Saskatchewan Environmental Society

COMMENTS FROM THE SASKATCHEWAN ENVIRONMENTAL SOCIETY ON AREVA'S PROPOSAL FOR THE RE-LICENSING OF THE MCCLEAN LAKE OPERATION MINE AND MILL SITE

Prepared for submission to the Canadian Nuclear Safety Commission

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INTRODUCTION

The Saskatchewan Environmental Society (SES) appreciates this opportunity to review and comment on the AREVA proposal for extension of their licence to operate the McClean Lake mine and mill for a further 12 years (AREVA, 2017). As part of a network of active and historic uranium operations in the Athabasca region, the McClean site contributes to a complex mix of issues including regional economic development, social and community change, ecosystem disturbance and long-term contamination risks. As a component of Saskatchewan's current economic base, but one that is facing global market challenges and an uncertain future, the uranium industry is of significance and concern to the whole province.

In their Request for a Licensing Decision, AREVA (2017) notes they are requesting the renewal of Licence UMOL-MINEMILL-McCLEAN.00/2017. If granted, this renewal will allow AREVA to:

- Operate and modify a nuclear facility for the mining of uranium and produce uranium concentrate (U3O8) at the McClean Lake Operation;
- Mine a nuclear substance (uranium ore);
- Produce a uranium concentrate; and
- Import, possess, use, store, transfer and dispose of nuclear substances and radiation devices.

AREVA (2017) specifically notes they "[are] not proposing new activities and [are] requesting that the Licence be issued for a 12-year term." (p. 1-9). AREVA (2017) further provides a list of activities that could occur during this 12-year term, if granted:

- The relocation of a contaminated landfill (located adjacent to the JEB Tailings Management Facility) to the Sue C/A pit;
- Upgrades to Sue Water Treatment Plant to improve the operation year-round;
- The expansion of the JEB Tailings Management Facility to maximize tailings placement. This will include construction of an embankment or portion of a perimeter, placement of a natural liner, and raising the elevation from 434 mASL to 448 mASL. Construction will begin in 2018 and occur over a 9 year period;
- Mining at SABRE site pods (four additional holes drilled and mined);
- Receipt and disposal of potentially reactive waste rock in the Sue C/A pit;
- Completion of the Selenium Adaptive Management Plan;

- Monitoring of sulphur dioxide mitigation;
- Mining of some or all of the McClean Lake remaining orebodies (Caribou deposit, McClean deposits, the Sue D deposit, the Sue E deposit) and/or Midwest orebodies.

While AREVA maintains they are not proposing new activities, SES notes that there are a long list of potential activities AREVA could pursue if this licence renewal is granted.

Our concern is that the physical and social environment be protected. The issues associated with uranium mining are complex and are generally poorly understood by the public. This means that the process of public participation must allow for well-informed research and study, and for education by trusted messengers. SES strives to contribute positively to these functions.

In the current project we have been limited by the inadequate time allowed for review. The original documents were received from CNSC several days later than expected. On reviewing them we found serious information gaps which required meeting with the proponent and identifying other data sources. AREVA staff were very helpful in providing extensive additional documentation which we received only one week before our submission was due, a week which included the Easter long weekend. Within the various documents we found inconsistencies and ambiguities which hindered our ability to evaluate the effectiveness of the measures designed to protect the environment.

It is clear that AREVA has done very extensive and thorough analytical work on the site and has accumulated masses of relevant data. What appears to be lacking is an adequate system of coordinating this data and making it accessible to a concerned public. **Providing more accessible resources and more time for organizations such as SES to participate would allow us to play a more effective role in this process.**

As recommended by CNSC, this document is organized by Safety and Control Areas, and then by other matters of regulatory interest. SES recommendations are in bold type.

SAFETY AND CONTROL AREA COMMENTS

1. The Management System

The Management System Safety and Control Area covers the framework which established the processes and programs required to ensure an organization achieves its objectives, continuously monitors its performance against these objectives and fosters a healthy safety culture.

1.1 Comment Relevance

Saskatchewan Environmental Society (SES) comments in this section refer to the processes and programs in place required to ensure AREVA achieves its environmental objectives and monitors progress against these objectives. While environmental issues are typically limited to discussion in the Environmental Protection Safety and Control Area section, we argue that establishing a robust management framework for monitoring and mitigating impacts on the environment is key to achieving AREVA's environmental objectives.

In this section the Saskatchewan Environmental Society identifies several issues pertaining to species at risk related to the McClean Lake Operation (MLO) and AREVA's request for re-licencing (AREVA, 2017).

1.2 Inconsistencies

There is a considerable amount of inconsistency observed throughout the documents SES was provided to assess potential impacts of re-licencing on species at risk, specially the Submission by CNSC Staff (CNSC Staff, 2017) and the 2016 Environmental Performance Technical Information Document Volume 1 and Volume 2 (AREVA, EP TID Vol. 1, 2016 and AREVA, EP TID Vol. 2, 2016). Independently, the Submission by CNSC Staff leads one to believe rare plant and lichen species surveys, as well as sub-national rankings for all species, had not been considered. When SES eventually obtained the 2016 Environmental Performance Technical Information Documents detailing work around rare species, we discovered rare plant work has indeed been completed and sub-national rankings and data are considered.

While this misperception was clarified upon receiving the Technical Information Documents from AREVA, SES observed new inconsistencies between Volume I and the Submission by CNSC Staff. For example, AREVA lists provincially- and nationally-ranked species at risk in Table 5.4-1 (AREVA, EP TID Vol.1, 2016), depicted in Figure 1 below. However, in Table 3.1 of the Submission by CNSC Staff (CNSC Staff, 2017), which lists species that may occur in the local assessment boundary, several additional species are included. Specifically, Table 3.1 in the Submission by CNSC Staff lists red knot

(*Calidris canutus rufa*), northern myotis (*Myotis septentrionalis*), little brown myotis (*Myotis lucifugus*), olive-sided flycatcher (*Contopus cooperi*), common nighthawk (*Chordeiles minor*), barn and bank swallow (*Hirundo rustica and Riparia riparia*), buff-breasted sandpiper (*Tryngites subruficollis*), horned grebe (*Podiceps auritus*), and two species of bumble bees (*Bombus bohemicus and Bombus terricola*, none of which are included in Table 5.4-1. Table 3.1, depicted in Figure 2 below, is derived for the local assessment boundary, which is included within the regional assessment boundary depicted in table 5.4-1. Presumably then, all of the rare species listed in the Submission by CNSC Staff Table 3.1 should also be included in AREVA's Table 5.4-1. It is unclear to SES why they are not.

To further investigate, SES gained access to the 2007 Environmental Impact Statement for the Midwest project (AREVA, 2007) - which AREVA frequently references in Section 5 of the Technical Information Document Volume I - from the Saskatchewan Ministry of Environment webpage. This work is relevant to the relicensing of the MLO because the Midwest deposit lies only 15 km west of the MLO (AREVA, 2007), their Local Assessment Boundaries overlap and both sites share a Regional Assessment Boundary (the Athabasca basin). Thus many if not all of the species listed should be the same. Unfortunately, the tables containing the data for species at risk – Tables 4.5-1 through to 4.5-15 (AREVA, 2007) - are all missing from the Appendix of this version accessible online. SES did not have the time to confirm if this was the case in all versions of this Environmental Impact Statement.

SES did however, locate a recent comprehensive study report for the Midwest project online prepared by a host of government agencies including the CNSC (CNSC, 2012). This document also included a species at risk list, Table 8.6 (shown in Figure 3 below), which again does not match the tables provided in AREVA EP TID Vol.1 (2016) or CNSC Staff (2017). Specifically, the canada warbler (*Wilsonia Canadensis*), piping plover (*Charadrius melodus circumcinctus*), whooping crane (Grus Americana) and common nighthawk (*chordeiles minor*) are included in Table 8.6, but not necessarily in Table 5.4-1 and/or Table 3.1 shown in Figure 1 and 2 below. The exclusion of the first three species seems logical, as their breeding habitats or migrating routes do not specifically overlap with the Local Assessment boundaries for the MLO or Midwest area, and no occurrences have been reported at that latitude (with the exception of the piping plover which has been recorded at the Athabasca sand dunes (SKCDC, 2017a)). However, Table 8.6 reports that the common nighthawk has been observed within the Midwest local assessment boundary and thus it should certainly be included in Table 5.4-1 in AREVA EP TID Vol. 1 (2016).

SES recommends these lists be consolidated and standardized across various reports. SES further recommends that species listed, based on scientific criteria established nationally and subnationally (by the Committee on the Status of Endangered Wildlife in

Canada and Saskatchewan Conservation Data Centre respectively), as well as those listed under national and subnational legislation, are included in these lists. SES acknowledges AREVA has incorporated this last recommendation in their version of species at risk lists.

TABLE 5.4-1

Provincially Tracked, and Federal and Provincial Listed Species at Risk Known or with Potential to Occur in the Regional Assessment Boundary.

Common Name	Scientific Name	SKCDC Rank[a]	COSEWIC[c] Status	SARA Status[d]	Schedule[e]	Observed or Sign Detected in the Local Assessment Boundary
BIRDS						
Cooper's hawk[b]	*Accipiter cooperii*	S4B, S2M, S2N	Not at Risk	-	-	-
Boreal owl[b]	*Aegolius funereus*	S3	Not at Risk	-	-	-
Great blue heron	*Ardea herodias*	S3B	-	-	-	-
Golden eagle[b]	*Aquila chrysaetos*	S3B, S4M, S3N	Not at Risk	-	-	-
Short-eared owl[b]	*Asio flammeus*	S3B, S2N	Special Concern	Special Concern	Schedule 1	-
Turkey vulture	*Cathartes aura*	S2B, S2M, S2N	-	-	-	-
Piping plover	*Charadrius melodus circumcinctus*	S3B	Endangered	Endangered	Schedule 1	-
Semipalmated plover	*Charadrius semipalmatus*	S1B, S5M	-	-	-	-
Yellow rail	*Coturnicops noveboracensis*	S3B, S2M	Special Concern	Special Concern	Schedule 1	-
Trumpeter swan	*Cygnus buccinator*	S3B	Not at Risk	-	-	-
Tundra swan	*Cygus columbianus*	S5M	-	-	-	-
Black-throated blue warbler	*Setophaga caerulescens*	S2B	-	-	-	-
Pileated woodpecker	*Dryocopus pileatus*	S4B, S3N	-	-	-	-
Rusty blackbird[b]	*Euphagus carolinus*	S4B	Special Concern	Special Concern	Schedule 1	X
Peregrine falcon[b]	*Falco peregrinus anatum*	S1B, S4M, S2N	Special Concern	Threatened	Schedule 1	-
Red-throated loon	*Gavia stellata*	S1B	-	-	-	-
Whooping crane	*Grus americana*	SXB, S1M	Special Concern	Threatened	Schedule 1	-
Bald eagle[b]	*Haliaeetus leucocephalus*	S5B, S4M, S4N	Not at Risk	-	-	X
Northern shrike	*Lanius excubitor*	S1B, S4N	-	-	-	-
Glaucous gull	*Larus hyperboreus*	S2N, S2M	-	-	-	-
Short-billed dowitcher	*Limnodromus griseus*	S1B, S4M	-	-	-	-
Connecticut warbler	*Oporornis agilis*	S2B	-	-	-	-
American white pelican	*Pelecanus erythrorhynchos*	S3B	Not at Risk	-	-	-
Red-necked phalarope	*Phalaropus lobatus*	S4B, S3M	-	-	-	-
Pine grosbeak	*Pinicola enucleator*	S2B, S4N	-	-	-	X
Caspian tern	*Hydroprogne caspia*	S2B, S2M	Not at Risk	-	-	-
Forster's tern	*Sterna forsteri*	S4B	Data Deficient	-	-	-
Barred owl[b]	*Strix varia*	S3	-	-	-	-
Northern hawk owl	*Surnia ulula*	S3B, S5N	Not at Risk	-	-	-
MAMMALS[b]						
Wolverine	*Gulo gulo*	S3	Special Concern	No status	No schedule	-
Cougar	*Puma concolor*	S2	-	-	-	-
Woodland caribou	*Rangifer tarandus caribou*	S3	Threatened	Threatened	Schedule 1	-
Barren-ground caribou	*Rangifer tarandus groenlandicus*	S3N	Special Concern	Special Concern	Schedule 1	X
AMPHIBIANS						
Northern leopard frog	*Lithobates pipiens*	S3	Special Concern	Special Concern	Schedule 1	-

Species shown in bold are those species with distribution ranges that overlap the local assessment boundary; all others have ranges that overlap the regional assessment boundary.

[a]Saskatchewan Conservation Data Centre Tracked Taxa List: Vertebrates (SKCDC 2015b), where,

S1 = extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals; critically imperiled; may be susceptible to extirpation because of some factor of its biology); S2 = rare (6 to 20 occurences in Saskatchewan or few remaining individuals; imperiled; may be susceptibe to extirpation because of some factor of its biology); S3 = rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places; vulnerable; may be susceptible to extirpation by large scale disturbances); S4 = common (more than 100 occurrences; generally widespread and aundant but may be rare in parts of its range; apparenlty secure but may be of long-term concern); S5 = very common (more than 100 occurrences; widespread and abundant, but may be rare in parts of its range; demonstrably secure); B = for a migratory species, rank applies to the breeding population in the province; N = for a migratory species, rank applies to the non-breeding population in the province; M = for a migratory species, rank applies to the transient population.

[b]As protected under the Wildlife Act (1998).

[c]Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2016), where,

species that is particularly sensitive to human activities or natural events but is not an endangered or threatened species; Not at Risk = a species that has been evaluated and found to be not at risk; Data Deficient = the available information is insufficient to resolve a species eligibility for assessment, or to permit an assessment of the species risk of

[d]Status under The Species at Risk Act (GC 2002).

[e]Assigned schedule under The Species at Risk Act (GC 2002).

Source: AREVA 2007.

Figure 1. Table 5.4-1 extracted from AREVA, TID Vol. 1 (2016), listing provincially tracked, and federal and provincial listed species at risk known or with potential to occur in the regional assessment boundary.

Table 3.1 Species at Risk that may occur in the local assessment boundary

Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Status	Notes
Birds				
Olive-sided flycatcher	*Contopus cooperi*	Threatened	Threatened	
Common nighthawk	*Chordeiles minor*	Threatened	Threatened	
Red knot, rufa subspecies	*Calidris canutus rufa*	Endangered	Endangered	Migrant only
Peregrine falcon	*Falco peregrinus*	Special concern	Special concern	Migrant only
Rusty blackbird	*Euphagus carolinus*	Special concern	Special concern	
Short-eared owl	*Asio flammeus*	Special concern	Special concern	
Yellow rail	*Coturnicops noveboracensis*	Special concern	Special concern	Outside range, occurrence unlikely
Barn swallow	*Hirundo rustica*	No Status	Threatened	Edge of range
Bank swallow	*Riparia riparia*	No Status	Threatened	
Red-necked phalarope	*Phalaropus lobatus*	No Status	Special concern	Migrant only
Buff-breasted sandpiper	*Tryngites subruficollis*	No Status	Special concern	Migrant only
Horned grebe	*Podiceps auritus*	No Status	Special concern	
Mammals				
Northern myotis	*Myotis septentrionalis*	Endangered	Endangered	
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	
Woodland Caribou, Boreal Population	*Rangifer tarandus*	Threatened	Threatened	
Caribou – Barren-ground population	*Rangifer tarandus*	No Status	Threatened	Edge of range
Wolverine	*Gulo gulo*	No Status	Special concern	
Amphibians				
Northern leopard frog – western boreal/prairie population	*Lithobates pipiens*	Special concern	Special concern	Edge of range, occurrence unlikely
Arthropods				
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	No Status	Endangered	Within range
Yellow-banded Bumble Bee	*Bombus terricola*	No Status	Special concern	Within range

Figure 2. Table 3.1 extracted from CNSC Staff (2017, ERA, p. 25), listing species at risk that may occur in the local assessment boundary.

Table 8.6 Provincially Tracked, Federal Listed and Provincial Listed Species at Risk Known or with Potential to Occur in the Regional Assessment Boundary

Common Name	Scientific Name	Tracked Provincial Species(a) (SCDC)	Listed Provincial Species(b) (Wildlife Act)(c)	COSEWIC(d) Listed Species (SARA)(d)	Observed or Sign Detected in the Local Assessment Boundary
BIRDS					
Canada Warbler	Wilsonia canadensis	S5B, S4M, S4N		Threatened	
Common Nighthawk	Chordeiles minor	S4S5B, S4S5M		Threatened	X
Cooper's Hawk	Accipiter cooperii	S4B, S2M, S2N		Not at Risk	
Boreal Owl	Aegolius funereus	S3B, S3N		Not at Risk	
Great Blue Heron	Ardea herodias	S3B			
Golden Eagle	Aquila chrysaetos	S3B, S4M, S3N		Not at Risk	
Olive-sided Flycatcher	Contopus cooperi	S4		Threatened	X
Short-eared Owl	Asio flammeus	S3B, S2N	Vulnerable or Special Concern	Special Concern	
Turkey Vulture	Cathartes aura	S3B, S2M, S2N			
Piping Plover	Charadrius melodus circumcinctus	S3B	Threatened and Endangered	Endangered	
Semipalmated Plover	Charadrius sempalmatus	S1B, S5M			
Yellow Rail	Coturnicops noveboracensis	S3B, S2M	Vulnerable or Special Concern	Special Concern	
Trumpeter Swan	Cygnus buccinator	S1B		Not at Risk	
Tundra Swan	Cygus columbianus	S5M			
Black-throated Blue Warbler	Dendroica carulescens	S2B			
Pileated Woodpecker	Dryocopus pileatus	S4B, S3N			
Rusty Blackbird	Euphagus carolinus	S4B		Special Concern	X
Peregrine Falcon	Falco peregrinus	S1B	Threatened and Endangered	Threatened	
Red-throated Loon	Gavia stellata	S1B			
Whooping Crane	Grus americana	SXB, S1M	Threatened and Endangered	Endangered	
Bald Eagle	Haliaeetus leucocephalus	S5B, S4M, S4N			X
Northern Shrike	Lanius excubitor	S1B, S4N			
Glaucous Gull	Larus hyperboreus	S2N, S2M			
Short-billed Dowitcher	Limnodromus griseus	S1B, S4M			
Connenticut Warbler	Oporornis philadelphia	S2B			
American White Pelican	Pelecanus erythrorhynchos	S3B		Not at Risk	
Red-necked Phalarope	Phalaropus lobatus	S4B, S3M			
Pine Grosbeak	Pinicola enucleator	S2B, S4N			X
Caspian Tern	Sterna caspia	S2B, S2M	Vulnerable or Special Concern	Not at Risk	
Forster's Tern	Sterna forsteri	S4B		Data Deficient	
Barred Owl	Strix varia	S3B, S3N			
Northern Hawk Owl	Surnia ulula	S3B, S5N		Not at Risk	
MAMMALS					
Wolverine	Gulo gulo	S3S4	Vulnerable or Special Concern	Special Concern	
Cougar	Puma concolor	S2S3			
Barren-ground Caribou	Rangifer tarandus	S3			X
Woodland Caribou	Rangifer tarandus caribou	S3	Threatened and Endangered	Threatened	
AMPHIBIANS					
Northern Leopard Frog	Rana pipiens	S3	Vulnerable or Special Concern	Special Concern	

Species shaded in yellow are those species with distribution ranges that overlap the local assessment boundary; all others have ranges that overlap the regional assessment boundary

S1 extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals; critically imperiled; may be susceptible to extirpation because of some factor of its biology)
S2 rare (6 to 20 occurrences in Saskatchewan or few remaining individuals; imperiled; may be susceptible to extirpation because of some factor of its biology)
S3 rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places; vulnerable; may be susceptible to extirpation by large scale disturbances)
S4 common (more than 100 occurrences; generally widespread and abundant but may be rare in parts of its range; apparently secure but may be of long-term concern)
S5 very common (more than 100 occurrences; widespread and abundant, but may be rare in parts of its range; demonstrably secure)
B for a migratory species, rank applies to the breeding population in the province
N for a migratory species, rank applies to the non-breeding population in the province
M for a migratory species, rank applies to the transient population

Figure 3. Table 8.6 extracted from CNSC (2012, pp.103-104), listing provincially tracked, and federal and provincial listed species at risk known or with potential to occur in the regional assessment boundary.

1.3 Species Surveys

SES was surprised to learn in the Submission by CNSC Staff that AREVA has not confirmed whether certain rare or endangered species occur in the area, specifically northern leopard frog (*Lithobates pipiens*), rusty blackbird (*Euphagus carolinus*), olive-sided flycatcher (*Contopus cooperi*)and common nighthawk (*Chordeiles minor*). The CNSC staff recommends that AREVA "confirms the presence or absence of these species in the LSA," presumably through appropriate surveys, and if they are found to be present, CNSC further recommends AREVA "submit a plan for further studies to assess the potential impact" (CNSC, 2017, ERA, p.10).

It is unclear if this statement refers to only olive-sided flycatcher, common nighthawk, northern leopard frog and rusty blackbird as referred to on page 10, or the full listing of species in Table 3.1, mentioned later on page 25. If the former, it is difficult to understand why these four species are specifically highlighted in the CNSC Staff Submission.

For its part, AREVA (EP TID Vol. 1, 2016) reports 2003 and 2004 "baseline field investigations" in the local assessment boundary, following up with "[a]n iterative approach was then used (involving ecosite phase classification and field surveys) to develop a list of potential wildlife species at risk occurring in the [Local Assessment Boundary], based on their documented distribution ranges and habitat requirements" (p.5-21). In Table 5.4-1 (AREVA, EP TID Vol.1, 2016), AREVA indicates that rusty blackbird, bald eagle, pine grosbeak and barren-ground caribou have been observed either directly or indirectly within the local assessment boundary. It is unclear if this detection is due to a concentrated survey effort or occurred by chance. From what is included in AREVA EP TID Vol. 1 (2016), SES concludes alongside CNSC staff, that surveys have not been conducted to determine the absence or presence of these species.

As AREVA's EP TID Vol. 1 (2016) notes, the Saskatchewan Conservation Data Centre is the organization responsible for evaluating a species' status within provincial boundaries and keeps up to date species lists with sub-national ranking levels on its website (http://www.biodiversity.sk.ca/). Recently, the Saskatchewan Conservation Data Centre released an interactive map for viewing rare and endangered species occurrences province-wide (SKCDC, 2017a). With the help of the staff at the Saskatchewan Conservation Data Centre, SES has used this tool to assess what species data the provincial government has for the McClean Lake Operation and surrounding area.

According to HabiSask, several species at risk have been identified in or near the Local Assessment Boundary for McClean Lake, including the Northern Hawk Owl and Olive-

sided Flycatcher. While this is noted in the Comprehensive Study for the Midwest Project (CNSC, 2012), it is not noted in AREVA's EP TID Vol. 1 (2016).

As the Submission by CNSC Staff mentions, species listed under Schedule 1 of the Species at Risk Act considered Threatened or Endangered possess legal protections under the Act, including the development of a mandatory recovery plan. Of the species listed in Table 3.1 this would apply to red knot (*Calidris canutus rufa*), northern myotis (*Myotis septentrionalis*), little brown myotis (*Myotis lucifugus*), olive-sided flycatcher (*Contopus cooperi*) and common nighthawk (*Chordeiles minor*). All of these species have recovery strategies developed by the Committee on the Status of Endangered Wildlife in Canada. If any of the eleven species listed in Table 3.1 that also are included in Schedule 1 of SARA do happen to occur in the Local Assessment Boundary, they are not benefitting from the legal protection afforded by this Act, the Migratory Bird Convention Act, or guidelines such as minimum setback distances. Further, sub-national rankings of these species are important. Furthermore, according to the Saskatchewan Conservation Data Centre, avoidance or mitigation is required for species with a provincial rank of S3 to S1 (SKCDC, 2017b).

Overall, as AREVA's TID Vol.2 (2016) notes, "[a]n important consideration in an environmental risk assessment is the determination of the presence or absence of species at risk." (p.4-4). In the view of the SES, it is unacceptable that AREVA has not yet determined absence or presence of rare species. **We support the CNSC staff's recommendation to determine the presence or absence of rare species in the area. We further recommend that data from these surveys is provided to the Saskatchewan Conservation Data Centre and Environment and Climate Change Canada to further work around rare species protection in Canada.**

1.4 Species Information

Olive-Sided Flycatcher (*Contopus cooperi*)

> This species has been identified near the MLO in previous surveys, according to HabiSask data (Table 1).
>
> According to COSEWIC, an estimated 900,000 individuals of this species breed in Canada, representing just over half of the global population. Researchers estimate the population decreases annually by 3.4 per cent.
>
> There is currently a lack of adequate data to assess critical habitat for this species and studies are ongoing. Critical habitat is expected to be identified by 2020; data that AREVA can provide to support these studies would be timely.

Probable significant threats relevant to the MLO include reduced availability of insect prey, fire suppression, deforestation and land conversion in nonbreeding habitat, forest harvesting, energy and mining exploration and extraction, and residential and commercial development.

The Olive-sided Flycatcher is protected by the Migratory Birds Convention Act, 1994, which prohibits the harming of birds and the disturbance or destruction of their nests and eggs.

Recovery plan: Environment Canada. 2015. Recovery Strategy for Olive-sided Flycatcher (Contopus cooperi) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vi + 51 pp. available online at http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_olive-sided%20flycatcher_e_final.pdf

Common Nighthawk (*Chordeiles minor*)

Ten per cent of the global population of common nighthawks are estimated to breed in Canada, in every province and territory except Nunavut. This species requires open ground or clearings for nesting, this includes open forests such as mixedwood and coniferous stands, burns and clearcuts and wetlands such as bogs, marshes, lakeshores and riverbanks that could occur in the MLO area.

Threats to the population identified by COSEWIC and relevant to the MLO area include loss or degradation of breeding habitat due to industrial activities.

This species is also protected under the Migratory Birds Convention Act (1994) and its regulations protect Common Nighthawk nests and eggs anywhere they are found, regardless of land ownership.

Recovery Strategy: Environment Canada. 2016. Recovery Strategy for the Common Nighthawk (Chordeiles minor) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vii + 49 pp. available at http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_common%20nighthawk_e_final.pdf

Red knot, rufa subspecies *(Calidris canutus rufa)*

The *rufa* subspecies of red knot breeds solely in Canada; there are an estimated 42, 000 members of this species left globally. According to COSEWIC there is uncertainty around critical habitat because the species is relatively elusive, particularly for inland freshwater habitats the birds use during spring and fall migrations. In Saskatchewan, stopover critical habitat has been identified

around the Quill Lakes, Last Mountain Lake and Chaplin Lake, but assessment is ongoing until 2025.

While there is currently limited data for this species in remote areas, the MLO site could potentially fit into the stopover critical habitat for this species. Activities Likely to result in the destruction of critical habitat that are relevant include industrial areas, mining activities and industrial effluents which may results in a permanent or temporary destruction of habitat.

Recovery plan: Environment and Climate Change Canada. 2016. Recovery Strategy and Management Plan for the Red Knot (Calidris canutus) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 54 pp. available online at https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_mp_red_knot_e_proposed.pdf

Northern Myotis (*Myotis septentrionalis*) and Little Brown myotis (*Myotis lucifugus*)

The territory of both the Little Brown Myotis and the Northern Myotis spans Saskatchewan, with the Northern Myotis limited to the boreal forest ecozone. The two species were emergency listed as Endangered in 2014 because of sudden and dramatic declines across the eastern portions of their ranges due to white-nose syndrome.

These species typically require hibernacula, maternity roosts and foraging areas. Typically, hibernacula for these species are subterranean features, such as caves or abandoned mines, but COSEWIC notes that less is known about sites used for hibernacula in western Canada. The locations of hibernacula are less known in Yukon, Saskatchewan, and Nunavut.

Threats relevant to the MLO include habitat loss and degradation (e.g., destruction or degradation of hibernacula, maternity roosts, and foraging areas), disturbance or harm due to industrial activity, pollution, and climate change.

Proposed Recovery Plan: Environment Canada. 2015. Recovery Strategy for Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis), and Tri-colored Bat (Perimyotis subflavus) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. ix + 110 pp. available online at http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_LittleBrownMyotisNorthernMyotisTricoloredBat_e_proposed.pdf

2. Physical Design

The Physical Design Safety and Control Area relates to activities that impact on the ability of systems, components and structures to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

2.1 Comment Relevance

AREVA has not included a section on Physical Design in their request for relicensing (AREVA, 2017). The Saskatchewan Environmental Society (SES) maintains that reassessing physical design, especially in light of future plans for the site, is necessary given new information arising over time. Specifically, this section outlines how climate change may impact operations and long-term maintenance of the MLO and surrounding environment.

2.2 Climate Change

SES considered what medium and long term external factors might impact the McClean Lake Operation (MLO) and the surrounding environment. We consider climate change and associated impacts the most important of these external factors, one which has the potential to significantly change the meteorological parameters that will impact the MLO to the end of the century. These changes are important, because, as AREVA EP TID Vol. 1 (2016) notes, "[m]eteorological mechanisms govern the dispersion, transformation and eventual removal of pollutants from the atmosphere." (p. 3-1). Despite noting this, AREVA EP TID Vol. 1 (2016) has compared climate data from 2000 to 2015 with past climate normals (1971-2000) in the Climate and Air Quality section. However, Section 3.1.3.2 of AREVA EP TID Vol. 1 (2016) excludes projections of future precipitation and in AREVA EP TID Vol. 2 (2016), which is supposed to depict "predictive risk modelling" there is no mention of climate change. SES found reference to changes in climate normals only in AREVA (2015), detailing plans for the Tailings Management Facility expansion.

Climate change is expected to contribute to both gradual changes in natural conditions and changes in the frequency, severity and timing of climate extremes. This means that the conditions that have historically characterized the climate around the MLO, including "long, cold winters and short, cool summers" (CNSC Staff, 2016, EAR p.21) with average annual precipitation measuring 387 mm, will no longer apply.

According to the Prairie Climate Centre[1], regions at high latitudes like Saskatchewan are expected to warm at nearly twice the rate of the global average temperature. Thus, in a high carbon future[2] where large amounts of carbon dioxide (CO_2) are continually produced, global concentrations of CO_2 could reach 540 parts per million

(ppm) by mid-century, corresponding with an average[3] 3.1 degrees Celsius temperature increase above pre-industrial levels in the prairie region.

In a low carbon future[4], assuming drastic action to reduce greenhouse gas emissions, global CO_2 concentrations could reach 485 ppm by 2050, corresponding with an average 2.8 degrees Celsius increase above pre-industrial levels in the prairie region.

Changes in the processes of precipitation accumulation and melt, alterations in the timing of precipitation, and a highly active precipitation cycle will contribute to water insecurity in the MLO region that is difficult to predict. AREVA EP TID Vol. 1 (2016) correctly notes that "the quantity of precipitation strongly affects the rate at which pollutants such as fugitive dust are released to the atmosphere." (p. 3-1). However, Section 3.1.3.2 of AREVA EP TID Vol. 1 (2016) states that the Rainfall Frequency Atlas of Canada by Hogg and Carr (1985) is the most appropriate method to calculate precipitation that is likely to be observed over long time periods, from 50 to 100 years. This is despite noting that this method used to calculate precipitation totals between 2010 to 2015 underestimated observed amounts. Further, 24-hour probable maximum precipitation specifically does not take into account long-term climatic trends. AREVA EP TID Vol.1 (2016) notes that "standard practice within the industry is to design containments to store a 'Regional Storm' (typically the largest storm of record) and to pass the probable maximum flood (PMF)." (p.3-4). SES suggests these methods and principles are insufficient for planning purposes as we head into a century of increasing climatic variability and uncertainty.

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[1] The Prairie Climate Centre (PCC) is a collaboration of The University of Winnipeg and The International Institute for Sustainable Development, providing high quality data and maps depicting expected climate changes for the prairie provinces of Canada.

[2] The PCC's high carbon future scenario is based on the representative concentration pathway (RCP) 8.5 adopted by the Intergovernmental Panel on Climate Change in their fifth Assessment Report (AR5) published in 2014. Each of the RCP's used by the IPCC in AR5 (RCP2.6, RCP4.5, RCP6, RCP8.5) describes futures that are considered possible depending on how much greenhouse gases are emitted in the years to come.

[3] The "average" refers to the average temperature derived from a range produced from 12-model suite global climate models (ACCESS1.0, CanESM2, CCSM4, CNRM-CM5, CSIRO-Mk3-6.0, GFDL-ESM2G, HadGEM2-CC, HadGEM2-LR, INM-CM4, MPI-ESM-LR, MRI-CGCM3, MIROC5). This data originates from Pacific Climate Impacts Consortium, which has statistically downscaled data available on its website pacificclimate.org.

[4] The PCC's low carbon future scenario is based on the RCP 4.5 adopted by the Intergovernmental Panel on Climate Change in their fifth Assessment Report (AR5) published in 2014. Each of the RCP's used by the IPCC in AR5 (RCP2.6, RCP4.5, RCP6, RCP8.5) describe futures that are considered possible depending on how much greenhouse gases are emitted in the years to come.

According to the PCC, precipitation, largely in the form of rain, is projected to fall more abundantly particularly in the spring and fall. Average precipitation around the Wollaston Lake area is expected to increase by approximately 25 mm by mid-century and 30 mm to 40 mm by the end of the century. As the atmosphere warms, the Intergovernmental Panel on Climate Change predicts a trend of increased frequency of extreme heavy or torrential rainfall events. In the United States, the National Oceanic and Atmospheric Administration has observed a 10 to 74 per cent increase in heavy rainfall events (more than 2 inches in 48 hours) from 1958 across the country, with States directly below Saskatchewan receiving 21 per cent of rainfall events as heavy downpours. This coincides with the climate projections in the TMF Expansion documents, expecting an increase in the order of 25 per cent for extreme events.

Over decades, these precipitation changes have the potential to reduce the stability of the site, causing erosion and shallow slope failure, and dislodging contaminants so that they are more likely to move into downstream water bodies.

Thus, each remedial measure planned on site should be assessed for whether its design is adequate to withstand many decades of heavier, more intense precipitation. This is particularly pertinent when considering tailings and waste rock cover.

At the same time, it is also expected to be hotter by mid-century, increasing the odds of extreme heat days and higher rates of evapotranspiration.

While these models can predict changes in temperature and precipitation patterns, it is more difficult to predict the cumulative and cascading impact on Saskatchewan's ecosystems. The rapid pace of global climate change will give species very little chance to adapt or evolve to changing conditions; the pressure on rare and endangered species will intensify. Specifically, climate change is expected to alter the phenology (timing of lifecycle events) of species; this has already been observed worldwide (Root *et al*., 2003)

According to the Intergovernmental Panel on Climate Change, the Boreal Shield Ecozone in which the MLO resides is more sensitive to climate changes than other types of forests. Climate change is expected to shift ecozone boundaries north and change patterns of natural disturbance. In particular, forest fires are predicted to increase in frequency and intensity (Yale, 2017).

While we note AREVA's effort to include climate change projections in AREVA (2015) in regard to the Tailings Management Facility soil cover, the potential of these changes should be taken into account in both the Request for a Licensing Decision and the Decommissioning Plan.

3. Environmental Protection

The Environmental Protection Safety and Control Area covers programs that identify, control and monitor releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

3.1 Comment Relevance

In this section the Saskatchewan Environmental Society (SES) notes several issues around the release of hazardous substances to the environment, notably selenium. Effects on the environment not considered are also noted.

3.2 Environmental Impacts Not Considered

AREVA's EP TID Vol. 2 (2016) presents "predictive risk modelling" to "support current and future licensing applications and environmental assessments" (p.xxvii). Table 4.3-1 in AREVA EP TID Vol. 2 (2016) shows species at risk considered for inclusion in this risk assessment. This table is depicted below in Figure 4. Due to the gaps between species lists mentioned in the section above, there are several species that should be added to this list for consideration, including red knot (*Calidris canutus rufa*), northern myotis (*Myotis septentrionalis*), little brown myotis (*Myotis lucifugus*), olive-sided flycatcher (*Contopus cooperi*), common nighthawk (*Chordeiles minor*), barn and bank swallow (*Hirundo rustica and Riparia riparia*), buff-breasted sandpiper (*Tryngites subruficollis*), horned grebe (*Podiceps auritus*), and two species of bumble bees (*Bombus bohemicus and Bombus terricola*).

All of these were identified as being within the Local Assessment Boundary for the MLO in the Submission by CNSC Staff (CNSC Staff, EAR, 2017), as listed in Figure 2 in section 1.2 above. Furthermore, as AREVA's EP TID Vol. 2 (2016) notes, species at risk are required to be assessed individually, and this should be the case for those species listed in CNSC Staff EAR (2017), but not in AREVA TID EP Vol.1 (2016).

Another consequence of excluding some species at risk from those being considered is that some of these species have diets and habitat selection unlike other species selected for analysis during the risk assessment in AREVA TID Vol. 2 (2016). For example, olive-sided flycatcher, listed in SARA Schedule 1 as Threatened, almost exclusively feed on flying insects including bees, wasps, flies, moths, and grasshoppers (Environment Canada, 2016). In contrast, the only other insect eating bird chosen for assessment, rusty blackbird, feeds primarily on aquatic insect larvae. Interestingly, AREVA's EP TID Vol.2 (2016) notes that the willow ptarmigan serves as a representative for the olive-sided flycatcher (despite reportedly eating foliage, fruits, flowers and woody vegetation) and then later says that the rusty blackbird also serves as a representative for olive-sided flycatcher, as an insectivore, on page 4-10. This is an inconsistency.

Table 4.3-1 Species at Risk for Consideration

Common Name	Scientific Name	Observed in Region: Y/N	COSEWIC Designation	Selected for Inclusion?	Comment
Amphibians					
Northern Leopard Frog	*Lithobates pipiens*	N	Special Concern	Y	The local study area is near the northern fringe of the northern leopard frogs range; during spring, northern leopard frogs breed within small waterbodies containing emergent vegetation. Although suitable habitat for northern leaopard frogs is present within the study area, no northern leopard frogs have been recorded, which may be related to the short breeding and rearing season (i.e., length of ice-free period) (Volume 1 of 2016 EP TID).
Birds					
Rusty Blackbird	*Euphagus carolinus*	Y	Special Concern	Y	The rusty blackbird has been observed within the local assessment boundary (Volume 1 of 2016 EP TID).
Peregrine Falcon	*Faloc peregrinus anatum*	N	Special Concern	N	Peregrine falcon have the potential to occur in the local assessment boundary, but have not been observed (Volume 1 of 2016 EP TID). Similar diet to eagle; selected as representative for peregrine falcon exposures.
Short-eared Owl	*Asio flammeus*	N	Special Concern	Y	While the species breeding range includes northern Saskatchewan (COSEWIC 2008) the short-eared owl has not been observed within the local assessment boundary (Volume 1 of 2016 EP TID). As an avian species feeding mainly on small mammals, short-eared owl was selected for the assessment.
Yellow Rail	*Coturnicops noveboracensis*	N	Special Concern	N	The yellow rail breeding range includes most of Saskatchewan (COSEWIC 2001). However, yellow rail have not been observed within the local assessment boundary (Volume 1 of 2016 EP TID). Similar diet to scaup; selected as representative for yellow rail exposures.
Mammals					
Wolverine	*Gulo gulo*	N	Special Concern	N	Wolverine were identified as potentially occurring within the local assessment boundary; however none have been observed (Volume 1 of 2016 EP TID). Although the wolverine is listed as a special concern in COSEWIC, it has not been identified in SARA. Exposures represented by other carnivore mammals.
Woodland Caribou	*Rangifer tarandus caribou*	N	Threatened	Y	Woodland caribou have the potential to occur in the local assessment boundary, but have not been observed (Volume 1 of 2016 EP TID). Selected for assessment.

Note: species at risk identified in Volume 1 of 2016 EP TID as potentially occurring within the local assessment boundary.

Figure 4. Table 4.3-1 extracted from AREVA EP TID Vol.1 (2016), listing species at risk for consideration during the risk assessment.

It does not appear to SES that any impacts to the environment - other than exposure to radionuclides, non-radionuclides, constituents of potential concern and emissions – have been considered in this risk assessment. While AREVA maintains they are not proposing new activities in their request for re-licensing (AREVA, 2017), their current licence already provides them with the ability to pursue a wide range of possible activities, including:

- The operation and modification of a nuclear facility for the mining of uranium and the production of uranium concentrate (U_3O_8) at the McClean Lake Operation;
- The ability to mine a nuclear substance (uranium ore);
- The consent to produce a uranium concentrate; and
- Import, possession, use, storage, transfer and disposal of nuclear substances and radiation devices (AREVA, 2017).

AREVA (2017) also provides a long list of activities that may commence over the licence term. These activities include, but are not limited to, relocating the JEB TMF contaminated landfill, construction to expand the JEB TMF, mining at the SABRE site or in any of the McClean Lake orebodies, and receipt and/or disposal of ore and waste rock from Cigar Lake. AREVA is requesting a licence be granted for twelve years, and any of these activities may occur across this time period.

From our perspective, these activities, if pursued, could result in a variety of interactions with the environment, for instance during site clearing and construction, the use of transportation corridors, increased production of dust and noise pollution, spills during transportation and construction or in seepage from ore stockpiles and the tailings management facility.

The Comprehensive Report for the Midwest project (CNSC, 2012) suggests these impacts could lead to a variety of environmental impacts such as reduced water and habitat quality, soil erosion, direct losses of soil, vegetation and wildlife, habitat fragmentation, sensory disturbance to wildlife, altered wildlife behavior and movement, or changes to chemical properties. In terms of the Midwest Project, CNSC (2012) considered some of these activities would lead to a "significant" impact on the environment in terms of magnitude, extent, duration, reversibility, frequency and likelihood (See Tables 9-2 and 9-4 in CNSC (2012)). It is logical to assume similar impacts would occur at the MLO site for similar types of activities. **Therefore, SES suggests these potential impacts be considered in risk assessments associated with the environmental performance of the MLO and further used to assess this application for re-licensing**. As the goal of AREVA's TID Vol. 2 (2016) is to support licensing applications, it is vital that environmental impacts other than those related to the exposure to radionuclides, non-radionuclides, constituents of potential concern and emissions are considered. Habitat fragmentation, altered species behaviour and continued human disturbance in particular can have a significant impact on species over extended periods of time.

SES further suggests that mitigation measures for potential impacts – such as those suggested in the last column of Table 9.3 in CNSC (2012) – be included in the requirements for relicensing.

3.3 Selenium

In AREVA EP TID Vol. 2 (2016), SES notes that risk assessment modelling anticipates substance limit exceedances that will impact the environment, specifically for selenium. These limit exceedances are largely associated with the processing of Cigar Lake ore. Three scenarios for selenium concentrations in effluent from the JEB Waste Treatment Plant are modelled in AREVA EP TID Vol. 2 (2016) – a base case (100 µg/L), scenario 2 (treatment implemented in 4 years; 10 µg/L) and scenario 3 (treatment implemented in 4 years; 40 µg/L). Impacts to a variety of organisms are identified.

Results indicate that impacts to the environment due to selenium exposure are wide-ranging – across selenium scenarios, geographically and through time. Table 5.3-2 (AREVA EP TID Vol.2, 2016) indicates a predicted concentration of selenium in tissues exceeding guidelines between 41 per cent (scenario 2) and 58 per cent (base case) of the time in Sink, Vulture, McClean or Kewen Lake between 2016 and 2100.

Even in scenario 2, representing the best case scenario for selenium treatment technology, impacts are predicted for many species, including mink, mallard, muskrat and scaup. According to AREVA EP TID Vol.2 (2016), "[t]he effects of selenium are most apparent in egg-laying vertebrates... Several species that depend on the aquatic environment (mallard, merganser, mink, muskrat, scaup, and potentially eagle) as well as terrestrial birds that eat emergent aquatic insects (blackbird) were identified as a concern from exposure to selenium." (p.7-7). Selenium levels are expected to result in reproductive effects in northern pike in Sink and Vulture Lakes (AREVA EP TID Vol. 2, 2016), and it has been shown that selenium concentrations can be up to an order of magnitude higher in fish eggs than in fish muscle tissue (Casey and Siwik, 2000). These elevated concentrations could also reflect the presence of contaminants in lake sediments and lower trophic levels.

While SES appreciates that AREVA has recognized this problem and has taken several steps to address it – including continual improvement initiatives, initiating evaluation of treatment technologies (zero valent iron and BioteQ Selen-IX Process), development of a Selenium Risk Management Plan (accepted by CNSC staff in 2016), development of a field studies plan and risk-based criteria for the McClean Lake East Basin – SES remains concerned that the environment is continually being exposed to unacceptably high levels of selenium while these initiatives are developing. While it is unclear to us which scenario as modelled in AREVA EP TID Vol.2 (2016) will come to resemble reality, CNSC Staff EAR (2017) indicate that interim administrative and action levels have been set for

selenium in AREVA's Selenium Risk Management Plan, of 0.084 mg/L and 0.112 mg/L respectively (p.14). This is 84 µg/L and 112 µg/L, significantly above the 1.5 µg/L water quality criterion for the protection of aquatic life recommended by the United States Environmental Protection Agency and used as a desirable endpoint in Table 5.3-1 in AREVA EP TID Vol. 2 (2016). While CNSC Staff EAR (2017) state that "AREVA has submitted an update on selenium risks that provided a forecast of expected selenium concentration in treated effluent [predicting] concentrations will be much lower than those assumed in the ERA (at or below 40 µg/L)" (p.10) it is difficult for SES to comment further on this without access to the November 2016 forecast mentioned.

Further, AREVA has four years to actually implement a selenium treatment technology – a treatment technology that CNSC Staff (2017) indicate will be subject to the principles of BATEA (Best Available Technology Economically Achievable) and ALARA (As Low As Reasonable Achievable). While AREVA (2017) indicates some improvement initiatives (such as changes to the leaching and tailings neutralization processes) will be implemented in the meantime, some of the so-called mitigation measures described by CNSC Staff EAR (2017), such as increased water quality monitoring and supplemental studies, should not be considered mitigation, as they do not actually reduce impact. Rather, the results of studies may support mitigation efforts in the future.

Ultimately, because selenium effluent concentrations have been increasing and because a treatment technology will not be implemented (let alone effective) until 2020, it is questionable whether the following statement from CNSC Staff EAR (2017) is valid: "[b]ased on review and assessment of the results presented in AREVA's reports and compliance verification activities, CNSC staff conclude that the effluent monitoring program currently in place for the McClean Lake Operation continues to provide adequate protection to the environment." (p.14).

This brings us to issues that will be more fully described below in Section 8 of our submission, namely ambiguity of terms and defining acceptable levels. Why are economic principles guiding the selection of treatment technologies when concentrations of toxic chemicals are presently not kept below limits where harm is imposed on the environment? What does "reasonably achievable" mean? Is it reasonable that a milling operation can continue with no technology in place that can reduce toxic chemicals to below levels that are shown to harm the environment?

AREVA EP TID Vol. 2 (2016) frequently refers to impacts being "limited" to the Sink and Vultures Lakes Treated Effluent Management System, referred to as S/V TEMS, or the western portion of McClean Lake. It appears as if these regions are considered "sacrifice areas" – an accepted impact in the name of continuing operations. Sink Reservoir receives continuously contaminated effluent and the water level is very low where effluent enters the reservoir, to the extent that the northeast section of the lake is

practically dry, except for the effluent stream. Effluent does not get diluted to the extent necessary to assure concentrations below Canadian Council of Ministers of the Environment guidelines. The effluent discharge eventually enters reservoir water but the effluent current does not readily mix with the surrounding water, again limiting dilution and preserving elevated contaminant concentrations.

While the name may have been changed to "reservoir," SES respectfully reminds CNSC and AREVA that S/V TEMS refers to lake ecosystems, Sink Lake and Vulture Lake, both of which have wildlife and plant species depending on them. **While Sink Lake has been sacrificed in the water decontamination process, water contaminant levels from Vulture and McClean Lake should remain negligible to reduce the impact of the mill on the environment.** We believe the local populations should be able to drink water and consume fish and animals from Vulture Lake and McClean Lake without any concerns of exposure to harmful contaminants.

While an ideal situation from the SES perspective would be to halt mining activities until it can be demonstrated that technology is in place to limit toxic chemical releases to levels below those that would harm the environment, we recognise the need to compromise. Surveys commissioned by AREVA (2017) indicate the public has ranked the environmental impact associated with uranium mining higher than issues such as economic diversification and employment, demonstrating desire amongst the public for robust environmental protection (more on this in Section 7 below). We understand that the technology is not yet in place to achieve reasonable effluent concentrations. However, it is not unreasonable from our perspective to hold off operations and the release of contaminated effluent before the process is fully optimized.

To this end, SES makes the following recommendations:

- **To accurately quantify acceptable contaminant concentrations in treated effluent, the fluid dynamics of the water bodies should be taken into consideration and contaminant concentrations should be calculated as a function of (1) the volume of the water body that the effluent flows into and (2) water mixing dynamics in the water body.**
- **Until technology can be implemented that can reduce the concentration of selenium to below 10 µg/L, AREVA should reduce the percentage of Cigar Lake ore included in the milling mix and prioritize stockpiled ore milling;**
- **If a 12-year licence is granted, SES recommends that CNSC require AREVA to cap selenium releases in 2017 and meet declining concentration benchmarks across the 12 year period.**

- **If a 12-year licence is granted, SES recommends that CNSC build in requirement that requires AREVA to report on selenium concentration reductions on an annual basis;**

- **Prioritize prevention rather than remediation. Initial costs may be higher, but remediation costs could eventually be much higher with even unsatisfactory results. Therefore, AREVA should be encouraged to (1) continue optimizing its effluent treatment process to assure a higher standard of water quality and (2) consider using a combination of alternative methods such as permeable reactive barriers to prevent the formation of underground contaminant plumes.**

- **To avoid Sink Lake, Vulture Lake and sections of McClean Lake becoming "sacrifice areas", SES recommends CNSC require AREVA to outline a remediation plan for those areas where environmental impacts due to selenium exposure are predicted, based on the level of selenium reductions AREVA is able to achieve across the licence period granted.**

- **SES recommends AREVA clearly articulate in the plain language summary the trade-offs associated with potential "sacrifice areas" or different selenium scenarios where they exist. This addition should explain (1) why impacts to wildlife in the S/V TEMS, and downstream waterbodies should be considered acceptable risks and (2) why allowing AREVA to continue milling operations when they cannot yet economically achieve lower selenium concentrations should be considered reasonable.**

3.4 Subsurface Contaminant Flow Management

Tailings stored in the JEB Tailings Management Facility are in direct contact with groundwater without any barrier to prevent contaminants leaching into the groundwater. The only hydraulic containment measure in place at present is the underdrain (AREVA HGM TID Vol.1, 2016, p.1-2). Arguably, downward groundwater flow along the pit walls and dewatering at the bottom of the pit prevent any contaminated water from reaching fresh water. The McClean Lake area exhibits an extensive network of faults, which in part intersect. In the JEB pit alone, more than 3300 different types of geological structures have been identified, meaning the area is subject to instability (AREVA HGM TID Vol.1, 2011). The McClean Lake area exhibits an extensive network of faults, which in part intersect. The interconnection of the subsurface waterways as well as between groundwater and surface water bodies should not be underestimated. Hydraulic conductivity of the Athabasca Formation varies vertically where the upper sandstone, except for the fractured part, has a lower hydraulic conductivity than the lower sandstone, and the Athabasca Group comprises several aquifers. It appears as if the linkage of aquifers through fractures and faults have not been taken into

consideration. **Because of numerous fractures and faults and a shallow groundwater table, SES maintains it is crucial to minimize contact between groundwater and mine tailings and to release highly efficiently treated effluent to the environment to provide a healthy environment for centuries to come.**

It is unrealistic to expect negligible ground and surface water contamination after the dewatering of tailing pits will have ceased. **Sustainable, long-term, preventive alternative methods, such as permeable reactive barrier technology, to filter out contaminants before they reach the environment surrounding the containment facility should already be considered and adopted.**

CNSC Staff EAR (2017) states, "[g]roundwater does not pose a direct risk to human health or the environment, as it is not used as a drinking water resource." (p.33). This is not factual, as groundwater replenishes surface water, wildlife and plants depend on that water. Additionally, it is difficult to predict population trends over the lifespan of the mine and its legacy. Future generations of humans may depend on these water sources.

Section 3 of CNSC Staff EAR (2017) provides various arguments suggesting a lack of significant effects on groundwater quality. For example, AREVA states there are no significant trends in groundwater quality, except for the groundwater under the Sue clean rock waste stockpile where a contaminant plume is forming. SES argues that this plume could lead to significant contaminant concentrations in surface waters as this groundwater recharges the nearby Bena Lake. **While AREVA states that the water quality should not be affected, they should be required to provide solid evidence that no impact will arise.**

SES recommends that CNSC require AREVA to address the following issues: (a) tailings in direct contact with groundwater once treat-and-pump will have ceased and release of contaminants in groundwater, (b) the contaminant plume flowing between Sue clean rock waste pile and Bena Lake and (c) treated effluent flowing into the Sink Reservoir with insufficient dilution and dispersion.

3.5 Water Balance

SES notes the dewatering pump-and-treat method used at McClean Lake disturbs the local water balance. **Efforts should be made to identify the impacts of the dewatering of pits on the water table and consequently on the surface ecological environment**. Moreover, it removes a large quantity of water from the local hydrological cycle. Groundwater that is redirected to the surface is subject to both evaporation and downflow in streams, and leaves the local hydrological cycle. Although detailed background studies have been performed, **SES would be interested in reading more**

about the groundwater recharge rates, the age of the groundwater being extracted by the mill operations and variations in groundwater water table levels over the last two decades. The large volume of groundwater being pumped through continuous pit dewatering at the JEB Tailings Management Facility alone is more than 2 400 million m^3/day (AREVA HGM TID Vol.1, 2016). Pit dewatering may not always affect the local water table level significantly but it could have an impact at a regional scale. In fact, the Isis and Osiris lakes in the JEB area are influenced by dewatering (AREVA EP TID Vol.2, 2016, p.iii).

3.6 Air Contamination and Deposition of Particulate Matter

In August 2016, 4400 m^3 of effluent with pH above action level were released from the Sue Water Treatment Plant into the Sink reservoir (AREVA, 2017). The action level was 9 and two discharges had levels 9 and 9.15. **While CNSC Staff EAR (2016) states that effects on the environment were negligible, it is important to report quantitatively the effects on the environment to the public and to define precisely the term 'negligible'.** Otherwise, such a statement becomes subjective and lacks transparency.

In 2009 and 2015, high levels of sulphur dioxide (SO_2) were released in the ambient air. More specifically, in 2009, very high SO_2 levels were emitted. AREVA (2017) notes the calciner stack was extended and the air flow velocity was increased to improve dispersion and air quality around the mill. **Based on average wind direction and speed, modeling of the dispersion process around the calciner stack should be performed to identify the contaminant distribution areas.** Contaminants may travel long distances before precipitating as particulate matter. Plants and soil from potentially contaminated areas should be tested accordingly.

4. Waste Management

Waste management covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. This area also covers the planning for decommissioning.

4.1 Comment Relevance

In this section the Saskatchewan Environmental Society (SES) provides comments and recommendations specific to the plans to expand the facility used to store liquid waste (tailings). We also provide several comments related to the Preliminary Decommissioning Plan.

4.2 Expansion of the JEB Tailing Management Facility

As part of the JEB Tailings Management Facility Optimization Project, SES notes AREVA plans to install a bentonite amended liner up to 443 mASL instead of 429 mASL. Given the plans to increase milling capacity and also store waste from other mining operations, SES considers this suggestion to increase the storage capacity of the JEB Tailings Management Facility risky. Tailings would be stored at the level of till sediments, which could enhance the risk of contaminating ground water. Moreover, the consolidated tailings pile would lay above ground level and be prone to erosion from heavy to extremely heavy rainfalls, which will become more likely with climate change. Channels could rapidly form in the overburden cover of the consolidated pile in response to heavy rainfalls and erode deeper in the pile through these channels, thereby exposing the contaminated tailings. The geological record shows a 2 meter vertical displacement in the sandstone of the McClean area (AREVA HGM TID Vol.1, 2011), which suggests that a future faulting event could occur and disturb tailings and waste rock stockpiles.

Both the JEB Tailings Management Facility expansion and AREVA's other option, a Purpose-Built Tailings Management Facility, could involve strong adverse effects for the environment. The construction of a Purpose-Built Tailings Management Facility would disturb a larger area, and involve additional dewatering, tailings transport and the storage of a large amount of waste rock. However, constructing a new pit may become an inevitability in the future, reinforcing the reasons why we would not encourage AREVA to push the current JEB Tailings Management Facility past limits that could impact the environment. However, given what is known for the expected licensing term in terms of impact on the environment, SES tends to support the JEB Tailings Management Facility expansion, although the consequences for the environment, in the event of an unstable construction or extremely heavy rainfalls, could be catastrophic for Fox Lake and the surrounding area. **Our two major concerns about the JEB Tailings Management Facility expansion are (1) embankment failure and release of pond water and tailings solids to the environment and (2) groundwater contamination above the till/sandstone contact.**

If the JEB Tailings Management Facility expansion were to be approved, **SES strongly suggests that the soil cover system consisting of processed waste rock/till bentonite amended layer be as thick as possible and include additional available technology within the soil cover to mitigate contamination risks of surface water. The JEB Tailings Management Facility expansion design should assure that runoff from the tailings pile is caught so as to not flow directly into the surrounding water bodies. In addition, the plan should include the growth of vegetation as quickly as possible to avoid soil cover**

erosion due to wind and water. Such a wide-open exposed area would significantly disturb the surrounding ecosystem.

Slope stability and durability of the embankment design should be extremely carefully engineered because this aspect of the project is crucial to its long-term success.

SES also discourages the storage of demolition materials and contaminated waste in the JEB Tailings Management Facility to minimize the contaminant content of the JEB Tailings Management Facility material.

Finally, SES recommends that any further request to expand the JEB Tailings Management Facility should be denied.

4.3 Information Gaps in Preliminary Decommissioning Plan

Our initial review of the Preliminary Decommissioning Plan (AREVA, 2016b) was handicapped by gaps in the document. Appendix A (Figures) is blank. So is Appendix B (Financial Calculations). These gaps limited SES' ability to review the adequacy of funding for decommissioning.

The missing sections in AREVA (2016b) were provided to us by AREVA following our April 13th meeting. The cost calculations in Appendix B are broken down into a 2-year post-operation period and a subsequent decommissioning period. SES notes an inconsistency in costing for diesel fuel between tables B2.12 and B2.14 ($1.00 or $1.42 per litre?) in the decommissioning period.

Presumably fuel costs have been incorporated into the equipment costs in each Planning Envelope, rather than being separated out, but because we cannot see how much fuel will be used in total it is not possible to determine whether this cost inconsistency is significant.

4.4 Funding for Post-Decommissioning

The CNSC Regulatory Guide G-206 requires that "[d]ecommissioning plans that assume the need for post-closure licensing, monitoring, surveillance and maintenance of the decommissioned activities must include financial provisions for these actions". In Section 2.4 of AREVA (2016b) AREVA claims that "active controls will not be required post-closure", but acknowledges the need for an institutional control framework requiring administrative controls placed on future land use. In the financial planning, SES does not observe any provision for the costs the Government of Saskatchewan will incur in managing such administrative controls in perpetuity. In addition, although the hope is that the contaminant containment systems will perform perfectly forever, we must assume that periodic monitoring and perhaps maintenance will take place after the site is transferred to the Provincial Institutional Control Program. Indeed, AREVA (2016b)

indicates that "monitoring of effluents and emissions will continue as long as these releases persist". We cannot assume that the rate of release of contaminants will follow a smooth curve over time. If an increase in releases occurs after several quiet years it will presumably be because of a fracture or breakdown in a natural or engineered containment system. Where is the funding allocation provided for responsible care under ICP? **AREVA acknowledges that a funding allocation for responsible care under Institutional Control Program has not been included in the costing. SES recommends that it should be.**

4.5 Future Land Use

The Preliminary Decommissioning Plan (AREVA 2016b) provides a post-closure radiation objective that would lead to an incremental dose of no more than 1mSv/year above background level, and states that radiological release criteria for decommissioning will be based on future land use assessment involving local stakeholders. It is risky to assume that intensity of current land use is a good predictor of land use in the future. As the climate changes, and southern regions become less comfortable for human habitation, and as migration of environmental refugees increases, we may well see a significant increase in population in northern Saskatchewan. It may be a mistake to assume that people will only visit the area for hunting and trapping in perpetuity, and that their annual exposure would be based on very part-time occupancy. **SES recommends that AREVA be required to describe the exposure risks that would accompany year-round occupancy of the site, and further to describe how land use could be controlled over the very long-term future.**

4.6 Future of the JEB Tailings Management Facility

AREVA (2016b) describes the fate of many different contaminated or problem materials as "placement in the JEB TMF". In addition to accommodating the very significant planned increase in tailings, during decommissioning the pit is scheduled to receive quantities of waste rock, demolition debris, pond liners, concrete, tanks, ancillary buildings, residual ore and chemical reagents. It is unclear what the structural make-up and properties of the resulting mix of materials will be. The McClean Tailings Management Facility Expansion Project Description (AREVA, 2015) that was provided by AREVA following our April 13th meeting provides a detailed description of the alternatives considered for additional tailings storage space and how the decision was made to select the JEB Tailings Management Facility expansion as the most desirable option. This document acknowledges that there is uncertainty about the volume of additional storage space that will be required in the longer-term future, and that it may be necessary to eventually add another tailings facility. It is thus recognized that the process of on-going care and maintenance of the site does not have an identifiable end-point, and that the ultimate costs are extremely difficult to estimate.

4.7 Long-Term Maintenance

Many of the concerns raised about the industry relate to potential impacts on future generations. Given all the uncertainties about Saskatchewan's (or Canada's) future capacity to carry out remediation or maintenance over periods of several centuries, it is not re-assuring to be told basically that "if problems arise in the future, we'll fix them". While funding is generally allocated in decommissioning plans for future monitoring and maintenance, there is no assurance that the appropriate regulatory, information and management structures will be in place over an indefinite period of time. This leads to a need for current environmental protection strategies that are more robust than those commonly proposed.

OTHER MATTERS OF REGULATORY INTEREST COMMENTS

5. Licensee's Public Information Programs

5.1 Public Support

Section 4.2.1 of the Request for a Licensing Decision submitted by AREVA (2017) details public support for uranium mining in Saskatchewan. The Saskatchewan Environmental Society (SES) notes that the level of support generally for the industry has remained lower among northern residents than in Saskatchewan as a whole (77 per cent compared to 81 per cent in 2016) (AREVA, 2017). This is surprising, given the employment benefits of the industry experienced overwhelmingly in the north. Typically, employment benefits come hand in hand with the feeling of ownership that grants trust and a social licence to operate (Thomson and Boutilier, 2014).

SES would be able to comment more fully on this section if certain information were present. For instance, the graph referred to directly after Figure 4-2 (AREVA, 2017) depicting the "most frequently mentioned concerns" (p.4-7) appears to have been omitted. Although AREVA (2017) notes that about 20 per cent of those surveyed in the north have specific environmental concerns associated with uranium mining, SES did not originally have access to this AREVA Figure. After SES was able to meet with AREVA, we were supplied access to 2016 Situation Summary (Fast Consulting, 2016), which included this graph and others.

In the Situation Summary (Fast Consulting, 2016), SES notes that approximately 20 per cent of northerners surveyed in 2016 are concerned about the environmental impact of the uranium industry, and almost half of respondents in the north listed environmental impact as an important issue associated with uranium mining. In terms of issues,

environmental impact was also listed as more important than jobs, economic diversification, safety issues and waste management in the north, and in Saskatchewan overall. While a smaller percentage of people in Saskatchewan overall were concerned about the environmental impact of the industry, it was still the most frequently cited issue and concern across the province.

There is no information provided about public understanding of uranium mining and milling in Saskatchewan in Section 4.2 (AREVA, 2017). Public understanding is very different from public support. For instance, high levels of support paired with low levels of understanding would not gauge the true level of support for the industry among Saskatchewan residents. Ideally, the industry could enjoy high levels of support from informed residents.

The Situation Summary (Fast Consulting, 2017) also reports that 77 per cent of northerners are supportive of the uranium industry, while 43 per cent are strongly supportive. During our meeting with AREVA, SES raised concerns about the 23 per cent level of opposition in the north. AREVA staff however regard 77 per cent as a high approval rating, better than what is achieved in other jurisdictions. Owen and Kemp (2012) note that concepts like public support and social licence are often used to privilege the majority, while important concerns from marginalized groups fall to the wayside. These authors suggest that companies need to recognize and engage with expectation held by a broader suite of stake-holders.

SES suggests that this level of concern among local residents should not be regarded as satisfactory.

5.2 Social License

It is no secret among the academic literature that our current review processes for development are not always adequate to gain the trust and approval of local communities, often referred to as a social licence. These processes may be particularly challenging in the context of the poor historical legacy of the uranium mining industry in Saskatchewan. While we know better now, the industry still appears to be struggling with the issue of achieving a social licence.

As AREVA (2017) has implied in Section 4.1, gaining a social licence to operate is based on the beliefs and perceptions of the local communities. The general lack of support for uranium mining by one fifth of local residents, and less support in northern regions where mining takes place, reflects the degree of mistrust that SES has observed in other environmental review processes. Typically social licence is based on a site-specific basis, so while uranium mining in general may have high levels of support, a specific site may not (Thomson and Boutilier, 2014).

Social licence is a process which involves first gaining legitimacy, then credibility and then trust (Thomson and Boutilier, 2014). Commonly companies face a number of challenges in obtaining a social licence, such as viewing this process as a series of transactions rather than relationship-building, confusing technical credibility with social credibility, delaying stakeholder engagement, failing to give reliable information or failing to respect and listen to a community (Thomson and Boutilier, 2014). Local stakeholders sense a lack of respect when decisions are taken out of their hands, when they are told what they need, when how they experience things is assumed, and when the best way to mitigate negative impacts is decided for them (Moffat and Zhang, 2013). Owen and Kemp (2012) suggest the aims a "social licence" seeks to achieve is entirely incompatible with the paradigm of managing risks and maximizing returns that is observed in industry, and indeed in regulating bodies. From this perspective, gaining community trust becomes about managing the risk of increased expectations and opposition to the industry, rather than resulting in long-term sustainable engagement that is mutually beneficial (Owen and Kemp, 2012).

As mentioned earlier, companies do best in achieving the highest level of social licence – trust – when they engage in measures of joint ownership with local communities. This is where concepts like joint monitoring committees fit in. While some negative impacts are inevitable from all forms of development, truly collaborative approaches to mitigate impacts are shown to increase trust. Research suggests processes that create quality relationships are more important than attempting to offset the negative impacts of development through community investment and providing local employment (Moffat and Zhang, 2013).

Ultimately, these concepts go beyond the template provided for interveners, the thousand page documents, and technical nature of monitoring. Truly gaining the trust of local communities, specifically where it pertain to environmental protection, **requires AREVA to listen and respond to what individuals in a community expect, and do better than simply meeting the formal obligations associated with their licence to mill and mine** (Owen and Kemp, 2012).

5.3 Trust in Monitoring and Modelling Data

Concerns are sometimes raised about the fact that monitoring and modelling data are produced by the proponent rather than by an independent body. While we recognise that a limited Independent Monitoring Program is in place at McClean Lake, we also expect the CNSC to provide a good deal of the certainty that the public can rely on the accuracy of information supplied by the proponent. **In particular, we would like to see details of what takes place during a CNSC inspection.** Information about what assumptions are made in the modelling of long-term and cumulative impacts needs to be provided in accessible language.

With respect to the Independent Environmental Monitoring Program contracted to Canada North Environmental Services Ltd, we note that the monitoring sites used (in and around Kewen Lake) seem to be to the south and west of the McClean Lake operation. While this would be logical from the perspective of hydrological flow, we question why, in looking for air-borne contaminants, one would not monitor sites east of the mine site to take into account the prevailing winds from the west.

6. Other

6.1 Ambiguity of Language

This ambiguity of language is writ large in the present AREVA (2017) application, where the company submits that the necessary measures are in place to ensure that AREVA continues to conduct its operations "in a manner:

- To limit the risks to the health and safety of workers and the public;
- To limit the risks to the environment; and
- To limit the risks to national security."

"Limiting risks" is a very un-defined objective. So is ALARA; what does "reasonably achievable" mean? What is reasonable to a northern resident living off the land may not be reasonable to a corporate manager with investors to keep satisfied. Such ambiguity makes it possible for the proponent to claim that appropriate caution is being observed, while residents are not convinced that this is the case.

6.2 Acceptable Levels

One of the factors that make it difficult to evaluate the potential impacts of contaminants released into the environment is the proliferation of standards of acceptable levels of contamination. In various review documents we see references to "Effluent release limits", "Action levels", "Site specific objectives", "Interim administrative levels", "Saskatchewan Surface Water Quality Objectives for protection of aquatic life", "Lowest effect level", "Severe effect level" etc. Although we recognize that each one of these criteria is designed to serve a particular purpose, it is hard for the uninitiated to evaluate what is an appropriate level of contamination for them to accept. People generally do not have the opportunity to review how these levels were established, how conservative they may be, or what degree of assurance exists as to their reliability. In the current project, we learn that "decommissioning criteria for in-pit water and sediment quality will be defined on a site-specific basis following further study and discussion with the regulatory agencies." So we find people still feeling unconvinced that declared 'safe levels' are indeed safe**. SES recommends that a document written in**

clear accessible language be created which defines each term used in categorizing contaminant levels. The method of establishing each level should be described, along with how it should be used in planning and estimating risk.

6.3 Terminology

We had a considerable amount of difficulty determining the difference between RAB, LAB and LSA. Presumably, the regional assessment boundary (RAB) refers to the entire Athabsaca basin, although we could not find a specific reference to this. Instead, we assume this via inference based on Figures 2.4-2 in the Environmental Performance Technical Information Document, May 2016 (EP TID) volume 1. Is local assessment boundary the same as local study area?

6.4 Review Time

Finally, in the listing of generic concerns, we include the inadequacy of the time allowed for preparation of interventions in the review process. We would like to have been able to do a more thorough analysis of the information provided, and to seek out relevant information from other sources. Presumably the Technical Information Documents would fill many of the information gaps that we see in the licensing proposal and the CNSC staff review. This time the allocated review period is 18 working days (from the date documents were received and excluding weekends and statutory holidays). We believe that a more appropriate review time would be 30 working days to allow for gaps in accessing and studying additional information and arranging for consultation with the proponent.

Following a meeting on April 13th with AREVA staff, we were provided with an additional 2,500 pages of relevant documentation which we would have liked to have had time to review much more thoroughly than we were able to. We suggest that CNSC review what it hopes to accomplish through the involvement of participants such as ourselves, and whether the Commission might gain more value by allowing a longer review period.

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