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An Environmental Review of the CNSC'S 2016 Regulatory Oversight Report on the Use of Nuclear Substances

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Introduction

CELA welcomes this opportunity to intervene and provide comments on the Canadian Nuclear Safety Commission's (CNSC) *Draft Regulatory Oversight Report on the Use of Nuclear Substances in Canada: 2016* (the draft Report).

In this review, CELA focuses on the potential environmental effects and impacts on human health and safety stemming from the 2,233 licensees authorized to use nuclear substances in Canada, and provides a series of requests and recommendations aimed at improving environmental protections within the areas covered by the draft Report.

CELA's comments include an analysis of the environmental risks stemming from the inspections, reported events and orders issued by the CNSC as noted in the draft Report. CELA has also sought to provide recommendations on how environmental risks can be reduced or avoided, and has endeavoured to highlight systemic issues which can inform future action or reform. Lastly, CELA's review compares the CNSC's reporting of environmental protections and performance in the draft Report, to previous years' Reports on the use of nuclear substances.

1. Analyzing environmental protection inclusions in the 2016 Regulatory Oversight Report

This chapter provides CELA's comments, recommendations and requests to the CNSC on the issue of environmental protection as it relates to licensing and regulatory licence requirements. This chapter also reviews the draft Report's overall coverage of environmental protection, effects and risks.

1.1. Inspections and reporting

Significant drop in time spent on inspections/compliance verification

Inspections and other compliance verification activities are an important tool in ensuring protection of the environment and therefore CELA has analyzed the time spent on compliance verification, as included in the draft Report.

A number of potentially significant changes can be observed in the draft Report: first, in 2015 a total of 1,568 inspections were carried out. In 2016 the number of inspections decreased by 116 to 1,452 - with a corresponding drop in inspections of roughly 7.4 %.

Secondly, when analyzing the number of person days spent on compliance verification, CELA notes an even more significant drop from 1,790 days to 1,564 days, or roughly 12.6 %. The overall drop in person days from 13,400 days in 2015 to 12,645 in 2016 is also significant, albeit more modest at roughly 5.6 %. While the overall drop in person days is significant, the impact on compliance verification is thus highly disproportionate and cause for further concern.

CELA **requests** an explanation for the apparent decrease in time spent on compliance verification and the reduction in actual inspections, as well as an assessment of its potential negative impact on compliance and accompanying effects on environmental protection-related compliance. If no negative impact is expected, CELA **requests** information on what changes have been put in place to offset this lack of inspections.

The only explanation for the decrease in compliance verification is alluded to at page 17 of the draft Report, which points out that "*[t]here was a significant increase in the number of certification activities in 2016 due to the expiry and renewal of a higher-than-average number of device certificates.*" If this is the CNSC's reason for the decrease in compliance verification, CELA notes that the decrease could likely have been predicted and averted. Page 17 also notes that "this trend will continue into 2017." CELA **requests** information on the steps taken by the CNSC to prepare for this continuing trend, including how it will ensure this will not negatively impact compliance verification.

As a way of highlighting the importance of regular inspection, page 18 of the draft Report states that *"[e]scalated enforcement actions were taken against licensees in the medical, industrial, academic and research, and commercial sectors in 22 instances in 2016. The majority were in response to inspection findings."* From this statement, we see the importance of inspections, as the majority of escalated enforcement actions followed inspections. Also, out of the 1452 inspections performed, 22 led to escalated enforcement actions (this amounts to one escalation per 66 inspections). With 116 fewer inspections occurring in 2016, the stats suggest that as many as two additional escalated enforcement actions may have been put in place if the inspection rate had been similar to the rate in 2015.

On page 26, the draft Report notes that 472 inspections did not meet compliance expectations in at least one safety and control area (SCA). This equates to a non-compliance rate of 32.5 %.

With 116 fewer inspections, this would suggest that 32.5 % or as many as 38 cases of non-compliance may have gone undiscovered, as compared to the inspection rate of 2015.

CELA also notes that the Radiation Protection SCA, which is likely also relevant to environmental protection, shows an even lower compliance rate of 84.6 %. This is troubling not only from a safety perspective, but as a potential indicator of an increasing risk of exposure to the environment.

Verification of self-reporting

CELA **requests** further information on how and to what extent the annual compliance reports (mentioned on page 9 of the draft Report) are verified by the CNSC, including an estimate of the percentage of licensees that are subject to inspection annually. In particular, CELA **requests** information relating to the environmental aspects of these reports and their verification.

Determining statistics on environmental releases

CELA **requests** information from the CNSC, demonstrating the number of potential or actual releases to the environment that may have occurred in the past. CELA also **requests** information from the CNSC regarding how it determines whether a release has taken place, and what post-incident monitoring occurs.

Assessment of reported events

Page 83 of the draft Report provides that "*[l]icensees reported 139 events to the CNSC that are covered in this report – all of which were assessed by CNSC staff.*"

CELA **requests** information on how these assessments are carried out, with a focus on elements relevant to environmental protection. What factors are considered, what information is relied upon and how the information is collected is requested as part of this information request.

Regulatory focus in 2017

Page 83 of the draft Report lists a number of areas that will be the subject of greater regulatory focus in 2017. CELA **recommends** that environmental protection be added as a regulatory focus for 2018, in reflection of a licensee's ongoing obligation to "make adequate provision for the protection of the environment" per s. 24(4) of the *Nuclear Safety and Control Act.*

Additionally, highlighting environmental protection as an area of greater regulatory focus would provide an opportunity for the public to review and provide comments on potential environmental risks and releases.

Inspection worksheets and environmental protection

CELA notes that the inclusion of environmental protection is extremely limited in the inspection worksheet (provided at pages 156-165 of the draft Report) and only appears in the rating system definition (page 163) and within the category of worker's obligations (p 158). Despite the mention of environmental protection at page 163, it is not accompanied by any inspection requirements.

Furthermore, page 158 of the draft Report merely quotes the general requirements in s. 17 of the *General Nuclear Safety and Control Regulations, SOR/2000-202*, which requires that workers report significant risks to the environment as well as unauthorised releases into the environment.

CELA **requests** the CNSC to provide an explanation as to why inspection worksheets do not require an explicit review of environmental protection and, clarify whether this component may be covered in another form. CELA furthermore **requests** that any type of environmental protection review, that may currently be taking place, be described in the 2018 regulatory oversight report. If no such review is currently occurring, CELA **recommends** that the existing inspection protocols be amended to include a review of licensees' environmental protection efforts.

Inspection frequency

CELA **requests** an overview of the frequency of inspections, including what types of follow-up actions occur in cases of non-compliance. For instance, do all cases of non-compliance result in follow-up inspections? If not, what types of non-compliance are automatically subject to follow-up inspections?

1.2 Compliance

Operating Performance SCA is rated second lowest in compliance

While environmental protection is a listed SCA in the draft Report, it does not form part of the

draft Report's discussion. Therefore in light of this gap, CELA has had to rely on reporting and statistics related to the SCA of Operating Performance (which mentions the term environment in its discussion) when considering environmental protection.

CELA notes that the Operating Performance SCA scored a compliance rating of 87.4% - the second lowest in terms of compliance. CELA **requests** information on the degree to which this is representative of environmental compliance. CELA furthermore **requests** that the CNSC provide compliance statistics that deal exclusively with performance within the environmental protection SCA. CELA also **requests** the CNSC explain why this is the second lowest performing SCA, as well as what plans have been put in place, or will be put in place, to improve the score.

Page 28 of the draft Report mentions that 1313 inspections having been carried out under the Operating Performance SCA. It is unclear why this number is lower than the total number of inspections, which is 1452. CELA asks the CNSC to **clarify** whether there are some inspections that only include a review of some of the four SCA's discussed by the CNSC in the draft Report.

On page 28, the draft Report concludes that "*[a]ll sectors continued to demonstrate adequate performance within the operating performance SCA in 2016, with 87.4 percent of inspected licensees (1,147 of 1,313 inspections) found to be in compliance with regulatory requirements*." CELA **requests** the CNSC to explain what constitutes inadequate performance, where 87.4 % is considered adequate, and define what factors are relied upon when making a finding of inadequate as opposed to adequate.

Compliance rating levels are likely to cause confusion

With regards to the rating levels described in Appendix F of the draft Report, distinguishing between the rating levels **BE** ("below expectations") and **UA** ("unacceptable") can be a cause of confusion. Upon reading Appendix F, Table 10, it is CELA's understanding that the old rating levels **C** ("Improvement is required") and **D** ("This areas is seriously compromised") are being merged into the new rating level **BE** (Below expectations).

CELA fails to see how compliance that can be described as seriously compromised is not labelled as **UA**, or unacceptable, but merely below expectations. The descriptions of these rating levels are thus likely to mislead the public about the number of licensees whose performance is less than acceptable, and CELA **recommends** using less ambiguous expressions such as those previously employed by the CNSC (see Appendix F, Table 10 of the draft Report).

If the CNSC does not wish to use the old rating levels, CELA **recommends** that the CNSC at least retain the distinction between **C** ("improvement required") and **D** ("this area is seriously compromised"), or alternatively that the old rating levels **D** ("This area is seriously compromised") and **E** ("Breakdown") be merged into the new category of **UA** ("unacceptable").

In support of this view, CELA notes that on page 153 of the draft Report, the CNSC's own description of rating level **UA** ("Unacceptable") includes the following passage: "*Compliance with regulatory requirements is unacceptable, **and is seriously compromised***" (emphasis added). This language clearly matches the description of the old rating level **D** ("This area is seriously compromised"), and begs the question why compliance which only amounts to the old rating level **D** was not included under the new rating level **UA** ("unacceptable")? Indeed, the detailed description of the new rating level **BE** ("Below expectations"), does not include the wording "*this area is seriously compromised*".

The changes in rating levels proposed by CNSC are likely to underestimate the severity of incidents when compared to the old rating levels, as events which were previously labeled as **D** ("this area is seriously compromised") are now labelled with the less severe **BE** ("Below expectations"). Non-compliance, which can be labelled as "*seriously compromised*", is unacceptable, not merely below expectations, and thus belongs under the rating level of **UA**.

To the extent that the CNSC does not agree with CELA's concerns, CELA **requests** information on what has been done to avoid such confusion and mislabelling of non-compliance, including whether events that were previously reported as **D** ("this area is seriously compromised") are now more likely to be reported as **UA** ("unacceptable"). If such a change in reporting has taken place, CELA **requests** statistical information on non-compliance, which shows that the types of compliance that were previously reported as **D** ("this areas is seriously compromised") are indeed reported as **UA** ("unacceptable").

Finally, CELA **recommends** that the overall grade assigned to a licensee is accompanied by a list of the individual grades assigned to said licensee that are lower than **SA** (Satisfactory) or **B** (Meets Expectations). This will provide greater transparency as it will show the areas in which each licensee needs to improve their performance.

Determining what is adequate performance

Pages 25, 28 and 30 of the draft Report state that the performance of licensees is "*adequate*". CELA does not agree with this characterization and finds that, given a compliance rate of 87.4 % for operating performance and 84.6 % for radiation protection, the overall performance is

better labelled as in need of improvement and thus inadequate. CELA **requests** information on how CNSC rates the performance of licensees, including what level of compliance is required for CNSC to rate overall performance of licensees as adequate.

Furthermore, on page 82 the following is said of the overall findings in the draft Report (please note, similar statements are made elsewhere in the draft Report):

> The evaluations of findings for the safety and control areas (SCAs) covered in this report show that, overall, licensees made adequate provisions for the protection of the health, safety and security of persons and the environment from the use of nuclear substances.

CELA submits that stating that licensees made *adequate* protection provisions is misleading. Some licensees made adequate provisions, some did better than adequate, while others performed unacceptably. Lumping all of these findings together and stating that, on average, provisions were adequate provides a distorted impression, which suggests that the provisions of all licensees were adequate, when in fact 12.6 % were not in compliance with the Operating Performance SCA while 15.4 % were not in compliance with the Radiation Protection SCA. Over 15 % of licensees did not make adequate provisions - a fact which is diminished by the CNSC's conclusions. CELA **recommends** that this wording be altered so as to not give the impression that all licensees performed adequately. Wording such as *"the majority of licensees performed adequately"* would be more suitable.

Lastly, as these performance indicators are only related to licensees who were subject to inspections, the data may not be indicative of all licensee compliance and performance.

Tracking of repeated non-compliance

Page 26 of the draft Report states, "*In 2016, 472 inspections did not meet compliance expectations in at least one SCA. The CNSC reviewed past performances of these licensees and noted that 12 percent of these same licensees were rated below expectations or unacceptable in that same SCA on their last inspections. This is consistent with industry performance in general, however the CNSC will track trends in this area in future editions of this report to assess trends.*"

CELA seeks further explanation on the term "industry performance" and **requests** further information on the degree to which the CNSC compares such averages to compliance goals set independently of industry performance. CELA submits that in addition to relying upon industry compliance benchmarks, the CNSC should provide comparisons with independent sources, thereby importing objectivity and independence into its compliance standards.

1.3 Protection standards and regulatory requirements

Environmental protection programs

While the draft Report makes it clear that radiation protection programs are required for every licensee (see page 30), no clear requirement appears to be imposed with regards to environmental protection programs. However, on page 4 of the draft Report it is stated that *"[t]he NSCA, its regulations and the licences require that licensees implement and maintain appropriate programs to … protect the environment*". Furthermore, s 24(4) of the *Nuclear Safety and Control Act* expressly requires that a licence "*make adequate provision for the protection of the environment.*"[1]

As it is a condition of licensing that a licensee demonstrate it has programs in place aimed at environmental protection, CELA **requests** information on what programs have been put in place in this regard. If none of the programs put in place by the licensees, nor parts thereof, deal with environmental protection, CELA **requests** an explanation as to why this has not been done, and furthermore **recommends** that a review be carried out to determine what environmental protection programs might be needed to ensure sufficient environmental protections.

Comments and questions related to the ALARA-standard

CELA presumes that the determination and application of an "as low as reasonably achievable" (ALARA) standard will vary according to the licensed activity to which it applies. With this in mind, CELA **requests** information on how ALARA is determined for the different licence types covered by the draft Report.

On page 8, section *2.1.4 Radiation Protection* (and similarly on page 7, section *2.1.1 Doses to Workers*) the following is stated:

> Radiation protection programs are required for every licensee to ensure that contamination levels and radiation doses received by workers are monitored, controlled and maintained below regulatory dose limits, and kept ALARA, with social and economic factors taken into account.

CELA **requests** the CNSC explain what "social and economic factors" are taken into account and the process by which they are considered and weighed.

[1] Nuclear Safety and Control Act (S.C. 1997, c. 9), s. 24(4).

Immediately following the above statement, the following is said on page 8, which appears to propose how to implement procedures aimed at keeping contamination levels and radiation doses ALARA:

> Licensees can meet these objectives by monitoring worker doses; posting radiation warning signs; planning appropriately for radiological emergencies; managing oversight of operational activities; instituting effective workplace practices that emphasize the use of time, distance and shielding to minimize exposure to radiation; and using appropriate protective equipment.

CELA **requests** information on actions taken by the CNSC to ensure that these various measures are implemented in an optimal fashion. CELA furthermore **recommends** that a principled approach be taken, based as far as possible on defined standards, procedures and best practices developed through scientific analyses of empirical data, including practices developed in other jurisdictions.

CELA furthermore **requests** information on whether a similar ALARA approach is being applied to environmental protection, and if so, how is this done? If this is not occurring, CELA **requests** information on the benchmark relied upon to ensure environmental protection.

Guide G-129 Rev. 1, which assists persons regulated by the CNSC with keeping exposures ALARA, is referenced on page 7 of the draft Report (link embedded in text of section 2.1.1). In G-129, it is stated that *"resources for monitoring the environment beyond the workplace that is affected by operations should be identified and provided."*[2]

CELA **requests** information on whether these resources have been implemented with regards to the licences covered by this annual review.

In G-129, it is furthermore said that *"[t]he regular review of dose records and other appropriate indicators, such as the frequency of contamination incidents or results of environmental monitoring, form a critical part of ensuring that doses are ALARA"*[3] (emphasis added).

This statement makes it clear that environmental monitoring will take place, and that such monitoring is essential to achieving ALARA. CELA therefore **requests** information on the degree to which regular reviews of the results of environmental monitoring have taken place.

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[2] Page 5, section *7.3.1 Resources*.

[3] Page 5, section *7.3.2 Operational Reviews*.

Additionally, on page 5 of G-129, it is proposed that "*[i]n the interest of ensuring that the use of nuclear materials poses no undue risk to the public, management should receive summary reviews of the results of environmental monitoring and should ensure that radionuclide emissions to the environment are kept ALARA.*"[4]

CELA **requests** information on whether any CNSC inspections include an examination of such summaries, and whether CNSC inspections incorporate the results of summary reviews of environmental monitoring. CELA also **requests** information on whether the findings from summary reviews are verified by the CNSC, and if so, how this is performed.

In general, CELA **recommends** that more detailed information about environmental monitoring be included in the annual review. CELA further **recommends** that this information be provided along with information on how the different types of licenced activities are required to carry out environmental monitoring. A general statement covering all licence types would be insufficient given the high degree of variation in the licenced activities.

CELA notes that section 2.1.4 of the draft Report contains no mention of environmental monitoring as part of the ways in which exposure can be kept ALARA. This seems contrary to G-129. Missing is also any direct mention of keeping environmental emissions ALARA, suggesting that this may not be a goal that is pursued independently.

Finally, G-219 states that "*[i]n order to substantiate decisions regarding what is reasonably achievable, licensees should document the rationale for the judgement*", and lists a number of considerations that may be relevant to make when considering ALARA.[5] CELA **requests** information on how the CNSC examines licensee documentation, in particular documentation related to environmental protection.

Required to demonstrate protection of the environment

On page 11 of the draft Report, it states that in order to obtain a licence from the CNSC, applicants are required to demonstrate that they will protect the health and safety of persons *and the environment*. CELA **requests** information on how this is demonstrated to the satisfaction of the CNSC, as well as information on the particular requirements which must be met, and whether these requirements are communicated to applicants before they apply for a licence.

[4] Page 5, section *7.3.3 Environmental Monitoring*.
[5] Page 8, section *8.2 Substantiation*.

CELA **submits** that the draft Report, as well as future regulatory oversight reports, provide a beneficial opportunity for the CNSC to review environmental protection measures proposed by the licensee during the licence application stage and required, by the CNSC as a condition of licensing. Without adequate review of environmental safeguards in the annual oversight Report, it is difficult to discern continuity between licence requirements, current oversight and agreed to environmental protection measures.

Specific references to the NSCA and associated regulations

CELA **recommends** that the draft Report include pinpoints to the provision or section number when referring to particular requirements in the *NSCA* or International Atomic Energy Association (IAEA) guidance.

While the draft Report contains numerous references to the NSCA, its regulations and IAEA guidance documents, it does not specify the exact provision being considered. This makes it more difficult for the public to determine whether the regulatory requirements have indeed been met, by impeding the ability to cross-reference the draft Report with the text of the statute or guideline.

Vague references to environmental protection measures

The issue of vagueness in the draft Report is of concern when considering environmental protection measures, with references being made in various places in the draft Report to the CNSC (see for instance, page 14), requiring information on environmental protections. CELA **requests** that specific references to the actual environmental protection requirements be included, rather than simply stating, as done on page 14, that the CNSC will determine if "*adequate measures are in place in respect of their use to protect the environment[…]*".

CELA submits that references to *adequate* measures are too vague to allow members of the public to review whether sufficient requirements are imposed with regards to environmental protections. One way to address this lack of clarity could be to provide a (generic) set of requirements for each type of licenced activity, and thereby clearly identify what *adequate* measures typically look like. If these requirements already exist, CELA **recommends** that specific references to these requirements be included in the draft Report. At present, CELA has not been able to locate such requirements for the various licence types covered by the draft Report, and it is thus unclear to CELA what exact standard or standards of protection guide the CNSC's review of *adequate measures*.

1.4 Environmental risks and exposures

Transport of nuclear substances

Regarding the transport of nuclear substances, CELA **requests** a summary of information on the types of substances and amounts that are transported under licences covered by the draft Report. This general information would allow the public to gain insight into the potential risks to the environment, in the event a shipping container or storage device is compromised.

CELA has already requested information on transportation routes and corridors, however, was informed that "there are no routing requirements in the *Packaging and Transport of Nuclear Substances Regulations, 2015* or the *Transportation of Dangerous Goods Regulations.*" The CNSC further noted that while some security plans include routing, this information is not publicly available due to its prescribed nature.

The issue of environmental protection and transportation is further discussed below, in Section 5 of this submission.

Radiological impacts on the environment

Page 35 of the draft Report states that "*[f]or all of the events reported, the licensees implemented adequate response measures to mitigate the impacts of the events and to limit radiation exposure to workers or any radiological impact on the environment.*"

In addition to this statement in the draft Report, CELA **requests** the CNSC specify the radiological impact on the environment which took place in 2016, the severity of the impact and what measures were put in place to mitigate harm to the environment and prevent re-occurrence.

Fluctuation in spills, contamination and releases

Information provided on page 36 of the draft Report shows that a significant decrease in spills, contamination and releases occurred from 2014 (39 reported events) to 2015 (17 reported events), and that this decrease remained in 2016 (20 reported events).

The draft Report, however, does not discuss the possible reasons for these fluctuations. Additionally, the draft Report does not specify the magnitude or size of the spill. CELA **requests**

this information be provided and **recommends** that Appendix D, List of Reported Events, include units and substance name when describing the spill which occurred.

Malfunctioning or damaged devices

According to page 36-37 of the draft Report, there were 45 events related to damaged or malfunctioning devices. CELA **requests** the CNSC explain the process it uses to confirm that no leakage has occurred.

Spills and contamination

Section 5.72 (on pages 37-38 of the draft Report) addresses spills and contamination. The draft Report is silent on the steps taken to confirm that spills/contamination did not pose a risk to the environment. CELA **requests** this information be provided in future regulatory oversight reports, in order to demonstrate the decision-making process through which a finding of 'no harm' is reached. Further, CELA **requests** the CNSC confirm how it determines a clean-up process to be sufficient and how the process protects against indirect releases of radioactive substances into the environment.

Environmental impact of industrial subsectors not included in the draft Report

Page 56 of the draft Report points out that four subsectors are highlighted in further detail in the Report.

CELA **requests** information on the environmental impact of industrial subsectors not covered in the scope of the draft Report. Ideally, this information would indicate which of the subsectors not included in the draft Report pose the greatest risk to the environment should a release occur (single event), as well as which of these subsectors is likely to have the largest cumulative negative impact on the environment (all events).

Information on releases to the environment

Page 83 states that "*[t]here were no releases of nuclear substances to the environment that had an adverse radiological impact or that resulted in a person receiving a dose in excess of the regulatory limit for members of the public.*"

CELA **requests** information on the number of releases to the environment, how large these releases were and where they occurred. CELA also **requests** information on how releases are quantified.

Additionally, CELA **recommends** that statistics be gathered on all environmental releases, and that this information be included in future version of the annual Report, preferably in a section of the annual Report, which covers all issues related to the Environmental Protection SCA (see section 2.1 below).

Handling of spills

Below, CELA sets out a number of specific questions regarding the handling of reported events that had the potential of leading to spills or unintended releases of nuclear substances. These questions focus on whether any environmental exposure may have taken place. In addition to the questions posed below, CELA **requests** more general information on the procedures that are followed to limit releases to the environment when spills do occur.

On page 94, event no. 2694 consisted of "*[a] spill of a nuclear substance during the preparation of radioisotopes. The spill was covered with a steel plate. There was no skin contamination or thyroid intake as a result of this spill.*" CELA **requests** information as to what exposure to the environment, if any, this event resulted in.

Event no. 2862 and event no. 2864 seem to be nearly identical event, but for no. 2862 the type of incident is reported as *Packaging and transport*, while for no. 2864 the type of incident is reported as *Spill*. CELA **requests** information on the reason for this distinction.

Event no. 2869 (page 106) occurred when "*[a] piece of metal with a radiation warning sign was discovered at a scrap metal facility.*" CELA **requests** information on the origin of this piece of metal. CELA is interested in whether it was determined where this piece of metal might have come from, and how it made its way to a scrap metal facility. CELA's main concern is whether this event is indicative of a problem related to the handling nuclear waste, or whether CNSC is able to provide some form of documentation, which shows that this is an isolated event.

During event no. 2920 (page 107) "*[a] spill of a nuclear substance occurred during the administration of a nuclear medicine therapy. The incident resulted in skin contamination of the technician with an estimated dose above the regulatory limit.*" CELA **requests** information on how this skin contamination was removed and how the spill was cleaned up. CELA's aim here is

to obtain information on what procedures have been put in place to ensure that an exposure to a worker does not inadvertently result in a subsequent exposure to the environment.

1.5 Other issues related to the protection of the environment

Consideration of environmental issues not directly related radiation or radioactive substances

On page 35 of the draft Report, an incident is described where a worker was injured when he was pinned under his truck. This injury is not included in the totals reported. CELA **recommends** that a similar approach be taken with regards to harm to the environment, i.e. that the draft Report should include information about harm that is not caused directly by radiation but in the course of work related to licences covered by this draft Report.

To obtain such information, CELA **recommends** that the CNSC encourage its inspectors to consider if there are any other environmental concerns not related to radiation or nuclear substances, and to report any actual or potential adverse impact on, or harm to, the environment stemming from an licenced facility.

The purpose here is to consider environmental impacts that might be caused by, or directly related to, the licenced activities, but which are not the result of the environment being exposed to radiation or radioactive substances. The purpose is also to encourage CNSC inspectors to report the environmental impacts they observe during inspections or other fieldwork activities.

New online examinations for Class II RSO's

On page 16 of the draft Report, in section *3.5.1 Class II RSO examination*, we see that, starting in 2016, the CNSC has begun using an online examination for the first time to certify Class II RSOs.

CELA **requests** information on what parts of this examination, if any, deal with environmental protection.

2. Reforming the Regulatory Oversight Report - The Need for Comprehensive Environmental Review

2.1 Dedicated 'environment' chapter

In addition to the specific comments on environmental protection listed above in Section 1 of this submission, CELA has identified the need for the draft Report to include a dedicated chapter on environmental protection. The inclusion of such a chapter would not only assist in remedying the draft Report's cursory review of environmental protection, as highlighted in Section 1 above, but also provide an opportunity to review licensee compliance with existing environmental protection licence conditions.

The comments below further highlight why such a chapter is needed in the draft Report and, in addition to the comments in Section 1 of this submission, outline what a dedicated environmental chapter in the report should seek to address.

Environmental consideration in past regulatory oversight reports

Having reviewed past versions of the annual Reports, CELA notes that in 2011, the regulatory oversight report was entitled *Nuclear Substances in Canada: A Safety Performance Report for 2011*. While the current name was introduced in 2012, this only led to limited changes, and not, unfortunately, the inclusion of a more significant focus on environmental protection. As shown below in Section 4 of this submission, the word environment appears roughly the same number of times in the 2011 and 2012 reports. Given that the draft Report is focused heavily on safety, with infrequent mentions of the environment, the name of the 2011 Report appears to be a more fitting description of the scope of the draft Report.

While CELA welcomes the change in the regulatory oversight Report from a narrow focus on safety to a broader focus on the use of nuclear substances, generally, CELA submits that the content of the annual Report has not aligned with this revised scope. CELA's findings illustrate environmental protection has not been given sufficient attention, and appears to remain at the level seen in the 2011 safety-report.

CELA therefore **recommends** that the draft Report be expanded to include a more detailed review of other SCA's such as environmental protection. Given that the CNSC has accepted CELA's PFP-application on the basis of providing a review of the draft Report's environmental protection measures, we recognize that the issue is of importance to the CNSC. However, we

further encourage the CNSC to expand its discussion of this topic in future regulatory oversight reports.

Why independent consideration of the environment is recommended

Currently, the draft Report lacks direct emphasis on the environment, with the main focus seemingly being radiation protection and safety. While the issue of environmental protection is connected to radiation protection and safety, CELA recommends that environmental protection be assessed independently and as a component within each area of review (ie. medical sector, industrial sector, academic sector).

For these reasons, and the reasons set out elsewhere in this submission, CELA **recommends** that environmental protection be assessed independently. Such focus would first and foremost help prevent and reduce the risk of radiological releases into the environment. A designated environmental chapter would also provide greater awareness to the licensees that their conduct would be publicly reviewable and reported, in the annual regulatory oversight Report, for both radiation safety and environmental protection performance.

CELA acknowledges that many of the protective measures aimed at ensuring the safety of workers and the public are also likely to protect the environment. CELA, however, contends that independent consideration of the need for environmental protection is necessary to ensure the prevention and minimization of risk in the event of an accident.

CELA furthermore **recommends** that a summarized version of relevant information on environmental protection gathered through other CNSC activities, such as the CNSC's sampling through *Independent Environmental Monitoring Program (IEMP)*,[6] be included in this proposed environmental section of the draft Report where relevant to the activities covered by the Report. One example would be the *IEMP* put in place for TRIUMF Accelerators Inc.[7] Including a summary of this environmental protection information would help provide a more detailed image of the activities covered by the draft Report from an environmental protection perspective.

Furthermore, protection of the environment is not only a requirement of s.24(4)(b) of the *NSCA*, but also a required licence component pursuant to *REGDOC-2.9.1, Environmental*

[6] Online: http://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index-iemp.cfm
[7] Online: http://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/triumf.cfm

Principles, Assessments and Protection Measures[8] (version 1.1, dated April 2017). The following is stated in the preface to REGDOC-2.9.1:

> Note: For facilities or activities other than Class I nuclear facilities and uranium mines and mills, the CNSC reviews every licence application to verify that there are no significant interactions with the environment (for example, for most Class II facilities, such as hospitals and universities, and for the use and transport of nuclear substances and radiation devices, there is no interaction with the environment). If the CNSC's review of the application determines that the facility or activity:
>
> - has potential interactions with the environment and that additional consideration of environmental protection measures is warranted, the information in this document may be applied in a graded manner
> - does not interact with the environment, then only the CNSC's guiding principles for environmental protection (in section 2.1 of this document) are relevant as guidance for such facilities or activities

Therefore, as environmental protection is a consideration during licensing, CELA **recommends** that the CNSC report on the sufficiency of licensees' environmental protection measures, their current efficacy and the potential for improvement.

CELA **requests** information on how this review is carried out, including what factors are examined in order to determine that there is no interaction with the environment.

CELA also **requests** that the CNSC use the draft Report as an opportunity to revisit the factors it examined during the licensee's application to ensure that the licensee continues to demonstrate either '*no significant interactions with the environment*' or '*environmental protection measures are warranted*' per *REGDOC - 2.9.1.* Once this iterative review is complete,

CELA furthermore **recommends** that this information be included in the draft Report.

2.2 Procedures following environmental exposure

CELA has not been able to determine to what degree assessments of environmental exposure are a regular part of the CNSC's inspections or requirements. As the worksheets appended to the draft Report do not address environmental protection, CELA **requests** the CNSC provide an

[8] Online: http://www.nuclearsafety.gc.ca/eng/pdfs/REGDOCS/REGDOC-2-9-1-Environmental-Principles-Assessments-and-Protection-Measures-eng.pdf

explanation of the procedures governing their licensee assessment for environmental release or exposure.
For instance, does the CNSC's assessment of licensees' environmental compliance result in data, which can be traced for trends over time? Is there a threshold for environmental release below which it must not be reported to the CNSC, or are there types of licenses which are insulated from environmental review? Lastly, CELA **asks** whether there are inspection worksheets, not included in the draft Report, which specifically reference environmental exposure assessment criteria?

2.3. Safety and Control Area - Environmental Protection

Environmental protection is listed as one of fourteen safety and control areas (SCA) that the CNSC uses in its oversight of licensed activities. While CELA recognizes that the application of this SCA may vary depending upon the licence under review, CELA **recommends** that at a minimum, the draft Report should include an environmental protection section in order to ensure the review of the environmental protection SCA is systematic across all licences.

Appendix B of the draft Report states "*not all SCAs are considered for the inspection of nuclear substances activities and facilities.*" This statement is neither followed-up with an explanation as to why this is the case nor, how the SCA is applied in the context of licensee review and inspections. Should findings on environmental protection not be relevant to the type or individual licence, CELA **requests** the draft Report provide reasons discussing why this is the case. As this type of analysis would be helpful, for both the licensee and the public, CELA **recommends** that the draft Report be updated to include a chapter on the environmental protection SCA.

Furthermore, CELA **requests** information on the degree to which the environmental SCA has been applied across the various license types covered by the draft Report. Even though the environmental protection SCA is purportedly considered during licensee reviews and inspections, CELA also **requests** an explanation as to why detailed information on the environmental SCA is not included in the draft Report. Specifically, CELA **requests** that the CNSC include in the draft Report a discussion of the information it received and parameters upon which it decided the licensee to be compliant with the environmental protection SCA. For the most part, CELA has only found very vague references, which state that no harm to the environment occurred etc., but no explanations as to how this was determined.

3. The Emerging Oversight Field of Climate Change

An additional field of oversight reviewed by CELA, with potential impacts on the CNCS's actions protecting the environment from unintended radioactive releases, is the confluence of climate change with licenced activities.

As catastrophic weather events become more frequent, CELA **recommends** that the CNSC review the climate resiliency of licensees as part of its regulatory oversight reporting. The following section reports on two weather-related events, which are noted to increase in frequency and severity as a result of climate change, and their possible effects on licenced activity.

3.1. Flooding

Natural Resources Canada predicts that on average, Canada can expect more rainfall and an increase in heavy rainfall events.[9] Flooding hotspots include the land adjacent to rivers, streams and channels and also shorelines of lakes and oceans, where water can rise after high runoff, storm surges or the hammering of waves.[10]

As was noted during the during the CNSC's meeting reviewing the 2016 Regulatory Oversight Report for Nuclear Power Plants in August 2017, Craig Hebert from Canadian Nuclear Laboratories stated that an unintended release of water from Port Hope's legacy ponds occurred because of "extremely heavy rains and record rainfall." He continued that the "weather forecast these days isn't as reliable as we expect." This combination of weather severity and unpredictableness resulted in the onsite resources (ie. pumps and sandbags) being insufficient to safeguard against unintended outflow from the holding ponds.

CELA **recommends** that the CNSC consider climate impacts on both existing licences and future applications and renewals, and revisit potentially helpful international guidance. For instance, in regards to external events like weather, the IAEA recommends the following:

> 6.25 Consideration should be given to the storage conditions that may prevail following postulated initiating events, including external events such as earthquakes,

[9] Online: http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Full-Report_Eng.pdf

[10] Online: https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/ntrl-hzrds/fld-en.aspx

> tornadoes and floods, and the acceptability of such conditions should be ensured by the design.[11]

While recognizing that this recommendation is made in the IAEA's *Storage of Spent Nuclear Fuel, Specific Safety Guide No. SSG-15*, CELA submits it is an equally helpful consideration for any storage of radioactive substance, be it in transit, at a medical or research facility or temporary storage location.

CELA **recommends** that going forward, the CNSC ought to consider the effect of increased flood frequency and severity on the placement of radioactive devices and their confinement. Specifically, CELA **recommends** that all sites containing radioactive devices or nuclear substances be reviewed to ensure they remain protected from the side effects of flooding, such as erosion, and changes in hydrology or flood zone margins.

3.2. Wildfire

Natural Resources Canada recognizes that climate change and climate variability is predicted to increase fire-prone conditions across Canada. Climate change is predicted to result in more frequent forest fires in the boreal region, which by the end of this century could see a doubling in the amount of area being burned.[12]

In tandem with the expected increase in frequency and severity of wildfire is the "growing consensus that … fire agency suppression efforts will be increasingly strained."[13] Despite increasing pressure on response resources, the IAEA's *Storage of Spent Nuclear Fuel, Specific Safety Guide No. SSG-15* recommends, per 6.63, that "fire protection systems of appropriate capacity and capability should be provided."

As was noted in the draft Report (p 44), the forced evacuation of Fort McMurray, Alberta caused the CNSC to contact the affected licensees and, provide a list of locations where nuclear substances were stored to the Alberta Disaster Response Team. This occurrence demonstrates the necessity for the CNSC to determine whether there is "appropriate capacity" in the event a wildfire threatens sealed or stored radioactive substances. The ability of first responders to provide oversight of nuclear site safety - given NRCan's recognition that fire agency efforts will be strained in light of climate change - may be severely impaired.

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[11] Online: http://www-pub.iaea.org/MTCD/publications/PDF/Pub1503_web.pdf
[12] Online: http://www.nrcan.gc.ca/forests/fire-insects-disturbances/fire/13155
[13] *Ibid.*

CELA **recommends** the CNSC review all nuclear substance use licenses for confluence with postulated wildfire events. It is crucial that all nuclear substance infrastructure be reviewed through a climate lens, to determine the level of resiliency in light of climate modelling and wildfire predictions.

4. Trends in Environmental Protection - Reviewing Regulatory Oversight Reports from 2011 to 2016

Having reviewed regulatory oversight reports from 2011 to 2016, CELA determined that the words environment (or environmental) are mentioned roughly the same number of times in each of the annual Reports. The results can be summarized as follows:

- 27 times in 2011 (in the report entitled *Nuclear Substances in Canada: A Safety Performance Report for 2011*)
- 32 times in 2012
- 36 times in 2013
- 34 times in 2014
- 28 times in 2015, and
- 29 times in the draft Report for 2016

While most use of these words deal with environmental protection, several situations involve comments regarding work environments. The actual number of times that environmental protection are addressed is thus lower than these numbers suggest. Furthermore, in many instances the word is used in more generic situations such as to describe the role of the CNSC in protecting the environment. Reference to actual instances of environmental protection assessments are nearly nonexistent.

CELA has conducted a cursory review of the annual Reports from 2011 to 2015 and concluded that little variation occurred in the contexts in which the word environment/environmental appears, suggesting that little has changed in how this topic is treated in the past annual reports compared to the draft Report for 2016.

All annual Reports from 2011 to 2016 contain similar generic statements regarding releases to the environment:

> 2011: "*Furthermore, there were no releases of dispersible nuclear substances to the environment that resulted in a person receiving a dose in excess of the regulatory limit*

for members of the public or that had an adverse radiological impact on the environment."

2012: "*Furthermore, there were no releases of dispersible nuclear substances to the environment that resulted in a person receiving a dose in excess of the regulatory limit for members of the public or that had an adverse radiological impact on the environment.*"

2013: "*There were no releases of dispersible nuclear substances to the environment that resulted in an adverse radiological impact on the environment. "*

2014: "*There were no releases of a nuclear substance to the environment that had an adverse radiological impact or that resulted in a person receiving a dose in excess of the regulatory limit for members of the public.*"

2015: "*There were no releases of nuclear substances to the environment that had an adverse radiological impact or that resulted in a person receiving a dose in excess of the regulatory limit for members of the public.*"

2016: "*There were no releases of nuclear substances to the environment that had an adverse radiological impact or that resulted in a person receiving a dose in excess of the regulatory limit for members of the public.*"

While there are slight changes in wording in some years, these appear to be mainly questions of wording rather than content when viewed in context. In sum, the picture emerges that the CNSC has neither increased nor decreased its focus on environmental protection in the Report, but chosen rather for it to receive very little discussion in any of the last six years.

Given the information currently available to CELA, it remains unclear how the CNSC is able to make this default environmental determination, nearly unchanged for 6 years. The generic statement on impact to the environment, reproduced above, does not reflect year-to-year events or cumulative impacts, such as the numerous sealed sources and radiation devices that have been lost or stolen and not recovered during this time frame[14]. Furthermore, it is not clear whether the various spills and other mishaps that have occurred over the years may have had

[14] For an overview, see *Report on Lost or Stolen Sealed Sources and Radiation Devices*, May 23, 2017, online: http://www.nuclearsafety.gc.ca/eng/pdfs/Reports/Lost_Stolen_Reports/2017-05-23-CNSC-Lost-and-Stolen-Sealed-Sources-and-Radiation-Devices-Report-eng.pdf

an adverse impact on the environment. To determine this, more information on clean-up procedures is needed. CELA therefore **requests** a list of all sealed sources and radiation devices that have been lost and not recovered during the years of CNSC inspections. This list should include all sealed sources and radiation devices containing substances that have not yet decayed to background levels.

CELA also questions the ability of a regulatory oversight report to make a blanket environmental compliance statement given the lack of detail in the Reports and their detailing of environmental protection, effects and risk. CELA reserves judgement for a future version of the annual Report, which we submit, should include a more detailed review of environmental protection, risks and exposures.

5. Transporting Nuclear Substances - Human Health and Environmental Protection

The draft Report notes at page 41 that "*approximately one million packages containing nuclear substances are safely transported each year in Canada*." Given the proliferation of nuclear substance use in non-reactor contexts,[15] it is crucial to review the accompany risk of accidents as, as noted by the IAEA, accidents involving radiation sources occur more frequently than reactor accidents.[16] While these accidents may involve fewer numbers of people, they can nonetheless be serious.

5.1. Confirming the presence of radioactive devices

The IAEA Safety Guide TS-G-1.2, *Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material* recognizes that following an accident, the "initial problem will probably be one of recognition" and confirming the presence of radioactive material.[17] The Guide continues that information confirming the presence of radiological material may be provided through a visual inspection of the package (ie. external markings or labels) or placards on the outside of the vehicle.

Furthermore, pursuant to the *Packaging and Transport of Nuclear Substances Regulations, 2015,* carriers of radioactive material are required to comply with IAEA regulations respecting marking and labelling (s 28(1)(i)), and every consignor must clearly and indelibly print in its

[15] Online: http://www-pub.iaea.org/MTCD/Publications/PDF/te_1162_prn.pdf, page 1.
[16] *Ibid*
[17] Online: http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1119_scr.pdf, page 19.

transport documents, the particulars of the consignment (s 29(1)). Upon reviewing the CNSC's draft Report, CELA notes that many of the reported events listed in the Report are those involving exposure devices. Exposure devices, however, are exempt from these safeguards (see ss. 28(2) and 29(4), respectively).

CELA **recommends** that exposure devices not be exempt from labelling and shipping document requirements as, in light of the draft Report's documentation, a number of the reported events are accidents with vehicles containing exposure devices. In order to guarantee the safety of the public, first responders and the environment, it is critical that the substance, its risk and potential harm be clearly understood and demarcated to limit any possible radiological exposure.

5.2. Shipping documents

In addition to labelling, per the *Transport of Dangerous Goods Regulations,* SOR/2017-137 the shipper is required to display a 24-hour emergency telephone number on the shipping document accompanying the shipment of dangerous goods.

In response to this requirement, CELA **requests** information from the CNSC regarding the accessibility and protection of this shipping document, in the event of an accident. The importance of the shipping document is illustrated in the draft Report which notes that following the rollover of a tractor trailer (reported event no.2791), the towing company responsible for the highway clean-up ceased activity after noticing that radioactive materials were listed in the shipping document. CELA **requests** the CNSC to confirm the ease with which this document is accessible in the event of an accident and particularly, one involving fire where the document could potentially be destroyed.

Lastly, s. 7 of the *Packaging and Transport of Nuclear Substances Regulations, 2015* requires that in an application for a licence to transport a nuclear substance, the proponent must provide a detailed transport plan including its radiation protection and emergency response measures. As the licensing authority, CELA **requests** the CNSC to confirm how the exemptions for exposure devices is congruous with s. 7 of the packaging and transport regulation and, the basis upon which they decide the safety of the public and environment to be adequate.

5.3. Testing of packaging

As the draft Report notes on page 10, "*certain types of transport packages must be certified by the CNSC before they can be used in Canada*." Pursuant to the *Packaging and Transport of Nuclear Substances Regulations, 2015* each class of package must undergo specific testing requirements.

In lieu of the draft Report's publication of accidents involving radioactive devices during transports (see Appendix D of the draft Report), CELA **requests** the CNSC provide information regarding the extent to which real accidents are fed back into the testing process.

For instance, according to reported event no.2770, a radiation device was hit by a crane and per reported event no. 2784, a portable gauge was bent by an excavator. While CELA recognizes that the CNSC conducts follow-up testing on the devices to ensure the package is not compromised and any leak secured, CELA **requests** information as to how these accidents (1) feed into the testing of packaging process and (2) inform sector-wide procedural improvements, aimed at lessening the frequency of reported events.

5.4. Emergency response

As previously noted, s. 7 of the *Packaging and Transport of Nuclear Substances Regulations, 2015* requires that in an application for a licence to transport a nuclear substance, the proponent must include a detailed transport plan covering its radiation protection and emergency response activities. While the draft Report reviews the radiological exposures resulting from packaging and transport, the Report does not comment on the sufficient operability of the licensee's emergency plan following an accident.

CELA **recommends** that the draft Report would not only benefit from a retrospective review of emergency response for each of the reported events, but such a review would serve to highlight trends or gaps in the emergency response plans delineated by licence class, type or nuclear substance use.

CONCLUSION

General comments

As already alluded to in the introduction and throughout this submission, a number of CELA's comments, recommendations and requests stem from a lack of clarity or detail in general, with

respect to the draft Report's discussion of environmental protection. Consequently, one of CELA's recurring comments is for the CNSC to provide a greater amount of detail in its reporting on environmental protection in order to demonstrate, to the public, that licenses are scrutinized for compliance of s 24(4) of the NSCA which requires all licences to "make adequate provision for the protection of the environment." CELA encourages the CNSC to revisit the text of the draft Report and incorporate these findings and at a minimum, expressly provide for environmental protection in next year's version of the annual Report.

Given the draft Report's lack of detailed information on the current level of environmental protection and related issues - which CELA suggests may stem from the lack of focus on environmental protection in the inspection worksheets or, possibly a lack of environmental release events - CELA has found it difficult to carry out a sufficiently detailed examination of whether the measures currently in place are sufficient to protect against unauthorized releases into the environment. The paucity of environmental protection discussion in the draft Report and in previous annual Reports has impeded CELA's ability to determine, to a satisfying degree of detail and certainty, if improvements to environmental protections have occurred in 2016.

Despite the lack of detailed information, CELA has sought to analyze the reported events and orders issued by the CNSC and identify accompanying environmental risks. CELA has also endeavoured to provide recommendations to the CNSC, aimed at improving its existing environmental protection review process and sought to highlight potentially systemic issues related to environmental protection.

Inspections and reporting

As pointed out in Section 1.1 of this submission, a significant drop in the time spent on compliance verification can be observed, which is cause for concern. Combined with an operating performance SCA compliance rating of 87.4 %, this drop suggests that more time may need to be allocated to compliance verification in order to increase the current level of compliance.

Compliance

CELA submits that the compliance rating levels that are being phased in are somewhat misleading. The combination of the old compliance levels C and D into the new compliance level BE (Below Expectations) may lead to an overly optimistic image of the current level compliance.

This finding is made worse by the fact that the CNSC averages the performance of all licensees in order to conclude that, overall, licensees made adequate protection provisions. This is done despite the fact that some licensees made adequate provisions, some did better than adequate, while others performed unacceptably. The Report's reliance on confusing rating levels and averaging of poor and above average protection provisions together leads to a more positive image of compliance and protection that the underlying data seems to support.

Protection standards and regulatory requirements

CELA has also had difficulty finding information on environmental protection programs, although such programs are mentioned in passing on page 4 of the draft Report. Similarly, CELA has found that there is need for further clarification with regards to some aspects of the use and application of ALARA standards.

This vagueness appears to be mirrored in the lack of specific references to individual provisions in the *NSCA* and its regulations. It is also mirrored in the worksheets that are appended to the draft Report, as they contain little to no mention of environmental protection, and in the lack of detail on page 11 of the draft Report dealing with how licensees are required to demonstrate protection of the environment.

All in all, CELA finds that further information is needed in order to critique the adequacy of environmental protection standards, and compliance with regulatory requirements and licence conditions.

Environmental risks and exposures

When considering environmental risks and exposures, CELA observed a recurring issue in the Report, namely a lack of detail. While it is possible that risks and exposures are actually low, CELA would like to see a greater degree of information also in this area. This would allow members of the public to verify that risks and exposures are indeed acceptably low.

Lack of environmental focus and the need for a dedicated chapter on Environmental Protection

As a result of the above findings, and due to the draft Report's main focus on radiation protection and safety and not an equivalent focus on the environment, CELA recommends that environmental protection be assessed independently in a separate chapter - including an assessment of the Environmental Protection SCA. An environment chapter would ensure a focused and sufficiently detailed review of environmental issues, and provide an efficient way

of addressing several of the issues identified by CELA aimed at improving oversight and the protection of the environment.

Developments in protection

CELA has compared the draft Report to annual Reports from past years, and found that while there are slight changes in wording in some years, these appear to be mainly questions of wording rather than content when viewed in context.

CELA is of the view that little has changed in the review of environmental protection over the past several years. Furthermore, it appears as though the CNSC has found no impact on the environment for the past six years, while CELA is less convinced by this conclusion and reserves judgement for when a future version of the annual Report includes more information on environmental protection.

Climate change considerations

CELA also recommends that the CNSC add an additional area of oversight into its consideration of environmental protection: climate change and its effects on the integrity of stored and in-use nuclear substances. As catastrophic weather events become more frequent, CELA recommends that the CNSC review the climate resiliency of licensees as part of its regulatory oversight reporting.

Transporting nuclear substances

Lastly, as approximately one million packages of nuclear substances are shipped on an annual basis in Canada, it is necessary to consider how transportation, and requisite shipping documents and emergency plans, can be improved for additional human health and environmental safeguards. CELA recommends the draft Report include greater consideration of the human health and environmental ramifications of transport and discuss how procedural improvements can be made, in light of reported accidents.

All of which is respectfully submitted this 11th day of September, 2017:

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