances. It is not known at this time how exceeding action levels would be handled … since by definition there would be exceedances.

- **Safe limit for releases of nuclear substances (derived release limits).** The framework is silent on the well established safe limit for nuclear substances of 1mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.
- **Optimization Processes** - ALARA (as low as reasonably achievable, social and economic factors taken into account) appears to be missing from the proposed framework. ALARA needs to be an

integral part of any regulatory framework for the control of releases to the environment. ALARA is an important management tool to reduce the emissions and impact of nuclear substances, and based on the public dose performance to date of COG member facilities, it has been successful. For hazardous substances the concept of "pollution prevention" would be used.

3. Communication of risk and safe levels to the Public

The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and COG member companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

4. Specific Numeric Values "proposed' in the discussion document

Proposed dose constraint of 0.05 mSv/y for existing facilities – should not be included in a framework/process document.
The current license requirement for nuclear power plants for public dose is 1 mSv/y (corresponding activity release limits are calculated using CSA N288.1 methodology). The actual performance for nuclear power plants resulting in a public dose in the range of 0.01 to 0.045 mSv/y was determined from environmental measurements. This level of performance is the result of improvements over the years in station design and management practices (ALARA). Station performance is managed through measured emissions which give more conservative "public dose" numbers (CSA N288.1 methodology) than environmental measurements (which are available only after year-end).

Historical performance of dose to the public by COG member companies is acknowledged to be very good and has been widely communicated to the public – especially neighbouring communities. Changing the release limits against which performance is measured without an identified risk requirement is not acceptable and will complicate and confuse communication of performance and perception by the public of risk.

"Proposed" dose constraint of 0.01 mSv/y as a design objective for new build – should not be included in this framework process document for operating facilities. This level is very low and may in fact dictate technology selection when there is insignificant risk to the public or the environment associated with technologies with slightly higher emissions. Another real concern is that while this is designated as a "design objective" for new build, past experience would indicate it will become the licence limit for new build, and over time, it will be expected of existing facilities.

"Proposed" Tritium in Groundwater Design Objective of 100 Bq/l for new build – should not be included in this framework process document for operating facilities. This proposed value is not in keeping with Health Canada's Guidelines for Canadian Drinking Water (7000 Bq/L) which is based on the recommendations of the International Commission on Radiological Protection and the World Health Organization. The acceptability of 7000 Bq/L was recently reinforced in the Government of Canada response to the Joint Review Panel for the proposed Darlington new build.

All COG member companies have groundwater monitoring programs in place. Historical performance has indicated that at the site boundary groundwater tritium levels are below the safe drinking water

level of 7000 Bq/l. Again, establishing such a very low level for tritium in groundwater of 100 Bq/l, even as a design objective, is a concern because of the tendency of the public to expect this to apply to existing facilities.

5. Building on CSA N288 Successes

Since 2006, COG members have been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. CNA sent a letter to the CNSC reflecting this positive feedback from industry participants. A number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

6. Communication and consultation process

It would have been helpful to involve stakeholders earlier in the development of this document. This document contains many potential changes for stakeholders. Discussion at an earlier stage could have improved the clarity of intent and stakeholders could have provided timely information on impact on operations.

7. Terminology and definitions

Clarity of terminology is required to help communicate risk to the public. A number of terms are used inconsistently throughout the document.

AustralianUranium Association

29th June 2012

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Submission via email: consultation@cnsc-ccsn.gc.ca

Dear Sir/Madam,

Review of the CNSC Draft Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Michael Angwin CEO Australian Uranium Association

The Australian Uranium Association was established in 2006. Its purpose is to represent the uranium industry by articulating the national and global interest associated with Australian uranium exploration, mining and export, as well as by advocating the industry's views to government and the community. The AUA is the only advocacy body that exclusively represents uranium companies in Australia.

The AUA has reviewed the Discussion Paper *"DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities"* because it is likely to have international implications which extend beyond Canada. The nuclear fuel cycle, including uranium mining, is a heavily regulated and tightly interconnected network of industries based on the generation of power from the fission of uranium. Experience has shown that issues which affect one section of the fuel cycle in a specific regulatory region have the capacity to influence other areas and regions well beyond the original regulatory boundaries.

In the AUA review of this Discussion Paper a number of issues were deemed to be significant and should be addressed, including:

- Lack of clarity, within the discussion paper, on whether uranium mining is to be included in this approach, particularly in light of the stated desire for consistency in the summary;
- The use of dose constraints which appear to be inconsistent with international best practice and the recommended approaches to optimisation of radiation protection;
- The use of dose constraints which would be unable to be met in most uranium mining and milling operations – thus presenting the options of either shutting down or spending large sums reducing an already low risk (with no measurable benefit); and
- The recommendation of dose constraints at such a low level of exposure that verification for uranium mining would be extremely difficult or impossible, and that are less than the variation in natural background doses and would likely unnecessarily increase public concerns about extremely low levels of radiation exposure.

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- The use of such a low level for the dose constraint (ie 10 μSv for new build) is not in line with other industries or practise: i.e. if a similar approach was applied to other activities, industries, such as NORM and air travel would be non-compliant.

Although there is an argument that implementation in Canada of the measures proposed in this Discussion Paper could increase the relative competiveness of the Australian Uranium Industry, the AUA is of the view that inappropriate regulatory processes are detrimental to the industry as a whole. The AUA would therefore recommend that the CNSC reconsider the approach proposed in the Discussion Paper. In particular, the indiscriminate use of dose constraints so far below regulatory limits and at a level of exposure below natural background variability should not be progressed and will only have a detrimental impact on the nuclear fuel cycle with no net benefit to the general public. Dose constraints are intended to be situation-specific: what may be appropriate for a research reactor may not be suitable for a uranium mine.

The AUA would be pleased to elaborate on these comments and can provide further information to support the key points made.

Yours sincerely

Michael Angwin
Chief Executive Officer
E: michael.angwin@aua.org.au

Bruce Power™

June 28, 2012

NK21-CORR-00531-09645
NK29-CORR-00531-10164
NK37-CORR-00531-01905

Mr. M. Dallaire
Director General, Regulatory Policy Directorate
Canadian Nuclear Safety Commission
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Dear Mr. Dallaire:

Bruce Power Comments on CNSC Discussion Paper DIS-12-02 –
Process for Establishing Release Limits and Action Levels at Nuclear Facilities

The purpose of this letter is to participate in the discussion initiated by the CNSC through Discussion Paper DIS-12-02: "Process for Establishing Release Limits and Action Levels at Nuclear Facilities" (Reference 1). Bruce Power has deep concerns about the actual framework suggested in the Discussion Paper; however there are many misconceptions about this area that warrant discussion and we welcome the opportunity.

The Discussion Paper focuses on very low level routine emissions. We are proud of our environmental record in this area. The actual emissions from our facilities represent a negligible contribution to the normal background radiation exposure of about 6200 uSv that individuals receive each year on average in Canada. About 3100 uSv of this is due to natural sources. As noted in our annual radiological environmental monitoring program results, the public dose from operation of our facilities is about 1.5 uSv per year or less than 0.03% of the dose from normal background radiation. This implies that the nuclear industry's policy of continual improvement in all areas of safety including environmental safety is largely effective. This is also in line with the current regulatory framework for nuclear substances which seeks to keep exposures As Low As Reasonably Achievable (ALARA), as outlined in the regulatory document G-129, "Keeping Radiation Exposures and Doses As Low As Reasonably Achievable" established by the CNSC.

Bruce Power operates its facilities in accordance with an environmental management system that is ISO 14001 certified. This system is routinely audited by an external agency approved by ISO to maintain the certification. The approach of establishing a management system of programmatic controls to ensure requirements are met is common to all safety areas. This was the first step in moving to a system of Periodic Safety Reviews (PSR). PSRs will formalize a common practice in the Canadian industry of periodically reviewing equipment, system and process performance against modern codes and standards and thereby determining any necessary improvements through a

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risk based evaluation. Environmental equipment and performance is included in the ongoing reviews.

We remain concerned however that despite overall strong environmental performance, public perception often seems to be mixed. Good performance without the perception of good performance is not sufficient. It is our strongly held view that although necessary, regulations alone will never achieve true public confidence. Only through the interaction of: regulations and regulatory limits that clearly focus on the prevention of harm; industry management programs focused on continual improvement and updated through periodic reviews; and public information programs that allow members of the public to make an appropriate judgment on the effectiveness of the environmental programs, will the outcomes of excellent performance and public trust be achieved.

Listed below are the critical characteristics that we believe must be included in each of the three areas.

Regulations

Regulations should be used to set absolute limits and to determine the acceptable operating approach for facilities falling under those limits. Regulations and/or Licence Conditions should:

- Prevent unreasonable risk to the environment.
- Specify release limits that are based on scientific evidence and calculation.
- Incorporate a reasonable amount of conservatism appropriate to the potential impact or risk.
- Ensure an effective performance monitoring process to prevent violation of limits.
- Specify reporting requirements.
- Require periodic review of equipment performance on the same risk based basis for all nuclear safety processes and equipment.
- Require management programs that ensure responsible and optimized management of environmental impacts.
- Ensure harmonization of requirements and reporting between regulatory agencies (both federal and provincial) with overlapping jurisdiction.

Industry Programs

Industry Programs must ensure regulatory requirements are met and that operating performance is not simply managed to meet regulation but is optimized for best performance. These programs should:

- Make adequate provision for protection of the environment.
- Ensure that facilities operate with emission levels that are as low as practical despite operating values that may be well below regulatory constraints.
- Operate on the philosophy of continuous improvement.
- Track, trend and analyze performance.
- Set review, investigation, and action levels.
- Establish internal and external notification levels.

- Provide event response plans.
- Establish regularly scheduled equipment and program reviews.

Public Information Programs

Public perception in a highly technical area can easily be misled either accidentally or intentionally by those with other motives. It is the responsibility of both the regulator and the operator to ensure adequate information is provided in an ongoing manner. Public information programs should:

- Clearly indicate regulatory limits.
- Clearly indicate actual performance.
- Provide information that allows a reasoned judgment of the overall performance of environmental programs.
- Provide the information on an ongoing basis rather than just as a result of an event.

As mentioned above, Bruce Power, while supporting what we believe to be the underlying motive for this Discussion Paper, a continual improvement in performance, has deep concerns with the specific recommendations. We have provided additional details in Attachment A and in summary:

- A significant negative impact in public perception will inevitably follow the increased reporting when action levels are exceeded. These will be perceived as regulatory limit violations even though the levels are set much lower than any expectation of harm to the environment. There will be no way to effectively explain this complexity in the public domain.
- The cost of implementation of many of the recommendations will be excessive especially when compared with the very small improvements possible. The level of discussion in the Paper does not allow a proper impact analysis; however, it is clear that the cost for implementation of the recommendations would be in the tens to hundreds of millions of dollars. For example the mixing zone proposal, while highly desirable from our point of view, would require extensive design changes to the outfall structure, would not improve emissions, and is contradictory to current Provincial regulations in Ontario.
- Routine emissions are well monitored and very low as discussed above. The ongoing monitoring will detect problems long before any significant environmental risk can manifest itself. The negative public perception that is likely from increased reporting at extremely low levels will artificially increase the priority in this area. While this may appear to be desirable it can potentially pull resources from other areas which may in fact be at higher risk. To be effective and in the best interest of safety, resource decisions need to be based on an analyzed need and should not be driven by unreasonably low environmental objectives which do not represent actual risk.
- The issue of multiple regulatory agencies, with overlapping jurisdiction, monitoring the same processes is not properly addressed and a standardized approach needs to be evaluated. We all share the desire and the commitment to ensure environmental safety but it is not reasonable that industry should be required to meet different requirements, file separate reports and be subject to administrative penalties from multiple agencies for the same area of regulation.

- The nuclear industry is moving to a periodic review process that incorporates a holistic review of plant safety and ensures that improvements are implemented in accordance with a risk based analysis. Environment should not be separated from this review process nor should its priority be artificially enhanced.

Bruce Power views the Discussion Paper proposals, although well intentioned, as moving in the wrong direction. The proposed changes will have significant negative impact both on industry and on public perception. These possibly irreversible impacts make it necessary that changes be undertaken with care. We advocate that the spirit of the discussion be pursued further through broader consultation with major stakeholders.

As a company and as individuals who live in our community, we seek always to ensure that the environment is protected, that performance continually improves and that public and regulatory confidence is maintained. There is opportunity to make positive changes such that regulatory requirements are clarified, programs strive for as low as practical and public information is enhanced. Canada can take the lead in the development of an environmental information system that through a partnership between regulators, industry and the public ensures optimal performance and effective information dispersal. Effort will be required from all parties but Bruce Power is ready to participate fully in a discussion of possible improvements and their implementation.

If you require further information or have any questions regarding this submission, please contact Mr. Maury Burton, Department Manager, Regulatory Affairs at (519) 361-5291.

Yours truly,

FOR

Frank Saunders
Vice President Nuclear Oversight and Regulatory Affairs
Bruce Power

cc: CNSC Bruce Site Office (Letter only)
R. Lojk CNSC
R. Jammal CNSC
G. Rzentkowski CNSC
P. Thompson CNSC
T. Jameison CNSC

Attach.

Reference:

1. CNSC Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Attachment A
Bruce Power Specific Concerns DIS-12-02

General

The document title and body indicate that the content is related to process – a process/framework to establish release limits for nuclear substances and hazardous substances and a process to establish action levels. The document does suggest a possible framework for release limits and action levels. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values takes away from consultation to establish a robust framework and pre-empts the outcome of the process.

Regulatory Framework for the Control of Releases to the Environment

Bruce Power acknowledges the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance. Overall the framework presented is complex, difficult to understand and not transparent with respect to rationale for many of its aspects. Such radical changes are not justified in the document. This is more puzzling when current nuclear facility performance is acknowledged by CNSC to be good to very good, and the proposed framework is unlikely to improve it significantly, if at all. Furthermore, it does not deal adequately with the existing provincial and federal regulations for hazardous substances which we view as more than adequate to prevent unreasonable risk to the environment.

Bruce Power's Major Concerns

Nuclear substances and hazardous substances are intermingled throughout the document. They need to be dealt with separately in any framework that is established. Their methods of regulation are different and combining them makes the framework overly complex and hard to understand. The proposed framework does not acknowledge as equivalent existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC. This approach is loading on the back of Licensees additional work because various government agencies want to do it differently and in our view is not appropriate. This issue was specifically addressed in Section 6.2.1 of the Recommendations Report of Red Tape Reduction Committee, which stated "Regulators, in designing and managing their regulatory programs, are not sufficiently taking into account the collective impact of their requirements on businesses."

The Six Principles for establishing release limits and action levels are not really "principles" but appear to be a method to justify setting the lowest possible release limit.

Principle 1 "Adoption of a combined technology/exposure based approach"

We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment.

Principles 2 and 3 – "Sector-specific technology-based release limits (TBRLs) and case-specific technology-based release limits"

Bruce Power believes that TBRLs set far below the level needed for protection of environment and human health are difficult to justify. This is true whether the TBRLs are sector-based or case-specific.

Principle 4 "Exposure- based release limits"

Exposure based release limits on the other hand make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be. The framework is silent on the well established safe limit for nuclear substances of 1 mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.

The equivalency of existing provincial or federal requirements should be acknowledged so there is a single regulator for a given area. It is not acceptable to have double and triple regulations for hazardous substances. Multiple jurisdictions need to find a way of adopting a single set of requirements and avoid making the current undesirable situation worse. With the recent announcement by CNSC of their plans to use administrative penalties in the environment area it will now be possible to receive an administrative penalty from two federal and one provincial agency for the same event. Although DIS-12-02 states that CNSC expects to harmonize regulations to some extent, it needs to be complete harmonization or we will, in practice, have triplication of regulations, monitoring and reporting. Having another government agency setting release limits for parameters that are already regulated appears to go against current Federal Government initiatives.

Dose Constraints, as proposed in this paper, are not used as intended by ICRP/IAEA to ensure members of the public do not receive doses above the public dose limit as a result of exposure to multiple licensed facilities but are used instead to drive release limits to very low levels. Multiple licensed facilities do not exist is some areas.

Principle 5 - "Effluent/emission design objectives for new facilities"

Design objectives have no place in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents, and again, should be related to risk.

Principle 6 – "Action Levels"

Action levels should be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a CSA Standard to provide guidance on developing action levels should be considered. Also the setting of action levels needs to be linked to CSA N288.5 on effluent monitoring to ensure consistent and aligned reporting requirements.

Specific values were not proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to the statistical internal administrative levels that are currently used to identify to station staff circumstances that needed to be investigated. For a 0.05 mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels (5% DRL vs. 10% DRL). Additionally, an Action Level that can change based on a statistical calculation will result in further alarm to the general public, as focus will likely be on the fluctuating limit as opposed to the actual information trying to be communicated.

This proposed fundamental change by CNSC to set action levels just above current operating performance which is at de minimis risk levels would have facilities reporting performance as being close to the limit, whereas in the past the same performance was reported as being 2 or 3 orders of magnitude below the limit. This change will not be readily understood by the public who will now perceive that performance at de minimis risk levels to be of concern.

Ongoing monitoring of system performance is the actual key to success, not action levels. As part of our monitoring process, we establish investigation levels, action levels and notification levels. In our view this has been and continues to be the right approach.

Optimization Processes/Continuous Improvement

The Paper ignores the well established industry practice of ALARA (As Low As Reasonably Achievable). ALARA is the process of continuous evaluation and improvement that industry has used for many years to maintain environmental releases at the very low levels they are today. It is an important management tool used to reduce the emissions and impact of nuclear and hazardous substances. CNSC is seeking to do by regulation what Licensees have done out of our real desire to protect our communities and people. We believe that regulation should be used to set hard limits and as practiced by the industry a programmatic approach should be used to pursue excellence. Regulators already require that Licensees establish and maintain these types of management programs in other areas. We see no performance issue that should drive CNSC to use a different regulatory process for environment than would be used for reactor safety for example.

Public Perception of risk and safe levels

The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and nuclear industry companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

Building on CSA N288 Successes

Since 2006, Bruce Power has been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. The Canadian Nuclear Association sent a letter to the CNSC reflecting this positive feedback from industry participants. A number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

Recommendations

Our general recommendations are as follows:

Set Release Limits to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 (new) Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of 1 mSv/year should be maintained as the safe limit for setting derived release limits.

Manage nuclear substances and hazardous substances separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be.

Recognize and use "dose constraint" as a tool (consistent with ICRP and IAEA) to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1mSv per year not as a means to set absolute release limits.

Action Levels should be used to identify serious adverse conditions needing immediate action and reporting to the regulator.

Implement optimization through Programs to drive ongoing performance improvement and commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable), pollution prevention, and environmental management systems (ISO 14001, S/G-296). Regular optimization program performance reviews would ensure they remain effective.

Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater) have no place in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits to go in licences.

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June 28, 2012

VIA EMAIL

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Dear Mr. Dallaire:

Cameco Response to CNSC Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Further to Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities (the Discussion Paper), please find comments prepared by Cameco Corporation (Cameco) below. We would be pleased to respond to any further questions the Canadian Nuclear Safety Commission (CNSC) may have.

Introduction

Cameco's commitment to environmental protection is defined in our safety, health, environment and quality policy. Cameco recognizes protection of the environment among our highest corporate priorities during all stages of our activities. As such, protection of the environment is one of our four measures of success. Cameco strives to be a leading performer in the areas of safety culture, environmental leadership and operational excellence. Cameco is committed to preventing pollution and continually improving overall performance.

As an example of our success in this regard, the 2010 Annual Report on Uranium Management Activities released by the CNSC and Environment Canada makes the point that "as in past years, the uranium mining sector was the best performing mining sector relative to the *Metal Mining Effluent Regulations* effluent limits, with no exceedances in 2010."

The Discussion Paper proposes a regulatory framework for establishing release limits and action levels at nuclear facilities. As an operator of uranium mines and mills, uranium refining and

conversion facilities and nuclear fuel manufacturing facilities, Cameco will be directly impacted by any actions taken as a result of the Discussion Paper. While Cameco appreciates the opportunity to provide comments on this Discussion Paper, we are deeply concerned with the process being followed and with several substantive aspects of the proposed regulatory framework.

In general, implementation of the Discussion Paper and its proposed regulatory framework will result in a regulatory framework that is more subjective and arbitrary than protective. Effluent limits may be set at concentrations far lower than required to protect human health and the environment, and the Discussion Paper does not contain a cost-benefit analysis to justify this push to lower limits at existing facilities.

Moreover, the Discussion Paper implies that the nuclear industry, as it currently operates, is not safe. This message is a pronounced disconnect from the fact that the nuclear sector in Canada is a leading environmental performer. By proposing to reduce limits to *de minimis* levels, the Discussion Paper also undermines the value to the industry in striving to be an environmental leader in Canada, and would subject uranium mining and processing facilities to standards not expected of similar operations across Canada.

There is a difference in the potential risks from uranium mines, mills and processing facilities as compared to nuclear power plants. Thus, the Discussion Paper would be better structured so as to have a general part applicable to all licensed facilities and then have more specific sections distinguishing between these types of facilities where appropriate, particularly with respect to the proposed dose constraints.

In these comments, we will first discuss Cameco's general concerns regarding the Discussion Paper. We will then outline our specific concerns regarding the proposed regulatory framework and its application. We conclude by offering several recommendations for consideration.

General Concerns

The Process Being Followed by the CNSC is Unsatisfactory

Cameco is troubled with the process followed by the CNSC with respect to the Discussion Paper. Cameco is concerned that this Discussion Paper will become a regulatory document that will then be referenced in subsequent regulations. Our concern in this respect is twofold.

First, regulatory documents have been applied as mandatory requirements as opposed to guidance, as we believe they are intended.

Second, we are concerned that any subsequent regulations will not contain the specifics of the regulatory framework because they will already be established in the regulatory guidance documents that flow from this Discussion Paper. Consequently, review and comment on any subsequent regulations will not be effective or meaningful. Thus in our view, the process being followed to date does not satisfy the requirements for regulation making set down in the 2007 Cabinet Directive on Streamlining Regulation [the 2007 Cabinet Directive] and the *Statutory Instruments Act*. The gap between this policy and actual federal government regulatory practice was identified as a concern by the Red Tape Reduction Commission, which recommended in its

Recommendation Report: *Cutting Red Tape...Freeing Business to Grow* that the government take immediate action to address this gap so that regulations be better targeted, more effective, less costly and more responsive.

The 2007 Cabinet Directive requires the federal government to create accessible, understandable and responsive regulations, based on evidence and the best available knowledge and science. When drafting regulations, the government must determine that the benefits of regulation justify the costs. The federal government is also required to consult, coordinate and cooperate across the federal government, with provincial governments, with businesses and with Canadians. Cameco is concerned that this process is not being and may not be followed.

In particular, a determination of the costs and benefits of a proposed regulation in a regulatory impact analysis statement is required for federal regulations. Cameco is concerned there may not be a process in place for the CNSC to weigh the cost to industry and the economy of achieving compliance with release limits against the expected benefits. By developing regulatory documents that have been applied so as to create mandatory legal obligations through a discussion paper process, the requirement to undertake a cost-benefit analysis involving industry consultation may not occur.

A good example of a regulation-creating process can be taken from the development of the current *Metal Mining Effluent Regulations* (MMER) under the *Fisheries Act.* The process included a three-year study of mine effluent quality and the environmental effects of mining, completed in collaboration with the Mining Association of Canada, environmental non-government organizations (NGOs) and First Nations representatives (the AQUAMIN study). Further, the Canadian Council of Ministers of the Environment also has developed guidelines on stakeholder involvement. After the study was completed, existing federal and provincial regulations were reviewed and a multi-stakeholder workshop was held to consider the recommendations from the AQUAMIN study.

Finally, Cameco is concerned that in developing the Discussion Paper, the CNSC has disregarded its own existing regulatory and guidance documents. More specifically, the Discussion Paper does not reflect the risk-informed principles articulated in the CNSC's Regulatory Policy P-299, *Regulatory Fundamentals*. In addition, the Discussion Paper does not incorporate the principles outlined in Regulatory Policy P-223, *Protection of the Environment*, which speaks to a balanced approach and the need for consultation. Finally, the Discussion Paper does not mention or reflect the CNSC's policy concerning cost-benefit information as outlined in Regulatory Policy P-242, *Considering Cost-benefit Information.*

The Proposed Regulatory Framework will Result in Regulatory Overlap and Duplication

Several CNSC policy documents speak to the need to cooperate with other jurisdictions when setting regulations and implementing environmental protection measures. In addition, the 2007 Cabinet Directive specifically requires that federal departments and agencies consult, coordinate and cooperate across all levels of government when developing regulation. In times of federal and provincial fiscal restraint, it is all the more necessary to reduce overlap and duplication.

The Discussion Paper does not include any analysis of the potential for overlap with provincial or other federal legislation, and does not discuss whether any consultation processes have been undertaken. For example, the CNSC and Saskatchewan have reasonably aligned current effluent emission and reporting requirements that minimize overlap and duplication. In addition, Environment Canada currently regulates effluent for uranium mining and milling facilities. Cameco is concerned that the Discussion Paper will unnecessarily disturb this framework.

Environmental Protection Measures Should be Risk Informed

In Regulatory Policy P-299, *Regulatory Fundamentals*, the CNSC states that it bases regulatory action on the level of risk posed by the regulated activity and makes regulatory decisions in a risk-informed manner. In P-223, *Protection of the Environment*, the CNSC also states that environmental protection measures should be commensurate with the likelihood and significance of adverse environmental effects. Finally, the 2007 Cabinet Directive calls for "decisions based on evidence and the best available knowledge and science."

There is no process in place in the Discussion Paper that ensures the selection of the environmental criteria is informed by considerations of risk. In other words, limits are not derived based on the protection of human health and the environment. Instead, they are derived based on the ability to detect the contaminant (i.e. pollution prevention to *de minimis* levels). This is overly restrictive and not consistent with the environmental protection measures applied by other federal regulators, such as Environment Canada. This is also inconsistent with the requirements of licensees imposed by the *Nuclear Safety and Control Act* (NSCA) – which speaks to "all reasonable precautions".

A prime example within the Discussion Paper of a change that is not risk informed is the proposed dose constraint of 0.05 mSv per year, which will – in our view - become a *de facto* limit. The proposed dose constraint is a concern we will discuss in more detail below.

Release Limits Should Incorporate the ALARA Principle and Include a Cost Benefit Analysis

Cameco is concerned that the proposed regulatory framework for determining release limits does not mention, nor appear to reflect, the as low as reasonably achievable (ALARA) principle. This is contrary to the CNSC's Regulatory Guide G-129 *Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"*, which reflects subsection 4(a) of the *Radiation Protection Regulations* and requires licensees to keep effective and equivalent doses ALARA, after taking social and economic factors into account. Regulatory Policy P-223, *Protection of the Environment* also provides that environmental protection measures should prevent unreasonable risk by keeping all releases to the environment as low as reasonably achievable, social and economic factors taken into account.

As will be further discussed below, Cameco anticipates the application of the proposed regulatory framework may result in the imposition on our operations of future regulatory

requirements for effluent control that are based on "best technology" adopted from other jurisdictions regardless of cost, actual benefit to the receiving environment or applicability to site-specific conditions.

Regulatory Policy P-242, *Considering Cost-benefit Information*, requires the CNSC to consider information on cost and benefits submitted during the licensing process, and during the development of regulatory standards. Cameco is concerned that the Discussion Paper does not reflect this requirement.

Cameco employs best practices and uses ecological risk assessment models to predict the environmental performance of our operations. We do this to predict potential conditions in the receiving environment and, more importantly, to use that information to inform the designs of our pollution mitigation measures. This includes best available technology and techniques, economically achievable (BATEA), as described under Principle #5 of the Discussion Paper.

Principle #5 also notes the ultimate determination on the control is through the regulatory process (i.e. no significant adverse effect determined in accordance with the *Canadian Environmental Assessment Act* (CEAA) and no unreasonable risk determined in accordance with the NSCA). However, under the exposure-based release limit (EBRL) model described in Principle #4, a facility would be compelled to effectively implement best available technology to address *de minimis* releases within the receiving environment, selected at the discretion of the CNSC, regardless of the determination with respect to unreasonable risk.

In its current form, the Discussion Paper challenges the value of being an environmental leader in Canada. As part of Cameco's safety, health, environment and quality policy, Cameco strives for our operations to be beyond compliance. This establishes a high operating bar, and in doing so, ensures that we are able to demonstrate to our shareholders and stakeholders that we operate to the highest standards.

The performance expectations for facilities are established through the environmental assessment process. As such, our performance is driven by efforts to satisfy those environmental assessment predictions, which are set well below compliance levels. This establishes strong credibility with all of our stakeholders, develops a strong social license and adds to shareholder value for Cameco.

The framework in the Discussion Paper sets out to achieve *de minimis* performance as a matter of legal compliance post-environmental assessment as opposed to optimizing performance on an ALARA basis. This creates a paradox: if the operator's legal limits will no longer be risk-based, but instead be set to arbitrarily minimal levels or to the operator's best achievable performance, operators might be inclined not to optimize if the result is further legal restrictions on approved operations. While we recognize that advances in science can change the understanding and requirements, the operator should be afforded the opportunity of due process to adapt to a change before limits are imposed.

The Discussion Paper Does Not Clearly Define a "Limit"

We understand that one of the objectives informing the preparation of the Discussion Paper was increasing clarity around the regulatory framework. The Discussion Paper describes a hierarchy of intertwined concepts that include legislated limits, goals, objectives, criteria, guidelines, technology-based release limits (TBRLs), EBRLs and action limits. Further, Principle #1 may mean the CNSC can select the most stringent number as a "limit" to be ultimately imposed on the operator, regardless of the operator's past performance against legislated limits and regardless of whether it protects human health and the environment. This would seem to be a blurring of the generally accepted understanding of a limit in that it is protective of risks to human health and the environment.

Specific Comments on the Proposed Regulatory Framework

Principle #1: Adoption of a Combined Technology/Exposure-based Approach

The Discussion Paper proposes release limits be established based on effective and demonstrated pollution prevention control technologies or the limits required to meet risk-based and scientifically defensible ambient environmental quality guidelines, whichever are more stringent. The exception would be when an EBRL is not technically attainable and the residual risk does not pose an "unreasonable risk." In such cases, a specific technology-based release limit may be adopted as an interim limit, so long as releases are protective of human health and the environment.

In Cameco's view, this principle should specifically mention ALARA. In addition, these limits would appear to be imposed outside of the environmental assessment process and could result in material implications if the potential pollution prevention measures are not proportionate to a corresponding improvement in reducing the potential risk.

The CNSC is required to consider risk management in several CNSC policy documents;[1] and, in our view, the deferral in Principle #1 to whichever limit is more stringent is inconsistent with this principle. Minimizing release limits far below the level required for protection of human health and the environment should not be the objective of either an EBRL or a TBRL. The protection against risk should be the primary objective.

Principle #2: Sector-specific Technology-based Release Limits (TBRLs)

The Discussion Paper provides that when developing a TBRL, the CNSC will consider any relevant sector-specific TBRLs from other jurisdictions, and will apply the TBRL uniformly across an industrial sector.

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[1] See for example: Regulatory Policy P-299, *Regulatory Fundamentals*; Regulatory Policy P-290, *Managing Radioactive Waste*; Regulatory Policy P-211, *Compliance*; Regulatory Policy P-233, *Protection of the Environment*; and Regulatory Policy P-242, *Considering Cost-benefit Information.*

Again, as a starting point, there is no reference to ALARA as a requirement for the development of a TBRL. While there can be both a scientific and economic rationale for technology-based limits that reflect an industry norm, the Discussion Paper is unclear in setting out the approach that will be taken in developing a TBRL.

On page 7 of the Discussion Paper, TBRLs are referred to as "best practice" but on page 9 they are described as the "most effective demonstrated pollution prevention/control technologies." Cameco is concerned that TBRLs may be selected to represent best-available technology (BAT), which would result in licence limits in situations where BAT is not needed for adequate protection of human health and the environment.

In addition, Cameco is concerned that this process will subject the operator to changing environmental criteria without due consideration as to the suitability or the practicality of the technological constraint to be applied in the sector. Furthermore, caution must be exercised when considering TBRLs from other jurisdictions that may or may not be suitable to our climate and environment, and this is not captured in the Discussion Paper as drafted.

Principle #3: Case-specific Technology-based Release Limits

The Discussion Paper states that if no relevant sector-specific limit exists, the CNSC will consider case-specific technology-based limits, based on a review of an individual plant's existing performance.

The design and operating limits for a facility are approved through the environmental assessment and licensing process. The Discussion Paper appears to suggest that performance better than the approved design would become the regulatory limit, instead of the limit that was previously considered as part of the assessment and licensing process. Further, this would then appear to ignore that the facility's performance would have been assessed and accepted as safe and then validated through comprehensive operational and environmental monitoring programs.

While Cameco recognizes that advances in scientific knowledge may result in the necessity of a lower limit, the operator should be afforded the opportunity to pursue continual improvement rather than have lower requirements imposed when there is no corresponding scientific basis for doing so. Finally, this case-specific principle again does not refer to the ALARA principle.

Principle #4: Exposure-based Release Limits

The Discussion Paper states that the EBRL will be based on attaining federal/provincial environmental quality criteria at the end of an appropriate mixing zone and/or more complex site-specific environmental risk assessments informed by environmental monitoring data.

The Discussion Paper does not clearly set out how the CNSC will determine which federal or provincial environmental quality criteria are to be attained – though Principle #1 strongly suggests that the most stringent jurisdiction will be selected by the CNSC. The document also does not clearly define an "appropriate mixing zone." Which jurisdiction's criteria will be

applied and which mixing zone will be identified both have a material impact on the control measures that an operator would have to implement under the proposed regulatory framework.

Principle #4 leads Cameco to believe that notwithstanding the conclusions of an environmental assessment process, including the socio-economic considerations, there will not be any certainty for an operator as to what criteria they will be subject to in the future irrespective of impacts being accepted and a facility's licence being granted and performance monitored.

Moreover, Principle #4 creates the potential for overlap and duplication with various federal and provincial regulatory regimes. For example, in Cameco's mining operations, effluent discharges are currently regulated under the MMER. As stated above, in its 2010 Annual Report on Uranium Management Activities, the CNSC and Environment Canada reported that the uranium mining sector was the best performing mining sector relative to the MMER, and had no exceedances in 2010. This report provides further confirmation that effluent from the CNSC-licensed mining facilities did not result in a significant risk to the environment in 2010. Given that the uranium sector is the best performing mining sector in terms of effluent quality under the current auspices of the MMER, Cameco questions the need for additional regulatory standards that would demand a much higher degree of control over the uranium mining industry as compared to other metal mines.

Principle #5: Effluent/emission Design Objective for New Facilities

The Discussion Paper proposes that, where feasible, new facilities incorporate BATEA into their designs to attain effluent/emission design objectives.

Principle #5 essentially describes the process already undertaken by the operator in the development of a project description to be put forward for formal consideration in the environmental assessment process. Cameco is concerned that the concept of effluent/emission design objectives will lead to direct CNSC control in the design decisions made for new operations. Rather than direct input or control over an operation's design process, effluent/emission design objectives should be identified through a consultative and transparent regulatory process as was ultimately undertaken for uranium through the Priority Substances List (PSL2) process under the *Canadian Environmental Protection Act, 1999*.

Principle #6: Action Levels to Demonstrate Adequate Control

The Discussion Paper provides that action levels would be used to demonstrate that adequate control of the regulated facility is maintained and would be based on a facility's predicted or actual operating performance. Exceedances must be reported to the CNSC.

With respect to our mining and milling operations, Cameco already has action levels established as required by the *Uranium Mines and Mills Regulations.* Cameco is concerned that, contrary to the *Uranium Mines and Mills Regulations*, the Discussion Paper removes the discretion of the operator to define the conditions that represent a potential loss of control for their facility. The

Uranium Mines and Mills Regulations require an operator to have an Environment Code of Practice. Similarly, the *Radiation Protection Regulations* require an operator to have a Radiation Code of Practice. Both of these regulations and Regulatory Guide G-228, *Developing and Using Action Levels*, create effective regulatory control of potential hazards. The Discussion Paper does not explain why further regulatory control, which removes the discretion and expertise of the operator in setting an appropriate action level, is necessary.

The Discussion Paper suggests that having a consistent approach to developing action levels is the rationale. However, G-228 does provide a consistent approach, allowing licensees to develop action levels and reinforcing that "[a]ction levels are typically site and facility specific." Given the large diversity and complexity of nuclear facilities, the proposed approach is not sensitive to the wide variety of processes it might be applied to. For some it may be appropriate; whereas for others, it may be inadequate or unnecessarily onerous.

Basing action levels on the 95th percentile of a facility's actual operating performance would lead to frequent reporting of low risk, in-plant excursions that are not indicative of a real potential loss of control and lead to misperceptions about the operation of these facilities. In addition, tying these action levels to performance might be a disincentive to continuous improvement on the part of operators.

Finally, Cameco is all the more concerned about the proposed approach given that exceeding action limits may be considered a violation under the soon-to-be-amended *Nuclear Safety and Control Act* and result in the unwarranted imposition of administrative monetary penalties.

Specific Proposals for Dose Constraints

The Discussion Paper proposes a dose constraint of 0.05mSv/y for CNSC-regulated facilities, and a proposed dose constraint of 0.01 mSv/y for new nuclear power plant facilities. The Discussion Paper also proposes that new facilities with tritium releases incorporate an emission design objective of 100Bq/L for tritium in groundwater at the margin of the facility's control area.

Cameco is concerned that the case for a dose constraint has not been established, and further, is of the view that the proposal for a dose constraint of 0.05mSv/y for existing facilities is unwarranted and unachievable. The Discussion Paper does not offer a scientific justification for such a drastic reduction in emission criteria and does not mention ALARA in the discussion of these proposed *de minimis* levels. The proposed reduction is not based on risk management and undermines decades of regulatory and industry effort.

Further, the adoption of such a low dose constraint is not compatible with the International Commission on Radiological Protection (ICRP) system of radiation protection. The CNSC is proposing dose constraints in the range of an exemption level, which is not a reasonable starting point for the start of the optimization process. This is contrary to the intent of the ICRP system of radiation protection. The Discussion Paper incorrectly states that the IRCP has recommended adopting a dose constraint of 0.3 mSv/y. In fact, in ICRP Publication 103, the general dose

constraint for planned exposure situations is $\leq$ 1mSv/y and is situation specific.[2] The reference to a dose constraint of 0.3 mSv/y in ICRP Publication 103 is limited to radioactive waste disposal.[3]

While the ICRP considered adopting a generic value of 0.3 mSv/y for a dose constraint in ICRP Publication 103, the ICRP eventually withdrew this specific numeric recommendation in the face of significant international opposition to the concept of adopting a specific value. In commentary sent to the ICRP in response to this recommendation, the CNSC stated that the ICRP had not provided any argument for the "need, justification or benefit for the additional regulatory control on exposures."[4] The CNSC also stated that "dose constraints have little value over and above the requirement to keep doses ALARA (i.e. to optimize protection)."

In contrast to these statements, the Discussion Paper proposes to effectively equate exemption levels with dose constraints. Clearly, the CNSC has significantly departed from its previous position on dose constraints without defining the "need, justification or benefit for the additional regulatory control on exposures," undertaking a cost-benefit analysis or undergoing industry consultation.

Such a low dose constraint is also not in accordance with recent International Atomic Energy Association (IAEA) guidance on dose constraints. In IAEA Safety Standards Series No. GSR Part 3 (Interim) 2011, the IAEA states as follows:

> *The ICRP recommends a range of dose spanning two orders of magnitude within which the value of a dose constraint or reference level would usually be chosen. At the lower end of this range, the dose constraint or reference level represents an increase, of up to about 1 mSv, over the dose received in a year from exposure due to naturally occurring radiation sources. It would be used when persons are exposed to radiation from a source that yields little or no benefit for them, but which may benefit society in general. This would be the case, for instance, in establishing dose constraints for public exposure in planned exposure situations.*

It is unclear whether the design objective of 0.01 mSv/y will apply to new uranium mines and mills or fuel cycle facilities. However, as written, it would appear to and thus Cameco's concerns deepen. This dose constraint is not realistic for uranium mines and mills and Cameco's uranium mining and milling operations would be challenged to a much higher degree than our fuel cycle facilities in conforming to the proposed radiation dose restraint.

In sum, a dose constraint of 0.05mSv/y is either not achievable, or achievable only at great expense, at uranium mines and mills when there is no need to impose a dose constraint because 1 mSv/y is protective of human health.

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[2] See ICRP 103 Table 5, page 97 and Table 8, page 116.
[3] See ICRP 103, page 105
[4] CNSC Comments to ICRP on Draft ICRP Recommendations submitted September 15, 2006. Available online at: < http://www.icrp.org/consultation_viewitem.asp?guid=%7B7EED4C0B-4C0E-453B-A43D-C1CC19D4E25C%7D>.

Recommendations

1. A joint regulator/industry working group is recommended as a venue for transparent consultation that would include due consideration of:
    a. The definition of the process by which environmental criteria and constraints are selected by the CNSC;
    b. Transparent criteria for the definition of mixing zones;
    c. The applicable technology-based release limits for a sector; and
    d. The costs and benefits of achievable industry limits and action levels.
2. Alternatively, further consultation and discussion with industry in order to develop an approach based on due consideration of the costs and benefits, to ensure that proposed release limits are reasonable and to develop an approach to action levels that effectively indicates a loss of control situation without capturing the upper end of normal operation. Consultation with provincial and other federal agencies is necessary to ensure there is no overlap or duplication in the regulation of effluent. If an overlap or duplication is nonetheless identified, the CNSC should provide a mechanism to accept other frameworks as equivalent. This is a notion that is commonly applied in the US through their Agreement State or Primacy provisions.
3. The approach to release limits should be based primarily on achieving goals of human health and environmental protection, considering site-specific conditions. Allowing a TBRL based on best available technology to drive limits far below what is necessary to protect against potential risks to environment and human health may result in costs that are disproportionate to health and environmental benefits.
4. Any case-specific limits should not be set at levels that are far below those needed for protection of environment and human health. Further, these should be developed in discussion with the operator and should be set at levels that will not be exceeded under normal operating conditions.
5. The approach to EBRLs should recognize that mines are typically located in headwaters of drainage systems where there is little water available for dilution or mixing. The proposed criteria for mixing zones, developed for municipal wastewaters, should be modified to accommodate the realities of mine settings, specifically as they are approved at the time of environmental assessment.
6. In situations where normal performance is below any level of environmental or safety concern, action levels should be set above the range of vulnerability seen in normal operation in order to avoid unnecessary reporting and unwarranted regulator concern.
7. The case for dose constraints has not been established. There is no justification for what will be seen as another limit. If the CNSC wants to impose dose constraints, then sector specific constraints should be developed with input from stakeholders.

Conclusion

Cameco looks forward to further opportunities for consultation with the CNSC on the development of a framework for the establishment of release limits and action levels that will continue to ensure the protection of the environment and human health.

Cameco would be pleased to respond to further questions. Please contact the undersigned at (306) 956-6685 or liam_mooney@cameco.com.

Sincerely,

R. Liam Mooney
Vice-President
Safety, Health, Environment, Quality & Regulatory Relations
Cameco Corporation

LH:sc

c: P. Thompson, P. Elder, J. LeClair, B.R. Ravishankar
Regulatory Records - Cameco

CANADIAN ENVIRONMENTAL LAW ASSOCIATION
L'ASSOCIATION CANADIENNE DU DROIT DE L'ENVIRONNEMENT

June 27, 2012

VIA ELECTRONIC MAIL
< consultation@cnsc-ccsn.gc.ca >
AND ORDINARY MAIL

Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
Ottawa, Ontario
K1P 5S9

Dear Sirs or Mesdames:

Re: Discussion Paper on Process for Establishing Release Limits and Action Levels at Nuclear Facilities – DIS-12-02 – February 2012

The Canadian Environmental Law Association ("CELA") is an Ontario Legal Aid Clinic that uses existing laws to protect the environment and advocates environmental law reforms where appropriate. CELA has participated in numerous hearings before the Canadian Nuclear Safety Commission and in other fora respecting the impacts on human health and the environment arising from nuclear facilities. In this regard, CELA provides the following comments on the above Discussion Paper.

GENERAL

CELA has reviewed the June 2012 submission of the International Institute of Concern for Public Health ("IICPH") on the Discussion Paper and is in general agreement with the concerns expressed by IIPCH.

Beyond this, CELA is unsure at the end of the day whether the CNSC proposes establishing generic emission limits for all nuclear facilities (Principle 1), different emission limits depending on which "sector" is involved (Principle 2), site specific emission limits on a case-by-case basis (Principles 3 and 4), or a combination thereof.

In the experience of CELA in other contexts, we would note that Ontario has established enforceable legal standards applicable to all facilities (air emissions and soil/groundwater contamination), and has moved away from site specific limits only found in individual licences and towards more generically enforceable sector standards (water). Given the gravity of potential exposure to ionizing radiation, the public is better served by a national standard of human health

and environmental protection, and not by ad hoc limits that may differ from one geographic area to another.

In this regard, the Discussion Paper is unclear where the CNSC proposes to land on this issue. A hodge-podge regime of case or site specific limits would not advance the cause of national human health or environmental protection contemplated by the *Nuclear Safety and Control Act*.

SPECIFIC

CELA also wishes to address two specific points raised in the Discussion Paper. These include the adequacy of protections provided by: (1) existing guidelines for tritium in drinking water; and (2) point of impingement standards. These are discussed briefly below

Tritium in Drinking Water

In the course of proposing a 100 Bq/L effluent/emission objective for tritium in groundwater, the Discussion Paper also states that: "It is recognized that the current Canadian drinking water guideline of 7,000 Bq/L for tritium is safe" (Discussion Paper, page 19). Because of the CNSC's reliance on this guideline, the Discussion Paper argues that the 100 Bq/L objective is 100 times lower than the estimated dose associated with the Canadian drinking water guideline (Discussion Paper, page 19, footnote 18).

The problem with the CNSC rationale for the objective, is that the 7,000 Bq/L drinking water guideline for tritium has long been criticized as being too lenient. CELA raised concerns in the late 1990s when Ontario was considering adopting the 7,000 Bq/L Canadian Drinking Water Guideline for tritium as its drinking water objective. CELA noted at that time that the Canadian Drinking Water Guideline for tritium is 350 times higher than the recommendation made by the Ontario government's own Advisory Committee on Environmental Standards ("ACES") in 1994. CELA noted further in its 1999 submission to the province that ACES recommended a standard for Ontario in 1994 of 100 Bq/L that would be phased down to 20 Bq/L within five years. Accordingly, CELA recommended in 1999 that Ontario adopt 20 Bq/L as its drinking water standard for tritium.[1]

The 2012 IIPCH submission also refers to the arguments in this regard including the excess cancer risk per year per million people associated with the Canadian Drinking Water Guideline (350), and the cost achievability of a much lower standard (20 Bq/L), recognized by the nuclear industry itself, and recommended in 2009 by the Ontario Drinking Water Advisory Council.[2]

Accordingly, to the extent that the justification for the 100 Bq/L objective is the 7,000 Bq/L guideline, the CNSC should re-think both.

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[1] Canadian Environmental Law Association, *Comments to the Ontario Ministry of the Environment Regarding the Proposal to Adopt the Canadian Drinking Water Quality Guideline for Radiological Characteristics as an Ontario Drinking Water Objective for Radionuclides* (Toronto: CELA, October 1999). See also Canadian Environmental Law Association "Proposed Tritium Drinking Water Standard Too High Say Groups" (26 October 1999).

[2] Ontario Drinking Water Advisory Council, *Report and Advice on the Ontario Drinking Water Quality Standard for Tritium* (Toronto: ODWAC, 2009).

Point of Impingement Standards

Finally, the Discussion Paper also expresses general support for a point of impingement ("POI") approach for air emissions and release limits from nuclear facilities harmonized with that of Ontario's POI regime (Discussion Paper, page 21). The problem with this approach is that Ontario has long been severely criticized by the Environmental Commissioner of Ontario ("ECO") and others for continued reliance on the POI regime contained in O. Reg. 419/05, under the *Environmental Protection Act*. Facilities must use the dispersion models authorized in the regulation to predict contaminant concentrations at POI anywhere beyond their own property line. In 2005-2006, the ECO reported that continued reliance on a POI approach meant that while the Ontario Ministry of the Environment ("MOE") has some control over short-term *concentrations* of contaminants (measured over minutes or hours), MOE is not directly controlling annual *loadings* of contaminants. According to the ECO, for some types of persistent contaminants that accumulate in the environment, such as mercury or certain organic toxic substances, the annual load to the environment is a parameter with a great deal of significance. Furthermore, the ECO reported that with regard to controlling cumulative loadings of persistent toxic substances over time, Environment Canada noted that MOE will never be able to assess or control cumulative loadings effectively until the POI approach is replaced (ECO, 2005/2006 Annual Report Supplement, pages 78, 83 and ECO, 2005/2006 Annual Report, 94, 96 – emphasis in original).

The ECO also reported at that time that O. Reg. 419/05 does not address the impacts that mixes of various contaminants may have on environment or health. Moreover, the ECO also reported that MOE has itself previously acknowledged that O. Reg. 419/05 needs more work in that "The Regulation does not explicitly deal with background concentrations, cumulative or synergistic effects, persistence and bioaccumulation of contaminants". According to the ECO "These are thorny policy issues as well as complex science challenges, but they cannot be ignored if the ministry's goal is truly as stated, 'cleaner, healthier air, healthier communities and healthier Ontarians". (ECO, 2005/2006 Annual Report Supplement, pages 83, 87 and ECO, 2005/2006 Annual Report, pages 94-95).

In the circumstances, it is hardly precautionary for the CNSC going forward to rely on a regulatory approach that has been tested and found wanting. This too should be re-thought by CNSC.

CONCLUSIONS AND RECOMMENDATIONS

1. A hodge-podge regime of case or site specific limits would not advance the cause of national human health or environmental protection contemplated by the *Nuclear Safety and Control Act*.

2. To the extent that the justification for the proposed groundwater objective is the existing Canadian drinking water guideline, the CNSC should re-think both.

3. It is hardly precautionary for the CNSC going forward to rely on a regulatory approach (the Ontario POI regime for air emissions) that has been tested and found wanting. This should be re-considered by CNSC.

Yours truly,

CANADIAN ENVIRONMENTAL LAW ASSOCIATION

Joseph F. Castrilli
Counsel

June 30, 2012

Mr. Mark Dallaire, Director General
Canadian Nuclear Safety Commission
Regulatory Policy Directorate
280 Slater Street, P.O. Box 1046, Station B
Ottawa, ON K1P 5S9

Attention: Mark Dallaire

Re: Response to Discussion Paper DIS-12-02: *Process for Establishing Release Limits and Action Levels at Nuclear Facilities*

The Canadian Nuclear Association (CNA) has approximately 100 members, representing over 71,000 Canadians employed directly, or indirectly, in exploring and mining uranium, generating electricity, and advancing nuclear medicine. Included among our members are the Class I nuclear facilities, uranium mines and mills and nuclear waste management facilities that will be subject to the requirements outlined in the *Process for Establishing Release Limits and Action Levels at Nuclear Facilities* Discussion Paper, DIS-12-02.

CNA members are committed to environmental stewardship: protecting the land, air and water, both in the communities where they live and work, and globally. To fulfill this commitment, they monitor human health and the environment 365 days of the year, ensuring that both people and the environment (water, air, plants, animals and fish) are protected. CNA members recognize the need to limit releases to the environment and appreciate the opportunity to comment on the *Process for Establishing Release Limits and Action Levels at Nuclear Facilities* Discussion Paper DIS-12-02.

Enclosed are the CNA member recommendations regarding Discussion Paper DIS-12-02. However, our members would also ask that the Canadian Nuclear Safety Commission continue the dialogue with industry stakeholders as the process is developed.

Please feel free to contact me (613-237-4262) if you require any additional information.

Sincerely,

Heather Kleb, M.Sc.
Director, Regulatory Affairs
Canadian Nuclear Association

Cc.
Denise Carpenter, CNA President and CEO
Matthew Hickman, CNA Regulatory Affairs Officer

References

[1] Canadian Nuclear Safety Commission, 2012. *Process for Establishing Release Limits and Action Levels at Nuclear Facilities*, Discussion Paper DIS-12-02.

Process for Establishing Release Limits and Action Levels at Nuclear Facilities, Discussion Paper DIS-12-02

CNA Member Recommendations
2012 June 30

Prepared by Rina Parker and Dr. Don Hart of EcoMetrix Incorporated
on behalf of the Canadian Nuclear Association

The future is NU.

Preface

The Canadian Nuclear Safety Commission (CNSC) is charged by Parliament with regulating nuclear facilities and nuclear activities in Canada in order to protect the health and safety of workers, the public and the environment. Section 9 of the *Nuclear Safety and Control Act* (NSCA) states that the mandate of the CNSC is:

> ***a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to***
>
> ***i) prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use…***
>
> ***b) to disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use referred to in paragraph (a).***

The CNSC has interpreted its mandate for protection of the environment and health and safety of persons to include regulation of both nuclear and hazardous substances. Thus, Section 12 (f) of the *General Nuclear Safety and Control Regulations* requires licensees to: "take all reasonable precautions to control the release of nuclear substances and hazardous substances."

The CNSC, through Discussion Paper DIS-12-02, proposes to implement a more formal framework for establishing release limits and action levels to control releases to the environment (CNSC, 2012a). The stated purpose is to provide greater clarity to licensees and the public on how release limits are determined and to demonstrate that licensees are aware of and responsive to emerging situations where there may be a loss of control in systems or processes.

Canadian Nuclear Association (CNA) members have reviewed DIS-12-02 and have some overall policy concerns with the development and content of the document, as well as more detailed comments. The policy concerns are outlined in this Preface. Specifically, CNA members have concerns about the lack of rationale for lowering the release limits, the lack of consultation in developing and implementing the proposed changes, the perception that the implementation of the proposed limits is a foregone conclusion, the public perception of the changes, and the lack of a cost-benefit analysis for the proposed regulatory changes.

Lack of rationale

CNA members do not believe that there is a clear rationale for development of the CNSC's proposed framework for setting release limits and action levels. According to the CNSC, the objective of the

proposed process is to minimize the overall quantity and concentration of contaminants released to the environment to ensure that Canada's principles of pollution prevention, under the *Canadian Environmental Protection Act*, and the principle of adequate precaution to control releases, under the NSCA are being respected. The existing regulatory framework for nuclear facilities, uranium mines and mills and nuclear waste management facilities includes setting release limits for nuclear substances based on the public dose limit, but also has provisions to maintain releases as low as reasonably achievable (ALARA), social and economic factors being taken into account. The existing framework meets the requirements for pollution prevention and adequate precaution, and there is no evidence of adverse effects on the health and safety of persons or the environment from the operation of nuclear facilities (Class I), uranium mines and mills and nuclear waste management facilities.

The recent Government of Canada (2007) Cabinet Directive on Streamlining Regulation calls for "decisions based on evidence and the best available knowledge and science", and "regulatory response proportional to the degree and type of risk." Additionally, the June 2011 CNA paper "Jurisdictional Review of Processes for Establishing Effluent Release Limits in the Nuclear Industry" recommended a transparent scientific-based rationale for deriving release limits. The proposed dose constraint of 0.05 mSv/year is based on a philosophy of pollution prevention and is not supported by a rationale based on scientific consideration of risk.

Overall, the proposed CNSC framework will not provide greater protection of human health or the environment, because both are already protected. The CNSC acknowledges in the Discussion Paper that nuclear facilities, uranium mines and mills and nuclear waste management facilities currently operate well below existing release limits for nuclear substances, which are based on meeting the public dose limit. The latter is acknowledged to be protective of human health and the environment.

Lack of stakeholder consultation

CNA members believe that stakeholders should have been involved in the development of the proposed approach to regulating releases, in order to have had meaningful input to the process development. Discussion with industry stakeholders earlier in the development of DIS-12-02 could have improved the clarity of intent of the proposal, and stakeholders could have provided timely information on the impact of the proposed changes on their operations. Solicitation of industry input at an early stage in planning was also recommended in the CNA's Jurisdictional Review paper.

The recent Government of Canada (2007) Cabinet Directive on Streamlining Regulation requires "open, meaningful, and balanced consultations at all stages of the regulatory process". It specifically advises departments and agencies that "publishing proposed regulations in the Canada Gazette is not a substitute for meaningful consultations on the development of regulatory proposals". Publishing substantive changes to the regulatory process in a Discussion Paper is appreciated, but is not a substitute for active, two-way consultation.

The CNSC has actively engaged nuclear facilities through the Canadian Standards Association (CSA) standards development process, to produce meaningful standards (CSA N288.1, N288.4, N288.5, and

N288.6). This may be a useful forum for jointly developing practical approaches in some of the areas addressed by the CNSC Discussion Paper.

Foregone conclusion

CNA members question whether the outcome of the proposed process for developing release limits has been pre-determined. Some of the provisions specified in DIS-12-02 are actually outcomes that have already been implemented at some nuclear facilities through the licence renewal process (i.e., a 0.05 mSv/year dose constraint). Pre-determination is further illustrated in a CNSC Information Update on 7 May 2012 that stated "The CNSC is also considering the industry-wide adoption of dose constraints in order to establish limits for the releases of radioactive substances into the environment. The dose constraints would represent a fraction (5%) of the public radiation dose limit of 1 mSv/year. Some operators in Canada already have release limits based on the 5% dose constraint; it is a matter of harmonizing practices across the country" (CNSC, 2012b).

Public perception

CNA members believe that further reducing the limits will have a negative effect on public perception of the nuclear industry. The view that further reducing limits, below what is already protective of human health, safety and the environment, will reassure the public is questionable. Risk communication literature indicates that precautionary measures for risk reduction may serve to amplify public concerns (Wiedemann and Schütz, 2005). The public will perceive that they were not adequately protected previously. The public is also unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc.) and more likely to treat the various limits as equivalent, despite clarification that action levels are "early warnings of any process upsets and are set well below CNSC regulatory limits" and that "exceeding an action level does not represent a risk to the environment or to the health and safety of the public and workers". As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

The CNSC has not been completely transparent with respect to public communication. In a CNSC Information Update on 7 May 2012, the CNSC stated that "the proposed changes are part of our commitment to strengthening the regulatory framework for the protection of the environment and identifying clear regulatory expectations" (CNSC, 2012b). In this Update the CNSC implies that the current limits at nuclear facilities, uranium mines and mills and nuclear waste management facilities are not protective of the environment. However, as noted in DIS-12-02, the proposed limits are based on pollution prevention principles, not on protecting the environment, which is already achieved under the existing regulatory framework.

Lack of cost-benefit analysis

It appears that the CNSC has not completed a cost-benefit analysis of the proposed regulatory changes. It is clear that the proposed limits would result in more frequent exceedances of action levels and release limits, which would result in greater costs associated with reporting, follow-up, and public communication, without providing greater protection of the environment. The CNA's Jurisdictional Review paper recommended preparation of an economic analysis to estimate the cost that will be incurred to achieve compliance against the expected environmental benefits.

The Government of Canada (2007) Cabinet Directive on Streamlining Regulation calls for assessment of regulatory proposals at an early stage, considering "cost (or savings) to government, business or Canadians, and the potential impact on the Canadian economy and its international competitiveness", as well as "potential impact of the regulation on health and safety, security, the environment and the social and economic well being of Canadians". This is cost-benefit analysis.

The Cabinet Directive also calls for regulatory response proportional to the type and degree of risk. Thus, protection against risk is the primary objective, and regulatory requirements far beyond this objective, particularly if they are very costly, would be disproportionate to their benefit. If technology-based release limits (TBRLs) were imposed at nuclear facilities, for example, implementing best available technology to set limits much lower than needed to achieve protection of human health and the environment at these facilities would result in costs that are disproportionate to environmental protection benefits.

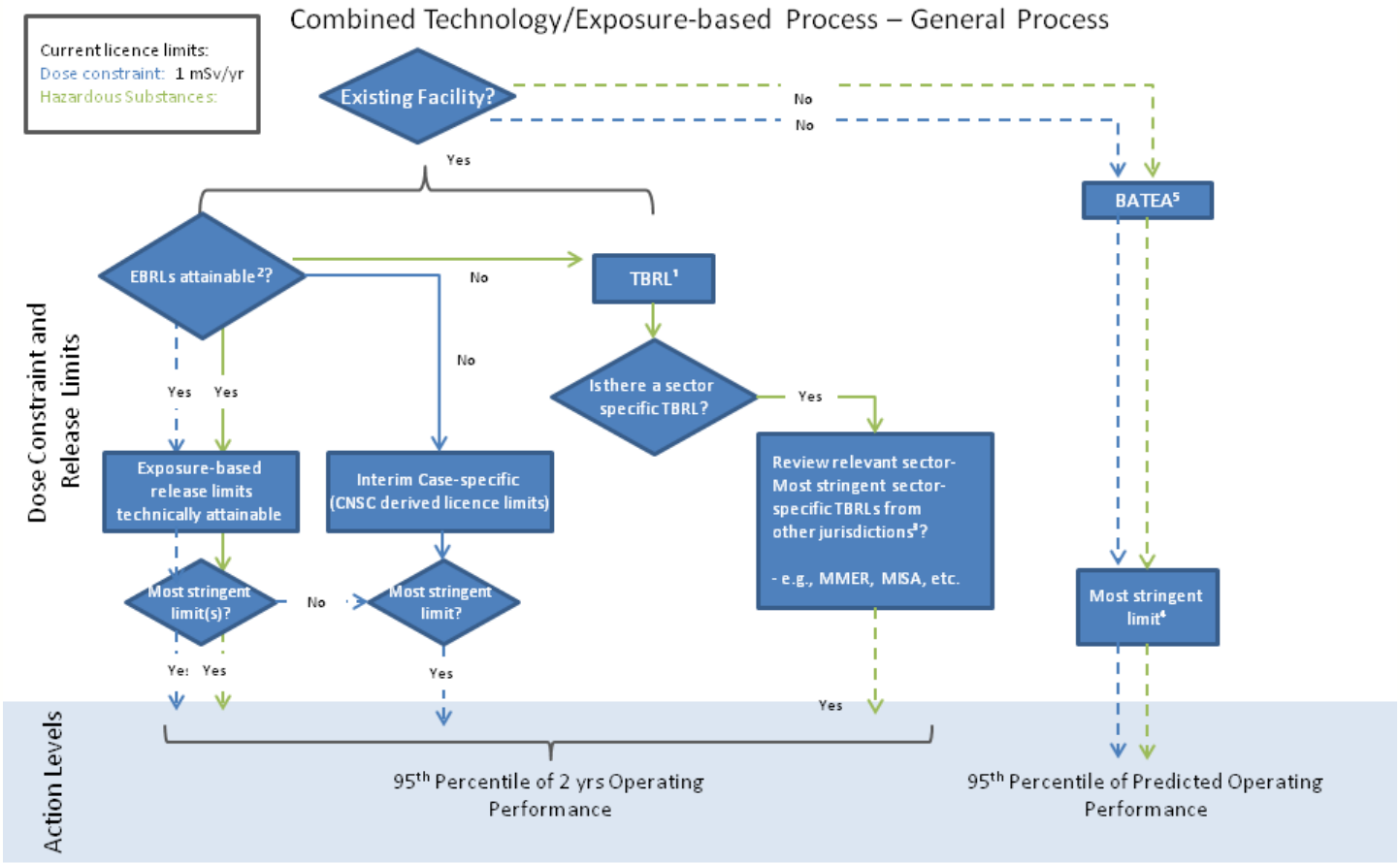
Introduction

Release limits set in licenses constrain the quantity and concentration of contaminants that may be released into the environment. First and foremost, release limits serve to protect human health and the environment. The CNSC proposes that they will also fulfill the goal of pollution prevention under the *Canadian Environmental Protection Act* (CEPA) and that of adequate precaution to control releases under the *Nuclear Safety Control Act* (NSCA).

Release limits may be either exposure-based release limits (EBRLs) or technology-based release limits (TBRLs). An EBRL is defined to ensure that environmental exposures above safe limits do not occur. It may vary from site to site based on assimilative capacity. A TBRL is based on available pollution prevention technologies, and effluent concentrations that these technologies can achieve. If defined to represent best available technology release limits may be more stringent than needed to protect human health and the environment.

Action levels serve as an early warning system to indicate when releases from a regulated facility may be deviating from the norm. The CNSC proposes to standardize the methodology for calculating action levels using a statistically based approach. These action levels are to be incorporated into the Licence Conditions Handbook. Licensees will be expected to regularly update their action levels in response to actual operating performance without the requirement to amend their licence.

CNA members' understanding of the CNSC proposed framework for establishing release limits and action levels is presented in Figure 1. The solid lines in Figure 1 indicate the path likely to be followed for an existing facility that cannot meet the proposed dose constraint of 0.05 mSv/year for nuclear substances.



[1]Exposure-based limit is not technically attainable and residual risk does not pose an unreasonable risk then interim TBRL
[2] DRLs are based on a newly established dose constraint of 0.05 mSv/yr for existing facilities. EBRLs for hazardous substances based on attaining federal/provincial environmental quality criteria at end of mixing zone and/or SSRA informed.
[3]Must be applied uniformly across an industry sector.
[4]DRLs based on newly established design objective of 0.01 mSv/yr for NPPs.
[5]To obtain effluent/emission design objectives. For example, new NPPs are subject to 100 Bq/L tritium in groundwater at margin of control area.

Figure 1: Combined Technology and Exposure Based Process for Setting Release Limits and Action Levels.

Good practice in setting release limits and action levels at nuclear facilities, uranium mines and mills and nuclear waste management facilities should include the following:

- **Scientific Rationale:** The rationale should be transparent and based on the specific goals of human health and/or environmental protection. First, it should show that there is a need for limits of the type proposed, i.e., there is a health or environmental benefit. Second, it should show that the limit setting is focused on the right contaminants, i.e., those of health or environmental concern, based on knowledge of the effluents. Third, it should show that the limits are set at achievable levels, based on knowledge of performance for treatment technologies that are available.

- **Economic Analysis:** This analysis estimates the cost that will be incurred to achieve compliance. It also weighs the cost (to industry and the economy) against the expected environmental benefits. If the costs are disproportionate to the benefits, then societal resources may be better spent.

- **Jurisdictional Review:** This review is a compilation of corresponding limits that are required in other jurisdictions. It provides a check that the proposed limits or standards are focused on a similar suite of contaminants that have been of concern for the industry elsewhere, and a check that proposed limits are not out of line with requirements elsewhere, placing Canadian industry at a competitive disadvantage. If the jurisdictional review identifies major differences in regulatory approach, closer scrutiny of the proposed approach may be warranted.

CNA members are encouraged by some of the steps the CNSC has taken with regards to stakeholder communication and consultation throughout this regulatory process. Members appreciate that the CNSC published their proposed process for setting release limits and action levels in a Discussion Paper and not a draft Regulatory Guide. The Discussion Paper provides a starting point for open dialogue between the CNSC and industry stakeholders regarding complex issues. The CNSC has also communicated their interest in public opinion by extending the public comment period on the Discussion Paper.

Nevertheless, CNA members have concerns regarding the development and content of the Discussion Paper, as outlined in the Preface of this document, and in the remaining sections. Our members would have liked to have been involved earlier in the development of the process for establishing release limits and action levels at nuclear facilities, uranium mines and mills and nuclear waste management facilities. The enclosed comments are offered in good faith that they will be considered for the ongoing further development of the process for establishing release limits and action levels.

The Preface discussed the overall policy concerns that CNA members have with the development and content of the CNSC's proposed process for establishing release limits and action levels at nuclear facilities. The following sections provide: general comment on the CNSC proposed regulatory framework and industry recommendations; sector-specific comments on the proposed process specifically pertaining to dose constraints, hazardous substances, action levels and design objectives; and a recommended path forward.

Industry Issues and Recommendations on CNSC Proposed Changes to the Regulatory Framework

The CNSC Discussion Paper DIS-12-02 states that the proposed framework for establishing release limits and action levels for nuclear and hazardous substances is based on six principles. A brief description of each principle is provided below, along with the CNA member concerns with the proposed principle, and CNA member recommendations. More detailed sector-specific comments are provided in the following section.

Principle 1: Adoption of a combined technology/exposure-based approach

It is proposed that release limits be established based on effective and demonstrated pollution prevention/control technologies or the limits required to meet risk-based and scientifically defensible ambient environmental quality guidelines, whichever are more stringent. The only exception is when the exposure-based limit is not technically attainable and the residual release does not pose an "unreasonable risk". In such situations, a case-specific technology-based limit may be adopted as an interim limit (see Principle 3).

The proposed CNSC approach is to adopt the lowest of the EBRL or TBRL. CNA members do not agree with this approach. The TBRLs and EBRLs are not equal and should not be equally weighted, as reaffirmed in the Cabinet Directive on Streamlining Regulation (Government of Canada, 2007). The Directive states that regulatory response should be proportional to the degree and type of risk. Additionally, selection of the most stringent limit does not take into consideration results from the environmental assessment process which informs facilities on what are considered approved effects and therefore acceptable risk.

CNA members recommend that the process for setting release limits be based primarily on achieving goals of human health and environmental protection, taking into account site-specific conditions, rather than achieving what is technologically feasible, regardless of need and cost. A clear distinction between nuclear and hazardous substances needs to be maintained, as outlined in CNSC regulatory guide G-296 "Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills" (2006). In this document, the CNSC states that pollution prevention is the key principle underlying management of hazardous substances in Canada, while for nuclear substances, the Radiation Protection Regulations require exposure and dose to persons be managed according to ALARA.

Risk-based EBRLs should be set for nuclear substances and TBRLs should be adopted for hazardous substances. TBRLs for hazardous substances should be based on common industry control technologies and on technologies that have proven to be economical.

Principle 2: Sector-specific technology-based release limits

When developing a TBRL, the CNSC will consider any relevant sector-specific TBRLs from other jurisdictions. A sector-specific limit relies on the use of the most effective demonstrated pollution prevention/control technologies. This type of limit would be applied uniformly across an industrial sector.

Principle 2 implies that if the CNSC deems that an existing TBRL is not adequate, the CNSC will develop a sector-specific TBRL. The harmonization process with federal and provincial regulators has not been discussed and needs to be clarified. A lack of harmonization will result in additional requirements and the duplication of effort. There is scientific, economic and jurisdictional rationale for technology-based limits that reflect an industry norm (e.g., the *Metal Mining Effluent Regulations* limits were developed this way). However, the Discussion Paper is unclear regarding the approach to TBRLs. TBRLs based on best available technology (BAT) are problematic if they become licence limits in situations where BAT is not needed for adequate protection of human health and the environment.

CNA members recommend that harmonization between the CNSC and other federal and provincial regulators be expedited to prevent the potential for increased reporting and duplication of regulatory requirements. As a first step, the CNA's 2011 paper recommended a jurisdictional review of other federal and provincial limits to identify inconsistent and duplicated regulatory requirements. In keeping with recently proposed federal legislative amendments, there is sector-wide support for federal – provincial equivalency with respect to the regulation of hazardous substances (e.g., provincial release limits could be deemed equivalent, the responsible agency could vary with sector, or licensee type, etc.).

Principle 3: Case-specific technology-based release limits

When developing a TBRL for which no relevant sector-specific limits exist, the CNSC would consider case-specific technology-based limits. This type of limit would be based on a review of an individual plant's existing performance, or the performance of similar facilities anywhere in the world. As previously mentioned, CNA members believe that TBRLs set far below the level needed for the protection of human health and the environment are difficult to justify. This is true whether the TBRLs are sector-based or case-specific.

The CNSC proposed dose constraint (0.05 mSv/year) is not achievable at many nuclear facilities, uranium mines and mills and nuclear waste management facilities. This would lead to case-specific technology based limits, perhaps as an interim measure (see Figure 1). An interim limit could provide a temporary solution, but would create uncertainty for industry and the public as to the length of time the interim dose constraint would be acceptable and if technological upgrades would eventually be required to achieve the proposed dose constraint.

CNA members recommend that any case-specific limits proposed be developed in discussion with the operator of the individual facility. They should be set at levels that are achievable and such that they will not be exceeded under normal operating conditions. Furthermore, they should not be set at levels that are far below those needed to protect human health and the environment. They should be informed by scientific, economic and jurisdictional rationale.

There are existing optimization programs to achieve ALARA (as low as reasonably achievable, social and economic factors being taken into account) and improve environmental performance (ISO 14001 environmental management systems, S/G-296).

Principle 4: Exposure-based release limits

EBRLs would be based on attaining federal/provincial environmental quality criteria at the end of the appropriate mixing zone and/or more complex site-specific environmental risk assessments informed by environmental monitoring data.

The CNSC proposes to calculate EBRLs through: modeling to back-calculate a release that will achieve a protective concentration at a specified receiver location (e.g., edge of mixing zone for water and point of impingement for air), a more complex environmental risk assessment (ERA), and/or establishing derived release limits (DRLs) for nuclear substances based on a dose constraint. The concept of mixing zones is introduced in the Discussion Paper, but not followed by sufficient detail to understand how it will be applied.

In principle, CNA members agree that a mixing zone approach can likely be supported by scientific, economic and jurisdictional rationale; however, the mixing zone criteria in CCME (2008) were designed for municipal wastewater treatment plants, and cannot be applied to all types of nuclear facilities, especially uranium mines and mills, or facilities releasing to municipal sanitary sewers. With respect to ERAs, and specifically hazardous substances, CNA members are concerned that a new ERA could fail to recognize that certain effects were deemed acceptable during the environmental assessment process, and that it could hold members to a different standard from others in their sector (e.g., other metal mines).

CNA members recommend that outcomes of the facility environmental assessment process be used when setting EBRLs (e.g., accepted mixing zones and effects). Furthermore, any new EBRLs should be risk-based (e.g., developed to achieve protection of human health and the environment at the edge of the mixing zone). They should not be based on meeting a dose constraint that is below the level needed for purposes of radiation protection (i.e., 1 mSv/year). Any further constraint is an aspect of optimization which should not be driving licence limits.

Principle 5: Effluent/emission Design Objectives for new facilities

It is proposed that new facilities incorporate into their design the best available technology and techniques economically achievable (BATEA), where feasible, to meet effluent/emission design objectives.

CNA members recommend that design objectives are more appropriately considered during the environmental assessment of a proposed project, or facility (Figure 1). They are part of a separate process and are therefore not relevant to the current discussion of release limits for existing facilities.

Principle 6: Action levels to demonstrate adequate control

Action levels will be used to demonstrate that adequate control of the regulated facility is maintained and will be based on a facility's predicted/actual operating performance.

The proposed CNSC methodology for establishing action levels is a statistical method (i.e., 95th percentile) based on predicted or actual operating data. Since action levels would be within the range of normal operation, there will be more frequent reporting and therefore associated public perception concerns. Setting such low action levels will also place constraints on ALARA programs making it difficult in terms of cost and practicality to further reduce emissions.

CNA members recommend that action levels be established based on operational performance over a number of years, and that they reflect upset conditions. They should be set above the range of variability seen in normal operation, but below the licence limit, in order to provide early warning of potential limit exceedances while avoiding unnecessary reporting. As defined in the *Radiation Protection Regulations*, action levels refer to "a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken."

Action levels are intended to provide early indication of the potential loss of program control, not to mark the upper range of normal operating conditions. If standardization of approaches to action levels is desired, guidance could be developed through the CSA process. CNA members have considerable experience in establishing internal action levels at their facilities. This experience could be utilized to develop practical guidance on action level development.

Sector-specific Considerations

Dose Constraints

CNA members do not support the use of a dose constraint to establish licence limits for nuclear facilities, uranium mines and mills and nuclear waste management facilities in Canada. Licence limits should be based on achieving conditions that are protective of human health and the environment. A radiation dose of 1 mSv/year (the current legal limit for members of the public) is protective of human health. There is no scientific rationale to change the basis of a licence limit from 1 mSv/year to a dose constraint of 0.05 mSv/year – a constraint based on pollution prevention, ALARA, and perceived achievability. Recently the International Atomic Energy Agency (IAEA, 2010) reviewed dose constraints in use around the world and concluded that most jurisdictions have dose constraints in the range of 0.1 to 0.3 mSv/year, most often 0.25 or 0.3 mSv/year. Existing action levels currently achieve this constraining of dose below the regulatory limit.

The proposed dose constraint value of 0.05 mSv/year does not meet the intended concept of a dose constraint and appears to be regulating ALARA. In the CNSC (2004) regulatory guide G-129 on ALARA, it states that "licensees are expected to reduce doses where this can be done without significant expenditure…[and] the CNSC may consider an ALARA assessment beyond the initial analysis, is not required in the following circumstances … dose to individual members of the public is unlikely to exceed 50 µSv per year". A dose of 0.05 mSv/year is considered de minimis, making it an inappropriate basis for a licence limit. The proposed dose constraint of 0.05 mSv/year is not achievable at many nuclear facilities, uranium mines and mills and nuclear waste management facilities. Even where it can generally be met, setting the dose constraint at 0.05 mSv/year will result in a greater number of exceedances of corresponding weekly or monthly values, reflecting normal variability, anomalous data, or outliers.

Uranium Mines and Mills

There is no international precedent for dose constraints at uranium mines and mills. Risk to human health and the environment has typically been evaluated during the environmental assessment process and has been found not to be significant. Also, environmental assessment follow-up monitoring demonstrates compliance with the 1 mSv/year public dose limit. Where potential effects are consistent both in magnitude and geographic extent between those identified in the environmental assessment process and the environmental effects monitoring program, the effects should not be reconsidered, or re-evaluated based on a newly devised system for establishing release limits.

Uranium mines and mills cannot comply with the proposed dose constraint of 0.05 mSv/year. Further, the inability of uranium mines and mills to comply with a dose constraint that has been established based on the performance of other sectors, could economically disadvantage the uranium mining sector. The uranium mining sector has already been held to a "higher bar" than other nuclear facilities with respect to recent requirements for tailings and waste rock management established through CNSC (2012c) regulatory document RD/GD-370 "Management of Uranium Mine Waste Rock and Mill Tailings", and should not be further disadvantaged. It is the view of the uranium mining sector that no dose constraint is appropriate, or required.

The uranium mines and mills understand that calculating DRLs according to the methodology in CSA standard N288.1-08 is not applicable to uranium mines and mills. The mines and mills currently use a "forward-calculation" approach to demonstrate that the public doses will be below the regulatory limit.

Fuel Processing and Manufacturing Facilities

The proposed dose constraint of 0.05 mSv/year is overly conservative and may be difficult for all facilities to achieve. The limit has recently been used in licenses for the fuel processing and manufacturing sector, suggesting that the outcome of the proposed process for developing release limits has been pre-determined. This limit was introduced with minimal opportunity for discussion and with no rationale for the adoption of the new limit. Any dose constraint should be based on a strong rationale (e.g., environmental protection demands, cost-benefit analysis, etc.).

Nuclear Power Generating Facilities and Research Facilities

The nuclear power generating sector is familiar with the concept of a dose constraint, but disagrees with the method of application used by the CNSC. The current proposal would result in an increased frequency of reporting, public perception issues, and additional costs related to reporting and public communication.

If a dose constraint is used it should be recognized as a tool to ensure that members of the critical group are not exposed from a combination of nuclear sources and future nuclear developments to dose levels higher than the dose limit of 1 mSv/year. Given the demonstrated industry performance within the current regulatory framework, dose constraints are not required.

Nuclear Waste Management Facilities

A dose constraint of 0.05 mSv/year would be inappropriate for application by a Waste Nuclear Substance Licensee, where the long-term low-level radioactive waste management facility has been designed to meet a dose objective of 0.3 mSv/year. The lower proposed dose constraint will not be achievable.

Hazardous Substances

If the CNSC is proposing to regulate hazardous substances, CNA members would like equivalency (i.e., complete harmonization) of existing federal and provincial requirements to prevent additional or conflicting reporting requirements and duplication of effort and cost, with no tangible benefits.

CNA members would like a clear distinction between nuclear and hazardous substances to be maintained. The limits for nuclear substances have been risk-based, while the limits for hazardous substances have been based in part on industry norms of treatment technology. Implementing the CNSC approach of applying the most stringent limit does not maintain this distinction between nuclear and hazardous substances.

One of the methods by which the CNSC proposes to calculate water EBRLs is through modeling, by a back-calculation from a safe concentration at the edge of a mixing zone. The mixing zone criteria from the Canadian Council of Ministers of the Environment (CCME, 2008) are not applicable to most uranium mines because they are typically located in headwaters of drainage systems with little water available for dilution. Mixing zones are also not appropriate for releases to small drainages such as a municipal sanitary sewer system. The proposed criteria should be modified to accommodate other options such as end-of-pipe release limits.

Uranium Mines and Mills

Hazardous substances are already adequately regulated at uranium mines and mills through the application of the *Metal Mining Effluent Regulations* (MMER). These end-of-pipe release limits are better suited for releases to narrow drainage ditches or small watercourses, because very little dilution is available in these receivers. Notably, over the past few years the CNSC (2012d) has rated the uranium mining sector the best performing mining sector relative to the *Metal Mining Effluent Regulations* effluent limits, with no exceedances in 2010.

It is recommended that overlap, or duplication, be avoided through the adoption of the existing sector-specific limit (i.e., the MMER) as equivalent, in keeping with the recent *Fisheries Act* amendments (Budget Bill, Bill C-38). The 2012 Budget Bill has provisions for amendment of the MMER – this existing mechanism could be used for setting new limits at metal mines, and for regulatory amendments such as the addition of Selenium to MMER effluent characterization requirements. The MMER process is a preferable process for the revision of effluent limits for uranium mine and mills as it has mechanisms for stakeholder consultation, communication and consensus building, and incorporates environmental effects, monitoring feedback on BATEA limits, for example.

As follow-up to the PSL2 study, a BATEA evaluation was conducted for uranium and concluded that a uranium release limit of 100 µg/L is considered BATEA. This limit should be maintained, as regulatory duplication may lead to additional or conflicting reporting requirements and duplication of effort and cost, with no tangible benefits. The uranium mining industry is already adequately regulated.

Fuel Processing and Manufacturing Facilities

The concept of a mixing zone does not work for releases to small drainages, or where facilities are releasing effluent to the municipal sanitary sewer system. An end-of-pipe release limit is better suited in these circumstances.

The CNSC proposed sector-specific TBRL for uranium of 110 µg/L may be suitable for release to surface water, but is not appropriate for discharges to sewers, particularly sanitary sewers, because such releases will receive additional treatment.

Nuclear Power Generating Facilities and Research Facilities

Hazardous substances are adequately regulated for nuclear power generating facilities and research facilities through Provincial regulation. These limits need to be recognized and adopted to avoid duplication. It is recognized that "total harmonization", through federal – provincial equivalency is being sought, but that will take time and duplication of monitoring and reporting requirements needs to be avoided in the meantime.

Nuclear Waste Management Facilities

Release limits for hazardous substances were established for two long-term low-level radioactive waste management facilities through a proponent defined process of evaluating the Best Available Technology Economically Achievable. The licence allows a one year interim period before release limits will need to be applied at the new facilities. The licence limits should be set high enough that they will not be exceeded under normal operating conditions.

Action Levels

CNA members support the concept of using action levels to provide early warning of potentially adverse conditions at a facility. However, the CNSC proposed 95th percentile statistical method for calculating action levels based on operating data, would result in unnecessary exceedances. Frequent exceedances would diminish the meaning and importance of action levels; hence continuous improvement and proactive pollution prevention and control would not be achieved. Setting action levels according to this CNSC proposed method would also minimize the importance of ALARA, by setting action levels at or below ALARA. Instead of regulating ALARA, limits should be used a management tool to limit emissions.

The *Radiation Protection Regulations* define action levels as "a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken." CNA members would support action levels set above the range of variability seen in normal operation, but below the licence limit, in keeping with the definition of action levels as per the *Radiation Protection Regulations*. Guidance on action levels could be developed through the CSA process and would provide the required details on sector-specific considerations.

Amendments to the NSCA provide the CNSC with the authority to establish and implement an Administrative Monetary Penalty System to further promote compliance by licensees through enforcement of licensing conditions and, in particular, environmental compliance. It is unclear whether the Administrative Monetary Penalty System would apply to exceedances of action levels. CNA members believe that the imposition of monetary penalties based on exceeding the proposed action levels, which do not indicate loss of control, would be entirely unwarranted.

Uranium Mines and Mills

The proposed approach to establishing action levels does not readily apply to uranium mines and mills, where releases from water treatment plants are strictly controlled and released on a batch basis, once the desired water quality is achieved. Action levels should be meaningful (e.g., based on performance, and above the range of normal operation) such that an exceedance truly represents loss of control.

Statistical methods to determine the upper end of the normal operating range are overly simplistic and fail to acknowledge complex processes and trade-offs that result from optimization. Statistical methods may be more appropriate for the development of internal administrative levels.

Fuel Processing and Manufacturing Facilities

The fuel processing and manufacturing facility data are neither normally, nor log-normally distributed. This will create difficulties in the application of statistical process control methods, which usually rely on a standard form of distribution (see Figure 4 in DIS-12-02).

Action levels established using the proposed methodology will lead to an increased frequency of reporting and public concern. Action levels should be meaningful (e.g., based on performance, and above the range of normal operation) such that an exceedance truly represents loss of control.

Nuclear Power Generating Facilities and Research Facilities

Action levels should be developed as tools to identify serious adverse conditions needing immediate action and reporting to the regulator. The approach should be based on past operating data and “headroom” to allow operational flexibility and prevent frequent reporting of inconsequential events. If a standard is required for setting action levels, members would recommend a CSA N288 document.

Nuclear Waste Management Facilities

Action levels should not be defined such that they are exceeded under normal operating conditions. A 95th percentile criterion will be exceeded under normal operation. Additional or alternate criteria are needed to ensure that action levels are indicative of upset conditions rather than normal operation.

A statistical process for developing action levels has already been imposed by the CNSC as a licence condition for two large long-term low-level radioactive waste management facilities. This suggests that the outcome of consultation on the CNSC proposed process is pre-determined.

Design Objectives

The CNSC is proposing a design objective of 0.01 mSv/year for new nuclear power generating stations, and a design objective of 100 Bq/L for tritium in groundwater. A design objective of 0.01 mSv/year for new stations could dictate technology selection, with no additional benefit to the environment. A dose of 0.05 mSv/year is already considered ALARA, according to G-129 (CNSC, 2004). An even a lower design objective is inappropriate for driving technology selection.

Of particular concern is that, over time, this design objective would potentially apply to existing facilities as a licence limit. Most importantly, CNA members agree that a design objective is part of the environmental assessment process and has no place in a regulatory framework document.

Uranium Mines and Mills

It is unclear whether the design objective of 0.01 mSv/year is intended to apply to new uranium mines and mills. If it does, then it is unachievable and inappropriate.

Fuel Processing and Manufacturing Facilities

The design objective of 0.01 mSv/year is below de minimis and inappropriate.

Nuclear Power Generating Facilities and Research Facilities

Environmental design objectives for New Builds (dose constraint of 0.01 mSv/year and 100 Bq/L tritium in groundwater) have no place in this document. They are environmental assessment related and would be established for the purpose of design optimization during that process.

Including design objectives in the release limit development process will lead to the public expectation that existing facilities should meet them and the public perception that the performance of existing facilities is not acceptable when in fact it is very good.

Nuclear Waste Management Facilities

A design objective of 0.3 mSv/year has been established for two long-term low-level radioactive waste management facilities in consultation with the CNSC. This is inconsistent with the recently proposed 0.01 mSv/year limit for new builds.

Conclusions and Next Steps

The CNSC, through Discussion Paper DIS-12-02, proposes to implement a more formal framework for establishing release limits and action levels to control releases to the environment (CNSC, 2012a). The existing regulatory framework for nuclear facilities, uranium mines and mills and nuclear waste management facilities includes setting release limits for nuclear substances based on the public dose limit, but also has provisions to maintain releases as low as reasonably achievable (ALARA), social and economic factors being taken into account. The existing framework meets the requirements for pollution prevention and adequate precaution, and there is no evidence of adverse effects on the health and safety of persons or the environment from the operation of nuclear facilities, uranium mines and mills and nuclear waste management facilities. Thus, there is no apparent need for the proposed new framework.

CNA members have reviewed DIS-12-02 and have presented in this submission a number of policy concerns, which include:

- **Lack of Rationale:** CNA members are concerned that there is not a clear rationale for development of the CNSC's proposed framework for setting release limits and action levels, and that the framework does not meet the intent of the recent Government of Canada (2007) Cabinet Directive on Streamlining Regulation.

- **Lack of Stakeholder Consultation:** CNA members are concerned that stakeholders were not involved in the development of the new approaches prior to CNSC release of DIS-12-02, and therefore have not had meaningful input to the process development.

- **Foregone Conclusion:** CNA members are concerned that the outcome of the proposed process for developing release limits has been pre-determined, that some of the provisions in DIS-12-02 are actually outcomes, and that they have already been implemented through the licence renewal process.

- **Public Perception:** CNA members are concerned that further reducing the limits, and the resulting increase in exceedances, will have an unnecessarily negative effect on public perception of the nuclear industry.

- **Lack of Cost-Benefit Analysis:** There is no evidence that the CNSC has completed a cost-benefit analysis of the proposed regulatory changes.

CNA members have provided comments on the six principles of the CNSC proposed framework for establishing release limits and action levels. They have also presented sector-specific comments regarding dose constraints, hazardous substances, action levels, and design objectives. Based on these considerations, CNA members recommend the following framework as a basis for establishing release limits for nuclear facilities, uranium mines and mills and nuclear waste management facilities:

- **Risk-based Limits:** CNA members believe that licence limits should be based on achieving environmental conditions that are protective of human health and the environment (i.e., achieving acceptable risk levels). A radiation dose of 1 mSv/year is protective of human health. The CNSC proposed dose constraint of 0.05 mSv/year for nuclear substances goes far beyond protection and a process document is not an appropriate place to propose a numeric value. Appropriate methodologies and risk assessments for ensuring protection are found in facility Environmental Risk Assessments (CSA N288.1, CSA N288.6 (new)) and project-specific Environmental Assessments.

- **Federal/provincial Equivalency:** CNA members would like equivalency between existing federal and provincial requirements for hazardous substances. Equivalency would prevent additional or conflicting reporting requirements and duplication of effort and cost, with no tangible benefits to human health and the environment.

- **Meaningful Action Levels:** CNA members support the concept of using action levels to provide early warning of potentially adverse conditions at a facility, but do not support the CNSC proposed statistical methods for calculating action levels, which would result in frequent reporting of inconsequential events. Action levels should be set above the range of variability seen in normal operation, but below the licence limit, in keeping with the definition of action levels as per the *Radiation Protection Regulations*. Action levels should be developed as tools to identify serious adverse conditions needing immediate action and reporting to the regulator.

- **Design Objectives:** CNA members believe that design objectives for new nuclear power generating stations have no place in a regulatory framework document. They are related to the Environmental Assessment process (planning and technical assessment) and would be established for the purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits that would be included in a licence.

- **Optimization:** CNA members support the use of optimization programs, commensurate with the risk presented by the facility in question, to drive ongoing performance improvement. Such programs achieve ALARA (as low as reasonably achievable, social and economic factors taken into account), incorporate pollution prevention, and involve environmental management systems (ISO 14001, S/G-296). Regular optimization program performance reviews would ensure that these programs remain effective and that continual improvement of performance occurs.

In terms of next steps, CNA members would like to engage the CNSC in discussion. Members propose an initial meeting with the CNSC to hear the rationale for the proposed release limit development process, to discuss how to address industry concerns, to agree on a framework, and to discuss the path forward. This meeting would help provide industry stakeholders with a transparent and clear path forward on the CNSC's proposal. After a framework and path forward are agreed upon, CNA members propose to have more detailed CNSC/industry working groups on specific topics to expand on individual aspects of the framework and ensure that the details have been worked out prior to implementation.

For example, with a framework in place, industry stakeholders could work with the CNSC on a cost-benefit analysis of the proposed regulatory changes. Industry is willing to share the information needed to perform

a thorough and useful cost-benefit analysis. This would permit consideration of cost-benefit information in order to make appropriate decisions regarding the proposed regulatory changes. In the end, any proposed changes would be supported by scientific rationale, economic analysis, and jurisdictional review, as recommended in the CNA's Jurisdictional Review paper.

After the initial CNSC/industry consultation, another option would be to initiate the CSA standards development process to develop detailed guidance on specific aspects of the agreed upon framework for setting release limits and action levels at nuclear facilities, uranium mines and mills and nuclear waste management facilities. For example, industry stakeholders are proposing to take the groundwater protection framework presented in DIS-12-01 "Protection of Groundwater at Nuclear Facilities in Canada" (CNSC, 2012e), and to develop a CSA standard that would provide details on how to implement the framework. Industry stakeholders also recommend following the CSA standards development process for developing detailed guidance on setting action levels for each sector.

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June 28, 2012 File 53A-03700-130-000

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Candu Energy Inc. Comments on CNSC Discussion Paper DIS-12-02 "Process for Establishing Release Limits and Action Levels at Nuclear Facilities"

Reference 1. CNSC Information Bulletin 12-07, "Invitation to comment on Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities", February 22, 2012.

This letter provides Candu Energy's comments on the CNSC Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities, as requested in Reference 1.

Candu Energy is proud of the environmental record of the Canadian CANDU industry. Over the past number of years, the industry has been focused on reducing its environmental footprint, particularly as it relates to emissions and public dose impact. It is important to note that actual emissions from CANDU facilities represent a negligible contribution to natural radiation exposure that individuals receive in Canada. As demonstrated in CNSC Info-210/rev.14, radiological discharges from Canadian CANDU reactors remain a small fraction of the Derived Release Limits, which translates to an extremely small incremental dose. This result is a direct response to licensee policies to continually reduce their environmental footprint, vendor policies to improve the environmental performance, public interest and regulatory oversight programs. It is recognized that there appears to be a gap in public understanding of the good environmental performance of COG Member facilities, and COG Members are committed to do a better job at communicating that good performance to the public, in conjunction with the CNSC.

Candu Energy supports the need to have a **transparent regulatory framework** for environmental protection at nuclear facilities that is consistent with Canadian environmental policies, legislation and regulations. The current control **framework for nuclear substances does just that**. It includes the framework to keep exposures As Low As Reasonably Achievable (ALARA) as outlined in the regulatory document G-129, "Keeping Radiation Exposures and Doses As Low As Reasonably Achievable (ALARA)" established by the CNSC: setting derived release limits (DRLs) for nuclear substances based on the public dose limit; setting Action Levels to detect a loss of control; and also has provisions to maintain releases ALARA, social and economic factors being taken into account.

Candu Energy recognizes that the DRLs are orders of magnitude higher than actual discharges and that is a concern to some people. If the introduction of the proposed new "release limit" concept was intended to address that

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concern, then having a standardized method to establish and report on "action levels" that are currently in licenses should satisfy that objective. New, lower "release limits" are not required.

In looking at international experience (IAEA TECDOC-1638) it appears that countries with dose constraints and related "authorized release limits" do **not** have "action levels" that are equivalent to those used in Canada. The goals and objectives of the application of authorized release limits seem to be parallel to Canadian "action levels" - exceeding would require reporting, initiating a regulatory investigation and under certain circumstances assigning penalties. Existing Canadian practice is therefore consistent with IAEA guidelines (IAEA WS-G-2.3). While it is recognized that such requirements can evolve, the IAEA plan for updating WS-G-2.3 (IAEA DPP-442) does not call for introducing changes to this approach.

Since the current CNSC framework already has "action levels", the proposed release limits seem redundant. Candu Energy supports the concept of and would participate in the development of a standardized method to establish "**action levels**" and believes this would be best developed through the **CSA process**, given that the CSA (Canadian Standard Association) has been a very successful venue to develop standards related to environmental protection at nuclear facilities such as CSA N288.1, .4, .5 and .6. The CSA process considers international experience when developing new standards. COG members have already made progress in the development of an "action level" method document that could be used as a seed document for a CSA Standard and would like to discuss this work with the CNSC.

The CNSC document G-296, "Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills" states that Pollution Prevention is the key principle underlying the management of hazardous substances in Canada, while for nuclear substances, the Radiation Protection Regulations require that exposure and dose to persons be managed according to the principle of ALARA. The industry believes that the concepts imbedded in these documents should be maintained, rather than using complex processes to establish release limits.

For Hazardous substances, Environment Canada and Provincial Ministry of Environment have adequately regulated in this area and have the expertise to ensure there is no unreasonable risk to the environment and to the health and safety of the members of the public. Those requirements are well managed through existing federal and provincial regulatory instruments, e.g., Environmental Compliance Approvals, MISA, CCME, etc. As such a harmonization of their requirements and reporting would be an effective approach rather than having a new framework for hazardous substances that would lead to duplication and/or overlap while the federal government is striving (and industry is asking) for a more streamlined regulatory system.

COG Members propose the following concepts for discussion in developing a regulatory framework which would meet the need for transparency and would better conform to the accepted convention of using risk based limits together with management processes to further reduce emissions (ALARA and pollution prevention). As a COG member, Candu Energy supports this COG initiative.

- Set **Release Limits** to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of 1 mSv/year should be maintained as the safe limit for setting Derived Release Limits as defined by CSA N288.1.

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- Manage **nuclear substances** and **hazardous substances** separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be.
- Use "**dose constraint**" as the upper bound of the optimization process (consistent with ICRP and IAEA) **only when required** to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1 mSv per year not as a means to set release limits. Given the environmental performance of COG members, this is not generally required for nuclear power plants.
- Develop a **standardized method** to establish **Action Levels** which should be used to identify serious adverse conditions needing immediate action and reporting to the regulator. The **CSA venue** would be best for such development
- Implement **Optimization through Programs** to drive ongoing performance improvement commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable) and pollution prevention. Regular optimization program performance reviews would ensure they remain effective.
- **Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater)** do not belong in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization.

Specific comments from CANDU Owner members and from Candu Energy on the discussion paper DIS 12-02 are provided in Attachments I and II, respectively. Candu Energy respectfully requests an opportunity to discuss with the CNSC these comments prior to final disposition.

Sincerely,

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Manager, Process Analysis
Candu Energy Inc.

cc. B. Dinh
A.G. Lee
J. Ryan (COG)
M. Soulard
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ATTACHMENT I

CANDU OWNER GROUP MEMBER COMMENTS ON DIS-12-02

1. **Document Content** - the document title and body indicate that the content is related to process – a process/framework to establish release limits for nuclear substances and hazardous substances and a process to establish action levels. The document does provide a framework for release limits and action levels. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values takes away from consultation to establish a robust framework and pre-empts the outcome of the process.

2. **Regulatory Framework for the control of releases to the environment** - COG members acknowledge the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance.

The framework presented does **not** do that. It is complex, difficult to understand (**see Figure 1**) and not transparent with respect to rationale for many of its aspects. One has to wonder why such radical changes are needed when nuclear facility performance is acknowledged by CNSC to be good to very good, and the proposed framework is unlikely to improve it any more. Furthermore it does not recognize that existing regulation for hazardous substances by the provinces and other federal agencies is more than adequate, and that CNSC does not have to add its own regulation in this area (e.g. it could use equivalency/ substitution/ delegation). The following points highlight our major concerns.

- **Nuclear substances and hazardous substances** are intermingled throughout the document. They need to be dealt with separately in the framework. Their methods of regulation are different and combining them makes the framework overly complex and hard to understand. Perhaps some time in the future they could be combined, but at this stage of development they need to be separate. In addition, the proposed framework does not acknowledge as equivalent existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC.
- **Six Principles -** for establishing release limits and action levels - are not really "principles". They appear to be a method to justify setting the lowest possible release limit.
- **Principle 1 -** We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment. Processes can then be put in place to look at technology-based limits and site specific limits if the exposure-based release limits cannot be met.
- **Principles 2 and 3 - Sector-specific technology-based release limits and case-specific technology-based release limits -** see the two points above.
- **Principle 4 "Exposure- based release limits"** make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be.
    - **Release limits for nuclear substances -** The concept of "**dose constraint**" has been used for some time internationally to make sure that individuals in the public are not exposed to more than the accepted safe dose limit of 1 mSv/year where multiple sources exist or may exist in the future. Dose constraints should **not** be used as they are here to set release limits. COG members recognize the international use of **"dose constraint"** as part of the **optimization process** (consistent with ICRP and IAEA) **only when needed** to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1mSv per year, **not** as a means to set absolute release limits. Setting release limits by selecting an arbitrary dose constraint value of 0.05mSv/year does not make technical sense, is not in keeping with the

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intended concept of dose constraint and appears to be prescribing a fixed level for ALARA – As Low As Reasonably Achievable, social and economic factors being taken into account. Moreover, it would make communicating historical good performance and public safety difficult since it is not based on risk and not all COG member companies could meet the release limits based on the proposed 0.05 mSv/year dose constraint. Given the historical good environmental performance of COG member companies, implementation of dose constraints is not required.

- **Release limits for hazardous substances** – CNSC needs to acknowledge the equivalency of existing provincial or federal requirements, so there is a single, best placed regulator, for a substance. It is not acceptable to have double regulation for hazardous substances. If the CNSC is going to regulate hazardous substances, Provincial requirements should be accepted verbatim, and harmonization done over time to ensure that there are never conflicting/duplicating monitoring and reporting requirements. It is anticipated that "harmonization" will require considerable effort and time (it has been talked about for years), and COG members do not want to be subjected to conflicting requirements from different regulators while this is being resolved. Although DIS-12-02 states that CNSC expects to harmonize regulations to some extent, it needs to be complete harmonization or we will, in practice, have duplication of regulations, monitoring and reporting. Having another government agency setting release limits for parameters that are already regulated appears to go against current Federal Government initiatives.

- **Principle 5** on "**effluent/emission design objectives for new facilities**" - design objectives have no place in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents and ALARA guidelines, and again, should be related to risk.

- **Principle 6 – 'Action Levels"** – COG members support and would participate in development of a method to set "action levels" taking into account historical operational data. The action levels need to be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a **CSA Standard** to provide guidance on developing action levels is the COG member preferred venue. Also the setting of action levels needs to be linked to CSA N288.5 (effluent monitoring), such that only streams requiring monitoring would be considered for action levels. **COG members have made progress in development of such a method to set action levels based on operational data which could be used as a seed document for a CSA Standard** and would like to discuss this with the CNSC.

  - Specific values have not been proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to the statistical internal administrative levels that are currently used by some COG members to identify to station staff circumstances that needed to be looked into - but are not reportable. For a 0.05 mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels (5% DRL vs. 10% DRL).

  - A related point is that the Federal Government has recently announced that it will be implementing **administrative penalties** for environmental exceedances. It is not known at this time how exceeding action levels would be handled … since by definition there would be exceedances.

- **Safe limit for releases of nuclear substances (derived release limits).** The framework is silent on the well established safe limit for nuclear substances of 1mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.

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- **Optimization Processes -** ALARA (as low as reasonably achievable, social and economic factors taken into account) appears to be missing from the proposed framework. ALARA needs to be an integral part of any regulatory framework for the control of releases to the environment. ALARA is an important management tool to reduce the emissions and impact of nuclear substances, and based on the public dose performance to date of COG member facilities, it has been successful. For hazardous substances the concept of "pollution prevention" would be used.

3. Communication of risk and safe levels to the Public

The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and COG member companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

4. Specific Numeric Values "proposed' in the discussion document

Proposed dose constraint of 0.05 mSv/y for existing facilities: this should not be included in a framework/process document.
The current license requirement for nuclear power plants for public dose is 1 mSv/y (corresponding activity release limits are calculated using CSA N288.1 methodology). The actual performance for nuclear power plants resulting in a public dose in the range of 0.01 to 0.045 mSv/y was determined from environmental measurements. This level of performance is the result of improvements over the years in station design and management practices (ALARA). Station performance is managed through measured emissions which give more conservative "public dose" numbers (CSA N288.1 methodology) than environmental measurements (which are available only after year-end).

Historical performance of dose to the public by COG member companies is acknowledged to be very good and has been widely communicated to the public – especially neighbouring communities. Changing the release limits against which performance is measured without an identified risk requirement is not acceptable and will complicate and confuse communication of performance and perception by the public of risk.

"**Proposed" dose constraint of 0.01 mSv/y as a design objective for new build: this should not be included in this framework process document for operating facilities.** This level is very low and may in fact dictate technology selection when there is insignificant risk to the public or the environment associated with technologies with slightly higher emissions. Another real concern is that while this is designated as a "design objective" for new build, past experience would indicate it will become the licence limit for new build, and over time, it will be expected of existing facilities.

"**Proposed" Tritium in Groundwater Design Objective of 100 Bq/l for new build: this should not be included in this framework process document for operating facilities.** This proposed value is not in keeping with Health Canada's Guidelines for Canadian Drinking Water (7000 Bq/L) which is based on the recommendations of the International Commission on Radiological Protection and the World Health Organization. The acceptability of 7000 Bq/L was recently reinforced in the Government of Canada response to the Joint Review Panel for the proposed Darlington new build.

All COG member companies have groundwater monitoring programs in place. Historical performance has indicated that at the site boundary groundwater tritium levels are below the safe drinking water level of 7000 Bq/l. Again, establishing such a very low level for tritium in groundwater of 100 Bq/l, even as a design objective, is a concern because of the tendency of the public to expect this to apply to existing facilities.

5. Harmonization with other Regulators (or delegation, substitution, or equivalency)

With the CNSC moving into setting release limits for hazardous substances, there is bound to be overlap of jurisdiction (provinces, Environment Canada, Fisheries), with the potential for increased reporting and duplication of regulatory requirements. This is likely, especially if the CNSC do not think the provincial requirements are adequate. It is not clear how CNSC's proposed "harmonization" would occur, and it is anticipated that it will take

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considerable time and effort. Recent government initiatives to address overlapping / duplicative regulatory activities under the Canadian Environmental Assessment Act will allow delegation or substitution, which would be preferred over harmonization. It would lead to a single, best placed regulator for a particular parameter. It would be preferable for CNSC to adopt the latter practice, and sort out any concerns it may have by working with the best placed regulator.

6. Building on CSA N288 Successes

Since 2006, COG members have been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. CNA sent a letter to the CNSC reflecting this positive feedback from industry participants. A number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

7. Communication and consultation process

It would have been helpful to involve stakeholders earlier in the development of this document. This document contains many potential changes for stakeholders. Discussion at an earlier stage could have improved the clarity of intent and stakeholders could have provided timely information on impact on operations.

8. Terminology and definitions

Clarity of terminology is required to help communicate risk to the public. A number of terms are used inconsistently throughout the document.

Summary - Discussion Points for a Regulatory Framework for the control of releases of nuclear and hazardous substances to the environment

The following discussion points for development of a regulatory framework which would meet the need for transparency and would better conform to the convention of using risk based limits together with management processes to further reduce emissions (ALARA and pollution prevention).

- Set **Release Limits** to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 (new) Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of 1 mSv/year should be maintained as the safe limit for Setting Derived **Release Limits** using CSA N288.1.

- Manage **nuclear substances** and **hazardous substances** separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be.

- Recognize **"dose constraint" only as a tool** (consistent with ICRP and IAEA) for the optimization process to ensure members of the public are not exposed to levels higher than the dose limit of 1mSv per year. It should not be used to set release limits. Given the performance of COG member facilities dose constraints are not needed.

- Develop a **standardized method** to establish **Action Levels** to identify serious adverse conditions needing immediate action and reporting to the regulator. The CSA venue would be best for such development. COG members have made **progress in development of such a method to set action levels based on operational data** which could be used as a **seed document for a CSA Standard** and would like to discuss this with the CNSC..

- Implement **Optimization Programs** to drive ongoing performance improvement commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable, social and economic considerations taken into account), and pollution prevention. Regular optimization program performance reviews would ensure they remain effective.

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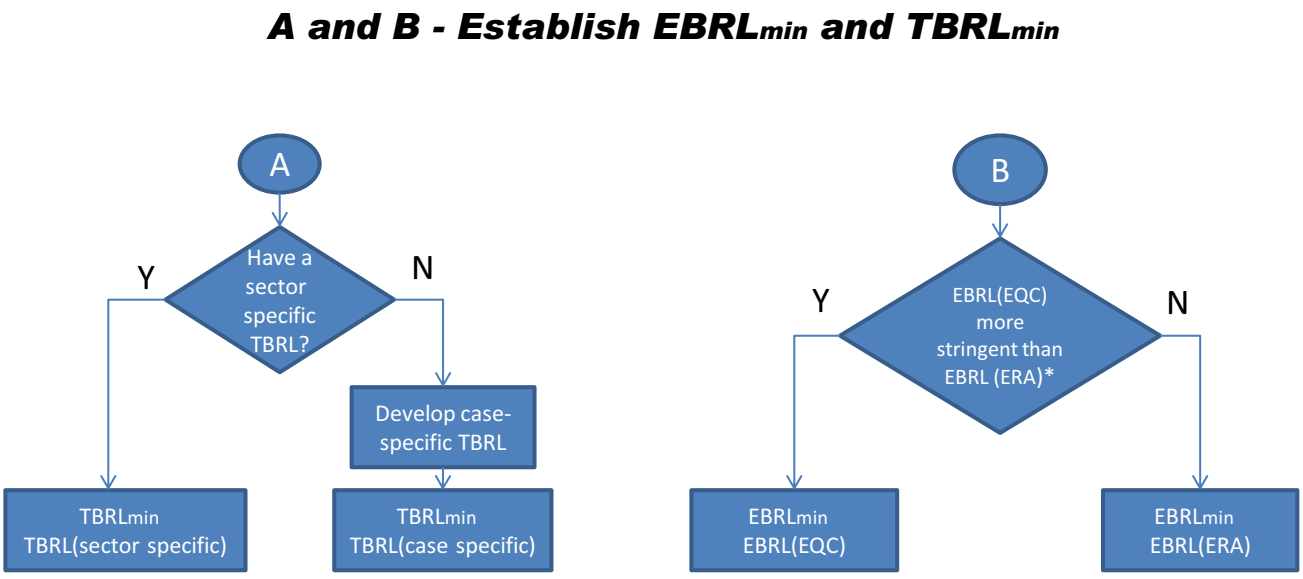
- **Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater)** have no place in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits to go in licenses.

Figure 1 – Combined Technology/Exposure-Based Approach – Existing Facility



Notes:
* EBRL(EQC) is EBRL based on Environmental Quality Criteria
EBRL(ERA) is EBRL based on Environmental Risk Assessment results.
Assume EBRL for nuclear substances is one of these.

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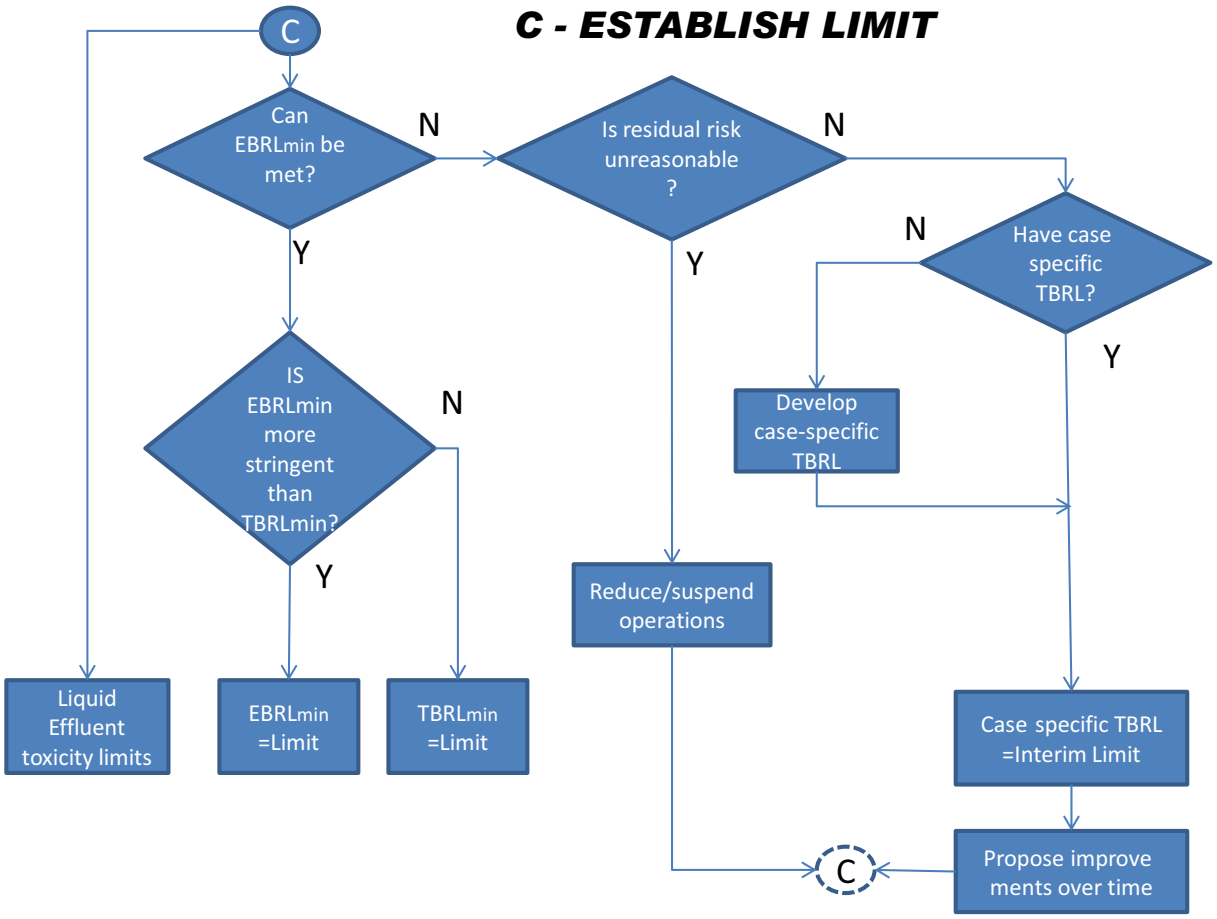
C - ESTABLISH LIMIT



D – USE STATISTICAL ACTION LEVELS

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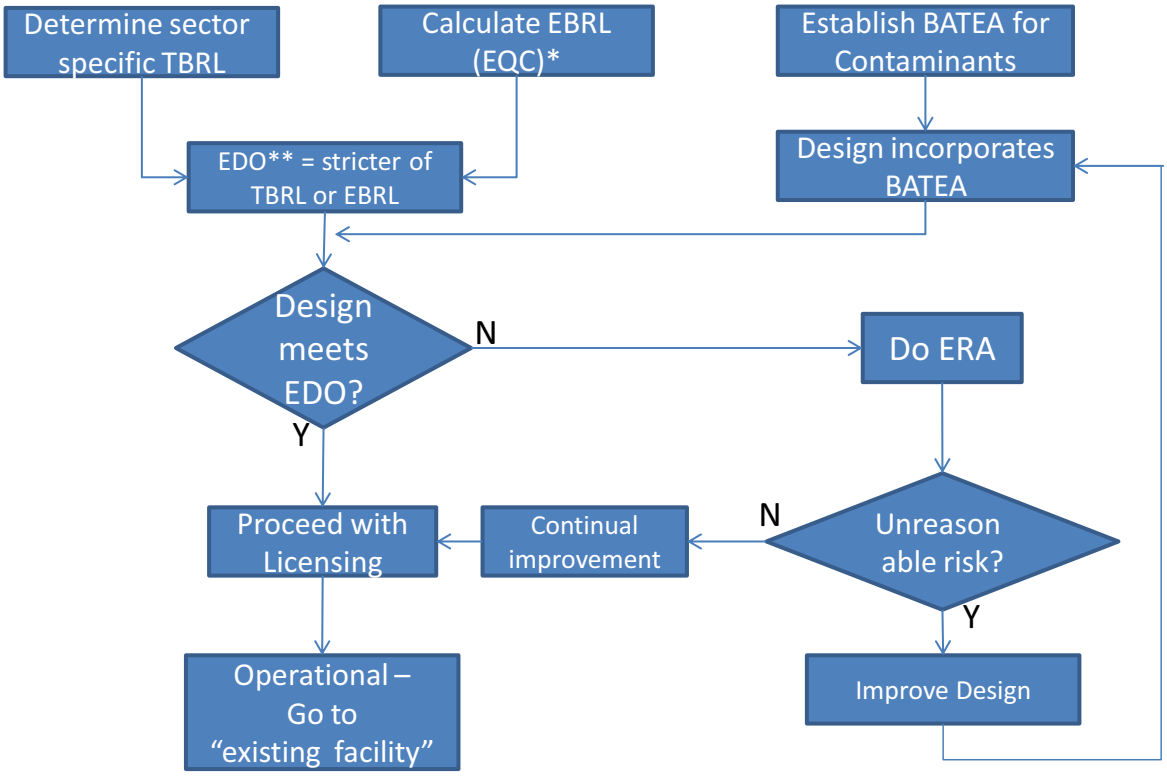
New Facility



Notes:

* EBRL(EQC) is EBRL based on Environmental Quality Criteria

** EDO is Effluent/emission Design Objective

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ATTACHMENT II

Candu Energy SPECIFIC COMMENTS ON DIS-12-02

Candu Energy recognizes the CNSC's rights and obligations in modifying or developing regulatory requirements and guidelines. As such, it recognizes that the CNSC may choose alternatives to some or all of the COG-member comments. The following, detailed comments are therefore offered to supplement those of the COG members, not to replace them.

Section 3.1

- Limits should be risk based unless there is no other alternative; adopting a more stringent technology based limit when an appropriate risk-based limit is available is not appropriate.
    - Adopting a TB-based limit that is more stringent than an appropriate risk-based limit is not consistent with good environmental practice as it will by definition impose requirements that are not justified by the risk mitigated.
    - Adopting a TB-based limit that is more stringent than an appropriate risk-based limit does not recognize the detrimental effects on society of imposing artificially low limits.[1]
    - Placing the priority on risk-based limits is consistent with the Commission mandate under the Nuclear Safety and Control Act, which is to "prevent unreasonable risk, to the environment and to the health and safety of persons" (paragraph 9(a) (i)).

Sections 3.2 and 3.3

- The terms best available technology and best available techniques have multiple interpretations, which increases the uncertainty associated with setting TBRLs. Even within the European Union the term BAT has different meanings. If the CNSC intends to pursue such approaches, then reference standards are required that the CNSC, Canadian industry and Canadian public have control over; it is undesirable to cede control of a Canadian regulatory practice to other jurisdictions.
- The selection of TBRLs should not be done in the absence of considering the cost and holistic benefits. The best technology must be judged based on economic achievability and the overall effects, not simply technological feasibility. Palo Verde, for example, achieves zero liquid discharge by evaporating its liquid effluents. This is economically viable, however, because the plant is located in a desert where natural evaporation rates are very high, and this approach inherently increases airborne emissions. As such, evaporation may be the "best" technology for reducing liquid effluents, but may not be the "best" technology for reducing environmental risk or the best investment in technology to reduce environmental impact.

Section 3.4

- The CNSC should provide a reference to the Environment Canada biological test methods.
- The CNSC should provide references to the Federal/provincial/territorial air and water quality standards, criteria, objectives and guidelines.

Section 3.5

- New facilities should be expected to incorporate appropriate and demonstrated pollution-prevention technologies and techniques, not the "most recently recognized". New facilities should not be forced to be R&D exercises, or to adopt technologies that may not significantly reduce risk (or may increase risk). Properly exercised, the ALARA process and CSA/N286 requirements on the use of feedback will ensure that new facilities consider the "most recently recognized".

[1] S. Dingwall *et al*, 'Human health and the biological effects of tritium in drinking water: prudent policy through science – addressing the ODWAC new recommendation', *Dose-Response* **9**, 6-31 (2011)

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- The terminology in this section (and the rest of the document) should be reviewed to ensure alignment with other CNSC documents and international recommendations. INPO 09-003, for example, specifies a margin model that uses terminology similar to "design targets", but with a different meaning. Similarly, the RD-310 and other CNSC documents discuss various operating regions (normal, AOO, DBA, etc.) for which systems are designed. It must be clear under what operating region and design assumptions/methodology an EDO applies.
- The definition of new nuclear facility needs to be clarified; would the existing Darlington plant, for example, be considered one facility, four facilities or more? Similarly, how would the addition of new "facilities" to an existing "facility" be addressed?
- As written, it could be interpreted that if a new facility can demonstrate that it would meet the EDOs, then it would be deemed to be ALARA and no further optimisation would be required. If this is the intent, then it should be clearly stated. If it is not the intent, however, the relationship of EDOs to the ALARA process needs to be explained.

Section 4.1

- The ability or inability of existing facilities to achieve any given public dose should not be the basis for selecting the dose constraint.
    - Given that the regulatory limit of 1.0 mSv/a is well below the dose level that is demonstrably detrimental to human health, dose constraints are a method of reducing the likelihood of exceeding a regulatory limit, not a method of protecting the public. There is no discernable reduction in risk from setting the constraint lower.
    - If the CNSC chooses to set a dose constraint that is lower than the accepted regulatory public dose limit, then it should follow its stated intent to harmonize its requirements with international requirements. As such, the ICRP-recommended value of 0.3 mSv/a would be more appropriate than the 0.05 mSv/a suggested. Adopting the ICRP recommendation would also be consistent with historical Canadian and international practices of basing radiation-protection requirements on ICRP recommendations.

Section 4.2

- The comments made, above, on basing EDOs on demonstrated performance also hold for new facilities.
- The logical basis for setting the EDO for a new facility lower than that of existing facilities base on the ability of existing facilities to achieve that lower value is inherently open to challenge. Such an approach will increase confusion and make it more difficult to explain environmental performance and risk to the public. Furthermore, any EDO set for new facilities will likely become an EDO for existing facilities through Periodic Safety Review, licence renewal or environmental assessment (e.g., for refurbishement). If the objective is to protect the public from risk, then the EDO for new and existing facilities should be the same unless it can be justified that a facility-specific EDO is necessary.

Section 4.3

- The comments on differentiating between existing and new facilities, above, also hold for this section.
- The comments on setting limits based on risk reduction provided for Section 3.1 also hold for this section.
- The rationale for selecting 100 Bq/L is at best weak, and selecting such a value is likely to increase societal risk by encouraging the misinterpretation of what the limit means. As noted in the report, the Canadian drinking water guideline of 7000 Bq/L is based on delivering a dose of 0.1 mSv/a under conservative ingestion assumptions; as such, it is already one order of magnitude below the regulatory dose limit of 1 mSv/a. Setting an arbitrary value almost two orders of magnitude lower has no obvious benefit to the public or environment. It is also inconsistent with the EDO of 0.05 mSv/a suggested by the CNSC in section 4.1, and the ICRP recommended 0.3 mSv/a,

Section 4.4

- The CNSC should provide references to the Federal/provincial/territorial air and water quality standards, criteria, objectives and guidelines.

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- The CNSC should provide a reference to the POI guideline and Ambient Air Quality Criteria (AAQC) defined by the Ontario Ministry of Environment.
- Hazardous substances should be managed separately since environmental protection regulations, air and water quality standards, criteria, objectives and guidelines differ between provinces and territories, and total harmonization between federal and provincial regulations may never happen.

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From: ole@nrtco.net [mailto:ole@nrtco.net]
Sent: Saturday, June 30, 2012 11:59 PM
To: Info
Subject: Comments on Discussion Papers DIS-12-01 and DIS-12-02

Dear Sir or Madam,

Please find attached comments submitted on behalf of Concerned Citizens of Renfrew County on Discussion Papers DIS-12-01 and DIS-12-02.

Thank you for the opportunity to provide comments.

Ole Hendrickson
Researcher, Concerned Citizens of Renfrew County

DIS-12-02 Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Comments from Concerned Citizens of Renfrew County - June 30, 2012

General comments

A positive step proposed in this document is the change from the 1 mSV dose constraint currently used to calculate release limits to a much more stringent value. This would put Canada more in line with accepted international practice.

As noted on page 6-7, current practice is that "The actual release limit is derived using conservative exposure-pathway modelling from the source of the release to a "representative person", a process referred to as derived release limit modelling." Some additional information on the process of modeling and estimating doses would be helpful. This is clearly an imperfect and challenging process, as illustrated by the fact that the CNSC's estimates of doses from a nuclear facility in our area have varied greatly. Furthermore, to state that exposure pathways in dose models are chosen to be "conservative" is a value judgement. As explained in the footnote on page 7, "The methodology for establishing DRLs comes from the Canadian Standards Association (CSA) standard N288.1-08 entitled, *Guidelines for Establishing Derived Release Limits for Nuclear Facilities*." These industry-written guidelines should be treated with some skepticism. Dose modeling is complex and imperfect. In our experience, not all the assumptions made in the CSA guidelines are conservative.

Nowhere in the discussion paper is it explained that current practice is for licensees to calculate derived release limits themselves, using the CSA guidelines. Not only did the nuclear industry write the guidelines for establishing release limits, but each individual nuclear facility then uses the guidelines to establish its own release limits. These limits are then simply incorporated by the CNSC into licenses, without, to our knowledge, a CNSC–led review process. We have seen cases where the process of deriving release

limits failed to use “conservative” assumptions, and the resulting limits were far too high to protect the public and the environment.

The discussion paper should explain how this problem will be addressed. One option would be for the CNSC itself to calculate “exposure based release limits” (EBRLs) and “derived release limits” (DRLs) for nuclear facilities. In fact, page 14 says that “The CNSC proposes to calculate EBRLs by one of the following three methods… 3. for nuclear substances, by establishing DRLs based on a dose constraint…” The CNSC must take additional steps to ensure that release limits are scientifically credible and based on conservative assumptions. It should take responsibility for providing a consistent process for setting release limits, and a consistent and high level of protection of health and the environment for the public living near any licensed facility.

A major concern with the discussion paper is the lack of clear principles to guide the process of establishing release limits. The so-called “core principles” in the paper do not qualify as “principles”. Our specific comments propose a way to address this. Specific comments:

A “principle” may be defined as ”A fundamental truth or proposition that serves as the foundation for a system of belief or behavior or for a chain of reasoning.” On page 1 of the Executive Summary in the section on “Release Limits”, the three bullets that follow the first paragraph could be used as principles for establishing release limits and action levels. This could be done by deleting the final sentence of the first paragraph, and starting a new paragraph with a “chapeau” for the three bullets such as:

> The process for establishing release limits and action levels at nuclear facilities is based on the following principles:
>
> - protect human health and the ambient environment;
> - ensure the most appropriate pollution prevention and control technologies are adopted; and
> - drive continuous improvement in the realm of proactive pollution prevention and control.

On page 2, the heading “Core principles” would be replaced by “Elements of the CNSC’s proposed approach”, and the following sentence would read “The CNSC’s proposed approach would be based on the following elements:”

We emphasize that the so-called “core principles” in DIS-12-02 do not fit any commonly used definition of this term. Protection of human health and the environment should be the over-riding principle in establishing release limits.

On page 2, the description of the “combined technology/exposure-based approach” is confusing, because the meaning of the terms “technology based release limits” and “risk-based release limits” is unclear in the Executive Summary. The announcement of

the opportunity to comment on the new regulatory framework for environmental protection (http://nuclearsafety.gc.ca/eng/mediacentre/updates/2012/May-07-2012-wanted-opinion-regulatory-protection.cfm) has a much better description:

> …the CNSC proposes to establish release limits based on the most stringent of two methods commonly used to set such limits (for both radioactive and non-radioactive substances):
>
> - Technology Based Release Limits (release level achieved based on the most effective demonstrated pollution prevention/control technologies) OR
> - Risk-Based Release Limits (release level based on scientifically defensible evidence and criteria).

This should replace the text for "Principle 1". The final two sentences under "Principle 1" should be deleted. A technology based release limit should only be used when it is more stringent than a risk-based release limit. When an exposure-based limit is not technically attainable, there is never a case where "the residual risk does not pose an "unreasonable risk"." Excessive exposures are always "unreasonable".

In line with this, so-called "Principle 3", "Case-specific technology-based release limits", should be deleted. Exceptions should not be made for individual facilities that cannot meet exposure-based limits. The argument made on page 18 for case-specific limits is:

> The use of a case-specific limit for such a facility would be protective of human health and the environment. It reinforces the principles of ALARA and pollution prevention by ensuring that the selection of a dose constraint for the sector as a whole is not influenced (i.e., restrained) by the inability of a single facility to achieve that number.

We find this highly troubling. It suggests that the CNSC's normal practice is to relax dose constraints so that even the worst-performing facility in a sector is able to continue operations. Lax environmental protection standards not only place the public at risk, but they also stifle innovation and competition, and fail to "drive continuous improvement".

"Principle 5" proposes the creation of "Effluent/Emission Design Objectives" for new nuclear facilities. This proposal merely serves to highlight that emissions levels are unacceptably high at existing facilities. The proposal would involve a 5-fold difference between the dose constraints for new and existing nuclear reactors, and a 70-fold difference between the limits for tritium in groundwater for new and existing nuclear reactors or for other tritium-releasing facilities. This begs the question, "Why can't existing facilities be redesigned to meet these objectives?"

We provide additional comments on the proposed 100 Bq/L groundwater tritium design objective below.

Cumulative doses are not adequately addressed in the discussion paper. On page 18 is the following statement:

> In addition to calculating the DRL for each radionuclide (or radionuclide group) based on the dose constraint, the total cumulative dose should also not exceed the dose constraint (summation rule).

The so-called "summation rule" does not provide adequate protection for the public. For example, the Chalk River Laboratories of AECL has released hundreds of radioisotopes on an ongoing basis for over 50 years, with a number of them (radioiodine isotopes, H-3, C-14, Ar-40, Cs-137, Sr-90, etc.) of significant concern and detectable in monitoring programs. When a dose constraint is applied to release of each individual isotope, and calculated annually, the cumulative impacts of past and possible future releases are ignored. When radionuclides have already accumulated in the environment near nuclear facilities, there is a strong case for imposing tighter restrictions on additional emissions. In the case of the Chalk River Laboratories, a portion of the ongoing annual releases is not even monitored – in particular, the strontium-90 plume that is in contact with the Ottawa River for several hundred meters.

The issue of long-term, cumulative doses is recognized by international radiation protection agencies. It should be clearly identified in the discussion paper. An approach should be identified that involves stricter limits for existing or proposed facilities that create long-term risks or that release multiple hazardous substances.

The discussion paper proposes "that new facilities with tritium releases incorporate an emission design objective [EDO] of 100 Bq/L for tritium in groundwater at the margin of the facility's control area," and provides additional details on this proposal:

- EDOs are design targets well below levels that represent a risk to health and the environment or those that would be used as licence limits. As such, EDOs would not be designated as licence limits… (p. 15)
- It is recognized that the current Canadian drinking water guideline of 7,000 Bq/L for tritium is safe. The proposed EDO value of 100 Bq/L for tritium – a value well below the drinking water guideline – was selected on the basis of being technologically and economically achievable, based on the performance of existing facilities. (p. 19)
- The intent is to provide further assurance that the public dose limit of 1mSv/year will not be reached or exceeded, that end use of groundwater will not be compromised and that releases will be maintained ALARA in accordance with pollution prevention principles and a commitment to continuous improvement. (p. 24)

Our group has a number of concerns with these statements. Most fundamentally, our recommendation is that tritium limits in groundwater at all nuclear facilities – new or existing - should be set at 20 Bq/L, in line with recommendations of the *Ontario Drinking Water Advisory Council, contained in the* Report and Advice on the Ontario Drinking Water Quality Standard for Tritium*, May 21, 2009.*

The Council recommended that the Ontario Drinking Water Quality Standard for tritium should be revised to 20 Bq/L, recognizing that:

- 20 Bq/L relates to heath effects from long-term, chronic exposure from drinking water over a life time of exposure of 70 years;
- 20 Bq/L is within the range of the variations considered by the Council (7 Bq/L to 109 Bq/L), for a 10-6 risk level; and
- 20 Bq/L, based on an annual average, is achievable in drinking water, without significant cost to the nuclear power industry, according to the Canadian Nuclear Association.

The statement made on page 19 of the discussion paper that "It is recognized that the current Canadian drinking water guideline of 7,000 Bq/L for tritium is safe" is directly contradicted by the findings of the *Ontario Drinking Water Advisory Council.* The outdated 7000 Bq/L guideline corresponds to a risk level far higher than the 10-6 risk used by the *Council* in developing its recommended 20 Bq/L standard.

Furthermore, even the CNSC admits that 100 Bq/L limit for groundwater tritium at nuclear facilities is "economically achievable, based on the performance of existing facilities" (p. 19). Why then is it so reluctant to make regulations that incorporate this level?

If the CNSC is truly committed to ensuring that "end use of groundwater will not be compromised" and that licensees have "a commitment to continuous improvement" (p. 24), it makes no sense to create a "design objective" for facilities that have not even been built, while allowing existing facilities to pollute groundwater to levels in excess of what reasonable persons would find acceptable.

From: David Coon [mailto:dcoon@conservationcouncil.ca]
Sent: Monday, April 30, 2012 2:17 PM
To: Consultation
Subject: DIS-12-02 comments

To: CNSC
Re: Comments on Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities:

Please find the comments of CCNB Action on the proposed methodology to establish in a consistent manner limits and action levels on environmental releases at Class I nuclear facilities, uranium mines and mills, and nuclear waste management facilities.

David Coon
Executive Director

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CCNB Action Comments on CNSC Document: DIS-12-02

Process for Establishing Release Limits and Action Levels at Nuclear Facilities

At a meeting of the Board of Directors of CCNB Action the following positions were approved:

There is no proven safe level of radiation exposure, therefore the public and the environment should not be exposed unnecessarily to man-made radiation. CCNB Action is aware that our electricity needs can be met by renewable energy sources like hydro, wind, solar, tidal power and biomass; therefore electricity production by nuclear power plants causes unnecessary exposure of the public and the environment to man-made radiation.

In relation to tritium emissions: The statements on page 19 of the CNSC DISCUSSION DOCUMENT DIS-12-02 that “the current Canadian drinking water guideline of 7000 Bq./L. for tritium is safe” and “no health effects are expected” are incorrect. According to the Ontario Advisory Committee on Environmental Standards 1994 report “A Standard for Tritium” the standard should be more strict. They recommended an immediate reduction to 100 Bq./L. to be reduced to 20 Bq./L. after 5 years. The current guideline was incorrectly calculated based on 1 year’s exposure instead of the 70 years exposure used in the drinking water guidelines for the other chemicals in the guideline. The 7000 Bq./L level would result in 350 excess fatal cancers per million people instead of 1-10. Dividing by 70 years gives 100 Bq./L., and dividing again by 5 to get the standard 1 fatal cancer per million gives 20 Bq./L. (Also, all living things incorporate tritium, chronic exposure to tritium leads to higher levels of organically-bound tritium, which remains in the body much longer than if it is not organically bound, and research on organically-bound tritium effects on DNA show that the weighting factor for tritium should be at least doubled, because it is more damaging than previously thought.)(Fairlie, 2007).

CCNB Action supports reduction of the tritium emissions level from 7000 to 100Bq./L., but preferably to 20 Bq./L., which would be more consistent with the usual standard of 1 excess fatal cancer per million persons. Section 4.3, page 19 of the CNSC document proposes an effluent/emission “objective” of 100 Bq./L. for tritium in “groundwater” at the plant boundary. Assuming “groundwater” means surface water and not groundwater as in aquifer, that “objective” means “enforceable standard”, and that the standard is applied to all facilities, including refurbished nuclear plants, this would be an improvement. (The tritium level in surface water at the boundary of the Lepreau nuclear waste facility was about 1600Bq./L. in 2006.) Page 19 states that this objective of 100Bq./L. is technologically and economically achievable, and it should be achieved without delay.

CCNB Action's position on Derived Release Limits (DRL's) is that the allowable emissions from the Point Lepreau nuclear plant are extremely high at 430,000 TBq./yr. (430,000 trillion Becquerels per year) to air, and 16,000,000 TBq./yr. (16 million trillion Becquerels per year) to water. The allowable emissions to water are much higher than any other nuclear plant in Canada and must be reduced. Considering that all organisms incorporate this radiation, and that the CNSC since the year 2000 has been responsible for protecting or fish and other aquatic creatures under the Fisheries Act according to this document, action on this is past due. Also, considering that fish, seafood and dulse are important to our diet and our economy, and that toxic substances deposited in bodies of water are shared with the air and deposited on the ground, it is vital to our health as well as that of our environment that these DRL's be reduced dramatically, and that radioactive and toxic effluent and emission standards that better protect human health and the environment be developed and strictly enforced. In developing these standards it must be considered that tritium emissions are more hazardous than previously thought, that "health" of an organism includes more than absence of "excess fatal cancer" and that undamaged DNA is required for the continued propagation of all organisms on earth. If these factors are taken into account, the proposal to change from DRLs to monitoring effluent and establishing release limits for nuclear and other hazardous substances would be an improvement.

CNSC proposes a dose constraint per reactor of .05mSv./yr. for old reactors, and .01 mSv./yr. for new reactors. CCNB Action submits that refurbished reactors should be classed as new reactors for this dose constraint. We agree that all the radionuclides added together should be less than the dose constraint.

With regard to the proposals for establishing release limits, CCNB Action supports choosing the stricter, more protective release limits in a choice between TBRLs (Technology-Based Release Limits) and EBRLs (Exposure-Based Release Limits), and between Federal and Provincial Standards. However, we note on page 26 that plans are to make exceptions

and allow a laxer TBRL to substitute for a stricter EBRL if the facility has difficulty meeting the required standard. This is not acceptable.

CCNB Action approves of consistency in investigation and applying and enforcing regulations, rather than making exceptions for violators.

CCNB Action strongly supports protecting our fish and other aquatic life.

CCNB Action has not reviewed the ancillary documents, such as CSA N288.6 for conducting ERAs (Environmental Risk Assessments), but we have been disappointed by the poor quality of ERA studies done in New Brunswick in the past.

A n accident involving radioactive sources in New Brunswick has brought to our attention the proliferation of radioactive materials for industrial, commercial and even consumer use, and the potential for accidents and dispersal of radioactive materials in the environment. We learned that the CNSC is responsible for supervising this as well. Will the CNSC be developing a discussion document to address this issue?

If the CNSC is to carry out its mandate to protect health and the environment, it is obvious that more CNSC inspection staff will be required, and these people should be hired as soon as possible.

References:

Tritium Hazard Report: Pollution and Radiation Risk from Canadian Nuclear Facilities, Dr. Ian Fairlie, June, 2007

CCNB Action is a non-profit environmental organization based in Fredericton with chapters in Saint John, Moncton and Fredericton.

e-mail: info@ccnbaction.ca

Mailing Address: 180 St. John Street, Fredericton, NB E3B 4A9

Please find attached compiled comments from Environment Canada on two CNSC Discussion Papers:

- February-22-2012-DIS-12-02 - Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Please contact me if you have any questions regarding the attached comments. Thank you for the opportunity to provide input to the discussion papers.

Regards
Nardia

Nardia Ali
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CNSC Discussion Paper DIS-12-02 (Feb 2012):

Process for Establishing Release Limits and Action Levels at Nuclear Facilities

General Comments

The proposed process for setting limits is sensible and familiar. EC supports the three bullets in Section 1.1 (Protect human health and the ambient environment, ensure the most appropriate pollution prevention and control technologies are adopted and drive continuous improvement in the realm of proactive pollution prevention and control). We suggest that they be given more prominence in the paper.

EC supports the Core Principles on pages 2-3 with two modifications. These modifications need to be carried throughout the paper to wherever the principles are mentioned:

A) Principle 4 includes the phrase" at the end of an appropriate mixing zone". The footnote on page 21 provides the rationale for the mixing zone as the Technical

Supplement 3 to the Canada –wide Strategy for Managemnet of Municipal Wastewater Effluent." However the Technical Supplement is clear that a mixing zone is only for degradable substances and it is understood from the subject matter that they mean *biodegradable* (as opposed to the "degradation" that occurs during the radiological decay of radioactive materials). The Technical Supplement says: "Degradable substances will be allowed to mix in a proportion of the receiving water, whereas toxic, persistent and bioaccumulative substances such as chlorinated dioxins and furans, PCBs, mercury and toxaphene, will not be allowed a mixing zone."

Furthermore the MMER and PPER do not provide mixing zones; rather industry must meet the regulated effluent limits at the point of discharge. However it is recognized that many substances are not regulated with specific release limits. While the proposed WSER does provide for mixing zones, the authorizations for them are temporary and short term.

Therefore given the non-biodegradable nature of effluent from nuclear facilities, and given that EC's regulations under the Fisheries Act do not include mixing zones at all or include them as a temporary feature, we recommend that the mixing zone concept be removed, or at a minimum, be severely curtailed to be used rarely in limited/exceptional situations.

B) Principle 5 (BATEA) acknowledges economics, but the other principles do not. Either the CNSC should provide a rationale for excluding cost considerations in the other principles, or the CNSC should include cost/economic considerations in them.

Principle 1: Adoption of a combined technology/exposure-based approach

- Overall, this principle seems to be a good basis to begin the determination process for release limits. Defaulting to the most stringent of the technology based and environmental quality criteria based release limits seem to be an appropriate pollution prevention approach. However, when an appropriate environmental quality criteria is being applied and consistently met by a facility, any "upgrade" to a more stringent technology based release limit should be voluntary on the part of the regulatee rather than a mandatory licence condition.

- "Unreasonable risk" is used as the criteria upon which case specific technology-based limits may be adopted if an exposure based limit is found to be technically

unattainable. However a definition of “unreasonable risk” or how to determine it has not been provided.

- It is not clear what course of action would be taken in the case where the residual risk (when EBRL is not technologically attainable) with a case-specific TBRL still poses an “unreasonable risk”. Both the summary and detailed descriptions of principle 1 in section 2 and 3.1 respectively, seem to assume that the case-specific TBRL would be protective of human health and environment. However this may not always be the case. Would the CNSC require the release and the associated operations cease in that situation?

- The phrase “…surrounding environment…” in the third paragraph of section 3.1 may be refined to “…receiving environment…” to more clearly reflect the relationship between the releases and the subject of the release limits.

- There seems to be a disconnect between the description of TBRL’s as the “minimum acceptable limits for releases” representing “the minimum level of control applied” and what is implied by the “most stringent release limit” indicated in principle 1. It may be conflicting to both industry and regulators to refer to TBRL’s as both the minimum level and the most stringent/best available technology level.

- Figure 2 qualify the “Whole Effluent Toxicity” criterion as such that it “must not be acutely toxic”. This qualification of the criterion may be too narrow for the purposes of the Fisheries Act. The Fisheries Act states in section 36(3) that “*No one shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water*”. A deposit of a substance may be deleterious though it may not specifically meet the test of acute toxicity. Therefore, it would be more appropriate to qualify this criterion as effluent that “must not be deleterious to fish (as defined under the Fisheries Act)”.

Principle 2: Sector-specific technology-based release limits

- It is stated that when Canadian TBRL’s are not available, international TBRL’s that is considered to be the best available technology or technique will be adopted if found to be acceptable. What is the test for acceptability? It is recommended that the test for acceptability include a minimal risk of a deposit of deleterious substances in water frequented by fish as defined under the Fisheries Act.

- It is not clear whether the “best available technology/technique” will also need to meet the “economically achievable” criteria of BATEA. BATEA is mentioned only once in this discussion paper under section 2 for principle 5 that summarizes the principle. Some jurisdictions refer to BATEA principle as simply the “best available technology” (BAT) principle with the understanding that BAT principle includes “economically achievable” . Perhaps the “economically achievable” criteria is implied in the description of principle 2 in section 3, however this is not clear.

- It is presumed that an international TBRL would be considered if there was no Canadian TBRL and the EBRL is not technologically attainable. However the scenario under which international TBRL’s might be adopted is not clearly described.

- The principle proposes that the CNSC would develop sector-specific TBRL’s in consultation with industry and other stakeholders if it deems that the current release limits do not exist or are deemed to be outdated. It is presumed that other stakeholders include relevant government agencies. It is recommended that government agencies are explicitly included in this statement.

Principle 3: Case-specific technology-based release limits

- This principle seems reasonable.

Principle 4: Exposure-based release limits

- The Fisheries Act does not provide any provisions for the inclusion of a mixing zone for the deposit of a deleterious substance. Therefore method #1 presented in section 3.4 for principle 4 stands in contravention to the Fisheries Act. This method may induce licensed facilities to violate the Fisheries Act.

- Method #2 presented in section 3.4 is a reasonable approach. However the endpoint for the ERA cannot be population level sustainability if the effluent constitutes a deposit of deleterious substances into waters frequented by fish. The pollution prevention provisions of the Fisheries Act do not distinguish between populations and individuals of fish. Rather the endpoint of the ERA should be the determination of whether the deposit constitutes a deposit of a deleterious substance. Furthermore, the ERA cannot avail itself to the dilution of deleterious substances within a mixing zone under the Fisheries Act.

- Establishment of DRL's as outlined in CSA N288.1-08 standard and as stated in method #3, is not appropriate for non-human biota since the standard does not apply to non-human biota (section 1.5, CSA N288.1-08). Therefore, DRL's would need to be developed to take into consideration the effects on non-human biota beyond that which is prescribed in CSA N288.1-08.

- The concept of harmonization with EBRL's in provincial permits may be inappropriate if the provincial permits endorse mixing zones. Regulatees are required to comply with the Fisheries Act if equivalency cannot be established with other regulations or permits.

- It is unclear if the EC criteria mentioned for demonstrating non-toxic effluents will be applied end of pipe or with a mixing zone.

- The term "hazardous" should be defined in the document

- The approach outlined in the discussion paper could result in more relevant and meaningful effluent limits for the environment than some current licence limits. However if a mixing zone approach is considered in spite of the above concerns expressed about non-compliance with the Fisheries Act, consideration should be given to the fact that mixing zones and the conditions in the receiving environment are not static and conditions could change as a result of natural events such as beaver dams, climate change and drought. As an example, there was a situation in Alberta where facilities were regulated using both action levels and mixing zones. Severe drought conditions resulted in significant changes in the mixing zone and an exceedance in an important environmental parameter occurred. Given that the catalyst for this was climatic and not operational, the facility argued that they should not be responsible for the outcome. Significant environmental effects occurred with this situation.

Principle 5: Effluent/emission design objectives for new facilities

- Effluent/emission design objectives (EDO's) for liquid effluents to be discharged to waters frequented by fish must not be deleterious at end of pipe.

Principle 6: Action levels to demonstrate adequate control

- Industry may object to lowering the action limits significantly since the public perception optics may seem to be less positive. An alternative may be to leave the action limits and create a new limit that corresponds to the new approach

outlined in this section. Generally EC agrees that a process control limit that provides meaningful feedback to the operator is preferable to the current use of the action limit – which is seldom approached and thus does not have any real role in informing the operator of significant changes in normal operations.

Dose constraints – section 4.1 and 4.2

- The use of dose constraints that conform to ALARA principle to ensure that radiation exposure is far below existing regulatory limits is appropriate. However though the description the environment as a beneficiary of this approach, the doses being considered are for human beings. Dose constraints for non-human biota have not been specifically considered. A similar approach for non-human biota would also ensure that potential impacts on ecological receptors are being considered and accounted.

Mixing zones in surface water and exposure-based limits – section 4.4

- It is acknowledged that mixing zones are well accepted as a pollution prevention approach used by industry and in many provincial permitting systems. However as mentioned earlier there is no provision for mixing zones under the Fisheries Act.
- An oversight by the drafters of the discussion paper is the lack of information on the subject of “thermal discharge” from nuclear power plants. The document should expressly include thermal discharge as a release that may be subject to regulatory control. It would be reasonable to emphasize that the mixing zone approach would no more render deleterious thermal discharge harmless than it would render hazardous substances non-deleterious for the purposes of the definition in subsection 34(1) and the prohibition in subsection 36(3) of the Fisheries Act.
- There is a minor error on page 7 in the 2nd paragraph under “Technology-based release limits”. Schedule 4 (not 3) of the MMER includes the effluent limits.

From: Desiri, Paul (GE Power & Water) [mailto:Paul.Desiri@ge.com]
Sent: Friday, May 25, 2012 11:48 AM
To: Consultation
Subject: DIS-12-02, "Process for Establishing Release Limits and Action Levels at Nuclear Facilities"

Below, please find comments from GEH-C on the subject document:

Major Areas of Concern

1. The application of a statistical process control (SPC) approach to the setting of action levels, and thereby determining what constitutes an exceedance, is inconsistent with definition of Action Levels (significant breakdown).
2. Emission data are not necessarily normally, or log-normally distributed.
3. It is much better to have administrative limits for SPC to avoid setting off alarm bells unnecessarily. What this may do is alarm members of the public unnecessarily. It also punishes good performance because those operators with tight control could have more restrictive action levels than an operator with looser, more variable control.
4. The design objective of 0.01 mSv is below deminimis and may be too low. It is different if the designer of a new facility can achieve this without an undue mount of additional expenditure/cost … but if it becomes too expensive for the small return on risk reduction this would not be a good use of environmental protection resources.
5. The 110 microgram per liter limit that has mentioned may be suitable for drinking water but is not appropriate for sewer discharges, particularly sanitary. This level may not be achievable and is not consistent with a pathways analysis approach that has served to protect the public and environment adequately.
6. Reporting requirements would be cumbersome, if upper 5% of data is reportable for several different substances, or parameters. The increasing frequency of reporting could create public concern as it would appear that performance has significantly declined when it may have not changed.

Minor Areas of Concern

1. Lack of clarity as to whether BATEA investigation is a requirement for an existing facility that is meeting EBRL's.
2. Lack of clarity on Ecological Risk Assessment based approach.
3. The mixing zone concept does not work for releases to small drainages, or the municipal sanitary sewer system.

Do not hesitate to contact me for additional information or clarification

Sincerely

Paul Desiri
Manager, Environment Health and Safety and Licensing
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Hydro Québec Production

Le 27 juin 2012

« ***CONFIDENTIEL*** »

Monsieur François Rinfret
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Hydro-Québec
Centrale nucléaire de Gentilly-2
4900, boul. Bécancour
Bécancour (Québec)
G9H 3X3

Objet : **Commentaires sur le document de travail DIS-12-02 intitulé : Processus d'établissement des limites de rejets et des seuils d'intervention dans les installations nucléaires**

Monsieur,

Le but de cette lettre est de fournir les commentaires d'Hydro-Québec sur le document de travail DIS-12-02 « Processus d'établissement des limites de rejets et des seuils d'intervention dans les installations nucléaires ». Nous avons des préoccupations sur l'encadrement présenté dans le document de travail et nous profitons de cette opportunité pour vous présenter nos préoccupations.

Hydro-Québec est une compagnie responsable qui s'est engagée à respecter les normes environnementales partout au Québec. La direction production nucléaire adhère au principe de développement durable et accorde une haute priorité à l'environnement. Les résultats d'analyses du programme de surveillance environnementale, qui sont publiés dans notre rapport annuel, démontrent hors de tout doute que l'impact sur la dose annuelle au public qui est de l'ordre de grandeur de 1 µSv est négligeable par rapport au bruit de fond naturel de radioactivité. Dans son programme de gestion environnementale, Hydro-Québec établit des programmes, des objectifs et des cibles qui permettent de s'améliorer de façon continue. Tel que décrit dans le document de la CCSN, le principe ALARA qui est un moyen efficace pour diminuer les doses est appliqué dans la gestion environnementale des effluents liquides et gazeux.

Avant d'émettre nos commentaires, nous voudrions souligner le fait qu'Hydro-Québec est consciente de l'importance de rassurer le public et de travailler de concert avec COG et la CCSN à optimiser le système de gestion environnementale. Nos commentaires sur le document de travail, reflètent les préoccupations de la communauté nucléaire canadienne. L'annexe 1 présente de l'information supplémentaire qui a été préparée par les membres du NEAC (Nuclear Environmental Affairs Committee) qui est un sous-comité de COG.

En accord avec les autres membres de COG, Hydro-Québec propose les concepts suivants qui permettront de développer un encadrement pour rencontrer le besoin de transparence et de mieux se conformer à une convention qui est basée sur une évaluation des risques. De cette façon, l'amélioration du système de gestion environnementale permettra de préparer des plans de prévention de pollution et de respecter le principe ALARA.

- Établir des limites de rejets pour protéger le public et l'environnement à des niveaux de risque acceptable. Des méthodes éprouvées sont disponibles dans la norme CSA N288.6 qui traitent de l'évaluation des risques environnementaux. Pour les substances nucléaires, une valeur de 1 mSv/année devrait être maintenue pour le calcul des LOD (Limites Opérationnelles Dérivées) tel que décrit dans la norme CSA N288.1.
- Gérer les substances nucléaires et les matières dangereuses de façon distincte, puisque l'industrie n'est pas rendue au stade de l'harmonisation totale.
- Utiliser les contraintes de dose comme limite supérieure pour les installations existantes n'est pas requis selon les membres de COG puisque des seuils d'intervention inférieurs à la LOD sont déjà instaurés dans toutes les centrales.
- Développer une nouvelle norme standardisée de la CSA pour établir des seuils d'intervention qui seraient utilisés en cas de situations anormales et qui seraient rapportables aux instances gouvernementales.
- Implanter des plans de prévention de pollution et des plans ALARA dans le but de prévenir les risques associés à chacune des centrales.
- La contrainte de dose pour les nouvelles centrales de 0.01 mSv/année et la concentration de 100 Bq/l de tritium dans les eaux souterraines devraient faire partie du processus d'évaluation environnementale et d'optimisation de la conception et non pas être associées à des limites de rejet.

Par la présente, Hydro-Québec vous demande la possibilité de discuter des commentaires énumérés ci haut avec les autres membres de COG et la CCSN avant l'adoption finale.

Nous demeurons disponibles pour toute question supplémentaire à ce sujet.

Recevez, Monsieur, nos salutations distinguées.

Claude Gélinas
Chef Centrale
Centrale nucléaire de Gentilly-2
RL/CG/cf

p.j. Annexe 1

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Dossier actif
Richard Laporte

ANNEXE I

CANDU OWNER GROUP MEMBER COMMENTS ON DIS-12-02

1. **Document Content** - the document title and body indicate that the content is related to process – a process/framework to establish release limits for nuclear substances and hazardous substances and a process to establish action levels. The document does provide a framework for release limits and action levels. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values takes away from consultation to establish a robust framework and pre-empts the outcome of the process.

2. **Regulatory Framework for the control of releases to the environment** - COG members acknowledge the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance.

The framework presented does **not** do that. It is complex, difficult to understand (**see Figure 1**) and not transparent with respect to rationale for many of its aspects. One has to wonder why such radical changes are needed when nuclear facility performance is acknowledged by CNSC to be good to very good, and the proposed framework is unlikely to improve it any more. Furthermore it does not recognize that existing regulation for hazardous substances by the provinces and other federal agencies is more than adequate, and that CNSC does not have to add its own regulation in this area (e.g. it could use equivalency/ substitution/ delegation). The following points highlight our major concerns.

- **Nuclear substances and hazardous substances** are intermingled throughout the document. They need to be dealt with separately in the framework. Their methods of regulation are different and combining them makes the framework overly complex and hard to understand. Perhaps some time in the future they could be combined, but at this stage of development they need to be separate. In addition, the proposed framework does not acknowledge as equivalent existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC.

- **Six Principles -** for establishing release limits and action levels - are not really "principles". They appear to be a method to justify setting the lowest possible release limit.

- **Principle 1 -** We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment. Processes can then be put in place to look at technology-based limits and site specific limits if the exposure-based release limits cannot be met.

- **Principles 2 and 3 - Sector-specific technology-based release limits and case-specific technology-based release limits -** see the two points above.

- **Principle 4 "Exposure- based release limits"** make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be.

    - **Release limits for nuclear substances -** The concept of "**dose constraint**" has been used for some time internationally to make sure that individuals in the public are not exposed to more than the accepted safe dose limit of 1 mSv/year where multiple sources exist or may exist in the future. Dose constraints should **not** be used as they are here to set release limits. COG members recognize the international use of **"dose constraint"** as part of the **optimization process** (consistent with ICRP and IAEA) **only when needed** to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1mSv per year, **not** as a means to set absolute release limits. Setting release limits by selecting an arbitrary dose constraint value of 0.05mSv/year does not make technical sense, is not in keeping with the intended concept of dose constraint and appears to be prescribing a fixed level for ALARA – As Low As Reasonably Achievable, social and economic factors being taken into account. Moreover, it would make communicating historical good performance and public safety difficult since it is not based on risk and not all COG member companies could meet the release limits based

on the proposed 0.05 mSv/year dose constraint. Given the historical good environmental performance of COG member companies, implementation of dose constraints is not required.

- **Release limits for hazardous substances** – CNSC needs to acknowledge the equivalency of existing provincial or federal requirements, so there is a single, best placed regulator, for a substance. It is not acceptable to have double regulation for hazardous substances. If the CNSC is going to regulate hazardous substances, Provincial requirements should be accepted verbatim, and harmonization done over time to ensure that there are never conflicting/duplicating monitoring and reporting requirements. It is anticipated that "harmonization" will require considerable effort and time (it has been talked about for years), and COG members do not want to be subjected to conflicting requirements from different regulators while this is being resolved. Although DIS-12-02 states that CNSC expects to harmonize regulations to some extent, it needs to be complete harmonization or we will, in practice, have duplication of regulations, monitoring and reporting. Having another government agency setting release limits for parameters that are already regulated appears to go against current Federal Government initiatives.

- **Principle 5** on "**effluent/emission design objectives for new facilities**" - design objectives have no place in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents, and again, should be related to risk.

- **Principle 6 – 'Action Levels"** – COG members support and would participate in development of a method to set "action levels" taking into account historical operational data. The action levels need to be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a **CSA Standard** to provide guidance on developing action levels is the COG member preferred venue. Also the setting of action levels needs to be linked to CSA N288.5 (effluent monitoring), such that only streams requiring monitoring would be considered for action levels. **COG members have made progress in development of such a method to set action levels based on operational data which could be used as a seed document for a CSA Standard** and would like to discuss this with the CNSC.

  - Specific values have not been proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to the statistical internal administrative levels that are currently used by some COG members to identify to station staff circumstances that needed to be looked into - but are not reportable. For a 0.05 mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels (5% DRL vs. 10% DRL).

  - A related point is that the Federal Government has recently announced that it will be implementing **administrative penalties** for environmental exceedances. It is not known at this time how exceeding action levels would be handled … since by definition there would be exceedances.

- **Safe limit for releases of nuclear substances (derived release limits).** The framework is silent on the well established safe limit for nuclear substances of 1mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.

- **Optimization Processes -** ALARA (as low as reasonably achievable, social and economic factors taken into account) appears to be missing from the proposed framework. ALARA needs to be an integral part of any regulatory framework for the control of releases to the environment. ALARA is an important management tool to reduce the emissions and impact of nuclear substances, and based on the public dose performance to date of COG member facilities, it has been successful. For hazardous substances the concept of "pollution prevention" would be used.

3. Communication of risk and safe levels to the Public

The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and COG member companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

4. Specific Numeric Values "proposed' in the discussion document

Proposed dose constraint of 0.05 mSv/y for existing facilities – should not be included in a framework/process document. The current license requirement for nuclear power plants for public dose is 1 mSv/y (corresponding activity release limits are calculated using CSA N288.1 methodology). The actual performance for nuclear power plants resulting in a public dose in the range of 0.01 to 0.045 mSv/y was determined from environmental measurements. This level of performance is the result of improvements over the years in station design and management practices (ALARA). Station performance is managed through measured emissions which give more conservative "public dose" numbers (CSA N288.1 methodology) than environmental measurements (which are available only after year-end).

Historical performance of dose to the public by COG member companies is acknowledged to be very good and has been widely communicated to the public – especially neighbouring communities. Changing the release limits against which performance is measured without an identified risk requirement is not acceptable and will complicate and confuse communication of performance and perception by the public of risk.

"**Proposed" dose constraint of 0.01 mSv/y as a design objective for new build – should not be included in this framework process document for operating facilities.** This level is very low and may in fact dictate technology selection when there is insignificant risk to the public or the environment associated with technologies with slightly higher emissions. Another real concern is that while this is designated as a "design objective" for new build, past experience would indicate it will become the licence limit for new build, and over time, it will be expected of existing facilities.

"**Proposed" Tritium in Groundwater Design Objective of 100 Bq/l for new build – should not be included in this framework process document for operating facilities.** This proposed value is not in keeping with Health Canada's Guidelines for Canadian Drinking Water (7000 Bq/L) which is based on the recommendations of the International Commission on Radiological Protection and the World Health Organization. The acceptability of 7000 Bq/L was recently reinforced in the Government of Canada response to the Joint Review Panel for the proposed Darlington new build.

All COG member companies have groundwater monitoring programs in place. Historical performance has indicated that at the site boundary groundwater tritium levels are below the safe drinking water level of 7000 Bq/l. Again, establishing such a very low level for tritium in groundwater of 100 Bq/l, even as a design objective, is a concern because of the tendency of the public to expect this to apply to existing facilities.

5. Harmonization with other Regulators (or delegation, substitution, or equivalency)

With the CNSC moving into setting release limits for hazardous substances, there is bound to be overlap of jurisdiction (provinces, Environment Canada, Fisheries), with the potential for increased reporting and duplication of regulatory requirements. This is likely, especially if the CNSC do not think the provincial requirements are adequate. It is not clear how CNSC's proposed "harmonization" would occur, and it is anticipated that it will take considerable time and effort. Recent government initiatives to address overlapping / duplicative regulatory activities under the Canadian Environmental Assessment Act will allow delegation or substitution, which would be preferred over harmonization. It would lead to a single, best placed regulator for a particular parameter. It would be preferable for CNSC to adopt the latter practice, and sort out any concerns it may have by working with the best placed regulator.

6. Building on CSA N288 Successes

Since 2006, COG members have been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. CNA sent a letter to the CNSC reflecting this positive feedback from industry participants. A

number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

7. Communication and consultation process

It would have been helpful to involve stakeholders earlier in the development of this document. This document contains many potential changes for stakeholders. Discussion at an earlier stage could have improved the clarity of intent and stakeholders could have provided timely information on impact on operations.

8. Terminology and definitions –

Clarity of terminology is required to help communicate risk to the public. A number of terms are used inconsistently throughout the document.

Summary - Discussion Points for a Regulatory Framework for the control of releases of nuclear and hazardous substances to the environment

The following discussion points for development of a regulatory framework which would meet the need for transparency and would better conform to the convention of using risk based limits together with management processes to further reduce emissions (ALARA and pollution prevention).

- Set **Release Limits** to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 (new) Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of 1 mSv/year should be maintained as the safe limit for Setting Derived **Release Limits** using CSA N288.1.

- Manage **nuclear substances** and **hazardous substances** separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be.

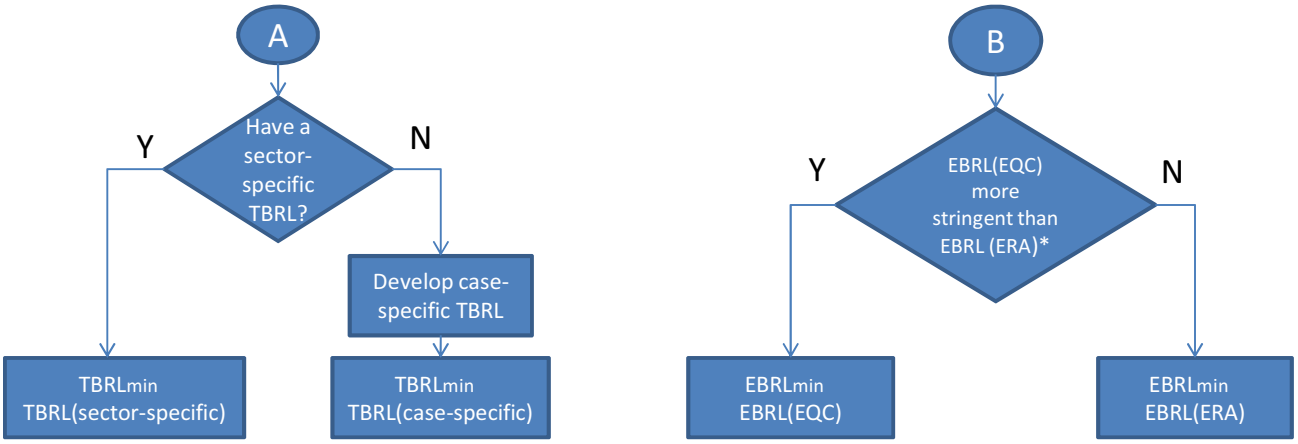
- Recognize **"dose constraint" only as a tool** (consistent with ICRP and IAEA) for the optimization process to ensure members of the public are not exposed to levels higher than the dose limit of 1mSv per year. It should not be used to set release limits. Given the performance of COG member facilities dose constraints are not needed.

- Develop a **standardized method** to establish **Action Levels** to identify serious adverse conditions needing immediate action and reporting to the regulator. The CSA venue would be best for such development. COG members have made **progress in development of such a method to set action levels based on operational data** which could be used as a **seed document for a CSA Standard** and would like to di.. scuss this with the CNSC

- Implement **Optimization Programs** to drive ongoing performance improvement commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable, social and economic considerations taken into account), and pollution prevention. Regular optimization program performance reviews would ensure they remain effective.

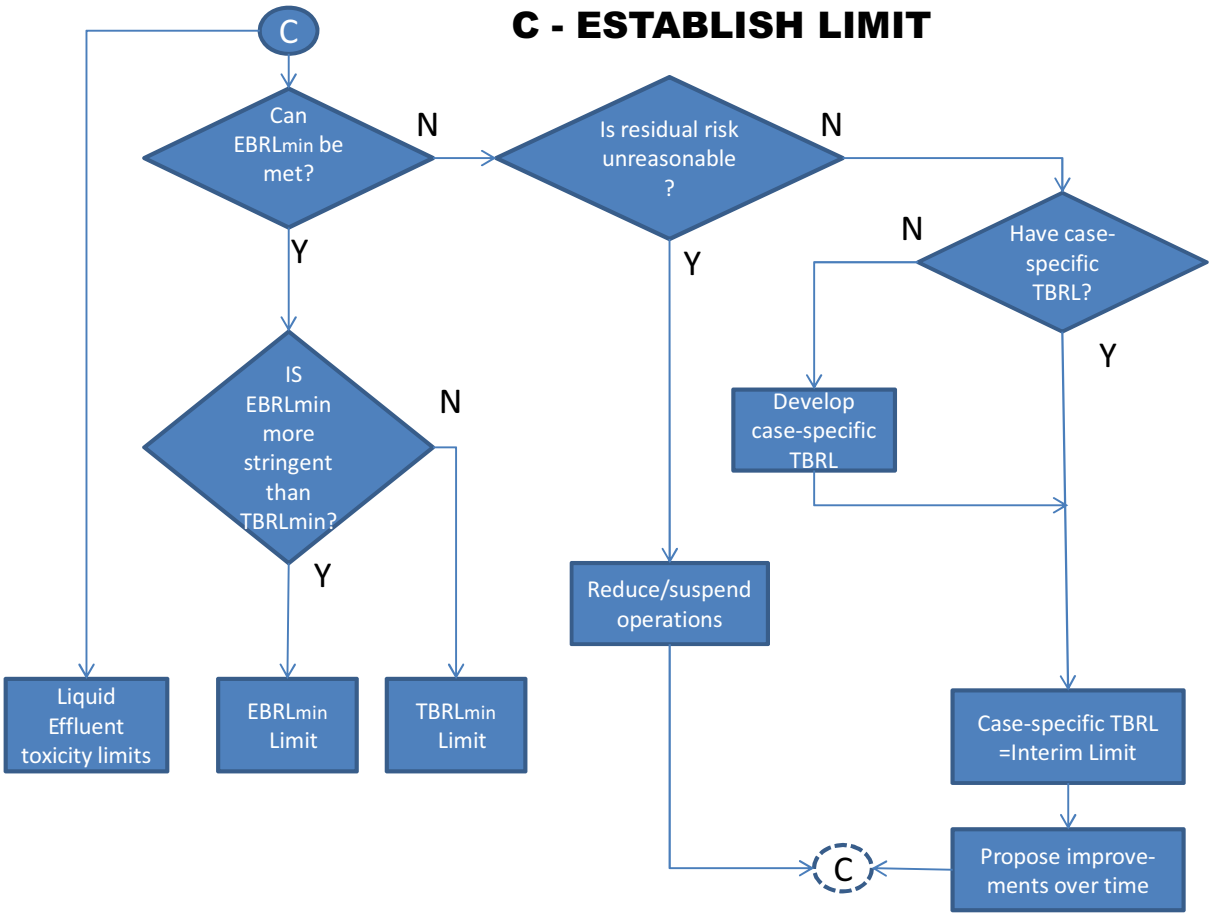
- **Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater)** have no place in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits to go in licenses.

Figure 1 – Combined Technology/Exposure-Based Approach – Existing Facility



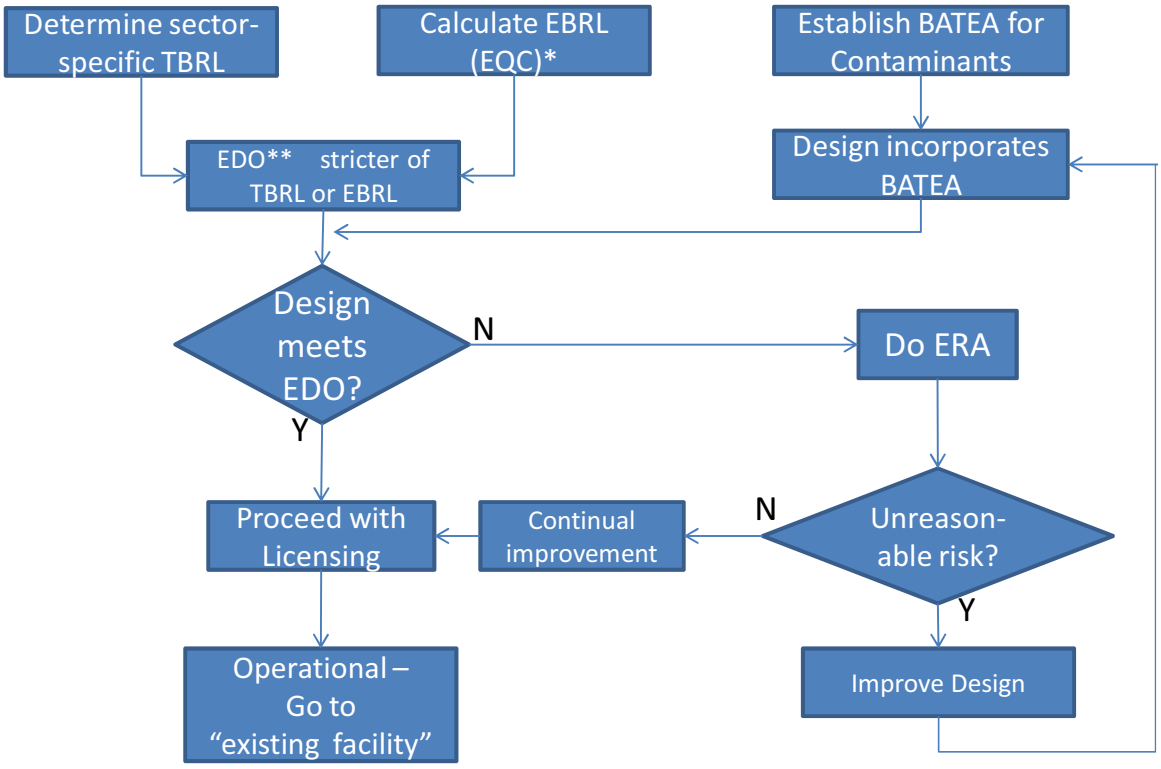
Notes:
* EBRL(EQC) is EBRL based on Environmental Quality Criteria
EBRL(ERA) is EBRL based on Environmental Risk Assessment results.
Assume EBRL for nuclear substances is one of these.

Name


C - ESTABLISH LIMIT
C
Can EBRLmin be met?
N
Is residual risk unreasonable ?
N
Have case-specific TBRL?
N
Y
Y
Y
IS EBRLmin more stringent than TBRLmin?
N
Y
Develop case-specific TBRL
Reduce/suspend operations
Liquid Effluent toxicity limits
EBRLmin Limit
TBRLmin Limit
Case-specific TBRL =Interim Limit
Propose improve-ments over time
C
D – USE STATISTICAL ACTION LEVELS

Name

New Facility



Notes:

* EBRL(EQC) is EBRL based on Environmental Quality Criteria

** EDO is Effluent/emission Design Objective

-----Original Message-----
From: J. Denys Bourque
Sent: Wednesday, May 09, 2012 10:22 AM
To: Consultation
Subject: Comment(s) on preface section of DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities document

Comment: Nous, Les Intendants du Madawaska, sommes absolument opposés à l'énergie nucléaire à cause des risques inhérents à cette forme d'énergie.

Voilà. Nous n'avons rien d'autre à dire.

Date: 2012-05-09
Provider: J. Denys Bourque
Organization: Les Intendants du Madawaska
Email:

INTERNATIONAL INSTITUTE OF CONCERN FOR PUBLIC HEALTH (IICPH)

June 22, 2012

Canadian Nuclear Safety Commission (CNSC)
P.O. Box 1046, Station B
Ottawa, ON K1P 5S9
Phone: 1-800-668-5284 Fax: 613-995-5086
Email: consultation@cnsc-ccsn.gc.ca

Re: Comments on Discussion Paper

Process for Establishing Release Limits and Action Levels at Nuclear Facilities
DIS-12-02 CNSC, February 2012[1]

Part A: Introductory Remarks

For several years, IICPH has expressed serious concerns over CNSC's "release limits" for radionuclides at nuclear facilities, including their efficacy, their relevance to actual emissions, and the lack of public transparency as to how these limits have been established.

Our experience with specific nuclear facilities has revealed a great disparity, in some cases, orders of magnitude, between reported emissions of radionuclides to air and water, and the Derived Release Limits (DRLs) established by CNSC for the licensee. As such, they do not serve to "restrict" the amounts actually discharged. In practice, nuclear facilities are operated so that they actually discharge only a few percent of the DRLs.

CNSC, as Canada's nuclear regulator, is responsible for regulating nuclear facilities in order to protect the health and safety of workers and the public and the environment. By setting release limits that do not even relate to level of emissions that are reported does not serve the well-being of the public or CNSC's mission.

In addition to release limits, we are also concerned that "action levels" (ALs) are determined by the licensee. While ALs are typically lower than release limits, there is no legal requirement for a facility to actually take action when these levels are approached or exceeded. Consequently, we consider these action levels to be virtually meaningless.

The Discussion Paper notes that "greater clarity needs to be provided to licensees and the public on how release limits are determined, and to demonstrate that licensees are aware of and responsive to emerging situations where there may be a loss of control in systems or processes." We certainly agree with that statement.

[1] Discussion Paper: http://www.nuclearsafety.gc.ca/eng/pdfs/Discussion-Papers/12-02/February-22-2012-DIS-12-02-Process-for-Establishing-Release-Limits-and-Action-Levels-at-Nuclear-Facilities_e.pdf

The CNSC is proposing to implement a more formal framework for establishing release limits and associated ALs. The proposed approach is based on six core principles which include: adopting a combined technology/exposure-based approach; sector-based technology-based release limits; case-specific limits; exposure-based limits; effluent/emission design objectives for new facilities; and action levels to demonstrate adequate control.

IICPH has long recommended a review of the methodology for setting release limits and that this review be transparent and subject to public scrutiny. Therefore, we are interested in reviewing this Discussion Paper and in particular, considering whether the proposed revisions to the procedures for establishing these limits and the ALs will address concerns that we have raised in our submissions to the CNSC tribunal on these specific matters for a number of nuclear facilities.

Part B: Overview of Submission

While the Discussion Paper includes radioactive and other hazardous substances, IICPH is submitting comments and questions focussed on release limits for nuclear substances.

Specifically, we are asking the following;

- Will the proposed release limits address the great discrepancy between reported emissions and current release limits at existing facilities?
- Will these revised limits be precautionary and protect the most vulnerable populations from radiation exposure?
- Will they result in reduced emissions of radionuclides to air and water from nuclear facilities?
- Will the process of setting ALs for each facility be made transparent to the public and subject to scrutiny? Will exceeding or approaching an AL require action on the part of the facility?
- Will the methodology (based on the Canadian Standards Association (CSA) standard) used by CNSC for calculating Derived Release Limits (DRLs) be open to the public and independent peer review?
- Will CNSC seek methodologies other than those of the CSA for developing DRLs?
- Will the process for setting standards be clear to licensees and the public?

As to the purpose of establishing “standards” in general, we offer the following view:

There must be a paradigm shift in how these “standards” are determined to ensure proper, precautionary protection of the health of the entire public, and especially of the most vulnerable populations. Just because emissions of radionuclides from a facility lie within or below current standards does not mean that there is no harm.

Over the years, as more has been discovered about the hazards associated with certain substances, and the effects of radiation, standards have become more stringent. It has become clear that the current “allowable” level of exposure of 1 mSv/year for the public and 50 mSv/year for nuclear workers is not fully protective. Any ionizing radiation is capable of causing cancer.

Ultimately, from a public health standpoint, no processed or manufactured forms of radionuclides should be bioavailable. The burden of proof must shift to the industry to prove that its operations meet this standard of safety before it is permitted to operate. The regulator must ensure that standards are meaningful and effective in protecting human health, not just in the short term, but for future generations.

Part C: Background – Current Practice and Methodology

Release Limits

As noted in the discussion paper, currently two types of release limits are established and applied at CNSC-regulated facilities: exposure-based release limits (EBRLs) and technology-based release limits (TBRLs). "EBRLs are established with the objective of ensuring that releases to the receiving environment stay below certain levels, in order to meet desired human health or environmental quality criteria. TBRLs are based on the available pollution prevention technologies and techniques and establish a minimum level of treatment as determined by technology and economics."[2] They do not inherently consider environmental constraints or sensitivities, but assume that the application of "best practices" offers "some level of protection."[3]

Comments

The comment in the Paper that because "EBRLs and TBRLs are set below limits required to protect human health and the environment, exceeding a limit does not necessarily imply that either the health of the public or of an ecosystem is at risk" is rather puzzling, if not illogical. Exceeding a limit **is** most definitely a concern, not only because the limits may not be protective, but also because exceeding limits may indeed cause harm to human health and the environment and should be unacceptable.

The use of TBRLs (for radionuclides) is not appropriate, as it is only an assumption that "best practices" applied offer **some level of protection** [emphasis added]. Limits cannot be set on the basis of offering a vague assurance of "some" protection.

Derived Release Limits (DRLs)

DRLs, a type of exposure-based release limits (EBRLs), are the legal upper bounds for releases of radioactive substances to the environment. The DRL represents the quantity of a radionuclide that, if released from the specified facility, would result in the most exposed member of the public receiving a dose equal to the specified dose objective (i.e., regulatory public dose limit or specified dose constraint).

Calculations of DRLs by the CNSC are based on a dose constraint of 1 mSv/year, (the public dose limit – a level which the CNSC asserts is recognized to be protective of human health and the environment, although CNSC does note that in some instances stricter dose constraints have been used.)[4]

The resulting release limit (DRL) is derived from exposure-pathway modelling from the source of release to a "representative person". In other words, DRLs are models that translate dose constraints, in this case, International Commission on Radiological Protection (ICRP) safe dose to the public (1 mSv/yr) into site-specific levels. The methodology for establishing DRLs comes from the Canadian Standards Association (CSA) standard CSA N288.1-08: *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities.*[5]

Comments:

We find the current DRLs highly flawed as regulatory tools for a number of reasons. For example:

[2] Discussion Paper p.1
[3] Ibid p.7
[4] Ibid p. 6
[5] Ibid p.7

- IICPH fundamentally disagrees with the assertion by CNSC that the public dose limit of 1 mSv/year (as set by ICRP) is "recognized to be protective of human health and the environment". First and foremost, there is no safe level of exposure to ionizing radiation, as has been acknowledged in the National Academy of Science series "Biological Effects of Ionizing Radiation" BEIR VII Report. Therefore, the maximum safe dose of any ionizing radiation is zero. Any other value set for a safe dose is based on the degree of risk, that is, the degree of harm to human health and the environment that is tolerated by regulatory bodies. Thus, it follows that any prescribed limits (dose constraints) based on 1 mSv/year accepts that harm will be done, is not protective of human health and the environment, and cannot "minimize the risk of adverse health effects due to radiation exposure".
- DRL models are prepared by the licensee and reviewed by the regulator. Licensees may choose model parameters that underestimate doses and allow much higher emissions than if doses were estimated in a precautionary manner.
- The methods for calculating DRLs do not account for the cumulative effects of doses that occur over a number of years, and ignore the accumulation of radionuclides in the environment and in individuals.
- The DRL-setting process is closed to the public and does not involve peer review by independent scientific experts.
- Nuclear licensees and the CNSC routinely report emissions as "percentages of DRLs", rather than showing the actual DRLs. This gives the public the impression that because emissions are well below the regulated limit, the emissions themselves are not significant. This disempowers the public, making it difficult to obtain information about actual release levels.
- The CNSC uses models in preference to monitoring actual emissions as a basis for regulatory action. Dose estimates for air emissions are based upon assumptions about the behaviour of stack plumes, which are notoriously difficult to model.
- Estimates of public doses arising from waterborne discharges of radionuclides are based on the dilution capacity of receiving waters and on average flow, rather than minimum flow.

Part D: Examples of Current Release Limits

The following four examples illustrate some of the issues regarding the current release limits in relation to the actual emissions.

1. **Tritium Releases from Nuclear Generating Stations (2006)**[6]

Facility	Gaseous Emissions Bq/year		Liquid Effluents Bq/year	
	Tritium oxide (HTO)	% DRL	Tritium oxide (HTO)	% DRL
Darlington, On	1.3×10^{14}	0.3	1.9×10^{14}	0.004
Bruce, On	9.0×10^{14}	1.0	7.3×10^{14}	0.226
Point Lepreau, NB	9.0×10^{14}	0.04	1.6×10^{14}	0.001

Note: In the document referenced, the DRLs for each facility were not given.

[6] Reference: CNSC 2009: CNSC Tritium Releases and Dose Consequences in Canada in 2006, p. 17, 18 http://nuclearsafety.gc.ca/pubs_catalogue/uploads/CNSC_Release_and_Dose_eng_rev2.pdf

2. SRB Technologies (Pembroke Ontario)

a) Air emissions of tritium oxide (HTO):

DRL for HTO (up to 2006): 1.51 x 10^{15} Bq/year

In 2006, releases of HTO to air were 7.2×10^{13} Bq, 4.8% of the DRL.

The DRL for HTO has since been revised as follows:

Feb 2007-July 31 2008: 1.35 x 10^{14} Bq/year.

July 31 2008-2015: 6.72 X 10^{13} Bq/year

In 2009, HTO releases to air were 1.43 X 10^{13} Bq, 21.2% of the DRL.

b) DRL for emissions of tritium to sewers – 200 Gg/year

Actual releases (years 2005-9, excluding the suspension period): approximately 44 Gg/year (average), about 22% of the DRL.

Comment:

CNSC suspended SRBT's tritium processing licence for an eighteen month period from January 2007-July 2008 based on what CNSC considered to be unacceptable levels of groundwater contamination.[7]

3. Blind River Refinery[8]

a) **Uranium Air Emissions –** (annual average)

Current limit: 4.01 kg/hr (equivalent ~ 35,000 kg/year).
Actual emissions: approx. 0.00014 kg/hour (~ 120 grams/year).

b) **Uranium Liquid Effluent Releases –** (annual average)

Current limit: 20 mg/L.
Typical (actual) releases: 0.02 mg/L.

Comments:

The enormous disparity between the licensed limits and the reported emissions has rendered these limits meaningless.

These release limits have recently been revised to 0.21 kg/hr for uranium air emissions (~ 1840 kg/year), and 2 mg/L for uranium in liquid effluent.[9] However, the basis for these proposed limits is not known, at least publicly. Even so, they are approximately two orders of magnitude greater that the emissions reported.

D. Port Hope Conversion Facility (PHCF)

Licence Limits - annual average air emissions of uranium (in grams per hour, g/hr)

- UF6 plant: 290 g/hr, reported emissions 3-6 g/h
- UO2 plant: 150g/hr, reported emissions 0.27 to 1.4 g/hr

[7] IICPH oral submission SBRT hearings, May 2010
[8] Ibid p. 27,28
[9] The revised limits were proposed by CNSC in their Submission November 3, 2011 CMD 11-H18

"Action levels" (ALs) were set at 50 g/hr for the UF_6 plant and 7 g/hr for the UO_2 plant. But ALs are not enforceable limits. They only require the company to take certain measures, in this case, file a report. [10]

In Cameco's submission of November 3, 2011 with respect to standards and limits that are prescribed for radiation, it is stated that [11]

> PHCF's operations have maintained radiation exposures well below the dose limits. Environmental emissions are being controlled to levels that are a fraction of the regulatory limits, and public radiation exposures are well below the established limits. During the current licence period the PHCF has not exceeded any CNSC limits with respect to radiation protection.
>
> With respect to existing groundwater control measures, Cameco indicates that "there is no unreasonable risk to employees, the public or the environment from subsurface contamination onsite."

Cameco also stated that stack emissions for the two facilities for 2007-11 were "well below regulatory limits", but noted that there were four exceedances of action levels at the UO2 plant over that period.

A further statement by Cameco states "The facility expects to be in compliance with new Ministry of Ontario (MOE) uranium air standard (to take effect in 2016)".[12]

Comments:

> Once again, as in the case of the Blind River Refinery, the license limits are well above (~ two orders of magnitude) the reported emissions.
>
> The statements made by Cameco indicate that as long as a facility is well below the DRLs, there is no problem or unreasonable risk. This is highly disputable and in fact, not credible.
>
> It is not clear what action was taken when ALs were exceeded.
>
> With respect to the reference to the MOE air standard:
>
> The uranium annual air quality standard, incorporated into Ontario regulations on air (O. Reg. 419/05) is "an annual average standard of 0.03 $\mu g/m^3$ for uranium and uranium compounds in the PM10 size fraction (Particulate Matter less than 10 microns in size), based on kidney toxicity associated with exposure to these compounds".[13]
>
> The modelling used to determine the standard has a number of serious limitations, including a paucity of data, emphasis on kidney disease alone, and lack of consideration of the impact of airborne deposition of uranium on soils. This "standard" is not protective, especially with regards to children.

---

[10] CNSC CMD 11-H16 p. 19, 20 CMD 11-H16 Appendix C p. 12, Tables p. 23.
[11] Cameco CMD 11-16.1 , p.3,23,24,33-35
[12] Ibid p. 35
[13] [MOE Air Standard] - Refer to " "Ontario Air Standards for Uranium and Uranium Compounds", Ontario Ministry of the Environment, June 2011 http://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTA3MDk1&statusId=MTY5OTQy
http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2011/010-7192.pdf

Part E: Development of Exposure-Based Release Limits

The modifications proposed for calculating DRLs are based on changes to the current dose constraint, that is, the "public dose limit" of 1 mSv/year, to the following levels:

- Existing facilities: dose constraint of 0.05 mSv/year, a level apparently more commonly practised internationally, and
- New-build nuclear reactors: a dose constraint of 0.01 mSv/year.

The CNSC has provided the following rationale for these proposed new dose constraints;

Proposed dose constraint for existing facilities[14]

"Most international nuclear regulators use dose constraints as a means to restrict the dose received by the most exposed individual from a single source/facility. They are set at a fraction of the accepted regulatory public dose limit (1 mSv/year) and represent an upper bound that is very unlikely to be exceeded at a given facility. The ICRP has recommended adopting a dose constraint of 0.3 mSv/year. Internationally, many nuclear regulators have implemented dose constraints in the range of 0.1 to 0.3 mSv/year."

The Federal Provincial Territorial Radiation Protection Committee has also stated:
"The dose constraint would allow for exposures from other sources without the annual limit being exceeded." However, this Committee is of the view that if a dose constraint, as opposed to a dose limit, has been exceeded, this does not imply a failure to comply with the recommendations of the Guidelines. Rather it should call for a reassessment of the effectiveness of the program."

CNSC staff have done case studies using two dose constraints, namely:

1. 0.3 mSv/year – as recommended by the ICRP and
2. 0.05 mSv/year – based on pollution prevention principles, ALARA (see CNSC regulatory guide G-129*, Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"*) and achievability at existing CNSC-regulated facilities

Accordingly, it found that a dose constraint of 0.05 mSv/year was readily achievable by all nuclear power plants and uranium processing facilities.

Based on this evaluation, the CNSC proposes considering a dose constraint of 0.05 Sv/year for existing CNSC-regulated facilities. This dose constraint would also be used to calculate the DRLs for each radionuclide or radionuclide group according to CSA standard N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*. In addition to calculating the DRL for each radionuclide (or radionuclide group) based on the dose constraint, the total cumulative dose should also not exceed the dose constraint.

The paper also proposes that if a facility cannot operate under this dose constraint, "a case-specific limit could be considered".

Proposed dose constraint for new nuclear power plants [15]

The CNSC is also proposing that new nuclear facilities be expected to incorporate the most recently recognized pollution prevention technologies and techniques. The proposed design would be assessed against effluent/emission design objectives (EDOs).

[14] Discussion Paper P. 17
[15] Ibid p. 15

A review of existing Canadian nuclear power plant performance indicates that plants operate below 0.01 mSv/year. On this basis, CNSC staff propose using 0.01 mSv/year as an **effluent/emission design objective (**EDO) for new nuclear power plants. It is noted that "this design objective is not a limit, but serves as a design tool and is considered to be an attainable but challenging objective."

The Paper notes that the "inability to achieve an EDO does not mean the design is unacceptable". It further states "The proponent must demonstrate that the EDO cannot be achieved using the latest in best available technology economically achievable."

Comments/Questions:

Can CNSC explain why the "back" calculations" for DRLs using the public dose limit of 1 mSv/year and CSA methodology for models are so out of line with actual emissions?

What effect will a dose constraint of 0.05 mSv/year have on the DRLs for existing facilities?

Other than two dose constraint cases, there is no analysis of other possible dose constraints for existing facilities. There are no examples given as to what new release limits would be with the proposed dose constraint change. This is a critical piece in any exercise to re-examine the basis on which release limits are calculated.

In re-examining the dose constraints used to calculate DRLs, the CNSC should prepare a comparison of DRLs for various dose constraints and the actual annual emissions as reported.

In the case where a facility cannot operate under this dose constraint, why should a site-specific case be developed? This seems to contradict establishing a more precautionary dose constraint in the first place.

What is the merit for proposing a dose constraint of 0.01mSv/year for **new-build reactors** [emphasis added] only? In fact, the Discussion Paper states that "existing facilities already operate below 0.01 mSv/year". Why was this level not considered as a dose constraint for these facilities?

An emission design objective (EDO) is not enforceable. What is the point of having an "objective" higher than a regulated limit? Why even propose a dose constraint of 0.01mSv/year for new power plants when there is no obligation for these facilities to meet the resulting limit?

There is no change proposed in the CSA methodology to calculate DRLS. We question why this has not been considered. Furthermore, as has been previously mentioned, the CSA methodology is developed without any public participation, involvement or scrutiny. Hence, there has been no transparency or input in setting guidelines and release limits.

No concrete facility-specific examples have been provided to demonstrate how any of these dose constraints would be applied and what the resulting release limits would be. Without such an analysis, the applications of the Discussion Paper's proposals are very unclear.

Proposed effluent/emission objective of 100 Bq/L for tritium in groundwater [16]

New facilities with tritium releases are to incorporate an emission design objective of 100 Bq/L for tritium in groundwater at the margin of the facility's control area.

As rationale for this proposal, the CNSC states: "It is recognized that the current Canadian drinking water guideline of 7,000 Bq/L for tritium is safe." [17]

[16] Discussion Paper p. 19

[17] This is based on a dose of 0.1 mSv/year for this one pathway compared to the integrated CNSC public dose limit of 1 mSv/year. No health effects are expected at this level.

"The proposed EDO value of 100 Bq/L for tritium – a value well below the drinking water guideline – was selected on the basis of being technologically and economically achievable, based on the performance of existing facilities. Hence, this EDO is technology-based rather than exposure-based and represents an extremely low level of risk. This is equivalent to 0.0013 mSv/year, which is approximately 100 times lower than estimated dose associated with the Canadian drinking water guideline and 1,000 times lower than the *Nuclear Safety and Control Act* (NSCA) regulatory dose limit (1 mSv/year)."[18]

Comments:
The proposed tritium release emission design objective (100 Bq/L for tritium in groundwater) applies only to new facilities. This proposal will not alter the 7000 Bq/L current guideline for existing facilities, a level which is totally ineffective and inappropriate, especially given the number of nuclear facilities currently operating that release tritium into waterbodies.

In this context, what is considered to be a new facility? Is a refurbished facility considered new? What is the definition of a facility's control area?

The proposed tritium release EDO is substantially greater than tritium emissions from existing facilities.

An emission design objective (EDO) is not enforceable.

The reference to the current Canadian drinking water guideline of 7,000 Bq/L for tritium as safe is objectionable. The *Ontario Drinking Water Advisory Council* (ODWAC) has recommended that the Ontario Drinking Water Quality Standard for Tritium be revised to 20 Bq/L.[19] This level relates to health effects from long-term, chronic exposure over a lifetime of 70 years, and limits the lifetime risk to about one excess fatal cancer per million people. This matches the current Canadian Federal (and Provincial) limit for chemicals, which are set at levels that provide a lifetime risk of 1-10 excess fatal cancers per million people.

The current drinking water guideline of 7,000 Bq/L corresponds to a risk of 350 excess fatal cancers per million people from just *one year's* consumption of drinking water, not a lifetime (70 years). The risks used to determine standards for radioactive substances in Canada, such as for tritium in drinking water, must be at least as stringent as for non-radioactive chemicals.

According to the Canadian Nuclear Association, a level of 20 Bq/L is achievable without significant cost to the nuclear power industry. In fact, in Table 1 of the CNSC study on Standards and Guidelines for Tritium in Drinking Water, levels of tritium in drinking water near nuclear stations tend to be below 20 Bq/L for the most part. None are anywhere near the current standard. [20]

In fact for years, IICPH has recommended a level for tritium in drinking water of 10 Bq/L, working toward no manmade tritium in drinking water.

Action Levels
The CNSC requires licensees to determine action levels (AL) to serve as an early warning system to indicate when releases from a regulated facility may be deviating from the norm. However, the CNSC

[18] Discussion Paper and Footnote #18 p. 19
[19] http://www.odwac.gov.on.ca/reports/052109_ODWAC_Tritium_Report.pdf
http://www.odwac.gov.on.ca/standards_review/tritium/tritium.htm
[20] Canadian Nuclear Safety Commission (CNSC) Catalogue number INFO-0766 Standards and Guidelines for Tritium in Drinking Water http://nuclearsafety.gc.ca/pubs_catalogue/uploads/info_0766_e.pdf

notes in the Discussion Paper that the methodology for calculating and applying ALs for nuclear and hazardous substances across all licensed nuclear facilities has not always been consistent.

The CNSC is proposing that a standardized methodology for calculating and applying ALs for environmental protection be established, and that the proposed methodology be statistically based on predicted (new facilities) or actual operating performance. ALs are proposed to be established for all Class 1 nuclear facilities, uranium mills, and mines and waste management facilities with controlled points of release.

Comments:

Why are action levels determined by the licensee? Furthermore, there is no transparency at how these levels are determined.

What actions will be required if emissions from facilities approach or exceed these levels?

Will there be a mathematical relationship between ALs and release limits, e.g., by setting ALs at a certain percentage of the release limits?

Do ALs serve any useful function if they are not consistently set, and no effective corrective action is required when they are exceeded?

Part F: Scenarios

The Appendix of the paper has provided five scenarios to illustrate how the proposed framework and core principles would apply to new or existing CNSC-regulated facilities. The Scenarios are:

1. Applying new release limit protocols to existing CNSC-regulated facilities undergoing relicensing.
2. Developing release limits at an existing facility where there is need for additional treatment.
3. Establishing sector specific technology-based release limits.
4. Release limits at a proposed new facility.
5. Action levels for operational control.

For example, Scenario 1:[21]

For nuclear substances, identify applicable sector-specific TBRLs (which are only available for natural uranium series radionuclides in effluent) and establish EBRLs.

The EBRLs can be derived based on:

- the dose constraint of 0.5 mSv/year and the current CSA methodology
- the uranium annual air quality standard in Ontario (O. Reg. 419/05 – in force in 2016)
- a review of radiological environmental risk assessment and site monitoring

The more stringent of the EBRLs or the TRBLs is to be used as the limits in each case.

Questions/Comments

The scenarios do not clarify anything. In fact they are very confusing, likely not only to the public but to the operating facility itself.

It would have been far more helpful to carry out an analysis of how the proposed changes would affect specific facilities. Otherwise, there is no way of assessing the merits of the proposed changes.

[21] Discussion Paper p. 29

Summary Comments

We have found this document very confusing to analyze. While we appreciate efforts to revise standards, and introduce more stringent dose constraints for nuclear substances than is the current practice, we find that the Discussion Paper does not address the issues that we have raised in this submission with respect to release limits and ALs.

On one hand, there seems to be an interest in providing greater stringency and consistency to release limits. On the other hand, CNSC still defends the status quo. At what point will CNSC accept that there is no safe dose for ionizing radiation and therefore the so-called allowable public dose limit for radiation of 1 mSv/year (and 50 mSv/ year for Nuclear Workers) is not protective of human health and the environment and as such, cannot "minimize the risk of adverse health effects due to radiation exposure"? When will CNSC accept that the current Canadian drinking water guideline of 7000 Bq/L is not safe, particularly when many countries have standards set at 100 Bq/L and ODWAC has recommended a target of 20 Bq/L, which is easily attainable at present by nuclear facilities?

As we have commented, over time, standards for chemicals have become more stringent as more information is learned about the hazards they cause. This is why a precautionary approach is necessary to assure safety.

At one time there was no standard for radiation exposure. That is not the case today, even though the 'standards" are not nearly as precautionary as they should be. But the failure on the part of the regulator to accept the simple fact that there is no safe level of exposure, similar to chemical substances for which there is no threshold at which there is no harm, is a travesty.

We expect CNSC to take account of our concerns about this Discussion Paper, and take steps to provide a clearer document and better opportunity for public discourse on the topic of release limits for nuclear facilities.

Sincerely,

Anna Tilman

Vice-President, IICPH

Dear Lady, Sir,

Please find enclosed my comments on the Discussion Paper DIS-12-02.

Regards

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DIS-12-01 Process for establishing release limits and action levels at nuclear facilities

Comment 1

It is clear that the CNSC is looking for a regulatory tool that will help the staff identify "good performance" and "bad performance" at nuclear facilities. This is a problem of optimization and ICRP-103 has made useful recommendations regarding constraints as a tool for optimization.

It is important that the CNSC does not misinterpret the recommendations of the ICRP regarding constraints. I would like to guide the reader through a few paragraphs of ICRP-103.

p. 91

(216) In all situations, the process of optimisation with the use of constraints or reference levels is applied in planning protective actions and in establishing the appropriate level of protection under the prevailing circumstances. The doses to be compared with the dose constraint or reference levels are usually prospective doses, i.e., doses that may be received in the future, as it is only those doses that can be influenced by decisions on protective actions. They are not intended as a form of retrospective dose limit.

(219) Optimisation of protection is not minimisation of dose. Optimised protection is the result of an evaluation, which carefully balances the detriment from the exposure and the resources available for the protection of individuals. Thus the best option is not necessarily the one with the lowest dose.

p. 94.

(230) A dose constraint is a prospective and source-related restriction on the individual dose from a source in planned exposure situations (except in medical exposure of patients), which serves as an upper bound on the predicted dose in the optimisation of protection for that source. It is a level of dose above which it is unlikely that protection is

optimised for a given source of exposure, and for which, therefore, action must almost always be taken. Dose constraints for planned situations represent a basic level of protection and will always be lower than the pertinent dose limit. During planning it must be ensured that the source concerned does not imply doses exceeding the constraint. Optimisation of protection will establish an acceptable level of dose below the constraint. This optimised level then becomes the expected outcome of the planned protective actions.

(231) The action necessary if a dose constraint is exceeded includes determining whether protection has been optimised, whether the appropriate dose constraint has been selected, and whether further steps to reduce doses to acceptable levels would be appropriate. For potential exposures, the corresponding source-related restriction is called a risk constraint (see Section 6.1.3). Treating a dose constraint as a target value is not sufficient, and optimisation of protection will be necessary to establish an acceptable level of dose below the constraint.

(233) For occupational exposures, the dose constraint is a value of individual dose used to limit the range of options such that only options expected to cause doses below the constraint are considered in the process of optimisation. For public exposure, the dose constraint is an upper bound on the annual doses that members of the public could receive from the planned operation of a specified controlled source. The Commission wishes to emphasise that dose constraints are not to be used or understood as prescriptive regulatory limits.

To make a constructive proposal, it would be far more useful for the CNSC to define "dose constraints" and more generally "reference levels" (or "performance constraints") that represent good practices in the industry and guide the process of prospective optimization. These "reference levels" would be based on historical data and would help define an appropriate level of performance on the part of the licensee. Note that these "reference levels" are not limits in any legal sense, but they would allow the CNSC to meet all the objectives of the proposed regulations in a way that is much more understandable and consistent with existing regulations.

To understand the difference between the proposal in DIS-12-02 and the proposed "reference levels", let's consider a few examples of the use of "reference levels" in practice.

For example, most well run radio-chemistry labs in Canada may typically have a collective dose to workers of less than 5 mSv-person per year. This would be a "reference level" for the collective dose of all radio-chemistry labs. If a radio-chemistry lab had a larger annual collective dose, for no obvious reason, this should trigger an inspection by the CNSC. It may be that none of the workers received more than 1 mSv/y, well below the annual dose limit for Nuclear Energy Workers, but the poor performance relative to the collective dose "reference level" would indicate that something is not quite right at the lab. On the other hand, if the workload at the lab had suddenly increased

because of a refurbishment at the nuclear station, the collective dose at the lab may still be optimized and no regulatory action may be required.

To give another concrete example, let's consider the releases from nuclear power plants who have historically exposed the public to very low levels of radiation. The CNSC could define a "reference level" for the annual release of tritium in liquid effluents based on historical data. This "reference level" would have no relation to dose and would have no meaning as a legal limit. The reference levels would help define good performance for the licensee and would be a useful tool to identify poor performance, but they would not be used for DRL calculations and they would not be limits in any regulatory sense.

Since "reference levels" are regulatory tools that trigger investigations, it would make sense for the licensee set their Action Levels at or below the value of the applicable "reference level". This will ensure that Action Levels meet the objectives mentioned on pages 22-23 of DIS-12-02.

In summary, instead of changing the definition of limit, the CNSC should define "reference levels" that assist in the prospective optimization of protection.

Comment 2

The proposed regulations deliberately mix the concepts of "dose limit" and "dose constraint". This is going to generate a lot of confusion and is not going to be helpful.

A limit is absolute barrier that define what is legal and what is not. It is not a tool of optimization (dose constraint) or a tool for monitoring the control of a process (action level). It is consistent across regulations and activities and must provide a degree of certainty for all participants. A licensee that exceeds a limit is susceptible to a variety of penalties, depending on the context and severity of the breach. The proposed limits share none of those properties.

Comment 3

The proposed exposure based release limits would correspond to an annual dose of 0.05 mSv/y for existing facilities and 0.01 mSv/y (or 10 μSv/y) for new facilities.

First, the dose limit for new facilities corresponds exactly to the *De Minimis* criteria used to clear radioactive waste from regulatory control. The IAEA RS-G-1.7 Safety Guide and the CNSC own NSRD regulations exempt from regulatory control sources and waste that expose the public to less than 10 μSv/y. These exemptions were drafted to ensure that the CNSC would not waste time with trifles. The CNSC is now seriously considering setting the dose limit at the same level as the exemption limit.

Second, the new exposure limits will frighten the public into believing that exposure to 10 μSv/y is dangerous. This proposal will make public communication very difficult in years to come.

The CNSC should leave its dose limits as they are to ensure consistency between different regulations.

CNSC Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Comments by Dr. J. K. Khosla

1. This discussion paper proposes a very significant reduction in the exposure-based derived release limits (DRL). In addition, to satisfy the ALARA principle, it proposes technology-based released limits where they are more restrictive than the exposure-based limits. Furthermore, it requires that Action Levels may be established which would be indicative of the malfunction in the main processes or the mitigation systems. Where the available technology for reduction in pollution is such that the exposure-based limits can not be met, it is pragmatic in accepting limits which are practical and hence introduces sector- specific and case-specific release limits.

The proposed changes in the discussion paper are justified on the basis of six soundly based core principles. These changes are valid and long overdue.

The following comments are presented for consideration to make the discussion more complete.

2. A very significant reduction in the exposure-based DRL from 1 mSv/yr. to 0.05 mSv/yr. for the existing facilities and 0.01 mSv/yr. for the new the facilities has been proposed. It corresponds to a decrease by a factor of 20 and 100 respectively. Although, some arguments in favour of these changes are presented in this paper, there is a need for their consolidation at one place so that the readers have a full appreciation of the rationale. For example; it may be stated that:

A change of this magnitude in the exposure-based DRL is being proposed for the following reasons:

i) Pollution reduction rather that prevention of harm is the guiding principle in establishing DRL. Therefore, DRL is linked to the existing regulatory standards of acceptable level of quality of air, water and ground in the vicinity of the nuclear facility.

ii) The DRL is specified for each radionuclide or radionuclide group and is calculated as the amount which will result in a yearly dose corresponding to the DRL to an average member of critical group. The proposed reduction in DRL is intended to account for, among others, the additivity effect of all the radionuclides and associated pathways that may be released from a facility and the effect radiation on more vulnerable

members of the critical group, e.g. those who may have a compromise immune system.

iii) There is a need to eliminate the disconnect between DRL and ALARA principle in many cases, e.g., where the current release limits for the radionuclide are far greater than the what can be achieved in practice. Such a disconnect diminishes the incentive to minimize such releases.

iv) Using technology-based release limits, if more restrictive than exposure-based limits, will be consistent with the ALARA principle, as it will permit the most harm reduction that is achievable.

v) It is a commonly used international practice.

3. To further support the proposed reduction in DRL, the discussion paper should provide comparison of the new exposure-based DRL against the acceptable air and drinking water quality standards in various provinces in Canada, as well as against the similar DRL values used in other jurisdictions such as USA, Great Britain, Germany and France.

4. The use of the technology-based release limits may be a reasonable alternative to the exposure based limits in cases where the latter can not be met with the current technology and the overall risk is acceptable. However, the discussion paper should include the following concept.

Accepting this principle makes it imperative that the nuclear facility and the industry as a whole must invest in research to develop new technologies (related to process systems and/or mitigation systems) towards meeting the exposure-based limits. Also, licensees must periodically justify (e.g. at every license renewal time) that the current technology for reducing the release of radionuclides still remains the best industry practices.

It is also incumbent upon the regulatory authority (CNSC) to monitor the development of new technologies and require the nuclear facilities to implement technological changes would results in significant reduction in the release of radionuclides while being cost-effective. At that time, it should also consider revising the technology-based release limits.

From: Welles, Jennifer (ELG/EGL) [mailto:Jennifer.Welles@gnb.ca]
Sent: Friday, June 15, 2012 7:13 AM
To: Rinker, Michael
Subject: CNSC Discussion papers for public comment
Hi Michael,

Thank you again for the opportunity to provide comments on two discussion papers concerning regulation of nuclear generating facilities. We've gone around to various parties within the NB Department of Environment and Local Government and the Department of Health and have the following comments re: DIS-12-02:

1) Section 4.4 discusses the concept of permitting a mixing zone for the discharge of effluent that meets the "Environment Canada criteria for demonstrating non-toxic effluents". I expect the criteria is the EPS 1/RM/13 Reference Method for Determining Acute Lethality to Rainbow Trout, or the marine equivalent. My issue with this is the mixing zone is undefined so any reasonable discharge can be accommodated given a large enough mixing zone. I propose that no effluent failing to meet the water quality objective after dilution with the cooling water should be permitted to discharge (the cooling water would in effect be the mixing zone).
2) Section 4.6 deals with Action Levels. It is proposed that a statistical method be used to establish the trigger for the operator to conduct an investigation into the cause of the elevated parameter(s) in the effluent. It is noted that by using the statistical method a stable treatment system would have a relatively low trigger but an unstable system would likely have a higher trigger. The statistical approach might actually reward an operator for being less vigilant. I suggest that a combined approach using both a statistical trigger and a trigger of a predefined maximum of perhaps 50% of the discharge limit. A stable operator with a statistical trigger, equivalent to say 25% of discharge, would conduct in-house investigations for "exceedances" below the reportable Regulatory trigger of 50%. An unstable operator with a statistical trigger of 75% would use the reportable Regulatory trigger of 50%. I expect also that the triggers might change according to the parameter under consideration to address operational challenges and the nature of the parameter if elevated levels are released to the aquatic environment.

Overall, we did not notice areas of overlap with provincial jurisdiction and support the ideas put forward.

There may be a few more comments from a Health perspective, later today or by the first of next week (I haven't heard back from them yet) but I wanted to send out what we had at this point.

Thanks again for the opportunity to comment and please let me know if you would like to discuss anything that we've presented here.

Jennifer
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Énergie NB Power

Nucléaire Nuclear

Point Lepreau Generating Station
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June 27, 2012

Mr. Francois Rinfret, Director (Acting)
Point Lepreau Regulatory Program Division
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
Ottawa, Ontario
K1P 5S9

Dear Mr. Rinfret:

Subject: Comment on CNSC Discussion Paper DIS-12-02 "*Process for Establishing Release Limits and Action Levels at Nuclear Facilities*"

The purpose of this letter is to provide NB Power's comments on CNSC's Discussion Paper DIS-12-02 "*Process for Establishing Release Limits and Action Levels at Nuclear Facilities*", which was issued on February 22, 2012.

NB Power has maintained a strong environmental performance over the years, both from a radiological and conventional perspective. Our contribution to the public dose is negligible, and based on an Ecological Risk Assessment, neither our radiological nor our conventional releases pose a risk to the public. This is an indication that the existing regulatory framework is effective and ensures the safety of the public and environment. That being the case, it is not clear that changing the basis for release limits or action levels will actually reduce the risk to the public, or improve transparency.

With these points in mind, we have the following general comments on the Discussion Paper, which we believe are reflective of the industry as a whole. Additional details are provided in Attachment 1, which was developed through discussions with the Nuclear Environmental Affairs Committee of COG.

1. **Public trust and communication**. The proposed process would likely lead to changes (reductions) in release limits and action levels, and in turn may lead to more frequent reporting to the CNSC. However, the increased reporting will not be due to any reduction in "safety" or increase in "risk". We believe this will lead to communication challenges with the public and to an unintended and unfounded reduction in trust in both the CNSC and the industry.

   Instead, recognising that the industry does have a good performance record, we believe it would more advantageous to focus our efforts, with the CNSC, explaining how the existing framework is protecting the public and environment.

.../2

2. **Harmonization / agreements with other regulators**. The proposed process for setting release limits and action levels addresses both radiological and conventional compounds. We feel this would make the process un-necessarily complicated, as the traditional processes for setting standards use different methodologies and terminology. Given that there are already provincial processes and existing federal guidance for setting release limits for conventional compounds, we suggest that the CNSC meet its objectives with regard to the conventional compounds by entering into agreements with the provinces or other federal departments as appropriate. This is allowed by the Nuclear Safety and Control Act, would avoid duplication and regulatory overlap, and would result in a single best placed regulator for conventional compounds.

3. **Use of CSA processes**. The existing CSA system serves to provide a strong and proven process by which radiological release limits and action levels could be established. It would ensure alignment with existing CSA standards (e.g. CSA N288.1 Derived Release Limits), and would provide a forum for a systematic and balanced review of existing international and provincial expectations.

4. **Proposed Values**. The inclusion of potential or proposed values within the discussion paper appears misplaced. We suggest that it would be more appropriate that the CSA process be used to develop guidance on when and if dose constraints be developed, and if so, how they should be developed.

In summary, while we understand that the CNSC wish to increase transparency and provide clarity in the regulatory process, we believe there are opportunities and alternatives that could be used to help achieve those goals without creating undue concern and effort. If you require additional information, or would like to discuss these alternatives, please contact Charles Hickman at 506-659-7061 or CNHickman@nbpower.com.

Sincerely,

Wade J. Parker
Station Director
WJP/CNH

cc: (with attachment)
Mark Dallaire, Pierre Belanger, Jeff Ramsay, CNSC Site Office, consultation@cnsc.gc.ca, (CNSC)

Wayne Woodworth, Charles Hickman, Jennifer Allen, Matt Gorman, Joe McCulley, Scott Robertson, Kathy McRae (NBPN)

Attachments:
1. New Brunswick Power Detailed Comments on DS-12-02, 2012-06-27.

Attachment 1
New Brunswick Power Detailed Comments on DIS-12-02
(Developed in conjunction with the Nuclear Environmental Affairs Committee of COG)
2012-06-27

General

We feel that DIS-12-02 is essentially a policy document, proposing a process to establish release limits and action levels for nuclear substances and hazardous substances. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values takes away from consultation to establish a robust framework and pre-empts the outcome of the process.

Regulatory Framework for the Control of Releases to the Environment

NB Power acknowledges the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance. However, we find the framework that is presented is complex and difficult to understand – it is at odds with the desired objectives.

Given the success of the existing framework in ensuring good facility performance, it does not appear that changes are justified. Furthermore, it does not recognise the existing provincial and federal regulations for hazardous substances which are also successful in preventing unreasonable risk to the environment.

NB Power's Major Concerns

It is proposed that the process being put forward by the CNSC should focus on nuclear substances and not try to address hazardous substances simultaneously. DIS-12-02 intermingles nuclear and hazardous substances throughout and since their methods of regulation are different, combining them makes the framework overly complex and hard to understand. The proposed framework does not acknowledge as equivalent existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC. This approach is loading on the back of Licensees additional work because various government agencies want to do it differently and in our view is not appropriate. This issue was specifically addressed in Section 6.2.1 of the Recommendations Report of Red Tape Reduction Committee, which stated "Regulators, in designing and managing their regulatory programs, are not sufficiently taking into account the collective impact of their requirements on businesses."

The Six Principles for establishing release limits and action levels are not really "principles" but appear to be a method to justify setting the lowest possible release limit.

Principle 1 "Adoption of a combined technology/exposure based approach"

We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment.

Principles 2 and 3 – "Sector-specific technology-based release limits (TBRLs) and case-specific technology-based release limits"
We believe that TBRLs set far below the level needed for protection of environment and human health are difficult to justify. This is true whether the TBRLs are sector-based or case-specific.

Principle 4 "Exposure- based release limits"
Exposure based release limits on the other hand make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be. The framework is silent on the well established safe limit for nuclear substances of 1mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.

The equivalency of existing provincial or federal requirements should be acknowledged so there is a single regulator for a given area. It is not acceptable to have double and triple regulations for hazardous substances. Multiple jurisdictions need to find a way of adopting a single set of requirements and avoid making the current undesirable situation worse. With the recent announcement by CNSC of their plans to use administrative penalties in the environment area it will now be possible to receive an administrative penalty from two federal and one provincial agency for the same event. Although DIS-12-02 states that CNSC expects to harmonize regulations to some extent, it needs to be complete harmonization or we will, in practice, have triplication of regulations, monitoring and reporting. Having another government agency setting release limits for parameters that are already regulated appears to go against current Federal Government initiatives.

Dose Constraints, as proposed in this paper, are not used as intended by ICRP/IAEA to ensure members of the public do not receive doses above the public dose limit as a result of exposure to multiple licensed facilities but are used instead to drive release limits to very low levels. Multiple licensed facilities do not exist in some areas.

Principle 5 - "Effluent/emission design objectives for new facilities"
Design objectives have no place in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents, and should be related to risk.

Principle 6 – "Action Levels"
Action levels should be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a CSA Standard to provide guidance on developing action levels should be considered. Also the setting of action levels needs to be linked to CSA N288.5 on effluent monitoring to ensure consistent and aligned reporting requirements.

Specific values were not proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to the statistical internal administrative levels that are typically used to identify to station staff circumstances that needed to be investigated. For a 0.05

mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels (5% DRL vs. 10% DRL).

Additionally, an Action Level that can change based on a statistical calculation will result in further alarm to the general public, as focus will likely be on the fluctuating limit as opposed to the actual information trying to be communicated.

This proposed fundamental change by CNSC to set action levels just above current operating performance which is at *de minimis* risk levels would have facilities reporting performance as being close to the limit, whereas in the past the same performance was reported as being 2 or 3 orders of magnitude below the limit. This change will not be readily understood by the public who will now perceive that performance at *de minimis* risk levels to be of concern.

Ongoing monitoring of system performance is the actual key to success, not action levels. As part of our monitoring process, we establish investigation levels, action levels and notification levels. In our view this has been and continues to be the right approach.

Optimization Processes/Continuous Improvement
The Paper ignores the well established industry practice of ALARA (As Low As Reasonably Achievable). ALARA is the process of continuous evaluation and improvement that industry has used for many years to maintain environmental releases at the very low levels they are today. It is an important management tool used to reduce the emissions and impact of nuclear and hazardous substances. CNSC is seeking to do by regulation what Licensees have done out of our real desire to protect our communities and people. We believe that regulation should be used to set hard limits and as practiced by the industry a programmatic approach should be used to pursue excellence. Regulators already require that Licensees establish and maintain these types of management programs in other areas. We see no performance issue that should drive CNSC to use a different regulatory process for environment than would be used for reactor safety for example.

Public Perception of risk and safe levels
The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and COG member companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

Building on CSA N288 Successes
Since 2006, utilities have been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. CNA sent a letter to the CNSC reflecting this positive feedback from industry participants. A number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

Recommendations

Our general recommendations are as follows:

Set Release Limits to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 (new) Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of 1 mSv/year should be maintained as the safe limit for setting derived release limits.

Manage nuclear substances and hazardous substances separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be.

Where necessary and appropriate, recognize and use "dose constraint" as a tool (consistent with ICRP and IAEA) to ensure members of the public are not exposed from a combination of nuclear sources to levels higher than the dose limit of 1mSv per year not as a means to set absolute release limits.

Action Levels should be used to identify serious adverse conditions needing immediate action and reporting to the regulator.

Implement optimization through Programs to drive ongoing performance improvement and commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable), pollution prevention, and environmental management systems (ISO 14001, S/G-296). Regular optimization program performance reviews would ensure they remain effective.

Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater) have no place in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits to go in licenses.

From: Richard DeCaire
Sent: Friday, April 27, 2012 4:04 PM
To: Consultation
Subject: Comment(s) on toc section of DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities document

Comment: This Comment is for Annex A.5 - application error encountered on CNSC website.

In Scenario 5: Action levels for operational control

A release process that is in control will always have variability due to the statistical nature of radioactive decay. If Action Levels are set using statistical methods alone, then the licensee who has a process which is in control will be required to investigate (and potentially) report up to 5% for no reason, which will result in inefficiencies and needless cost for the licensee and the regulator. In cases where the licensee has a process which is well controlled then the Action Level should be set at a multiple of the 95th percentile. Conversely a licensee that has a process which is not in control will benefit unduely from the 95th percentile approach – a more appropriate Action Level would be much lower than the 95th percentile. The two extremes cases discussed above underline the difficulty in the statistical method. It must be grounded in all cases by exposure based limits.

Further, there is variation in recording practices for releases around the lower limit of detection (LLD) – does the licensee record a zero release, or a release equal to the LLD? Also, what if the licensees releases are << 0.01 mSv/yr – and they want to shorten sampling counting times, thereby increasing their LLD? These, and other details are critical in understanding the potential advantages and pitfalls of this statistical method. There are probably very few instances where it may be used effectively and appropriately.

Date: 2012-04-27
Provider: Richard DeCaire
Organization: Nordion (Canada) Inc.
Email: richard.decaire@nordion.com

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Further, there is variation in recording practices for releases around the lower limit of detection (LLD) – does the licensee record a zero release, or a release equal to the LLD? Also, what if the licensees releases are << 0.01 mSv/yr – and they want to shorten sampling counting times, thereby increasing their LLD? These, and other details are critical in understanding the potential advantages and pitfalls of this statistical method. There are probably very few instances where it may be used effectively and appropriately.

Executive Summary
Releases to air, surface water, groundwater and tailings/waste rock at one company/institution may be different by orders of magnitude relative to their DRLs. The main contributor to % DRL may be only one pathway. Different technologies are used to abate releases from different pathways. The text speaks about TBRLs, but is silent on whether this applies to all pathways. If the document is meant to only apply to the main pathway which contributes to %DRL then the text is logical. Where the text becomes confusing is how it will be applied to the lesser contributing pathway(s). Consider when releases to air represent 3% of DRL (contributing 0.03 mSv that year to the most critically affected person), but releases to water are only 0.01% of DRL (or 0.0001 mSv that year to the most critically affected person). In such a case the only Action Levels or abatement technologies worth considering are those that apply to/mitigate air releases.

The dose constraints/Action Levels of 0.01 mSv/yr for new builds and 0.05 mSv/yr for existing facilities are reasonable starting points to guide setting licensees Action Levels. NCRP 160 states the average annual effective dose to US citizens is 3.11 mSv/yr from ubiquitous background radiation. This means the average person will receive 0.05 mSv every six days and 0.01 mSv in less than 1.2 days. Action Levels lower than 0.01 mSv/yr are too small to be meaningful when the variations in ubiquitous background are considered (see Fig. 3.20, ICRP 160).
Driving Action Levels lower and lower using BATEA or TBRLs can lose all meaning when it is divorced from natural exposure levels. Action Levels should not be permitted to be lower than a de minimis value. A de minimis value of 0.01 mSv/year is proposed.

Date: 2012-04-27
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NWMO Comments on DIS-12-02
Process for Establishing Release Limits and Action Levels at Nuclear Facilities

General comments:

1. This document starts off with desirable goal of establishing uniformity in approach plus a clear distinction between TBRL and EBRL. But it then mixes the two. Specifically it frequently mixes the EBRL of 1 mSv/yr with what is achievable by current technologies, namely 0.01-0.05 mSv/yr and 100 Bq/L. The latter should be viewed as TBRLs, not EBRLs, as they are associated with technology and not with exposure effects. The EBRL should remain around the 1 mSv/yr value, or possibly the 0.3 mSv/yr ICRP dose constraint allowing possibility of multiple exposures. All else are TBRLs and should be labelled as such.

2. In the interest of establishing that this approach is rational, it would be useful to indicate if/how it is consistent with Canadian approach to chemical toxicity. E.g. add to the discussion of principles in Section 3.

3. Document adds in the EDO concept but does not adequately define it. It seems to be a third category of limits, besides TBRL and EBRL, that is applicable to "proposed facilities" but it is not clear what parameters other than a "dose-constraint" or "tritium release" might be considered for EDOs and how will each EDO be determined by the CNSC. This new category of limits seems unnecessary and confusing, especially if EBRLs and TBRLs also apply to new facilities, but if a decision is made to use them, a dedicated detailed Section on EDOs and its inclusion in the Glossary are needed.

4. Due to lack of clarity on use of TBRL, EBRL, sector-specific, case-specific and EDOs, it is not obvious exactly which ones will apply to a deep geologic repository.

5. In many places in this document, ALs are defined as "indicating when releases are deviating from the norm" and suggest that ALs are slightly above the norm. However, the Radiation Protection Regulations define ALs as "may indicate loss of control of part of a licensee's Radiation Protection program", which does not convey the same meaning/significance.

Specific comments:

Exec Summary, Action level subsection. Last sentence largely repeats earlier sentences in this section.

Exec Summary, Principle 2 and 5. Some clarification would be useful on expectations if technology changes. What would be implications on an existing facility?

Exec Summary, Specific Proposal on EBRL, first para. Incorrectly calls the 0.01-0.05 mSv/yr as an EBRL.

Section 2. Principle 6 on P.10 mentions 0.01 mSv/year as EDO for new nuclear facilities and does not specify that it is for new nuclear plants, while in other parts of the document, it is specified as EDO for new nuclear plants.

Section 3.3. Need to start this section discussion by reminding reader that this principle applies if there is no sector specific TBRL. E.g.: "If there is no sector-specific TBRL, then the CNSC proposes to ..."

Section 3.5. Principle 5. This is where EDO appears, but its relation to TBRL and EBRL concept is not clear. As mentioned above, it appears to be a third category. A nice-to-have target that is less than EBRL, and may or may not be technically achievable (i.e. possibly below TBRL). This principle for new facilities should still be TBRL focussed, but indicate that as a new facility it would be reviewed whether existing TBRL for older facilities still represented the state-of-art, and whether possibly a new sector or case-specific TBRL would be defined based on current BATEA.

Section 4.1. This section is not clearly worded. It in effect confuses EBRL and TBRL. The 0.3 mSv/yr may be viewed as an EBRL. It is consistent with the 1 mSv/yr exposure limit (which is grounded in both lack of data of effect, as well as natural background levels), but allows for a person to potentially be exposed to multiple sources while remaining within 1 mSv/yr. But 0.05 mSv/yr is a TBRL. Even countries which adopt a dose constraint of 0.1 mSv/yr are essentially making a TBRL decision although they do not use that terminology. The paragraph at the bottom of p. 17 is particularly loose in this respect. Given that CSNC has established this distinction in this paper, the terminology should be consistent.

Section 4.2. EDO terminology is again introduced unnecessarily. Why not identify the proposed value of 0.01 mSv/yr as a proposed TBRL?

Section 4.3. Similarly, why not keep the EBRL and TBRL distinction and terminology here?
The last paragraph in this Section suggests that the NSCA requirement “to take all reasonable precautions……..and into the environment” is not being respected with the current limits, even though footnote 17 clearly states that there are no health effects at the level specified in the current drinking water guidelines.

Scenario 1, p.29. Bullet says 'Establish EBRL', but subsequent bullet is about a TBRL. Bullet should be relabelled as 'Establish EBRLs and TBRLs'.

Scenario 1, p.29. There is some confusion possible here over the basis for 0.05 mSv/yr. In the earlier section where this value was discussed, it was raised in the context of nuclear power plants, and evidence was presented that this value was technically achievable across a sector, and therefore it was a potential sector-specific TBRL. Here the basis is given as G-129 ALARA. However the latter is not a TBRL, it is rather a suggested de minimus value for use in ALARA optimization. This is a rather different point. It is not very helpful to first introduce it here in this scenario example. If the G-129 value has any merit, then it belongs in the discussion under Section 4 with respect to TBRL. There it could indicate that there is little value in setting TBRL below 0.05 mSv/yr, as the dose has become de minimus.

Scenario 2, p.31. Second bullet. The use of EDO here is not helpful for reasons already noted. Better to use TBRL and EBRL terminology. Given the premise at the start of this scenario, I think that the new information would be used to derive a new EBRL for that effluent. There would separately be a review of BATEA to see what TBRL is relevant (not EBRL as listed in the third bullet).

Scenario 3, p.33. Second bullet. Is the concept of a "maximum average monthly release" clear? It is not immediately clear. Can this be simply stated as "maximum monthly releases"? Should a definition be included in the glossary if this is an important concept.

Scenario 4, p.34. First bullet, third subbullet. I think EDO should be replaced here with EBRL. Also in the last sentence of this section, it is implied that radionuclide specific criteria are not available for air. This seems odd as inhalation dose coefficients are widely available.

Scenario 4, p.34, Second bullet, first subbullet. I think EDO should be replaced here with EBRL.

Scenario 4, p.34, second bullet, third subbullet. Here the EDO should be replaced with TBRL.

Scenario 4, p.34. second bullet, last subbullet. Odd wording. An EDO (or TBRL/EBRL) is not a contaminant.

Scenario 4, p.34, footnote 27. As this scenario is by definition about a new facility, it is possible that there is no similar type of facility available to establish precedent on what is economically achievable. So this footnote is incomplete. Or is this scenario about a new nuclear power plant in particular?

Scenario 4, p.35, first subbullet on top of page. Odd wording. This subbullet only applies if the EBRL has not been achieved.

Scenario 4, p.35, second bullet, first subbullet. Change "Establish sector-specific TBRLs" to "Establish TBRLS". Whether they are sector or case specific is only determined as one gets into the details.

Scenario 4, p.35, second bullet, first subbullet. Text here proposes 0.05 mSv/yr as sector-specific TBRL. But previous discussion in this entire document has only provided rationale for 0.05 mSv/yr in the context of a nuclear power reactor. As this scenario is about an unidentified "new facility", it is not appropriate to simply quote a TBRL of 0.05 mSv/yr as there is no basis. Unless this scenario is about "New nuclear power reactors", in which case the scenario should be relabelled.

Scenario 4, p.35, 2nd bullet, third subbullet. This should be about selecting the lower of the EBRL and TBRL defined in prior two subbullets.

Scenario 4, p.35, third bullet, first subbullet, third subsubbullet. Is it intended that CNSC will be responsible for developing TBRLs where they do not otherwise exist? Or would the proponent propose and CNSC review/accept?

Scenario 4, p.35, third bullet, second subbullet, first subsubbullet. This discussion of using statistical procedures to develop case-specific TBRLs seems impractical. Given that there is no sector basis to work with (by definition for case-specific TBRLs), where would there be data to support statistical analysis? This point is acknowledged two subsubbullets later.

Scenario 4, p.35, third bullet, second subbullet, second subsubbullet. This subbullet is about establishing TBRLs. So it is not logical to discuss EBRLs here. This point should be at a higher level in this discussion.

Scenario 4, p.36, top subsubbullet. This point confuses the difficulty in establishing a case-specific TBRL when there are by definition limited other examples, with the need to define an EBRL. The key point raised in the main document is the need to establish both EBRLs and TBRLs and then use the lower of the two. This subsubbullet says an "EBRL may need to be developed". But according to the earlier principles, an EBRL is always developed. I think the point to be made here is that it may not be possible to develop a case-specific TBRL, and it may therefore be that the Action Levels are solely based on the EBRL. This is OK, it just can be made more clearly than worded here.

Scenario 5, p.37, third bullet. Editorial. (1) Delete "by no means". (2) Change "...responding to ALs is in itself a demonstration..." to "..responding to AL exceedance is a demonstration...".

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May 15, 2012
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Sir/Madam:

Re: Comments from the Ontario Ministry of the Environment Eastern Operations Division on the Canadian Nuclear Safety Commission Discussion Papers DIS-12-01 & DIS-12-02

Thank you for the opportunity to provide comments on the two (2) recently released discussion papers (Papers DIS-12-01 and DIS-12-02).

The Ontario Ministry of the Environment Eastern Region Operations Division has been involved with conducting abatement activities and providing review of hydrogeological and hydrological assessment reports for several nuclear related facilities or projects in Eastern Ontario. These projects include the Port Hope Area Initiative clean-up, the Cameco Conversion and Fuel Manufacturing facilities in Port Hope, as well as several former uranium mines located in Eastern Ontario that continue to be regulated by the CNSC. The MOE Eastern Region Technical Support Section is pleased to provide the following comments.

Generally speaking, the approach taken by the CNSC is acceptable. However there are some concerns with respect to the level of cooperation with other jurisdictions expressed in the documents. Many jurisdictions have specific regulations, guidelines and/or policies in place to deal with releases to the environment and protection of groundwater, surface water and air. There should be an inherent understanding in these documents that when the CNSC is dealing with releases or is establishing compliance limits for the protection of groundwater at their facilities, local, provincial or other federal regulators should be consulted.

Discussion Paper DIS-12-02 Process for Establishing Release Limits and Action Levels at Nuclear Facilities

1. The release limits and action limits proposed to be used a nuclear facilities do not take in to account other relevant jurisdictions. For example, releases into the natural environment may have impacts on other parties covered under provincial jurisdiction. Many provinces have release limits and action levels that should be considered when setting limits/levels at nuclear facilities, particularly for non-radiological parameters (i.e. bulk uranium, ammonia/nitrate, fluoride, etc.).

2. The use of BATEA (Best Available Technology Economically Achievable) is an MOE approved method when designing effluent treatment systems. However, the MOE has specific requirements in polices on how to develop and what is acceptable BATEA. It is important in these cases that the relevant provincial regulations/policies be contemplated by the CNSC when developing action levels and release limits.

3. The CNSC document proposes to use mixing zones when establishing release limits for hazardous substances. The MOE has specific policies dealing with how to develop and when mixing zones can be used. These should also be contemplated by the CNSC. Further, other regulations/acts such as the Fisheries Act and the Ontario Water Resources Act will not allow mixing zones for certain hazardous substances.

If you have any questions regarding these comments please do not hesitate to contact me at 613- 540-6884 or at peter.g.taylor@ontario.ca

Yours truly,

Peter Taylor
Manager, Technical Support Section, Eastern Region

PT/gl
c: Hope Boehm

ONTARIO POWER GENERATION

R. J. MacEacheron
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June 29, 2012

File No.: N-00531 (P)
CD# N-CORR-00531-05757

OPG Proprietary

Mr. Mark Dallaire
Director General

Regulatory Policy Directorate
Canadian Nuclear Safety Commission
280 Slater Street
Ottawa ON
K1P 5S9

Dear Mr. Dallaire:

OPG Comments on CNSC Discussion Paper DIS-12-02 "Process for Establishing Release Limits and Action Levels at Nuclear Facilities"

Reference 1. CNSC Information Bulletin 12-07, "Invitation to comment on Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities", February 22, 2012.

This letter provides Ontario Power Generation's (OPG) comments on the CNSC Discussion Paper DIS-12-02, Process for Establishing Release Limits and Action Levels at Nuclear Facilities, as requested in Reference 1. .

Introduction

OPG is proud of its environmental record. Over the past number of years, OPG has been focused on reducing its environmental footprint, particularly as it relates to emissions and impact on public dose. OPG's actual facility emissions represent a negligible contribution to the average radiation exposure of about 3000 µSv per year that individuals receive in Canada. . As noted in OPG's report "2011 Results of Radiological Environmental Monitoring Programs", the public dose is less than 1 µSv for each of its facilities. This performance implies that the nuclear industry's policy of continual improvement in all areas of safety including environmental safety is effective, and that the current regulatory framework for nuclear substances which seeks to keep exposures As Low As Reasonably Achievable (ALARA), as outlined in the regulatory document G-129, "Keeping Radiation Exposures and Doses As Low As Reasonably Achievable", is working.

In this context, OPG understands that the intent of the approaches developed in the Discussion Paper are "to improve the consistency and transparency of the regulatory oversight of releases to the environment" (p. 7, DIS-12-02) and "to provide greater clarity to licensees and the public on how release limits are determined, and to demonstrate that licensees are aware of and responsive to emerging situations where there may be a loss of control in systems or processes" (p. 2, DIS-12-02). OPG's comments are provided with these objectives in mind.

Lower release limits and action levels will not enhance public understanding

OPG recognizes that despite overall strong environmental performance, public perception may be mixed. Some members of the public may be concerned that existing Derived Release Limits (DRLs) are orders of magnitude higher than actual facility discharges. Instead of viewing this difference as successful oversight by the regulator in driving continual improvement in performance, the public may perceive the limits as being too relaxed. Only through the interaction of regulations and regulatory limits that clearly focus on the prevention of harm; industry management programs focused on continual improvement; and public information programs that allow members of the public to make an appropriate judgment on the effectiveness of the environmental programs, will the outcomes of excellent performance and public trust be achieved for both industry and the regulator.

The introduction of a new, lower "release limit" concept for radioactive effluents, along with lower action levels with increased reporting will inevitably result in a significant negative impact on public perception. Exceedances will be perceived as regulatory limit violations even though the levels are set much lower than any expectation of harm to the environment. There will be no way to effectively explain this complexity in the public domain. New, lower "release limits" are not required and do not support the objective of enhancing public understanding of how the CNSC and licensees ensure the protection from radiation exposure.

A standardized method to establish Action Levels is the best approach for consistency with international practices

In looking at international experience (IAEA TECDOC-1638) it appears that countries with dose constraints and related "authorized release limits" do not have "action levels". The goals and objectives of the application of authorized release limits seem to be parallel to Canadian "action levels" - exceeding would require reporting, initiating a regulatory investigation and under certain circumstances penalties.

OPG does not support the use of dose constraint to set release limits, as stated in the Discussion Paper. Since the current CNSC framework already has "action levels", the proposed dose constraint seems redundant. OPG supports and would participate in the development of a standardized method to establish and report on "action levels" and believes this would be best developed through the Canadian Standard Association (CSA) process, given that the CSA has been a very successful venue to develop standards related to environmental protection at nuclear facilities such as CSA N288.1, .4, .5 and .6. The CSA process considers international experience when developing new standards. COG members have already made progress in the development of an "action level" method document that could be used as a seed document for a CSA Standard and would like to discuss this work with the CNSC.

Emission of hazardous substances are already adequately regulated

For hazardous substances, Environment Canada and Provincial Ministries of Environment adequately regulate in this area and have the expertise to ensure there is no unreasonable risk to the environment and to the health and safety of the members of the public. These requirements are well managed through existing federal and provincial regulatory instruments, e.g., Environmental Compliance Approvals, MISA Effluent Monitoring and Effluent Limits regulations, CCME Guidelines, etc. Harmonization of existing requirements and reporting would be an effective approach where there is a need to establish consistency. Establishing a new framework for hazardous substances would lead to duplication and/or overlap while the federal government is striving (and industry is asking) for a more streamlined regulatory system.

Proposed concepts for strengthening the existing framework

OPG proposes the following concepts for discussion in order to strengthen the existing regulatory framework and meet the need for transparency. An approach based on the concepts below would better conform to the accepted convention of using risk based limits together with management processes to further reduce emissions (ALARA and pollution prevention).

- Set **Release Limits** to protect humans and the environment and achieve acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For nuclear substances the value of **1 mSv/year** should be maintained as the **safe limit** for setting Derived Release Limits as defined by CSA N288.1.

- Manage **nuclear substances** and **hazardous substances** separately. The benefit of a consistent framework for releases of nuclear and hazardous substances is not established in the discussion paper and could drive increased costs. This is particularly true in light of the existing regulatory frameworks already in place for hazardous substances. Layering an additional framework will increase costs and lead to a more complicated and confusing system of requirements rather than increasing transparency. Provincial requirements for releases of hazardous substances should be adopted verbatim, and harmonization achieved over time, ensuring there are no conflicting or duplicative monitoring and reporting requirements.

- Develop a **standardized method** to establish **Action Levels.** Action Levels should be used to identify serious adverse conditions requiring immediate action and reporting to the regulator. The Acton Levels should not result in frequent reporting of inconsequential events, which may be perceived as a risk to the public or the environment when no such risk exists. The **CSA venue** would be best for developing the methodology.

- Implement **Optimization through Programs** to drive ongoing performance improvement commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable) and pollution prevention.

Regular optimization program performance reviews would ensure the programs remain effective.

- Develop and/or participate in **Public Information Programs** to clearly explain regulatory limits and actual performance, provide information that allows a reasoned judgment of the overall performance of environmental programs, and provide the information on an ongoing basis rather than just as a result of an event.

- **Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater)** do not belong in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the purpose of design optimization through the EA process.

OPG has been working with the CANDU Owners Group members in the development of industry comments on the discussion paper DIS 12-02. Specific comments from CANDU Owner members and from OPG are provided in Attachments I and II respectively. OPG respectfully requests an opportunity to discuss these comments with the CNSC prior to final disposition.

Sincerely,

B. FLEET FOR.

Richard MacEacheron
Director, Nuclear Regulatory Affairs

ATTACHMENT I

CANDU OWNERS GROUP MEMBER COMMENTS ON DIS-12-02

CANDU OWNERS GROUP MEMBER COMMENTS ON DIS-12-02

1. **Document Content** - the document title and body indicate that the content is related to process – a process/framework to establish release limits for nuclear substances and hazardous substances and a process to establish action levels. The document does provide a framework for release limits and action levels. However, it also contains three specific numerical values related to "dose constraints and release limits" and "tritium in groundwater". Including these values goes beyond the scope and intent of the document and takes away from consultation to establish a robust framework by pre-empting the outcome of the process.

2. **Regulatory Framework for the control of releases to the environment** - COG members acknowledge the CNSC initiative to provide a more "transparent regulatory framework" that easily demonstrates CNSC input to and control over good nuclear facility performance.

   The framework presented does **not** do that. It is complex, difficult to understand (**see Figure 1**) and not transparent with respect to rationale for many of its aspects. Without clear objectives, the implementation of this framework could lead to public perception that nuclear performance in this area is poor. One has to wonder why such significant changes are needed when nuclear facility performance is acknowledged by CNSC to be good to very good, and the proposed framework is unlikely to improve it any more. Furthermore it does not recognize that existing regulation for hazardous substances by the provinces and other federal agencies is more than adequate, and that CNSC does not have to add its own regulation in this area (e.g. it could use equivalency/ substitution/ delegation). The following points highlight our major concerns.

- **Nuclear substances and hazardous substances** are intermingled throughout the document. They need to be dealt with separately in the framework. Their methods of regulation are different and combining them makes the framework overly complex and hard to understand. In addition, the proposed framework does not acknowledge as equivalent existing regulatory processes for managing hazardous substances. Equivalency should be a starting point in order to avoid duplication of regulation. However, the document only indicated that Provincial limits will be adopted where deemed adequately protective by the CNSC.
- **Six Principles -** for establishing release limits and action levels - are not really "principles". They appear to be a method to justify setting the lowest possible release limit.
- **Principle 1 -** We strongly disagree with "Principle 1" that a release limit will be based on the more stringent of the "exposure" or "technology" based release limit. Release limits need to be based on reasonable risk to the public and the environment. Processes can then be put in place to look at technology-based limits and site specific limits if the exposure-based release limits cannot be met.
- **Principles 2 and 3 - Sector-specific technology-based release limits and case-specific technology-based release limits -** see the two points above.
- **Principle 4 "Exposure- based release limits"** make sense in that they are risk based and have a clear meaning for the public. There are many tools to establish what they should be.
    - **Release limits for nuclear substances -** The concept of "**dose constraint**" and hence the development of authorized release limits has been used for some time internationally to make sure that individuals in the public are not exposed to more than the accepted safe dose limit of 1 mSv/year where multiple sources exist or may exist in the future. The current CNSC framework

already has “action levels”. The goals and objectives of “action levels” seems to be parallel to authorized release limits - exceeding would require reporting, initiating a regulatory investigation and under certain circumstances penalties. Therefore there is no need for dose constraints and authorized release limits and the industry does not support it or feel that it is necessary.

  - Setting release limits by selecting an arbitrary dose constraint value of 0.05mSv/year does not make technical sense, is not in keeping with the intended concept of dose constraint and appears to be prescribing a fixed level for ALARA – As Low As Reasonably Achievable, social and economic factors being taken into account. Moreover, it would make communicating historical good performance and public safety difficult since it is not based on risk and not all COG member companies could meet the release limits based on the proposed 0.05 mSv/year dose constraint. Given the historical good environmental performance of COG member companies, implementation of dose constraints is not required.
  - **Release limits for hazardous substances** – CNSC needs to acknowledge the equivalency of existing provincial or federal requirements, so there is a single, best placed regulator, for a substance. It is not acceptable to have double regulation for hazardous substances. If the CNSC is going to regulate hazardous substances, Provincial requirements should be accepted verbatim, and harmonization done over time to ensure that there are never conflicting/duplicating monitoring and reporting requirements. It is anticipated that “harmonization” will require considerable effort and time (it has been talked about for years), and COG members do not want to be subjected to conflicting requirements from different regulators while this is being resolved. Although DIS-12-02 states that CNSC expects to harmonize regulations to some extent, it needs to be complete harmonization or we will, in practice, have duplication of regulations, monitoring and reporting. Having another government agency setting release limits for parameters that are already regulated appears inefficient and inconsistent with initiatives to streamline regulatory requirements.

- **Principle 5** on “**effluent/emission design objectives for new facilities**” - design objectives should not be included in a document to define a process for establishing release limits and action levels for operating facilities. It should be in Environmental Assessment related planning documents, and again, should be related to risk.
- **Principle 6 – ‘Action Levels”** – COG members support and would participate in development of a method to set “action levels” taking into account historical operational data. The action levels need to be set at a level that identifies adverse conditions requiring immediate attention, not minor conditions that will lead to over-reporting and the possibility of portraying a risk to the public or environment that does not exist. Developing a **CSA Standard** to provide guidance on developing action levels is the COG member preferred venue. Also the setting of action levels needs to be linked to CSA N288.5 (effluent monitoring), such that only streams requiring monitoring would be considered for action levels. **COG members have made progress in development of such a method to set action levels based on operational data which could be used as a seed document for a CSA Standard** and would like to discuss this with the CNSC.
  - Specific values have not been proposed for action levels. However, it has been proposed that action levels be set statistically from historical data, and an example given is at the 95th percentile level. By definition, this would mean that for normally distributed data, 5% of the measurements would exceed their action level – which is reportable. This is a change in the use of action levels which have historically been intended to identify serious situations requiring immediate attention, and are rarely exceeded. The CNSC proposal is essentially equivalent to

the statistical internal administrative levels that are currently used by some COG members to identify to station staff circumstances that needed to be looked into - but are not reportable. For a 0.05 mSv/y dose constraint, the new action levels derived on a statistical basis from past performance would result in the undesirable situation of "action levels" and "release limits" being in the same range. The new release limits would in fact be roughly half of existing action levels (5% DRL vs. 10% DRL).

- o A related point is that the Federal Government has recently announced that it will be implementing **administrative penalties** for environmental exceedances. It is not known at this time how exceeding action levels would be handled … since by definition there would be exceedances.

- **Safe limit for releases of nuclear substances (derived release limits).** The framework is silent on the well established safe limit for nuclear substances of 1mSv/y dose to the public and it needs to be included. The 1 mSv/y limit for dose to the public should be maintained as a reference for safe operations and an anchor for past performance.
- **Optimization Processes -** ALARA (as low as reasonably achievable, social and economic factors taken into account) appears to be missing from the proposed framework. ALARA needs to be an integral part of any regulatory framework for the control of releases to the environment. ALARA is an important management tool to reduce the emissions and impact of nuclear substances, and based on the public dose performance to date of COG member facilities, it has been successful. For hazardous substances the concept of "pollution prevention" would be used.

3. Communication of risk and safe levels to the Public

The proposed changes in the release limits and action levels, which will result in more frequent reporting to the CNSC, will challenge both CNSC and COG member companies to clearly communicate to the public that historical very good performance is continuing, that historic very low risk to the public has not changed, and that only the reporting levels have changed. Further reducing the limits will have a negative effect on public perception of the nuclear industry. The public will perceive that they were not adequately protected previously. The public is unlikely to differentiate between the various types of limits (e.g., release limits, action levels, administrative control levels, etc). As a result of the new methodology, there will be an increased frequency of reporting exceedances of action levels, which may unnecessarily elevate public concern.

4. Specific Numeric Values "proposed' in the discussion document

Proposed dose constraint of 0.05 mSv/y for existing facilities – should not be included in a framework/process document.

The current license requirement for nuclear power plants for public dose is 1 mSv/y (corresponding activity release limits are calculated using CSA N288.1 methodology). The actual performance for nuclear power plants resulting in a public dose in the range of 0.01 to 0.045 mSv/y was determined from environmental measurements. This level of performance is the result of improvements over the years in station design and management practices (ALARA). Station performance is managed through measured emissions which give more conservative "public dose" numbers (CSA N288.1 methodology) than environmental measurements (which are available only after year-end).

Historical performance of dose to the public by COG member companies is acknowledged to be very good and has been widely communicated to the public – especially neighbouring communities. Changing the release limits against which performance is measured without an identified risk requirement is not acceptable and will complicate and confuse communication of performance and perception by the public of risk.

"**Proposed" dose constraint of 0.01 mSv/y as a design objective for new build – should not be included in this framework process document for operating facilities.** This level is very low and may in fact dictate technology selection when there is insignificant risk to the public or the environment associated with technologies with slightly higher emissions. While this dose constraint is proposed as a "design objective" for new build, past experience suggests that it would become the licence limit and a performance expectation for existing facilities.

"**Proposed" Tritium in Groundwater Design Objective of 100 Bq/l for new build – should not be included in this framework process document for operating facilities.** This proposed value is not in keeping with Health Canada's Guidelines for Canadian Drinking Water (7000 Bq/L) which is based on the recommendations of the International Commission on Radiological Protection and the World Health Organization. The acceptability of 7000 Bq/L was recently reinforced in the Government of Canada response to the Joint Review Panel for the proposed Darlington new build.

All COG member companies have groundwater monitoring programs in place. Historical performance has indicated that at the site boundary groundwater tritium levels are below the safe drinking water level of 7000 Bq/l. Again, establishing such a very low level for tritium in groundwater of 100 Bq/l, even as a design objective, is a concern because of the tendency of the public to expect this to apply to existing facilities.

5. Harmonization with other Regulators (or delegation, substitution, or equivalency)

With the CNSC moving into setting release limits for hazardous substances, there is bound to be overlap of jurisdiction (provinces, Environment Canada, Fisheries), with the potential for increased reporting and duplication of regulatory requirements. This is likely, especially if the CNSC do not think the provincial requirements are adequate. It is not clear how CNSC's proposed "harmonization" would occur, and it is anticipated that it will take considerable time and effort. Recent government initiatives to address overlapping / duplicative regulatory activities under the Canadian Environmental Assessment Act will allow delegation or substitution, which would be preferred over harmonization. It would lead to a single, best placed regulator for a particular parameter. It would be preferable for CNSC to adopt the latter practice, and sort out any concerns it may have by working with the best placed regulator.

6. Building on CSA N288 Successes

Since 2006, COG members have been working with the broader nuclear industry and regulators (including the CNSC) to develop standards needed by and useful to the industry through the CSA process. The process has been considered successful and the standards produced of high quality. CNA sent a letter to the CNSC reflecting this positive feedback from industry participants. A number of elements of this discussion document (action levels) and DIS-12-01(groundwater) would be appropriate for CSA Standards.

7. Terminology and definitions –

Clarity of terminology is required to help communicate risk to the public. A number of terms are used inconsistently throughout the document.

Summary - Discussion Points for a Regulatory Framework for the control of releases of nuclear and hazardous substances to the environment

The following discussion points for development of a regulatory framework which would meet the need for transparency and would better conform to the convention of using risk based limits together with management processes to further reduce emissions (ALARA and pollution prevention).

- Set **Release Limits** to protect humans and the environment to acceptable risk levels. Appropriate methodologies and risk assessments for determining protection are found in CSA N288.6 (new) Environmental Risk Assessment, Project Environmental Assessments, and facility Environmental Risk Assessments. For **nuclear substances** the value of **1 mSv/year** should be maintained as the safe limit for Setting Derived **Release Limits** using CSA N288.1.

- Manage **nuclear substances** and **hazardous substances** separately. It is recognized that "total harmonization" is being sought, but we are not there yet and may never be. Provincial requirements for hazardous substances should be accepted verbatim, and harmonization done over time to ensure there are never conflicting/duplicating monitoring and reporting requirements.

- Dose constraints should not be used to set release limits. The concept of **"dose constraint" is a tool** (consistent with ICRP and IAEA) for the optimization process to ensure members of the public are not exposed to levels higher than the dose limit of 1mSv per year. Given the good performance of COG member facilities dose constraints are not needed.

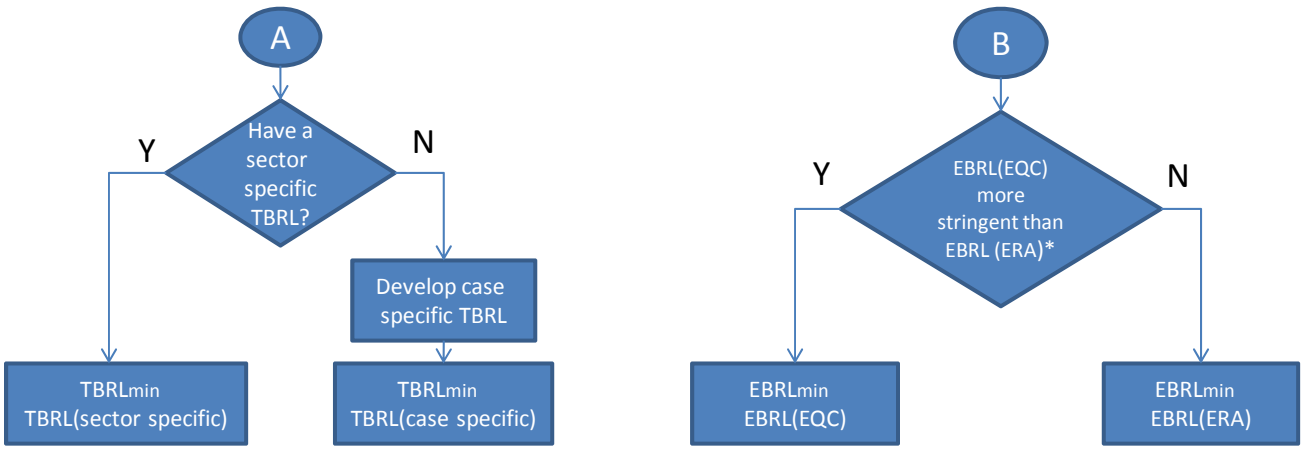
- Develop a **standardized method** to establish **Action Levels** to identify serious adverse conditions needing immediate action and reporting to the regulator. The levels should not require frequent reporting of inconsequential events, which may portray a risk to the public or the environment that does not exist. The CSA venue would be best for such development. COG members have made **progress in development of such a method to set action levels based on operational data** which could be used as a **seed document for a CSA Standard** and would like to discuss this with the CNSC..

- Implement **Optimization Programs** to drive ongoing performance improvement commensurate with the risk presented by the facility in question. Such programs include ALARA (as low as reasonable achievable, social and economic considerations taken into account), and pollution prevention. Regular optimization program performance reviews would ensure they remain effective.

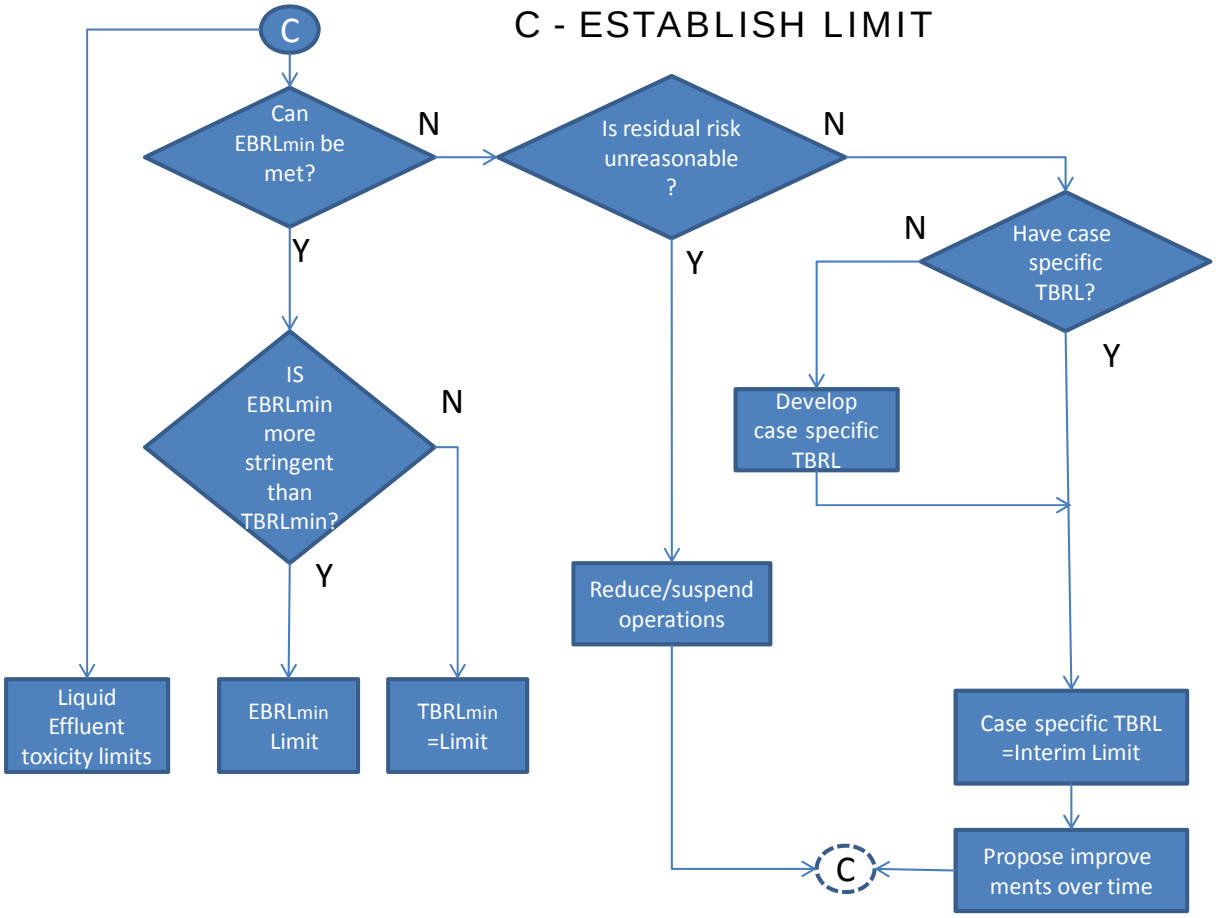
- **Effluent/Emission Design Objectives for New Build (dose constraint of 0.01 mSv/y and 100 Bq/L tritium in groundwater)** should not be included in this document. They are related to the Environmental Assessment process (planning and technical assessment), and would be set for the

purpose of design optimization. Such objectives do not need to be included in the process for setting operational release limits to go in licenses.

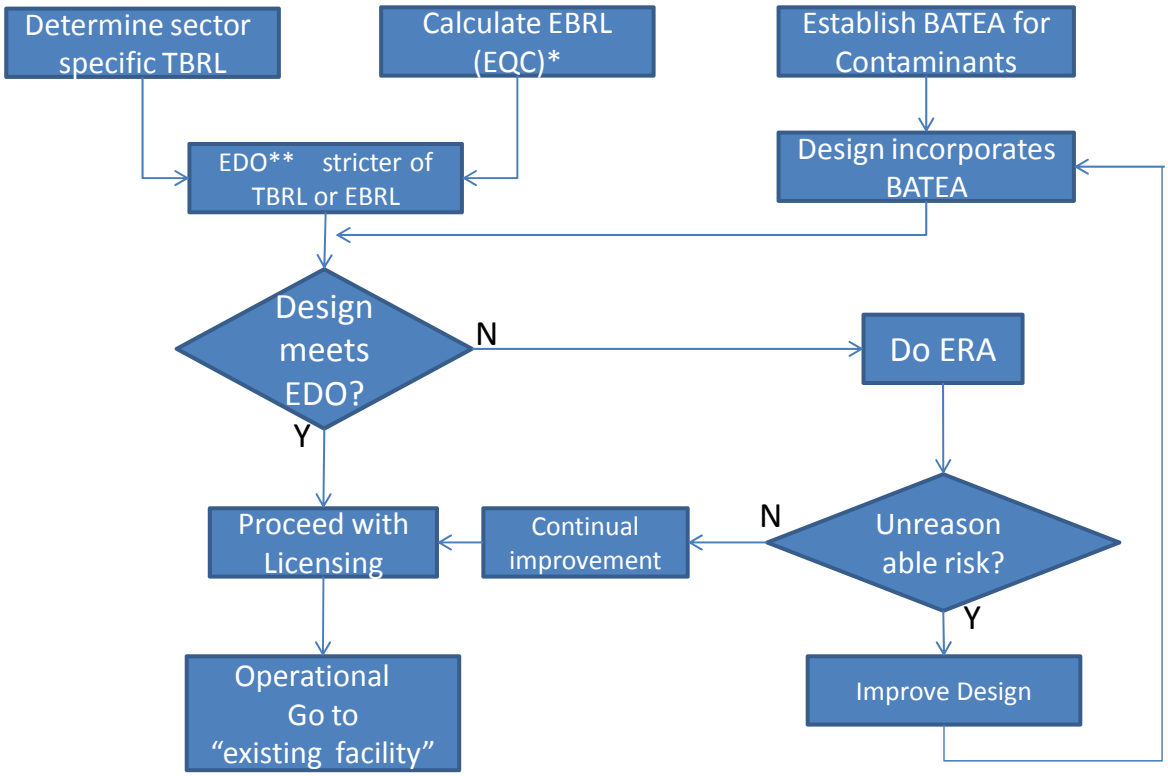
Figure 1 – Combined Technology/Exposure-Based Approach – Existing Facility



Notes:
* EBRL(EQC) is EBRL based on Environmental Quality Criteria
EBRL(ERA) is EBRL based on Environmental Risk Assessment results.
Assume EBRL for nuclear substances is one of these.


C - ESTABLISH LIMIT
C
Can EBRLmin be met?
N
Is residual risk unreasonable ?
N
Have case specific TBRL?
N
Y
Y
Y
IS EBRLmin more stringent than TBRLmin?
N
Y
Develop case specific TBRL
Liquid Effluent toxicity limits
EBRLmin Limit
TBRLmin =Limit
Reduce/suspend operations
Case specific TBRL =Interim Limit
C
Propose improve ments over time
D – USE STATISTICAL ACTION LEVELS

New Facility



Notes:
* EBRL(EQC) is EBRL based on Environmental Quality Criteria
** EDO is Effluent/emission Design Objective

ATTACHMENT II

OPG SPECIFIC COMMENTS ON DIS-12-02

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While OPG is supportive of the need to have a more transparent regulatory framework for environmental protection at nuclear facilities that is consistent with Canadian environmental policies, legislation and regulations, OPG believes that there are no solid rationales or additional benefits to be gained in adding the proposed dose constraint and new release limits to the existing effluent control frame work for nuclear substances. The framework presented is complex, difficult to understand and not transparent with respect to rationale for many of its aspects. Furthermore, it does not deal adequately with the existing provincial and federal regulations for hazardous substances which OPG views as more than adequate to prevent unreasonable risk to the environment.

The current control framework for nuclear substances and the framework to keep exposures ALARA as outlined in the regulatory document G-129, "Keeping Radiation Exposures and Doses As Low As Reasonably Achievable (ALARA)", established by the CNSC, are working and are driving continual improvements at Nuclear Power Plants (NPPs).

OPG has implemented these two frameworks and they are imbedded in its day to day operations of Pickering and Darlington stations. OPG's radioactive effluent control framework consists of the following key elements:

a. Derived Release Limits (DRLs) that are based on annual dose limit of 1mSv/yr to protect the human health.

b. Action Levels that are set approximately at 10% of respective DRLs to maintain proper control of emissions, exceeding ALs is an S-99 event and required a formal investigation.

c. Internal Investigation Levels (IILs) that is set at approximately 95 or 97.5 percentile of the last five years of station emissions. Exceeding this level will require an event report and a corrective action plan in place, if required.

d. Station Public and Environment ALARA review every two years: This step ensures station emissions are at ALARA and drives continuous improvement.

The success of the current framework is evident as radioactive emissions from Pickering and Darlington Stations continue to be below 1% of DRLs, and the resulting annual doses to the members of the public are below 1 μSv as noted in OPG's report "2011 Results of Radiological Environmental Monitoring Program".

I. Transparent Framework for Environmental Protection

1. The regulatory public dose limit of 1 mSv/a needs to be maintained as the **safe limit** for setting Derived Release Limits as defined by CSA N288.1. The disappearance of the safe limit of 1 mSv/a of dose to the public in the proposed control framework would fail to provide a reference for safe operations envelope and an anchor for past environmental performance.

2. The proposed framework seems to lack the ALARA element, an integral part of any regulatory framework for the control of nuclear substances released to the environment. ALARA is an important management tool to reduce the emissions and impact of nuclear substances. Since the implementation of OPG's Public and Environment ALARA program in 2008, the public dose performance to date of OPG facilities is a solid indication that the control framework of radioactive effluent and the ALARA framework have been successful and sustainable

3. If the proposed dose constraint of 0.05 uSv/a is to ensure licensees have a formal environment ALARA program in place, perhaps clearer expectations of the existing ALARA framework need to be set in regulatory document G-129, requiring NPPs to have a formal environment ALARA program in place with regular review cycles. OPG has a governing document for Controlling Radiation Exposure of the Public and the Environment to ALARA (N-STD-OP-0042). This governance requires the station to conduct an ALARA review every two years to help optimize the emissions and ensure opportunities to reduce emissions are identified and implemented.

4. The proposed methods to establish Release Limits and Action Levels are based on past operating data and as such there will unlikely be a clear distinction between the two levels. The licensees may exceed short-term action levels, i.e. weekly or monthly limits, more frequently and may exceed release limits at the same time. For example, the exceedance of gross beta gamma Action Level in 2010 of Pickering liquid effluent.

5. There is no gap in the current regulatory framework for the management of hazardous substances. Environment Canada and Ontario Ministry of Environment have adequately regulated in this area and have the expertise to ensure there is no unreasonable risk to the environment and to the health and safety of the members of the public. These requirements are well managed through existing federal and provincial regulatory instruments, e,g, e.g., Environmental Compliance Approvals, MISA Effluent Monitoring and Effluent Limits regulations, CCME Guidelines, etc. Harmonization of existing requirements and reporting would be an effective approach where there is a need to establish consistency. Establishing a new framework for hazardous substances would lead to duplication and/or overlap while the federal government is striving (and industry is asking) for a more streamlined regulatory system.

6. The proposed framework appears to ignore the risk based concept. The framework should be based on risk and consistent with the risk based approach used in CSA N288.6, .4 and .5. Additionally, recent environmental assessments conducted under CEAA for Pickering B refurbishment and Darlington New Build projects have determined that there is no environmental impact or no significant environmental impact from the releases of nuclear and hazardous substances.

II. Process to Establish Release Limits

1. The proposed core Principle 1, "Adoption of a combined technology/exposure based approach" and the CNSC's desire to expand the adoption of appropriate pollution prevention and control technologies to

establish the release limits of nuclear substances is a fundamental departure from the CNSC's scope for an Environmental Management System that the CNSC stated in G-296, "Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills" . In this document, the CNSC stated that Pollution Prevention is the key principle underlying the management of hazardous substances in Canada, while for nuclear substances, the Radiation Protection Regulations require that exposure and dose to persons be managed according to the principle of ALARA. OPG believes that the concepts imbedded in these documents should be maintained, rather than using complex processes to establish release limits.

2. The proposed process to establish Release Limits as outlined in the CNSC proposed core principles numbers 1 to 4 is too complex, convoluted and not transparent, as illustrated in Figure 1 of Attachment I. The exercise as proposed, would require significant iterations through the process loop and in some cases, may never get out of the loop. Licensees may have interim release limits for a long time. The efforts and cost incurred by both the licensees and the CNSC would be substantial and would not necessary result in a commensurate improvement in the environmental performance.

3. The costs of implementing technology-based release limits (TBRLs) would exceed benefits at existing nuclear facilities as emissions at existing facilities are already very low. The level of discussion in the Paper does not allow a proper impact analysis; however, it is clear that the cost for implementation of some of the recommendations could be in the millions with very small environmental improvements possible.

4. With respect to hazardous substances, it is important to ensure a facility is not held to two or three standards, with added expenditure of resources and regulatory reporting. Examples of potential overlap are given below:

    a. CNSC proposes to assess all effluents for aquatic toxicity. This proposal is not practical and contrary to MISA regulations.

    b. Testing liquid effluent at the point of discharge is contrary to MISA testing requirements at the control points. This will lead to additional unwarranted toxicity testing.

    c. The point of impingement (POI) definition given in the discussion paper conflicts with the definition in O.Reg. 419/05. It implies that a building on site receiving in excess of the POI standard concentration as being in exceedance of the POI.

5. With the recent announcement by CNSC of their plans to use administrative penalties in the environment area it will now be possible to receive an administrative penalty from two federal and one provincial agency for the same event.

III. Establishing Action Levels

1. OPG supports the need to have a standardized methodology to establish and apply Action Levels for environmental protection for all licensees. OPG supports and would participate in the development of a standardized method to establish and report on “action levels” and believes this would be best developed through the Canadian Standard Association (CSA) process.

2. Action levels should be set based on process knowledge and past operating data, at a level that represents an adverse conditions needing immediate action and reporting to the regulator. The levels should not result in frequent reporting of inconsequential events, which may be perceived as a risk to the public or the environment when no such risk exists. OPG does not support a general statistical approach to setting action levels.

3. Frequent exceedances of action levels would diminish the meaning and importance of action levels and create more burden to licensees and the CNSC in terms of resources and cost to address an action level exceedance. The cost to OPG for each exceedance was estimated at approximately $80K based on resources required for reporting, conducting analysis and corrective actions. In additional the CNSC would incur costs to manage exceedances of action levels. These costs would not necessarily be associated with improved Nuclear Power Plant environmental performance and protection of humans and environment.

4. The consequences of exceedances of action levels are unclear, specifically with respect to the proposed implementation of administrative penalties for environmental exceedances at the federal level.

5. Setting action levels for some hazardous substances would not be possible using a statistical approach. Most air emissions of hazardous substances do not have ongoing monitoring data, rather they rely on maximum estimates.

6. OPG recognizes that the DRLs are orders of magnitude higher than actual discharges and that may be a concern to some people. If the introduction of the proposed new “release limit” concept was intended to address that concern, then having a standardized method to establish and report on “action levels” that are currently in licenses should satisfy that objective. New, lower “release limits” are not required.

7. In looking at international experience (IAEA TECDOC-1638) it appears that countries with dose constraints and related “authorized release limits” do not have “action levels”. The goals and objectives of the application of authorized release limits seem to be parallel to Canadian “action levels” - exceeding would require reporting, initiating a regulatory investigation and under certain circumstances penalties.

8. Since the CNSC current framework already has Action Levels, the proposed dose constraint seems redundant, and OPG does not support the use of dose constraint to set release limits, as stated in the Discussion Paper. To that end, OPG supports the need to have a standardized method to establish

Action Levels and believes this method would be best developed through the CSA process, given that the CSA (Canadian Standard Association) has been a very successful venue to develop standards related to environmental protection at nuclear facilities such as CSA N288.1, .4, .5 and .6.

V. Effluent/Emission Design Objectives for New Facilities

1. Design objectives for new nuclear facilities should not form part of this regulatory framework, and are better suited in the guidelines for new nuclear plants, RD-337, Design of New Nuclear Power Plants.

2. Even though this is a “design objective” for new build, by including it in this document OPG is concerned it will become the license limit for new build and over time it may used to establish the performance expected of existing facilities. Examples of this occurring are IAEA 1638 and RD 360.

3. Setting an emission design objective of 0.01 mSv/yr for new NPPs would unnecessarily limit the choice of nuclear power technologies and overall optimization of plant designs. This value would be more difficult to meet if a potentially higher Relative Biological Effectiveness factor for tritium and/or ratio of OBT to HTO, as discussed in the CNSC tritium synthesis report, were adopted.

VIII. Specific Values For Dose Constraints and Tritium in Groundwater

1. The annual public doses from Canadian NPPs for the last five years have been below 0.01 mSv/yr, as estimated from environmental measurements. Using this performance to set effluent control limits is problematic as doses estimated from emission rates are normally higher than those calculated from environmental measurements, and the method to establish derived release limits, CSA N288.1, are conservative in nature.

2. OPG does not support the use of dose constraint to set release limits, as stated in the Discussion Paper. Setting release limits at 0.05 mSv/yr for existing NPPs would make release excursions exceed the prorated release limit for shorter compliance period e.g., weekly and monthly release limits for airborne and waterborne emissions respectively, and result in unnecessary license infractions. OPG would not always meet the proposed limit.

3. The design objective of 100 Bq/L of tritium in groundwater at the margin of the facility’s control area is contradictory to the recent response of the Government of Canada response to the Joint Review Panel for the proposed Darlington new build which reinforce the safe level of 7000 Bq/L. This is the current level stipulated in Health Canada’s Guidelines for Canadian Drinking Water (7000 Bq/L) which is based on the recommendations of the International Commission on Radiological Protection and the World Health Organization.

4. Tritium concentration in groundwater at some boundary wells at existing Darlington station and Pickering station are above 100 Bq/L. For Darlington New Build, the modelling indicates that the tritium in groundwater at the boundary would over time exceed 100 Bq/L.

IX. SUMMARY

1. In summary, the regulatory public dose limit of 1 mSv/a needs to be maintained as the **safe limit** for setting Derived Release Limits as defined by CSA N288.1.

2. The CNSC current Effluent Control Framework and the ALARA framework for nuclear substances, such that implemented by OPG, satisfy the objectives that the CNSC has set in the discussion paper DIS-12-02.

3. A standardized methodology to establish Action Levels based on operational data representing a serious adverse condition, and a realistic structure for reporting when an Action Level is exceeded would eliminate the need of the proposed Release Limits or Dose Constraint.

4. For hazardous substances, harmonization of Environment Canada and Ontario Ministry of Environment requirements and reporting would be an effective approach rather than having a new framework for hazardous substances that would lead to duplication and/or overlap.

OPG respectfully request an opportunity to discuss with the CNSC about these comments prior to final disposition.

From: sylvie.cloutier@mddep.gouv.qc.ca [mailto:sylvie.cloutier@mddep.gouv.qc.ca]
Sent: Friday, June 22, 2012 2:29 PM
To: McKee, Malcolm
Cc: isabelle.guay@mddep.gouv.qc.ca; louise.lapierre@mddep.gouv.qc.ca; yves.grimard@mddep.gouv.qc.ca; pierre.walsh@mddep.gouv.qc.ca
Subject: RE : DIS-12-02 : Processus d'établissement des limites de rejets et des seuils d'intervention dans les installations nucléaires
Bonjour Malcolm,

j'ai pris connaissance du document DIS-12-02: **Processus d'établissement des limites de rejets et des seuils d'intervention dans les installations nucléaires**. Tu trouveras plus bas quelques commentaires spécifiques et généraux concernant les principes préconisés et le mode d'application suggéré. En plus des centrales nucléaires, ce processus s'applique aux mines d'uranium, aux usines de concentration d'uranium et aux installation de gestion des déchets où l'on retrouve des points de rejets contrôlés. Dans ce document, la CCSN propose *d'améliorer l'approche à l'égard du contrôle des rejets dans l'environnement par la mise en oeuvre d'un cadre officiel d'établissement des limites de rejets et des seuils d'intervention pour les substances nucléaires et dangereuses*.

Au Québec, pour toutes ces installations et pour Gentilly II, le rejet de substances "dangereuses" est géré par le MDDEP. Pour les rejets liquides au milieu aquatique, la réglementation québécoise et la démarche décrite dans les *Lignes directrices pour l'utilisation des objectifs environnementaux de rejet (OER) relatifs aux rejets industriels dans le milieu aquatique* s'appliquent. Ainsi, pour chaque rejet, des OER sont calculés au cas par cas de façon à assurer la protection des usages de l'eau. Ces OER ne tiennent pas compte des contraintes analytiques, économiques et technologiques. Ils permettent d'évaluer l'acceptabilité environnementale des activités d'une entreprise ou d'un projet. Des activités peuvent ainsi être jugées préoccupantes pour l'environnement sur la base du nombre de paramètres qui dépassent les OER, de la fréquence ou de l'amplitude des dépassements. Dans tous les cas l'utilisation des OER se fait en complémentarité avec une approche technologique. Si les OER sont peu contraignants par rapport à la technologie disponible, les normes doivent correspondrent au minimum à la performance de la technologie retenue. Par contre, si les OER sont contraignants, différentes actions peuvent être enclenchées et les normes de base peuvent être resserrées de façon à contrôler les substances les plus problématiques (réf ld OER).De façon générale, les principes proposés par la CCSN sont conformes à l'approche québécoise pour l'"établissement de normes de rejet.

Or, de façon générale, les principes préconisés dans le document en consultation sont similaires à ces derniers. Selon le document, l'application des principes préconisées laissent le choix des critère et méthodes retenus (provinciales vs CCME) lors de l'évaluation environnementale. Évidemment au Québec, pour les substances dangereuses, la méthode et la réglementation québécoise continueront d'être appliquées.

De façon plus spécifique, voici quelques commentaires sur le contenu du document:

. Si les LRFE, les LRFT et les seuils existaient déjà, on comprend mal ce qui est nouveau pour la CCSN dans l'approche préconisée. Faire ressortir plus clairement la nouveauté.

. Certaines exigences ne s'appliquent qu'aux nouvelles installations et on comprend mal ce qu'est une nouvelle installation. Est-ce qu'une centrale qui a subit une réfection est

considérée comme une nouvelle installation? est-ce qu'une mine fermée qui est réouverte constitue une nouvelle installation?

. À la section 4.4, le document MDDEP, 2008 est cité dans le titre de la figure 3 mais la référence est absente à la fin de la section. Il faudrait ajouter cette référence d'autant plus que le document CCME (2008) qui lui est en référence est largement inspiré du document québécois. À la même section, il est faux de prétendre que cette méthode est **utilisée** à l'échelle nationale. Il faudrait plutôt dire: "La CCSN propose d'adopter les restrictions ou critères touchant la zone de dilution, selon ceux **reconnus** à l'échelle nationale **pour la gestion des effluents municipaux** (CCME,2008) et ceux utilisés niveau provincial.

. À la section 3.4, il est dit que les effluents liquides seront évalués pour en déterminer la toxicité pour le biote aquatique (poissons et invertébrés). Il faudrait préciser si on parle ici de toxicité aquatique aiguë ou chronique. Dans la même section, la note 10 définit ce qu'est un retrocalcul. Il faudrait ajouter à la définition que ces calculs tiennent compte aussi *de la quantité de contaminants déjà présente dans le milieu, s'il y a lieu.*

Par ailleurs, plus spécifiquement pour les centrales nucléaires:

. La technologie de traitement des petits volumes d'eau de procédé sera souvent la dilution de ceux-ci dans de très grands volumes d'eaux de refroidissement. Le document devrait préconisé l'enlèvement des contaminants à la source même si une dilution dans les eaux de refroidissement est possible.

. Plusieurs problématiques directement liées aux rejets de centrales nucléaires ne sont pas abordées: intrants utilisés, quantités d'eau utilisées, gestion du différentiel de température entrée-sortie, etc.. Si l'objectif est bien l'harmonisation des dossiers, des informations techniques de base sur ces éléments pourrait être l'objet d'un document complémentaire sur la description des rejets.

. Dans les centrales, une attention particulière doit être accordée aux rejets lors des périodes d'arrêt et de démarrage du réacteur de façon à s'assurer de l'absence d'impact lors de l'absence d'eau de refroidissement.

Espérant le tout à votre satisfaction, n'hésite pas à me téléphoner ou m'écrire pour toutes questions sur ces commentaires

Sylvie Cloutier
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Rio Algom

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Dr. Michael Binder
President & CEO
Canadian Nuclear Safety Commission
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Dear Dr. Binder,

RE: Discussion Document 12.02 Process for Establishing Release Limits and Action levels at Nuclear Facilities

Rio Algom Limited (RAL) has reviewed *Process for Establishing Release Limits and Action levels at Nuclear Facilities* issued by the Canadian Nuclear Safety Commission (CNSC) for the purpose of discussing the methodology to be applied in establishing release and action limits to be incorporated into licenses issued by the CNSC. After providing context for the application to decommissioned facilities, our response will focus on the proposed methods for derivation of release limits and action limits followed by comments on the proposed dose constraint.

Context

CNSC has granted Waste Facility Operating License WFOL-W5-3101.03/indf. to RAL for the possession and management of nuclear material in form of tailings, waste rock and treatment solids at our ten decommissioned uranium mining properties near Elliot Lake, Ontario. All ten sites have been decommissioned in full conformance with regulatory-approved closure plans based on robust and consistent design criteria. State of the Environment Reports issued in 2009 (Minnow, 2009) and 2011 (Minnow, 2011) confirm that the facilities are operating as expected and that water quality at the facilities and in the downstream lakes is improving and is approaching or in many cases better than Environmental Impact Statement (EIS) predictions.

In designing and implementing closure, RAL has consistently applied a risk-informed decision making framework that ensures protection of human health and the environment and promotes continuous improvement. This framework has been applied at a watershed scale (e.g. cumulative effects across multiple facilities) to multiple facilities (mines, mills, tailings management facilities) at various life-cycle stages (historic and on-going operations) and has supported long-term and responsible resource allocation through the application of cost-benefit analysis.

While the CNSC Discussion Document also relies on a risk-informed decision framework, the standardized approaches and narrow parameter-specific foci for derivation of release limits and action limits in the absence of cost-benefit evaluation have the potential to result in wasteful allocation of resources with conflicting and increased indirect environmental impacts (for example energy consumption to achieve technology-based parameter-specific limit). This is particularly true for closed facilities such as ours that have

implemented an approved closure plan based on a risk assessment approach which received approval by federal and provincial regulatory agencies including the Atomic Energy Control Board (the predecessor to the CNSC) and is performing as predicted. The ability of a closed facility to modify treatment and performance standards is much more arduous than for proposed or operating facilities and as such should be assessed through a risk-informed decision framework that considers the cost-benefit of changes in standards. The CNSC should seek a modified approach to closed/decommissioned facilities which implements a review of release and action limits only in instances where facility performance is not protective of ecological and human health as demonstrated through effective monitoring programs.

Release Limits

The proposed release limit methodology based solely on the most restrictive of technology-based or exposure-based release limits results in a release limit derivation framework with the following limitations:

- Does not promote clarity as to measures that are protective of human health and the environment and those that promote pollution prevention
- Does not promote integration of facility-wide impact evaluation and cost-benefit assessment
- Does not take into consideration life-cycle planning for facility

Derivation of release limits based on a combination of technology-based release limits (TBRL) or exposure-based release limits (EBRL) introduces a level of uncertainty to the public as to what is “safe” and to industry as to long-term stability of regulatory requirements associated with facility investments. In order to provide certainty, release limits should be based on federal or provincial regulatory instruments. Radiological release limits should be based on the public dose limit of 1 mSv/y (Radiation Protection Regulations) with changes to this limit subject to regulatory impact assessment on all nuclear industry sectors. Non-radiological release limits should be based on relevant federal sector-specific regulatory limits (e.g. Metal Mining Effluent Regulations for uranium mine and mills) or provincial equivalents. Site-specific release limits should be restricted to cases where site-specific environmental effects monitoring and subsequent investigation of cause have demonstrated that release limits for a given parameter or combination of parameters are not protective of human health and the environment. Regulation-based release limits provide a simple and transparent means to communicate what is safe to the public while providing consistency across industrial sectors in setting regulatory requirements.

Where it can be demonstrated that regulatory limits do not achieve the objective of minimizing overall quantity and concentration of contaminants released to the environment, it is recommended that release objectives be incorporated into licenses. The release objectives should establish clear regulatory expectations and licensee commitments for facility performance and provide life of facility benchmarks for facility performance evaluations. Facility-specific release objectives provide a transparent framework for pollution prevention while providing industry with a reliable lifecycle basis for facility investment.

Release objectives must be established at the facility design stage and form the basis of regulatory performance expectations for the planned life cycle of the facility. The

proposed framework for establishing release objectives is similar to that proposed for release limits in the Discussion Documents with the following modifications (Figure 1):

- Acknowledgment of integrated facility design and cost-benefit evaluation steps in establishing design release limits/objectives. This step promotes integrated evaluation of environmental impact mitigation and responsible resource allocation.
- Incorporation of adaptive management through facility performance review to provide on-going verification of release limits/objectives and promote continuous improvement within the life cycle context of the facility

Action Limits

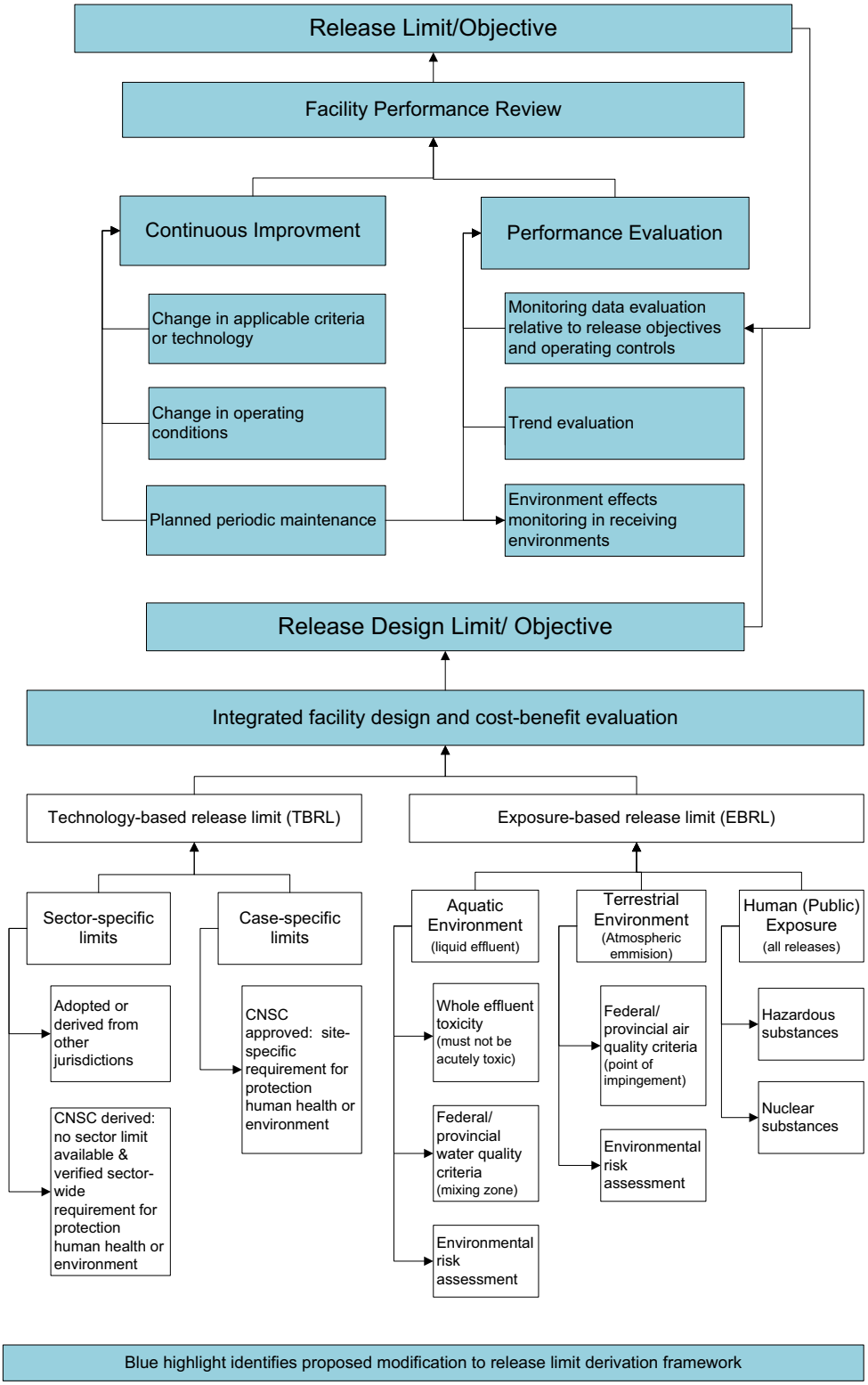
The proposed protocol of deriving action limits based on "some percentile (e.g. 95^{th}) of the statistical distribution of releases" is a useful tool in establishing action limits, but will not result in simple and effective detection and control of upset conditions.

Action limits as defined in the regulation are intended to indicate a potential loss of control and are used operationally to trigger immediate actions (e.g. stoplog installation) that are beyond routine operating response (e.g. flow or reagent adjustment). Action limits are and should remain distinct from operating control limits which define the desired operating range and are used to guide normal operating adjustments.

The proposed methodology was applied on a trial basis to the Nordic (continuous operation) and Pronto (seasonal/batch operations) treatment facilities. Statistical evaluation was based on six parameters (pH, TSS, U, Ra-226, Co, Fe, Mn) with action level reporting triggered when any parameter or group of parameters exceeded the derived action limit in a one month period. Trial application of proposed methodology indicates this approach would:

- Trigger 4 to 7 action limit reports/year at 95% confidence level or 2 to 4 reports/year at 99% confidence level at the Nordic facility compared to current frequency of 2 reports in a five year period. The incremental reporting is associated with known seasonal changes in operating conditions during spring run-off that is managed through established operating practices and does not reflect a potential loss of control.
- Trigger 2 to 3 action limit reports /year at 95% confidence level or 1 to 2 reports/year at 99% confidence level at the Pronto facility compared to current frequency of 1 in a five year period. The incremental reporting is associated with known seasonal changes in operating conditions as well as plant start-up and shut-down, is managed through established operating practices and does not reflect a potential loss of control.
- Have the potential to result in action level for iron at both Nordic and Pronto at concentrations above monthly mean discharge limit based on the data set applied to the evaluation
- While it is important to track and respond to values outside the operating control range, reporting of known and controlled variance in operating conditions as action limits has the potential to diminish the sense of urgency and response to valid upset conditions. At the Elliot Lake facilities effluent releases outside the "normal" operating range are identified through the data validation process and reported as flagged data in monthly regulatory water quality reports.

Figure 1. Process for establishing release limits and objectives



Adapted from Figure 2 ***Combined Approach for Establishing Release Limits***, Dis-12-02 Process for Establishing Releas Limits and Action Levels at Nuclear Facilities

Dose Constraint

The proposed dose constraint of 0.05 mSv/y as derived based solely on the performance on the power plants and uranium processing facilities is substantially below Health Canada Guideline and International Commission on Radiological Protection recommended dose constraint of 0.3 mSv/y. In establishing this dose constraint CNSC staff did not take into consideration the life cycle and investment in radiological risk reduction at existing uranium mines and mills or nuclear waste facilities.

Furthermore, requiring derivation of radiological release limits on dose constraints other than the regulatory value of 1 mSv/y has the potential to communicate to the public that the current regulatory limit is not protective of human health. Change to this regulatory limit should be subject to full regulatory amendment including a regulatory impact assessment that addresses all sectors of the nuclear industry.

At the Elliot Lake facilities decommissioned in full conformance with regulatory-approved plans with water quality in the downstream lakes approaching or in many cases better than predictions, radiological doses to hypothetical residents at 3 of the 6 receiving environment lakes exceed the proposed dose constraint of 0.05 mSv/y (Table 1). In all cases doses remain below the Health Canada guideline of 0.3 mSv/y confirming radiological releases are protective of human health. Furthermore, doses at all sites are at or approaching 0.1 mSv/y demonstrating RAL's commitment to keeping radiological doses as low as reasonably achievable, social and economic factor being taken into account.

RAL suggests that the proposed dose constraint should be re-evaluated taking into consideration all sectors of the nuclear industry and that the evaluation incorporate potential socio-economic impact on the sectors and their communities.

Table 1. Radiological Dose to Human Residents of Serpent River Watershed

	Radiation Dose[3]				
Lake	Water (mSv/y)	Fish (mSv/y)	Moose (mSv/y)	Mallard (mSv/y)	Total (mSv/y)
Quirke	0.038	0.043	0.003	0.011	0.094
Elliot	0.018	0.006	0.000	0.000	0.024
Nordic	0.019	0.006	0.000	0.000	0.025
McCabe	0.024	0.007	0.003	0.034	0.068
May	0.057	0.010	0.003	0.033	0.103
McCarthy	0.015	0.006	0.001	0.001	0.023
Reference	0.006	0.002	0.000	0.005	0.013
SRFN Current	0.011	0.018	0.015	0.003	0.047
SRFN Future	0.012	0.020	0.014	0.001	0.047
CNSC Limit[1]	1.000	1.000	1.000	1.000	1.000
Health Canada[2]	0.300	0.300	0.300	0.300	0.300

Notes:
1. CNSC Limit - Public dose limit established in the Nuclear Safety Control Act and Regulations
2. Health Canada Guideline
3. 2011 State of the Environment Report

In closing RAL requests that the proposed methodology for derivation of release limits be modified to incorporate the concepts of cost-benefit analysis and facility life cycle planning into the decision making process and that any proposed dose constraint be re-evaluated taking into consideration all sectors of the nuclear industry. Furthermore the proposed methodology for establishing action limits needs to incorporate application of operational knowledge and experience to ensure that action limits continue to reflect true instances of potential loss of control and do not replace operating control ranges used to respond to known and controlled variance in operating conditions.

Yours truly,

Debbie Berthelot,

Reclamation Manager

cc: Linda Broughton, Vice-President Rio Algom Limited

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26 June 2011

Dear Sir/Madam

Review of the CNSC Draft Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities

Rio Tinto is a multinational company with extensive experience in uranium mining. Recently Rio Tinto acquired Hathor Exploration Ltd., which had significant uranium prospects in Canada. Rio Tinto welcomes the opportunity to comment on the Discussion Paper DIS-12-2 Process for Establishing Release Limits and Action Levels at Nuclear Facilities.

Rio Tinto currently operates two major uranium mines (Rossing in Namibia and Ranger in Australia) and has over 30 years of experience in mining and processing uranium in sensitive environments. Rio Tinto also has a wide range of exploration interests worldwide and in particular interests in Canada such as the Roughrider deposit.

In the review of this discussion paper, Rio Tinto has concentrated on the potential impacts on uranium mining and processing and has not commented significantly on other aspects of the nuclear fuel cycle. However, some of the comments are applicable to all nuclear facilities, such as the inappropriate use of dose constraints. These points should be considered in relation to all nuclear facilities.

The response is supported by two appendices. The first appendix examines critical aspects of this discussion paper in more detail. The second appendix is a direct review of the document and highlights concerns with specific reference to the draft discussion paper.

The critical aspects of this discussion paper, on existing or potential uranium operations, are:

1. The proposed dose constraints (0.05mSv/y for existing operations and 0.01mSv/y for new-build) is totally inappropriate for uranium mining and processing operations.
2. There is no commentary on whether the same application of dose constraints would apply to the rehabilitation/closure phase of uranium mining and processing operations. Given the uncertainties in future land use and the high variability in natural background in some uranium provinces, it is extremely unlikely that the application of these constraints would be either practicable or achievable.
3. The application of the discussion paper's recommendations, for uranium mining and processing, is not clear. The paper makes one mention in the summary of having consistent approaches for "*all licensees of Class I nuclear facilities, uranium mines*

Rio Tinto

and mills and nuclear waste substance facilities", but the discussion paper but does not address any other operations other than Class 1 nuclear facilities.

4. The proposed methodology is not consistent with that recommended internationally (via bodies such as the International Commission on Radiological Protection and the IAEA) or that implemented by operators internationally. By being out of step with international application of dose constraints, the discussion paper may require additional burdens on existing and potential operations with no significant net benefit in terms of radiation protection. Inconsistency in radiation protection methodology may reduce the relative competiveness of Canadian resources and make existing operations or potential resource development impossible/uneconomical.
5. The proposed combination of exposure based limits with technology based limits appears to be in direct contravention of the ICRP recommended approach to optimisation. Within the optimisation principle, two approaches are recommended: dose constraints (analogous to exposure based limits) and the ALARA principle (analogous to technology based approaches). The discussion paper seeks to combine these two approaches in a manner which will be detrimental to both doses and industry.
6. The proposed dose constraints are at a level of trivial dose, far less than the natural variability in background doses. These low levels of operational contributed exposure will be impossible to measure and separate from natural background for uranium operations. The adoption of such trivial doses may increase public concern at levels of very low risk and increase "radiation-phobia" at levels which are not a true indicator of risk. The regulation at this level of risk is also totally inconsistent with that applied for other potential hazards.

Each of these points are discussed in more detail below, but overall, indicate that there is a need for significantly more consideration of the implications of this discussion paper on industry. If adopted "as is", it will have detrimental impacts on potential investment and future development in uranium operations in Canada. Application of the discussion paper's recommendations may become a significant burden for existing operations and government authorities in Canada. It also has the potential to decrease the competiveness of Canada in international terms and have Canada out of step with radiation protection worldwide.

Rio Tinto urges the Canadian Nuclear Safety Commission to reconsider the direction recommended in this discussion paper, particularly in considering uranium mining and processing, and the proposed numeric values for dose constraints. At a minimum, the discussion paper needs to be updated to clarify if these recommendations apply to uranium mining and processing or if these components of the nuclear fuel cycle are specifically excluded. Rio Tinto would welcome further discussion on these issues.

Yours sincerely

Frank Harris
Chief Advisor Radiation Governance and Product Stewardship

Rio Tinto

Appendix A: Detailed Comments on Critical Aspects

1. **The proposed dose constraints (0.05mSv/y for existing operations and 0.01mSv/y for new-build) is totally inappropriate for uranium mining and processing operations.**

The paper states that in determining these dose constraints they considered doses from existing nuclear facilities. It is presumed that the study did not include uranium mining operations. It is believed that these proposed dose constraints would not be able to be met by either existing mines or any new builds. This is backed up by international experience in uranium mining, which shows, dependent on site specific factors such as local population centres, that the calculated public doses are similar to or higher than the proposed dose constraints, which are based on nuclear facilities. This in no way diminishes the overall radiation safety of these uranium mining operations as they do operate at a level well below the applicable dose limits. The proposed dose constraints in this discussion paper are not applicable to uranium mining and a full review of existing and proposed operations will be required to determine suitable dose constraints. As such, uranium mining should be specifically excluded from the use of the proposed dose constraints.

2. **There is no commentary on whether the same application of dose constraints would apply to the rehabilitation/closure phase of uranium mining and processing operations. Given the uncertainties in future land use and the high variability in natural background in some uranium provinces, it is extremely unlikely that the application of these constraints would be either practicable or achievable.**

A very significant component of uranium mining is the eventual closure and rehabilitation of the site. Due to the timescales involved, there is significant uncertainty in the project long term public doses and this requires specific consideration when it comes to application of dose constraints. The proposed dose constraints would be very unlikely to be relevant to rehabilitated structures. In fact the proposed constraints are so low that they would fall well within other variables such as future land use and occupancy factors. As such, it should be included in the discussion paper that the dose constraints will not apply to closure and rehabilitation.

3. **The application of the discussion paper's recommendations, for uranium mining and processing, is not clear. The paper makes one mention in the summary of having consistent approaches for "*all licensees of Class I nuclear facilities, uranium mines and mills and nuclear waste substance facilities*" but the discussion paper but does not address any operations other than Class 1 nuclear facilities.**

The discussion paper is titled and specifically addresses only nuclear facilities. However, in the summary, the paper proposes a consistent approach for other operations including uranium mining. Given that the analysis did not consider these types of facilities, it is inappropriate to be suggesting that this approach be adopted in other areas. As such this reference to other types of operations should either be removed or the document substantially modified to justify the approach's use in other types of facilities.

4. **The proposed methodology is not consistent with that recommended internationally (via bodies such as the International Commission on Radiological Protection and the IAEA) or that implemented by operators**

internationally. By being out of step with international application of dose constraints, the discussion paper may require additional burdens on existing and potential operations with no significant net benefit in terms of radiation protection. Inconsistency in radiation protection methodology may reduce the relative competiveness of Canadian resources and make existing operations or potential resource development impossible/uneconomical.

In the discussion paper itself (Page 17), it clearly states both the internationally recommended dose constraint (0.3 mSv/y) (previously recommended by the ICRP but since withdrawn) and the general range of dose constraints adopted internationally (0.1-0.3 mSv/y).The discussion paper then proposes dose constraints significantly lower (over an order of magnitude for new build) and this is inconsistent with international practice. As a minimum it will significantly influence the international competiveness of Canada in uranium mining if adopted. It also has the potential to have a negative impact world wide as a number of Non-Government Organisations will likely be pushing this as the new (low) benchmark. For uranium operations, it is far more significant as these dose constraints are not relevant to mining but may be inappropriately used to adversely affect the industry.

5. **The proposed combination of exposure based limits with technology based limits appears to be in direct contravention of the ICRP recommended approach to optimisation. Within the optimisation principle two approaches are recommended: dose constraints (analogous to exposure based limits) and the ALARA principle (analogous to technology based approaches). The discussion paper seeks to combine these two approaches in a manner which will de detrimental to both doses and industry.**

The implementation of the ICRP principle of optimisation is dependent on two distinctly separate approaches: dose constraints and ALARA. These are separated because they have different focuses and drive optimisation using both regulatory approaches and the desire of industry to be operating well below regulatory requirements. Dose constraints are a far more formal approach and, as stated in ICRP103, set the "upper bounds" of the dose which constitutes the "basic level of protection". This can be seen as analogous to the exposure based approach and is designed to ensure a safe level of protection. Below that level, the second approach is to keep doses As Low As Reasonably Achievable, societal and economic factors being taken into account (ALARA). This has historically been industry driven and has realised doses well below the level of formal regulatory concern (one of the main reasons why doses used in this paper are so low). ALARA is a balance between the desire for lower doses against the cost and potential social impacts of achieving the dose reduction. This involves a degree of compromise and also is related to the viability of technology and the effectiveness of administrative controls. The ALARA approach is, in some ways, similar to a technological based approach but also includes elements of other radiation initiatives such as monitoring and control.

In the discussion paper, the dose constraint is based on a combination of the two approaches (and is dominated by the technological basis).This is not in line with the recommendations of the ICRP and is not without risk. By adopting this approach, the ALARA principle is significantly weakened and it could be seen that any improvements in dose reduction will be grounds for more stringent regulatory limits (ie the ratcheting down of limits based on good prior performance rather than a true need for more stringent regulation). This has the potential to instil a compliance mentality rather than a true optimisation process. This is likely to be counterproductive and may result in fewer initiatives in radiation protection and eventually become a detriment to further dose reduction approaches.

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6. **The proposed dose constraints are at a level of trivial dose, far less than the natural variability in background doses. These low levels of operational contributed exposure are impossible to measure and separate from natural background for uranium operations. The adoption of such trivial doses may increase public concern at levels of very low risk and increase "radiation-phobia" at levels which are not a true indicator of risk. The regulation at this level of risk is also totally inconsistent with that applied for other potential hazards.**

The proposed dose constraints represent an extremely small dose such that not only are they substantially less than natural background doses, they are actually less than the natural variability in background. The dose constraints are set at such a low level that they could be argued to be seen as not significant when natural background is taken into account. At the same time, by adopting these low levels, it is likely that it will heighten public concern about levels of radiation exposure which are not a true risk to public health. This will most likely flow on into increased opposition to current and potential developments, with resulting detrimental impacts on the operators. In particular for uranium mining, it also raises the question on how compliance will be measured and demonstrated. Due to the natural origin of the radionuclides being considered in uranium mining, it is extremely difficult to separate natural background exposure from operation related exposure. In fact, often the operational exposure is far smaller than the natural variation in pre-existing background radiation. This makes direct measurement almost impossible at the proposed dose constraints with resulting decline in the public acceptance of their radiation safety (despite the extremely low levels of exposure).

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Appendix B Specific Comments on the Discussion Paper Text

Page 3, Paragraph 3: As detailed elsewhere in this review, the dose constraints do not appear to be consistent with international recommendations or practices in use elsewhere.

Page 6, Paragraph 3 (after dot points): This paragraph highlights some of the problems with the approach recommended in the discussion paper. With the proposed limits based on a dose constraints set at a negligible level of radiation dose, there will be little room for setting action levels at an even smaller dose level.

Page 6 Last Paragraph: The discussion paper states that the release limits should be based on "conservative" exposure-pathway modelling. However, with the application of extremely restrictive dose constraints it is unlikely that conservative models will be used and this will reduce the inherent "safety factor" incorporated into current dose estimation.

Page 10, Paragraph 2: This review document is addressing the CNSC request for discussion on the proposed dose constraints. These dose constraints are believed to be inconsistent with international recommendations or practices in use elsewhere.

Page 11, Paragraphs 2-5: The approach proposed in this discussion paper is to combine technology and dose based approaches. This appears to be in direct contravention of the approach recommend by ICRP to optimisation. The ICRP recommends that dose constraints should form the "upper bounds" below which further optimisation is undertaken using As Low As Reasonably Achievable, societal and economic factors being taken into account (ALARA). The dose constraint is hence analogous to an exposure based approach designed to ensure that radiation protection is not compromised. ALARA is analogous to the technologically based approach where dose are reduced even further based on a "reasonable" compromise between reducing doses and societal and economic factors. In fact, historically, most dose reductions have been the result of judicious use the ALARA principle rather than direct regulatory actions. By combining these two approaches into one, the discussion paper threatens to reduce the effectiveness of ALARA and hence may have a detrimental effect on both industry and potentially doses.

Page 16, Last Paragraph: This is the first occurrence of the inclusion of uranium mining into the document even though the scope appears to be restricted to nuclear facilities. This leads to confusion about whether the intention of the discussion paper is to include uranium facilities or not. If the intention is to include uranium mining, than the justification for dose constraints needs to be reassessed as it is unlikely that current uranium mining would be able to meet the proposed dose constraints.

Page 17 Paragraph 2: The term "far" is inappropriate in the first line as this is determined on a case by case basis and it is not unusual to approach the dose limit in some activities associated with radiation. Given the inherent protectiveness of the dose limits this is not necessarily a concern providing justification and optimisation has also been undertaken in addition to limitation.

Page 17, Paragraph 3: This paragraph is in some ways the crux of the arguments against the dose constraints proposed in the discussion paper. The paragraph identifies the levels recommended by the ICRP (0.3 mSv/y for public exposure; this constraint recommendation has since been withdrawn) and also gives the range generally used internationally (0.1-0.3 mSv/y). Significant departure from these internationally accepted levels is likely to cause significant detriment and is unlikely to be justified. It also will raise doubt in the public about the safety of radiation limits given that the regulatory authority in Canada is setting levels so far below accepted practice.

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Page 17, Last Paragraph and Page 18, Paragraphs 1-4: The first option is based on accepted international practice and is fully consistent with all aspects of the optimisation principles recommended by the ICRP. The second option, as defined in the discussion paper text, attempts to combine the process of ALARA with dose constraints. These two processes are separate and distinct aspects of the optimisation principle and combining them will reduce the overall effectiveness of optimisation. The dose constraints, as recommended by the ICRP, are intended to be an "upper bounds" of exposure as the first component of the principle of optimisation. Below this dose constraint, additional optimisation is recommended in the form of As Low As Reasonably Achievable, societal and economic factors being taken into account (ALARA). Historical data has shown the effectiveness of the ALARA approach to reducing doses to levels far below the regulatory limits and action levels. Combining regulatory levels with ALARA successes will reduce the effectiveness and willingness to continually seek dose reductions as is the intention of ALARA. The proposed use of dose constraints of 0.05 mSv/y for existing facilities and 0.01 mSv/y is not justified, is out of step with international practices and does not reflect the optimisation principle.

Page 18, Paragraph 6: To use case specific limits for operations above 0.05 mSv/y is likely to cause detriment to operations which fall into this category. This would likely include additional regulatory scrutiny, justification and loss of public trust for a level of radiological risk which is well below the public dose limit. This is not in the government's, public's or operation's best interest and the case specific limits should be based on a more practicable dose constraint.

Page 18, Last paragraph: The use of 0.01 mSv/y is similarly out of step with international practice and faces the same issues as the 0.05 mSv/y constraint for existing facilities. By setting a dose constraint at such a low level (well within the natural variability from one dwelling to another) it is perpetuating an unrealistic fear of radiation at trivial doses. This is also likely to inhibit investment in future facilities because of concerns about both designing and also realising such a low level of public dose. At the very least, it may force move away from the current approach of using conservative models for design to requiring inherently more complex and less conservative design approaches. This in turn will increase the potential of actual doses approaching or exceeding the design characteristics with subsequent risk of regulatory non-compliance.

Page 19, Paragraphs 1-5: Although it is beyond the scope of this review to examine tritium, the adopted approach seems to have the same fundamental flaws as that used in the justification of the proposed dose constraints. One of the fundamental issues of radiation is that it can be measured down to sometimes trivial levels. Just because you can measure down to a totally trivial amount does not justify setting a limit based on this low level. Dose constraints should be based on doses and not on whether or not it is possible to measure low levels. Doses below the dose constraint should be reduced using the ALARA approach which inherently includes a test of whether it is "reasonable". The test of whether it is "reasonable" should include both the dose and a examination of societal and economic costs and should not be incorporated into the dose constraint.

Page 24, Paragraphs 1-3 (ie first paragraph and two dot points): These statements imply that CNSC would be seeking to have "consistent approaches" applied to all facilities including uranium mining. This statement is particularly of concern to Rio Tinto and undoubtedly elsewhere in the uranium mining industry. The entire discussion paper (with the exception of the minor comment at the end of Page 16) has focussed entirely on nuclear facilities as defined by CNSC. All the justifications used for the proposed approaches and dose constraints have been based on these facilities and do not appear to consider uranium mining. It is extremely unlikely that uranium mining, either existing or new build, would be able to comply with the proposed dose constraints. Also there is no consideration of how these dose constraints would be applied into the future. This is critical for uranium mining as future closure and rehabilitation is an integral part of mine planning. Given the uncertainties

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associated with determining radiological impacts into the future, the use of realistic and appropriate dose constraints is critical. The proposed dose constraints in this discussion paper would be totally inappropriate for the uranium mining industry and would significantly impact on the competiveness of the uranium mining industry in Canada.

Saskatchewan's Review Comments on the CNSC's Discussion Paper (DIS-12-02): Process for Establishing Limits and Action Levels at Nuclear Facilities

Introduction:

On April 13th Saskatchewan had a meeting with CNSC staff who listened to our concerns about the discussion paper and provided a glimpse into what the intent of the document was. We are very appreciative of the meeting, but it left us somewhat concerned as the discussions were in line with how we thought the document should read and were not at all consistent with what we read in the document itself.

Additional discussions on the intent of the document, the use of action levels and some of the dose constraints left us with a favorable impression of the proposed methodologies, but not of the language in the discussion paper.

Points of Agreement:

In general, we agree that effluent discharges should have as little impact as possible on the receiving environment and we are always looking for new ways of regulating more efficiently. There are some positive aspects to the proposed process, including:

- Use of a systematic process for determining release limits and action levels;
- The use of mixing zones;
- Use of existing standards; and
- Consideration of economics in decision making.

What we heard from staff was that a collegial process would be followed whereby the province had some input into the outcomes where existing provincial standards are employed in the effluent limit flow chart. What we heard made sense and clarified some points, including the following:

- Dose constraints for mines were developed as design objectives, not as hard limits;
- For effluents, the CNSC will look to existing standards and work with the province to define objectives where no limits currently exist;
- The CNSC is looking to harmonize limits where possible;
- It is not the CNSC's intention to dictate technologies or make economic decisions on projects;
- CNSC is also looking to outcome based decisions;
- Effects Based Regulatory Limits will incorporate aquatic mixing zone criteria similar to CCME and the provinces; and
- Action Levels based on statistical distribution of design or operating data—a practical concept and the discussion around how applied, recognizes that each operation is unique and selection and application of action levels requires flexibility.

Issues/Concerns:

Upon review of the document and upon meeting with CNSC staff, we are unable to support the document as written. The main reason is that the document as written speaks to a system that is in complete contrast to the collegial discussion we had with staff. The main concerns are:

1. Federal-Provincial Alignment:

The discussion paper reads as though the CNSC is fundamentally altering the current dynamic between the federal and provincial government. Saskatchewan believes it is inappropriate to single out an industry (Saskatchewan uranium mining industry) and impose standards not expected of similar non-uranium mining operations across the country. If there are site specific limits that are required, they should be derived through a joint consultation and consensus between the CNSC and the province. Our concerns reflect our interpretation of the discussion paper and fill us with concern that if not re-written into the type of language we heard from staff it will be subject to future misinterpretation, especially if incorporated into a CNSC Regulatory Document, and thereby perpetuate ongoing regulatory overlap and duplication.

2. Uranium Mine Classification:

While for the purposes of federal law uranium mines are nuclear facilities, provincially these operations are treated as mining operations and regulated as such. Clearly believing that nuclear facilities deserve special treatment, the document establishes release levels that diverge from other regulatory or guideline setting schemes like those used by MMER, CCME or the Committee on Drinking Water that rely primarily on the objective of protecting human health and/or the aquatic environment for setting limits. In those schemes, while control technologies are assessed, they typically do not “drive” the selection of a guideline – one which may be adopted by provincial or territorial governments. It is not clear to us why the CNSC would want to diverge from national practices, and if committed to doing so, why the CNSC would not propose these new directions at the national level with federal (e.g. Environment Canada and CCME), provincial, and industrial stakeholders. By treating mining operations as nuclear facilities, and not differentiated from nuclear power plants, the CNSC greatly skews the risk perception and subsequent application of regulation. Nowhere is this skewed risk perception better shown than in the proposal to lower the effluent dose limits for mines to 0.05 mSv/y for existing operations and 0.01 mSv/y for new ones. There appears to be no other justification for it other than nuclear power plants can achieve these levels therefore, so can any other nuclear facility. These low doses will be impossible and cost-prohibitive for uranium mines to attain despite there being no demonstrable environmental risk to drive these lower dose limits.

3. Governance and Policy:

The proposed discussion paper fails to meet our expectations for delivery of governance and public policy on a number of levels, including:

- While providing a proposed methodology for deriving effluent limits and action levels, the process provides no certainty of outcome for the proponent because of the arbitrary nature of the decision points;
- Will provide increased overlap and duplication with respect to provincial legislation;
- Puts the federal government in the role of deciding what is the best technology, and making decisions that affect the economics of a project;
- Removing the ability to regulate and manage effluent excursions without resorting to compliance and enforcement action;
- Sends a strong message to the public that current standards are inadequate for protection when this is far from reality;
- Continues to equate the risks of mining with the risks of nuclear power generation;
- There are no demonstrable environmental improvements or demonstrable need associated with the proposal; and
- The proposed framework continues the practices of command and control regulation by dictating virtually every aspect of an operation including the type of technology. This is a poor use of government's finite resources, and it is not outcome based or risk informed.

Despite current trends to minimize discussions of alternatives in the federal EA process, the proposed methodology will require significant efforts in this area in order for a company to comply.

4. Economics and Technology:

The document talks about economics in a number of areas. With respect to technology-based solutions it indicates that economics (cost-benefit discussion) may be considered, while for the use of ALARA it fails to mention that ALARA is not a complete statement unless is contains the phrase "*social and economic factors taken into consideration*". In all cases it appears that the CNSC is the sole determiner of what is economic and what is not. Determining the economic choices of industry should not be the purview of government. Historically, economic arguments by proponents have not played largely in CNSC decisions, and this is consistent with most federal agencies and legislation where there are no real mandates for considering economic factors. Without effective mechanisms for this type of discussion, it is more likely that the CNSC's defaults will be Best Available Control Technology (BACT), which is oblivious to economics, and not the Best Available Technology Economically Achievable (BATEA). This will continue to place the CNSC at odds with industry, especially in the absence of any means of having some form of arbitration when there is disagreement. Further, caution must be taken when considering technology based release limits from other jurisdictions – we have seen issues with this from the BLIERS (Base Level Industrial Emission Requirements) where limits were taken from other jurisdictions (geographically) that do not work or will not work in our climate/receiving environment. The unique aspects of geography,

climate, receiving environment and geology make this consideration especially important in mining where every site will have different drivers. Simply put, government has no business dictating the manner in which a company meets effluent limit targets as government is not the best equipped to understand economics or the use of technology.

What government is good at is setting reasonable limits within which industry can operate and monitor their performance. To avoid many of the issues described above, Saskatchewan is moving to a result-based regulatory system and allowing the choice of technology to be left to the proponent as long as they achieve the desired environmental and human health and safety outcomes. One of the reasons for this is that the province wants to avoid any culpability in the operations by choosing, recommending or selecting technologies – that should be the sole responsibility of the proponent as is the ultimate performance of the technology. If the CNSC dictates a technology and the proponent invests hundreds of millions in the technology and it fails to meet the desired targets, will the CNSC accept liability for that decision? If government sets a target and the proponent proposes the technology and warrants the results in an EA or through a code provision (e.g. signed off by a Qualified Person), then a failure to perform does not create any liability on the government. Further, government possesses a full array of regulatory tools to correct the situation, and if necessary require corrective action.

Recognizing that most operations perform much better than their licensed or permitted limits, the gap between effluent limits and operating levels allows for the effective management and regulation of process upset conditions without resorting to enforcement actions. Within this management zone, the use of action levels (in the more general sense) allows for a constructive management of the issues between operators and regulators. In proposing to set effluent limits far below the level of harm and providing a very narrow range of operational flexibility, and then adding the requirements for action levels, the potential for excursions above both the action levels and effluent limits is very high for uranium mines where processes are not as consistent as with nuclear power plants. This will put the CNSC in the position of having to regulate through enforcement, which seems counterproductive to all parties when the environmental risks are so low. For mining operations, it would appear that the proactive feedback mechanisms afforded by action levels the CNSC is looking for will not be very workable.

The goal of setting national limits also works against the considerable efforts proponents put forth in the environmental assessment process. If consideration was going to be given for waiving assessment requirements where proponents propose to meet national limits, similar to the way the province currently employs quality objectives (meeting the objectives is considered “de facto” protective and thus no further work to justify acceptability is warranted), then national limits broadly applied may have merit. Actual limits for specific sites, operations, and background conditions, derived through robust environmental impact assessments and continually checked against well thought out, robust monitoring programs are better management benchmarks against which to measure environmental performance than comparison to any national limits. Any limits broadly applied nationally will be too high for most operations, not high enough for a few, and not

specific or particularly relevant to any. This initiative works directly against the results based principles that the province is currently implementing.

Closing:

Since both the federal and provincial governments have key regulatory roles at Saskatchewan uranium mines, the federal government on the nuclear aspect of the project and the province with its mandate over resources, monitoring schemes need to be aligned as much as possible to avoid overlap and duplication. Currently, both the CNSC and the province have reasonably aligned effluent emission and reporting requirements that minimize overlap and duplication. We are not currently aware of any demonstrable need to tighten the regulatory standards by which uranium mines in the province operate.

While there may be merit in reviewing the current discharge limits, and methodologies used to establish them, that case has not been made to our satisfaction. With regards to a results-based focus, Saskatchewan believes that any review should be a joint effort rather than a unilateral one. The discussion paper does not mention this or mention a means of finding a solution if there is a disagreement between levels of government. If there is a model to follow in the discussion paper, it would be the development of air quality limits, which are done in coordination with the province and utilizing a mixing zone model (i.e. Point of Impingement methodology). Such a model should accrue to all discussions on effluent limits and action levels.

What we heard from staff would provide a solid basis for the renewal of our cooperative agreements, while the wording in the document will fail to prevent ongoing overlap and duplication in the regulation of uranium mines in Saskatchewan.

Please contact the undersigned for any clarification or to discuss further.

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Review of the CNSC Draft Discussion Paper DIS-12-02

"Process for Establishing Release Limits and Action Levels at Nuclear Facilities"

The World Nuclear Association

The WNA is the international organization that promotes nuclear energy and supports the many companies that comprise the global nuclear industry.

The WNA arose on the foundations of the Uranium Institute, established in London in 1975 as a forum on the market for nuclear fuel. In 2001, spurred by the expanding prospects for nuclear power, the UI changed its name and mandated itself to build a wider membership and a greater diversity of activities. The goal was to develop a truly global organization geared to perform a full range of international roles to support the nuclear industry in fulfilling its enormous growth potential in the 21st Century.

Since WNA's creation in 2001, the effort to build and diversify has borne fruit. WNA membership has expanded three-fold to encompass:

(i) virtually all world uranium mining, conversion, enrichment and fuel fabrication;
(ii) all reactor vendors;
(iii) major nuclear engineering, construction, and waste management companies; and
(iv) nearly 90% of world nuclear generation.

Other WNA members provide international services in nuclear transport, law, insurance, brokerage, industry analysis and finance.

The WNA welcomes the opportunity to comment on the CNSC Discussion Paper DIS-12-02: Process for Establishing Release Limits and Action Levels at Nuclear Facilities.

WNA Comments

The WNA is particularly worried about inappropriate precedents being set by the Canadian approach which may adversely affect the nuclear industry worldwide. In particular, the use of extremely low dose constraints as a de-facto limit for both existing and new build nuclear facilities has the potential to cause significant and unwarranted detrimental impact on the safe and peaceful use of nuclear power.

In the discussion paper the CNSC recommends the use of 0.05 mSv/y and 0.01 mSv/y as the dose constraints for existing and new build nuclear facilities. These dose constraints are approximately an order of magnitude less than that utilised in other regulatory regimes and are not justified in terms of the optimisation of radiation protection. Optimisation should be a balance between the potential benefit of reducing radiation exposure against the societal and economic cost of generating that benefit. The proposed dose constraints represent an extremely small dose such that not only are they substantially less than natural background doses, they are actually less than the natural variability in background. Using these low levels is unlikely to be justified and in effect is not an appropriate aspect of optimisation.

There is also the major issue that setting such low dose constraints may act as an inappropriate precedent internationally. This could cause significant impact on both existing and potential facilities for no net gain in radiation protection.

Also, by adopting these low levels, it is likely that it will heighten public concern about levels of radiation exposure which are not a true risk to public health.

The basis for working out the dose constraints seem to rely on what may be technologically possible rather than on what is justified from the radiation protection standpoint. This effectively sets the regulatory limits based on prior good performance and this has the potential to restrict future developments in reducing radiation exposure. The nuclear industry prides itself on operating in a safe manner and it commitments to reduce dose well below limits and recommendations. This is in line with the ICRP recommendations on optimisation which uses both the setting of dose constraints and the ALARA principle. By combining these two aspects of optimisation into a single dose constraint, CNSC will weaken the optimisation process and reduce the desire of industry to innovate and use technology and system based mechanisms to further reduce doses.

Conclusion

The WNA urges the CNSC to consider the wide implications of the Discussion Paper and its potential impact on the nuclear fuel cycle internationally. It also strongly advises the CNSC bases its recommendations on what is appropriate within the current system of radiation protection rather than what may be technologically possible for some specific nuclear facilities.

The WNA would welcome further dialog with the CNSC on the Discussion Paper.

Submitted on behalf of the Radiological Protection Working Group of the World Nuclear Association.