

Policy and Practice Report

Municipal Wastewater, Pulp and Paper and Mining Effluents

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A. INTRODUCTION

1. This policy and practice report (“Report”) provides an overview of municipal wastewater, pulp and paper mill and mining effluent disposal practices, and of the various regulatory frameworks governing those practices in the Province of British Columbia.¹
2. This Report is limited to these three effluent sources, which are regulated or proposed to be regulated under section 36 of the *Fisheries Act*. It does not look at the many other point or non-point sources of effluents discharged to the Fraser River.²
3. The information contained in this Report is derived from documents disclosed to the commission or otherwise obtained through the commission’s investigations.³ The accuracy of this Report is therefore subject to the accuracy of the documents so provided or obtained. Descriptions of policy and program objectives, purposes, outcomes, reviews or other qualitative assessments contained in this Report are as provided in the documents cited and are not necessarily the views of the commission.
4. This Report does not purport to be comprehensive nor authoritative and does not assess the case authorities or statutes to which reference is made. This Report aims to provide a contextual background for the commission’s hearings on the

¹ In this Report, ‘municipal wastewater’ may refer to both sewage and stormwater effluents. ‘Regulatory framework’ refers to laws and regulations as well as policies, standards, directives and guidelines. ‘Effluents’ refers to wastewater, or liquid wastes, discharged from municipal wastewater systems, pulp mills or mining activities.

² For more on non-point sources of effluents discharged into the Fraser River, see the commission’s policy and practice report entitled “Overview of Freshwater Urbanization Impacts and Management” [hereinafter “Freshwater Urbanization PPR”].

³ The commission’s Terms of Reference direct the Commissioner to use the automated document management program specified by the Attorney General of Canada: Ringtail Legal. Source references in this Report, where possible, refer to the unique document identifier attached to a given document by Ringtail Legal. For such documents, citations refer to the Ringtail pagination, which may differ from the original pagination. References to “exhibits” refer to exhibits tabled at the commission’s evidentiary hearings. A full list of exhibits can be found at <http://cohencommission.ca/en/Exhibits.php>.

potential impacts of pulp and paper, municipal wastewater and mining on Fraser River sockeye. All issues that may be examined during the commission's hearings on these three subjects are not necessarily covered in this Report.

Introduction to Contaminants in Municipal Wastewater, Pulp and Mining Effluent

5. There are several human-caused point sources of toxic, bioaccumulative and persistent substances that are discharged to the Fraser River watershed and the coastal waters of BC. Pulp mills, mines and municipal wastewater collection and treatment systems discharge millions of litres of effluent into the habitats of Fraser River sockeye salmon on a daily basis, effluents containing contaminants that potentially may adversely affect Fraser sockeye.⁴
6. The contaminants present in municipal wastewater, pulp and mining effluents consist of physical, chemical and biological components, including suspended solids, oxygen-demanding matter,⁵ ammonia, metals and chlorinated organic compounds.⁶

⁴ This commission contracted for a study of the effects of contaminants on Fraser River sockeye salmon. Researchers developed an inventory of aquatic contaminants in the Fraser River Basin, including those originating from municipal, pulp, and mining effluents. More than 200 substances of concern were identified. See Cohen Commission Technical Report 2: Potential Effects of Contaminants on Fraser River Sockeye Salmon, Exhibit 826 ["Technical Report 2"], including Tables 3.1, 3.7, 3.15 and 8.1.

⁵ Oxygen-consuming organic matter decays and consumes the oxygen dissolved in the surrounding water. Dissolved oxygen ("DO") is essential to the metabolism of all aerobic aquatic organisms. Biochemical oxygen demand ("BOD") refers to the level of oxygen consumed by the biological breakdown, or decay, of organic matter over a given period of time. See Canadian Water Quality Guidelines for the Protection of Aquatic Life: Dissolved Oxygen (Freshwater), available online at ceqg-rcqe.ccme.ca/download/en/177/ [hereinafter "Canadian Water Quality Guidelines: Dissolved Oxygen (Freshwater)"] at 1. See also British Columbia Ministry of Water, Land & Air Protection (as it then was), Lower Mainland Region, Status of Water, Sediment and Fish Quality in the Lower Fraser River (Hope to the mouth), from 1971 to 2003 (March 2004), BCP000363 [hereinafter "Lower Fraser River Report (2004)"] at 7.

⁶ Environment Canada, Indicators and Assessment Office, Ecosystem Science Directorate, Environmental Conservation Service, The State of Municipal Wastewater Effluents in Canada, A State of the Environment Report (Ottawa: 2001), CAN025061 [hereinafter "State of Municipal Wastewater Effluents in Canada"] at 30; see Technical Report 2, *supra*, Exhibit 826 at 21, Tables 3.2, 3.16 and 3.17.

7. The single largest constituents of municipal wastewater effluents are the conventional contaminants of BOD and suspended solids (measured as total suspended solids (“TSS”).⁷ The amount of TSS and BOD discharged by large treatment facilities into receiving waters can be substantial, even with higher levels of wastewater treatment.⁸ Trace metals (*i.e.*, inorganic chemicals such as copper and lead) can be particularly harmful to aquatic life and enter freshwater systems on a regular basis through stormwater.⁹ Nutrients discharged by wastewater treatment plans, such as ammonia,¹⁰ may have acute, chronic and sub-lethal effects in fish.¹¹ Some organic chemicals, such as chlorophenols, polychlorinated biphenyls (“PCBs”) and polycyclic aromatic hydrocarbons (“PAHs”) are also found in municipal wastewater.¹² Municipal wastewater effluents are also a source of polybrominated diphenyl ethers (“PBDEs”), which are used as fire retardants in a variety of consumer products in Canada.¹³
8. Pulp and paper mills were historically a large point source of dioxins and furans in British Columbia. Extremely toxic even in small amounts, dioxins and furans historically were formed as by-products in the manufacture of chlorophenols from the chlorine bleaching process used the pulp and paper industry.¹⁴ Dioxins and furans also have a strong tendency to adsorb to sediments, bioaccumulate and

⁷ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 20-1.

⁸ *Ibid.* at 21.

⁹ Lower Fraser River Report (2004), *supra*, BCP000363 at 7.

¹⁰ Environment Canada reported in 2000 that freshwater organisms are most at risk from exposure to ammonia. State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 38.

¹¹ Canadian Council of Ministers of the Environment (“CCME”), Canadian Water Quality Guidelines for the Protection of Aquatic Life: Ammonia, in Canadian Environmental Quality Guidelines (Winnipeg: 2000), CAN024153 [hereinafter “Canadian Water Quality Guidelines: Ammonia”] at 4. The CCME is a forum composed of the 14 ministers of the environment of federal, provincial and territorial governments. The CCME has been responsible for numerous water quality initiatives, including water quality guidelines for the protection of aquatic ecosystems and human health. The ministers meet usually once a year or more to discuss and prioritize environmental issues of national importance. Wastewater Fact Sheet, *supra*; State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 108.

¹² Technical Report 2, *supra*, Exhibit 826 at 57; State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 58-9. See also Table 3.17.

¹³ Technical Report 2, *supra*, Exhibit 826 at 107.

¹⁴ *Ibid.* at 106; Lower Fraser River Report (2004), *supra*, BCP000363 at 24.

biomagnify up the food chain.¹⁵ Since regulations were enacted in the early 1990s, and consequent improvements in treatment processes, the amount of dioxins and furans released from pulp mills in the province has decreased significantly.¹⁶

9. Mines, and metal mines in particular, have the potential to adversely affect water quality conditions in receiving water systems.¹⁷ Substances typically associated with mine effluent discharges include mercury and other metals, hydrocarbons and cyanides, in addition to conventional variables such as TSS and pH.¹⁸
10. Effluent point sources are also often a source of certain endocrine disrupting compounds (“EDCs”). EDC is a term used to describe an array of substances, rather than a discrete class of chemicals. Some EDCs are persistent and bioaccumulative. The effects of EDCs on fish may include endocrine disruption, altered immune function, growth reduction, feminization and mortality.¹⁹
11. Physical and chemical characteristics of the receiving environment may influence the toxicity of municipal, pulp and mining effluents on fish: temperature, water hardness, background concentrations of nutrients and metals, acidity or alkalinity, and the nature of the receiving water body (*i.e.*, whether the receiving waters are freshwater or salt water).²⁰ For example, water hardness may affect

¹⁵ Lower Fraser River Report (2004), *ibid.*, BCP000363 at 24.

¹⁶ BC Ministry of Environment (“BC MOE”), Toxic Contaminants: Are Measures to Reduce Pulp and Paper Effluent Effective? available online at http://www.env.gov.bc.ca/soe/et02/06_toxic/halide.html.

National Assessment of Pulp and Paper EEM Data, *infra*; DI Johannessen and PS Ross, Fisheries and Oceans Canada, Institute of Ocean Sciences, Late-run Sockeye at Risk: An Overview of Environmental Contaminants in Fraser River Salmon Habitat – Canadian Technical Report of Fisheries and Aquatic Sciences 2429, Exhibit 833 [hereinafter “Johannessen and Ross 2002”], *infra*, at 34.

¹⁷ Technical Report 2, *supra* at 21.

¹⁸ *Ibid.* at 22.

¹⁹ Endocrine disruptors affect normal hormone function at the parts per billion or parts per trillion levels. Their effects on fish, such as vitellogenic changes linked to estrogen exposure, are widely documented. *Ibid.* at 103; Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 6; State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 59 or 60.

²⁰ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 28; Lower Fraser River Report (2004), *supra*, BCP000363 at 18.

the toxicity of metals (e.g. copper and lead) and most inorganic chemicals (e.g. chlorides).²¹ Bases, such as ammonia, may become more toxic to fish as water becomes more alkaline, whereas the toxicity of acids, such as sulphuric acid, decreases.²² The volume and flow of a receiving water body may determine its assimilative capacity, the capacity to dilute or assimilate effluent deposits, and consequently the extent of the toxicity occurring in the vicinity of the discharge.²³

B. LEGISLATIVE FRAMEWORKS

Federal Legislative Framework

Fisheries Act

12. The *Fisheries Act*²⁴ and its regulations provide the legislative authority for the management of fisheries and the protection of fish and fish habitat.²⁵ The *Fisheries Act* contains two primary provisions for the conservation and protection of fish and fish habitat, within the part of the *Act* entitled “Fish Habitat Protection and Pollution Prevention.”²⁶
13. Section 35 prohibits any work or undertaking that results in the harmful alteration, disruption or destruction (“HADD”) of fish habitat,²⁷ unless authorized by the Minister of Fisheries and Oceans or by regulations under the *Fisheries Act*.²⁸

²¹ Lower Fraser River Report (2004), *ibid.*, BCP000363 at 19-20.

²² State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 29.

²³ *Ibid.* at 29.

²⁴ *Fisheries Act*, RSC 1985, c. F-14.

²⁵ Legislative Framework Overview Policy and Practice Report (November 1, 2010) [hereinafter “Legislative Framework PPR”] at 7.

²⁶ See ss.34-42.1. “Fish habitat” is defined in subsection 34(1) as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes” [s.34(1)].

²⁷ S.35(1).

²⁸ S.35(2).

14. Section 36 is the primary pollution prevention provision in the *Fisheries Act*. It governs the deposit of municipal wastewater, pulp and mining effluents into Canadian fisheries waters.

Subsection 36(3)

15. Subsection 36(3) prohibits persons, except as authorized by regulation under the *Fisheries Act* or other federal legislation,²⁹ from depositing,³⁰ or permitting the deposit of, a deleterious substance of any type into water frequented by fish,³¹ or in any place under any conditions where the deleterious substance may enter any such water.³² Any person who contravenes subsection 36(3) is guilty of an offence.³³
16. 'Deleterious substance' is broadly defined, in section 34, to mean:
- (a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water; or
 - (b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water;
- and without limiting the generality of the foregoing includes:
- (c) any substance or class of substances prescribed pursuant to paragraph (2)(a);

²⁹ Ss.36(4) and (5).

³⁰ Subsection 34(1) defines "deposit" as any discharging, spraying, releasing, spilling, leaking, seeping, pouring, emitting, emptying, throwing, dumping or placing.

³¹ "Water frequented by fish" means Canadian fisheries waters [s.34(1)].

³² S.36(3).

³³ S.40(2).

(d) any water that contains any substance or class of substances in a quantity or concentration that is equal to or in excess of a quantity or concentration prescribed in respect of that substance or class of substances pursuant to paragraph (2)(b); and

(e) any water that has been subjected to a treatment, process or change prescribed pursuant to paragraph (2)(c).

17. In summary, a deleterious substance is any substance, class of substances, or water containing such substances that would degrade or alter the quality of water so that it is rendered deleterious to fish or fish habitat or to the use of fish by people.³⁴
18. Subsection 36(3) does not oblige Fisheries and Oceans Canada (“DFO” or “the Department”) or Environment Canada to take any positive steps to protect fish habitat from pollution. Rather subsection 36(3) provides the discretion to prosecute persons who violate this prohibition.³⁵
19. The Supreme Court of Canada upheld the predecessor provision to subsection 36(3) as constitutionally valid and *intra vires* federal legislative authority in *R. v. Northwest Falling Contractors Ltd.*³⁶
20. The focus of section 36 is on preventing harm to fish and fish habitat. To establish a violation of subsection 36(3), it is not necessary to prove that actual harm occurred to fish or their habitat. In *Fletcher v. Kingston (City)*,³⁷ the Ontario Court of Appeal held that the Crown need only prove the substance deposited meets the definition of “deleterious substance” in subsection 34(1). The

³⁴ Wastewater Systems Effluent Regulations and Regulatory Impact Analysis Statement, *Canada Gazette*, Part I, Vol. 144, No. 12 (March 20, 2010), available online at <http://gazette.gc.ca/rp-pr/p1/2010/2010-03-20/html/reg1-eng.html> [hereinafter “WSER RIAS”].

³⁵ See the commission’s policy and practice report entitled “Enforcement of the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*,” Exhibit PPR9, available at <http://www.cohencommission.ca/en/Exhibits.php> [hereinafter “Habitat Enforcement PPR”].

³⁶ [1980] 2 SCR 292, 113 DLR (3d) 1.

³⁷ (2004), 70 OR (3d) 577, 240 DLR (4th) 734 (Ont CA).

prohibition focuses on the deleterious nature of the substance released into the water, not on the quality of the receiving water after the substance is deposited.³⁸

21. In *R. v. MacMillan Bloedel (Alberni) Ltd.*,³⁹ the appellant was charged for unlawfully depositing a deleterious substance in waters frequented by fish, contrary to (then) subsection 33(2) of the *Fisheries Act*. The British Columbia Court of Appeal determined that the phrase “water frequented by fish” should not be interpreted narrowly so as to “restrict the enquiry to commercial fish present at the moment of the spill in the very drop of water into which the oil was spilled.” The Court held that the term “water” could not be restricted to the few cubic feet into which the substance was deposited, because to do so would “disregard the fact that both water and fish move.”⁴⁰
22. Subsection 36(3) has been applied to the discharge of sewage effluent. In *R. v. Dawson (City)*,⁴¹ the city pleaded guilty for discharging raw sewage directly into the Yukon River and was ordered to build a secondary sewage treatment plant.⁴²
23. In 1985, DFO and Environment Canada signed a Memorandum of Understanding outlining their respective responsibilities for the administration and enforcement of the pollution prevention provisions of the *Fisheries Act*.⁴³
24. Environment Canada Enforcement Branch officials are designated as inspectors under subsection 38(1) of the *Fisheries Act* and made responsible for enforcing

³⁸ *Ibid.* at paragraphs 36, 78.

³⁹ [1979] 4 WWR 654, 12 BCLR 29 (BCCA).

⁴⁰ *Ibid.* at paragraphs 5-8.

⁴¹ 2004 YKTC 69.

⁴² 2003 YKTC 16. Prosecutions against the cities of North Battleford and Quesnel are referred to in the Annual Report to Parliament on the Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* (April 1 2004 to March 31 2005), CAN015844 at 35, 45 and 46. See also *Chapman v. British Columbia*, 2007 BCPC 85.

⁴³ *Ibid.* For a description of how DFO has delegated the administration and enforcement of section 36 to Environment Canada, refer to Habitat Enforcement PPR, *supra*, Exhibit PPR9.

subsection 36(3).⁴⁴ Environment Canada enforces subsection 36(3) in accordance with the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*, November 2001 (“Compliance and Enforcement Policy”),⁴⁵ developed jointly with the DFO.⁴⁶

25. The Minister of Fisheries and Oceans must prepare annual reports to Parliament on the administration and enforcement of sections 35 and 36 of the *Fisheries Act*, in addition to statistical summaries of convictions.⁴⁷

Regulations under Subsection 36(5)

26. The Governor-in-Council has broad authority under section 43 to make regulations for carrying out the purposes and provisions of the *Fisheries Act*, including with respect to the pollution of waters frequented by fish.⁴⁸ Specific authority to enact regulations permitting the deposit of deleterious substances is provided in subsections 36(4) and (5) of the *Act*. As discussed in sections below, regulations exist under subsection 36(5) permitting the deposit of deleterious substances in pulp and paper effluents and in metal mining effluents. In addition, the Canadian government recently proposed the Wastewater Systems Effluent Regulations (“proposed Regulations” or “WSER”), as published in the *Canada Gazette*, Part I on March 20, 2010.⁴⁹

⁴⁴ Office of the Auditor General of Canada, 2009 Spring Report of the Commissioner of the Environment and Sustainable Development (Chapter 1), Exhibit 35 [hereinafter “CESD 2009 Report”] at 11. Section 38 gives the Minister the authority to appoint inspectors and analysts [s.38(1)] and describes inspectors’ powers, including to enter, inspect, and take samples [s.38(3)], search [s.38(3.1)], and to take or direct remedial measures [s.38(6)]. Subsection 39(9) provides for regulations that require reporting of abnormal deposits of a deleterious substance or substances that occur in contravention of the general prohibition, regulations or site-specific authorizations.

⁴⁵ For a discussion of the Compliance and Enforcement Policy, see Habitat Enforcement PPR, *supra*, Exhibit PPR9.

⁴⁶ Environment Canada, Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* – November 2001, available at Exhibit 693 and online at <http://www.ec.gc.ca/alef-ewe/default.asp?lang=En&n=D6B74D58-1>.

⁴⁷ S.42.1. See e.g. Annual Report to Parliament, 2007-2008, *supra*, CAN180495.

⁴⁸ S.43(h).

⁴⁹ Wastewater Systems Effluent Regulations, *Canada Gazette*, Part I, Vol. 144, No. 12 (March 20, 2010), <http://gazette.gc.ca/rp-pr/p1/2010/2010-03-20/html/reg1-eng.html> [hereinafter “WSER”].

27. In the Commissioner of the Environment and Sustainable Development's ("Commissioner") Spring 2009 Report ("CESD 2009 Report"), the Commissioner examined how DFO and Environment Canada administered the *Fisheries Act* to prevent pollution and protect fish habitat.⁵⁰ The Commissioner found that, of the six subsection 36(5) regulations in force, only the *Pulp and Paper Effluent Regulations* and the *Metal Mining Effluent Regulations* are actively being administered by Environment Canada. He described the other regulations, originating from the 1970s, as outdated, difficult to enforce and in need of reconsideration.⁵¹

Canadian Environmental Protection Act

28. The *Canadian Environmental Protection Act* ("CEPA")⁵² is the primary federal legislative instrument for preventing pollution.⁵³ Environment Canada and Health Canada jointly administer *CEPA*. Together, these departments assess and manage the risks associated with new and existing toxic substances.⁵⁴ Under

⁵⁰ See CESD 2009 Report, *supra*, Exhibit 35; Fraser River Sockeye Salmon: Past Decline. Future Sustainability? Interim Report (October 2010), available on the commission website at http://www.cohencommission.ca/en/pdf/InterimReport/05_CohenCommissionInterimReport.pdf#zoom=100 at 127.

⁵¹ CESD 2009 Report, *ibid.*, Exhibit 35 at paragraphs 1.114-1.1116.

⁵² *Canadian Environmental Protection Act*, SC 1999, c. 33.

⁵³ A Guide to Understanding the *Canadian Environmental Protection Act, 1999*, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=E00B5BD8-1&offset=3&toc=show> [hereinafter "A Guide to Understanding *CEPA*"] at Part 2.

⁵⁴ As defined in *CEPA*, 'new substances' are those new to Canada since 1987, and 'existing substances' are the chemicals in use before 1987. Under *CEPA*, work-sharing arrangements may be made through administrative agreements with provinces and territories. These agreements may be made with respect to any matter related to the administration of the Act, including inspections, investigations, information gathering, monitoring, and reporting of collected data. These agreements do not relieve the federal government of its responsibilities under *CEPA* nor delegate legislative power to provinces and territories. A Guide to the *Canadian Environmental Protection Act, 1999* (March 2000), available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=8C6B52D8-9&offset=1&toc=show> [hereinafter "A Guide to *CEPA*"] at Part 1; A Guide to Understanding *CEPA*, *supra*; *CEPA 1999: Focus On Issues*, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=34BCF8AB-1> [hereinafter "*CEPA: Focus On Issues*"].

CEPA, a substance is defined as toxic based on its effects on living organisms and the environment, including on all organic and inorganic matter.⁵⁵

29. Under *CEPA*, a range of tools are available for managing the risks associated with toxic substances, including regulations, codes of practice and guidelines, as well as pollution prevention plans and environmental emergency plans.⁵⁶ In addition, in managing toxic substances under *CEPA*, Environment Canada uses policies and plans, including the 1995 Toxic Substances Management Policy⁵⁷ and the Chemicals Management Plan.⁵⁸
30. All new substances undergo an assessment before entering the marketplace. Most of the 23,000 existing substances currently in use were introduced in Canada without undergoing a full health and environmental risk assessment. *CEPA* requires that these existing substances be categorized in terms of whether they (a) are inherently toxic and either bioaccumulative or persistent; or (b) present the greatest potential for human exposure in Canada. Substances which fall into either category must be subjected to a risk assessment.⁵⁹
31. If a risk assessment indicates that the substance poses risks to the environment or human health, a plan of action to deal with the substance is to be created. As of February 2011, the Toxic Substances List (Schedule 1 of *CEPA*) lists over one hundred substances. Included on this list, and of particular relevance to municipal wastewater and pulp effluents, are inorganic chloramines, chlorinated

⁵⁵ S.3.

⁵⁶ *CEPA: Focus On Issues, supra.*

⁵⁷ Toxic Substances Management Policy, Government of Canada, Environment Canada, 1995 (EN 40-499/1-1995, available online at <http://www.ec.gc.ca/toxiques-toxics/default.asp?lang=En&n=2A55771E-1> [hereinafter "Toxic Substances Management Policy"].

⁵⁸ Chemicals Management Plan, available online at <http://www.chemicalsubstanceschimiques.gc.ca/plan/index-eng.php> [hereinafter "Chemicals Management Plan"].

⁵⁹ Environment Canada, The State of Freshwater Ecosystems in Selected Canadian Watersheds (January 12, 2007), CAN194780 [hereinafter "State of Freshwater Ecosystems (2007)"] at 110-11; *CEPA: Focus On Issues, supra.*

wastewater effluents, ammonia dissolved in water, effluents from pulp mills using bleach and nonylphenol and its ethoxylates.⁶⁰

32. *CEPA* sets out several guiding principles in its Preamble including:

- a commitment to implementing pollution prevention as a national goal and as the priority approach to environmental protection;
- a commitment to implementing the precautionary principle;
- the polluter pays principle;
- achieving sustainable development and removing threats to biological diversity through pollution prevention;
- the control and management of the risk associated with toxic substances, pollutants and wastes;
- the importance of an ecosystem approach;
- the need to eradicate the most persistent and bioaccumulative toxic substances from the environment; and
- the need to control and manage pollutants and wastes if their release into the environment cannot be prevented.⁶¹

Information Gathering, Objectives, Guidelines and Codes of Practice [Part 3]

33. Part 3 of *CEPA* requires the Minister of the Environment (“the Minister”) to:

- establish, operate and maintain a system for environmental quality monitoring;
- conduct research and studies relating to pollution, including toxic substances;
- gather, assess and publish relevant data on environmental quality;
- develop plans for the prevention, control and abatement of pollution;
- conduct research or studies relating to hormone disrupting substances, methods related to their detection, methods to determine their actual or likely short-term or long-term effect on the environment and human health,

⁶⁰ Environment Canada, Toxic Substances List – Schedule 1, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=0DA2924D-1&wsdoc=4ABEFFC8-5BEC-B57A-F4BF-11069545E434>.

⁶¹ *CEPA*, Preamble.

and preventive, control and abatement measures to deal with those substances to protect the environment and human health; and

- and publish or distribute such information through a clearing-house.⁶²

34. Under Part 3, the Minister has established and must maintain the National Pollutant Release Inventory.⁶³ The NPRI provides facility-specific information on the release, disposal and recycling of over 300 substances, including toxic substances.⁶⁴ Industrial and commercial facilities that meet the NPRI reporting criteria must report information about pollutant releases to Environment Canada annually.⁶⁵ The publication of this information is meant to encourage facilities to voluntarily reduce their release of harmful pollutants and allows the government to track reductions or increases in discharges.⁶⁶
35. Generally speaking, *CEPA* authorizes the federal government to develop regulations, guidelines and codes of practice for toxic substances, nutrients and other substances relating to water quality and resource management.⁶⁷ Environment Canada and Health Canada may establish objectives for any media, including water, under sections 54 and 55.⁶⁸

⁶² Ss.44(1) and (4).

⁶³ Ss.46-48.

⁶⁴ Environment Canada, the *Canadian Environmental Protection Act, 1999* and the National Pollutant Release Inventory, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CEE0E728-1> [hereinafter “*CEPA & NPRI*”].

⁶⁵ S.46; *ibid.*

⁶⁶ Until the 2009 decision of the Federal Court in *Great Lakes United v. Canada (Minister of Environment)*, the Minister did not require mining companies to report all of their releases of pollutants and toxic substances. *CEPA & NPRI, ibid.*

⁶⁷ State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 107.

⁶⁸ In 1987, the CCME, then the Canadian Council of Resource and Environment Ministers (“CCREM”), released the *Canadian Water Quality Guidelines*, which included guidelines for the protection of freshwater life. Since their release, science-based guideline derivation procedures have been established and approved nationally for specific media and resource uses. The Canadian Water Quality Guidelines for the Protection of Aquatic Life series, discussed below, supersede those published by the CCREM in 1987. CCME, *Canadian Environmental Water Quality Guidelines: Introduction* (Winnipeg: 2001), available online at ceqg-rcqe.ccme.ca/download/en/95/; Review of Existing Municipal Wastewater Effluent (MWWWE) Regulatory Structures in Canada, prepared for the CCME (March 24, 2005), BCP005284 [hereinafter “*CCME Review of Existing MWWWE Regulatory Structures in Canada*”] at 21.

Pollution Prevention [Part 4]

36. Part 4 of *CEPA* sets out provisions enabling the Minister to require pollution prevention planning, so as to minimize or avoid the creation of pollutants.⁶⁹ This pollution prevention planning allows facilities, businesses or industries to select specific measures for meeting government objectives established under *CEPA*.⁷⁰
37. Toxic substances under *CEPA* are listed in Schedule 1. A substance is considered to pose unacceptable risks, and consequently may be added to Schedule 1, if it meets any of the following criteria:
- it has or may have an immediate or long-term adverse impact on the environment;
 - it poses or may pose a danger to the environment on which life depends; or
 - it is or may be harmful to human life or health.⁷¹
38. The Minister may require any person using and/or releasing a toxic substance on Schedule 1 to prepare and implement a pollution prevention plan.⁷²

Controlling Toxic Substances [Part 5]

39. Part 5 of *CEPA* governs the assessment of substances to determine which are toxic and to manage them accordingly.⁷³ For the purpose of Part 5 and Part 6,⁷⁴ a substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b)

⁶⁹ A Guide to *CEPA*, *supra* at Part 4.

⁷⁰ CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284 at 21-22; *ibid*.

⁷¹ *CEPA: Focus On Issues*, *supra*.

⁷² S.56(1).

⁷³ A Guide to *CEPA*, *supra* at Part 5.

⁷⁴ Except if the substance is considered “inherently toxic” under *CEPA*.

constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health.⁷⁵

40. The Governor-in-Council may, on the recommendation of the Ministers, make an order adding a substance to the List of Toxic Substances in Schedule 1 if satisfied that a substance is toxic.⁷⁶

41. Under the Toxic Substances Management Policy, a toxic substance may be managed in two ways, depending on its characteristics and sources:⁷⁷

(a) the “virtual elimination”⁷⁸ from the environment of toxic substances that result predominantly from human activity and that are persistent and bioaccumulative (referred to in the Policy as Track 1 substances);⁷⁹ or

(b) the management of other toxic substances and substances of concern, throughout their entire life cycles, to prevent or minimize their release into the environment (referred to in the Policy as Track 2 substances).⁸⁰

Controlling Pollution and Managing Wastes [Part 7]

42. Part 7 of *CEPA* provides pollution control powers for nutrients and for the protection of the marine environment from land-based sources of pollution.

⁷⁵ S.64.

⁷⁶ S.90(1).

⁷⁷ Toxic Substances Management Policy, *supra*.

⁷⁸ “Virtual elimination” in Part 5 means, in respect of a toxic substance released into the environment as a result of human activity, the ultimate reduction of the quantity or concentration of the substance in the release below the level of quantification specified by the Virtual Elimination List [ss.65(1) and (2)].

⁷⁹ Toxic Substances Management Policy, *supra*.

⁸⁰ *Ibid.* See also Chemicals Management Plan, *supra*. For a list of approaches, see also Government of Canada, Other Initiatives, available online at <http://www.chemicalsubstanceschimiques.gc.ca/plan/approach-approche/index-eng.php>.

43. Division 1 of Part 7 of *CEPA* authorizes the regulation of nutrients⁸¹ in “cleaning products” and “water conditioners” that degrade or have an adverse impact on aquatic ecosystems.⁸² The Governor-in-Council may make regulations for the purpose of preventing or reducing the growth of aquatic vegetation that is caused by the release of nutrients in waters and that can interfere with the functioning of an ecosystem or degrade or alter an ecosystem to an extent that is detrimental to its use by humans, animals or plants.⁸³
44. Division 2 of Part 7 of *CEPA* responds to the fact that about 80 percent of marine pollution originates from land-based sources such as municipal and industrial wastes. These pollutants affect the most productive areas of the marine environment, including estuaries and near-shore coastal waters.⁸⁴
45. “Land-based sources” are defined under *CEPA* as “point and diffuse sources on land from which substances or energy reach the sea by water, through the air or directly from the coast.” It includes “any sources under the sea bed made accessible from land by tunnel, pipeline or other means.” “Marine pollution” means “the introduction by humans, directly or indirectly, of substances or energy into the sea that results, or is likely to result, in (a) hazards to human health; (b) harm to living resources or marine ecosystems; (c) damage to amenities; or (d) interference with other legitimate uses of the sea.”⁸⁵

⁸¹ Sections 116-119. “Nutrient” means “a substance or combination of substances that, if released in any waters, provides nourishment that promotes the growth of aquatic vegetation” [s.116].

⁸² A “cleaning product” is a phosphate compound or other substance that is intended to be used for cleaning purposes, and includes laundry detergents, dish-washing compounds, metal cleaners, degreasing compounds and household, commercial and industrial cleaners [s.116], and “water conditioner” is a substance that is intended to be used to treat water, and includes water-softening chemicals, anti-scale chemicals and corrosion inhibitors [s.116].

⁸³ S.118. For example, the *Phosphorus in Certain Cleaning Products Regulations*, SOR/89-501, regulates the level of phosphates in laundry detergent.

⁸⁴ Environment Canada, The *Canadian Environmental Protection Act, 1999* and the Protection of the Marine Environment from Land-based Sources of Pollution, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=6A192A2C-1>.

⁸⁵ S.120.

46. *CEPA* grants the Minister power to issue environmental objectives, release guidelines and codes of practice specifically for the prevention and reduction of marine pollution from land-based sources.⁸⁶

Environmental Matters Related to Emergencies [Part 8]

47. Part 8 of *CEPA* provides a "safety net." Where no government regulations exist, it gives authority to require emergency plans for those substances⁸⁷ that have been declared toxic by the Ministers.⁸⁸

Government Operations and Federal and Aboriginal Lands [Part 9]

48. Part 9 of *CEPA* provides authority to ensure pollution prohibitions are applied to federal government operations and land, including aboriginal land, by the same type of environmental regulations as entities regulated by provinces. Part 9 also authorizes the Governor-in-Council, on the recommendation of the Minister, to regulate substances and to require environmental management systems, pollution prevention, pollution prevention plans and environmental emergency plans for government operations and federal and aboriginal lands.

Canada Water Act

49. The *Canada Water Act*⁸⁹ provides for the cooperative management of water quality⁹⁰ and water resource planning in Canada.⁹¹ Where an agreement cannot be reached with a province, the *Act* permits unilateral action by Canada with

⁸⁶ S.121.

⁸⁷ "Substance" refers to a substance on a list of substances established under the regulations or interim orders made under this Part of *CEPA* [*Environmental Emergency Regulations*] [s.193]. For the purposes of the definition "substance" in section 193 of *CEPA*, the list of substances consists of the substances set out in column 1 of Schedule 1 having a specified concentration [*Environmental Emergency Regulations*, SOR/2003-307, s.2].

⁸⁸ A Guide to *CEPA*, *supra* at Part 8.

⁸⁹ *Canada Water Act*, RS, 1995, c. C-11.

⁹⁰ BC MOE, Water Stewardship, available online at http://www.env.gov.bc.ca/wsd/water_rights/overview_legislation/index.html.

⁹¹ State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 108.

respect to federal waters or other waters of “significant national interest,” or where water quality has become a matter of “urgent national concern.”⁹²

Comprehensive Water Resource Management [Part 1]

50. Part I of the *Canada Water Act* authorizes the Minister of the Environment (“the Minister”) to establish consultative arrangements and enter agreements with the provinces for water resource management.⁹³ The Minister may enter into intergovernmental arrangements to establish bodies to consult on water resource matters and to advise on and facilitate the coordination or implementation of water priorities, policies and programs.⁹⁴
51. The Minister may also, with respect to waters where there is a “significant national interest” in water resource management, take these steps:
- formulate intergovernmental water resource management programs to establish and maintain an inventory of those waters;
 - collect, process and provide data on the quality, quantity, distribution and use of those waters;
 - conduct research;
 - design and implement projects; and
 - establish bodies to direct, supervise and coordinate those programs.⁹⁵

Water Quality Management [Part 2]

52. Part II of the *Canada Water Act* deals with water quality management.⁹⁶ Part II allows the Minister to work in cooperation with provinces in water quality

⁹² S.5, 6, 11, 13. “Water resource management” means “the conservation, development and utilization of water resources and includes, with respect thereto, research, data collection and the maintaining of inventories, planning and the implementation of plans, and the control and regulation of water quantity and quality” [s.2(1)].

⁹³ S.4.

⁹⁴ S.4.

⁹⁵ S.5.

⁹⁶ “Water quality management” means “any aspect of water resource management that relates to restoring, maintaining or improving the quality of water” [s.2(1)].

management of federal waters⁹⁷ or inter-jurisdictional waters⁹⁸ where the water quality has become a matter of “urgent national concern.”⁹⁹ Such cooperative agreements shall designate the waters to which they relate as “water quality management areas.”¹⁰⁰

53. Under section 18, the Governor-in-Council may make regulations prescribing substances; quantities or concentrations of substances and classes of substances in water; as well as treatments, processes and changes of water.
54. Canada has not enacted any regulations under section 18.

General [Part 4]

55. Part IV of the *Canada Water Act* deals with administration and enforcement.¹⁰¹ Under section 25, the Minister may designate qualified persons as inspectors or analysts under the *Act*. The Minister is also authorized to establish advisory committees to advise and assist him or her.¹⁰²
56. Under section 38, the Minister is required to prepare an annual report to Parliament on operations under the *Canada Water Act*. In the 2010 Fall Report of the Commissioner of the Environment and Sustainable Development, entitled *Monitoring Water Resources*, the Commissioner found that Environment Canada had failed to submit these annual reports from 2004 to 2009. He found that, although departments are required to submit annual performance reports to

⁹⁷ “Federal waters” are, “other than in Yukon, waters under the exclusive legislative jurisdiction of Parliament and, in Yukon, waters in a federal conservation area within the meaning of section 2 of the *Yukon Act*” [s.2(1)].

⁹⁸ “Inter-jurisdictional waters” means “any waters, whether international, boundary or otherwise, that, whether wholly situated in a province or not, significantly affect the quantity or quality of waters outside the province” [s.2(1)].

⁹⁹ S.11.

¹⁰⁰ S.11(2)(a). Also see *State of Freshwater Ecosystems (2007)*, *supra*, CAN194780 at 108.

¹⁰¹ Ss.25-39.

¹⁰² S.28(1).

Parliament on the performance of their programs, information on “key aspects of program performance and results” was not included in Environment Canada’s Departmental Performance Reports.¹⁰³

Canadian Water Quality Guidelines and Initiatives

57. The Canadian Council of Ministers of the Environment has published the *Canadian Environmental Quality Guidelines*, a set of ambient environmental quality guidelines aimed at protecting the quality of freshwater aquatic ecosystems, sediment, wildlife and habitat¹⁰⁴ The guidelines set levels beyond which adverse effects may be observed.¹⁰⁵ Within these guidelines are included the *Canadian Water Quality Guidelines for the Protection of Aquatic Life*, which establish acceptable levels for toxic chemicals, temperature and acidity,¹⁰⁶ and the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life*.¹⁰⁷
58. The *Canadian Water Quality Guidelines for the Protection of Aquatic Life (Ammonia)* for un-ionized and total ammonia¹⁰⁸ were developed using the 1991 CCME Protocol¹⁰⁹ and Environment Canada community ecological risk criteria.¹¹⁰

¹⁰³ Office of the Auditor General of Canada, 2010 Fall Report of the Commissioner of the Environment and Sustainable Development (Chapter 2), available online at http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201012_02_e_34425.html [hereinafter “CESD 2010 Report”] at paragraph 2.75.

¹⁰⁴ See CCME, *Canadian Environmental Quality Guidelines*, available online at <http://ceqg-rcqe.ccme.ca/>.

¹⁰⁵ *State of Freshwater Ecosystems* (2007), *supra*, CAN194780 at 113.

¹⁰⁶ *Ibid.* at 107.

¹⁰⁷ *Infra.*

¹⁰⁸ See *Canadian Water Quality Guidelines: Ammonia*, *supra*, CAN024153.

¹⁰⁹ CCME, Appendix IX: A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life (April 1991), in *Canadian Water Quality Guidelines*, Canadian Council of Resource and Environment Ministers (1987), cited in *Canadian Water Quality Guidelines: Ammonia*, *supra*, CAN024153 at 6.

¹¹⁰ Environment Canada, [Draft] *Canadian Environmental Protection Act Priority Substances List II – Supporting Document for Ammonia in the Aquatic Environment* (August 31, 1999), cited in *Canadian Water Quality Guidelines: Ammonia*, *supra*, CAN024153 at 6.

59. The *Canadian Water Quality Guidelines for the Protection of Aquatic Life: Dissolved Oxygen (Freshwater)*¹¹¹ were developed using supporting documents rather than the standard 1991 CCME protocol.¹¹² The Canadian water quality guidelines for the lowest acceptable dissolved oxygen concentrations were derived from the US Environmental Protection Agency's 'slight production impairment' estimates, but with the addition of a safety margin.¹¹³
60. The *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life*¹¹⁴ are aimed at protecting aquatic organisms that live in or on the sediment forming the bottom of lakes and rivers. The guidelines are used to evaluate the toxicological significance of sediment chemistry data and to prioritize actions.¹¹⁵
61. The CCME Water Quality Index ("WQI")¹¹⁶ was developed in 1999 as the national freshwater quality indicator.¹¹⁷ The WQI enables scientists to synthesize water quality data into simpler terms for consistent reporting to various audiences. The WQI uses three factors to measure attainment of water quality objectives: number of objectives not met; frequency with which objectives are not met; and maximum amount by which objectives are not met. Based on this, water quality is ranked as excellent, good, fair, marginal or poor.¹¹⁸
62. Environment Canada's 1976 *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments*¹¹⁹ address effluent from federal wastewater

¹¹¹ Canadian Water Quality Guidelines: Dissolved Oxygen (Freshwater), *supra*. The Canadian Water Quality Guidelines for the Protection of Aquatic Life: Dissolved Oxygen (Marine) are available at CAN024163.

¹¹² Canadian Water Quality Guidelines: Dissolved Oxygen (Freshwater), *ibid.* at 2, 5, 6.

¹¹³ *Ibid.* at 4.

¹¹⁴ Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Introduction), available online at <http://ceqg-rcqe.ccme.ca/download/en/225/> [hereinafter "Canadian Sediment Quality Guidelines"].

¹¹⁵ State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 108.

¹¹⁶ CCME, Water Quality Index, available online at <http://www.ccme.ca/sourcetotap/wqi.html>.

¹¹⁷ State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 113.

¹¹⁸ Lower Fraser River Report (2004), *supra* at 10.

¹¹⁹ The Guidelines for Effluent and Waste Water Treatment at Federal Establishments were originally issued under the *Canada Water Act*, Part III, which contained provisions concerning allowable

facilities.¹²⁰ The guidelines set out specific limits for BOD, TSS, chlorine residual and other parameters.¹²¹ They provide that secondary treatment, or an equivalent, should be the minimum acceptable treatment for wastewater from all federal facilities.¹²² They do not contain enforceable targets or timelines.¹²³

63. The Municipal Water and Wastewater Survey (“MWWS”) is a survey of the water sources, water use, water conservation, wastewater treatment level and water and wastewater pricing in all Canadian municipalities serving populations of 1000 or more, excluding First Nations communities. The MWWS has been conducted every two or three years since the early 1980s. The resulting information is used by policymakers and planners in making water management decisions, including with respect to wastewater infrastructure.¹²⁴
64. In 1994, the Ecological Monitoring and Assessment Network (“EMAN”) was established as a national network of more than 140 groups and individuals involved in ecological monitoring, including for freshwater and marine ecosystems.¹²⁵ The coordination and sharing of knowledge and information enable practitioners and scientists “to better detect, describe and report on

concentrations of nutrients in water treatment processes. Federal Activities Environmental Branch, Guidelines for Effluent and Waste Water Treatment at Federal Establishments (April 1976), available online at http://www.ec.gc.ca/eu-ww/0FB32EFD-73F9-4360-95EE-CB856FB4D971/1976_Guidelines_En.pdf; Natural Resources Canada, Canadian Environmental Acts, Regulations and Guidelines, available online at <http://www.nrcan.gc.ca/mms-smm/busi-indu/iar-ilr/cea-ild-eng.htm>.

¹²⁰ Environment Canada, Fact Sheet: Managing Wastewater, available online at <http://www.ec.gc.ca/eu-ww/25DDE2CB-3551-42C6-B624-16B3BAEBFB3C/20070517%201503%20Final%20-%20FACTSHEET%20EN.pdf> [hereinafter “Wastewater Fact Sheet”] at 3.

¹²¹ *Ibid.* at 3.

¹²² Guidelines for Effluent and Waste Water Treatment at Federal Establishments (April 1976), *supra* at 5; Wastewater Fact Sheet, *supra* at 3.

¹²³ Sierra Legal Defence Fund. The National Sewage Report Card: Grading the Sewage Treatment of 22 Canadian Cities, No. 3 (September 2004), CON000114 [hereinafter “National Sewage Report Card (2004)”] at 11.

¹²⁴ Environment Canada, Municipal Water and Wastewater Survey, available online at <http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=ED7C2D33-1>; State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 113.

¹²⁵ Environment Canada, Ecological Monitoring, available online at <http://www.ec.gc.ca/faunescience-wildlifescience/default.asp?lang=En&n=B0D89DF1-1> [hereinafter “Environment Canada Ecological Monitoring”].

ecosystem changes resulting from toxic substances.”¹²⁶ In 2008, the EMAN Coordinating Office was reorganized within the Wildlife and Landscape Science Directorate of Environment Canada and is developing an Integrated Ecosystem Assessment Strategy.¹²⁷

Provincial Legislative Framework

Environmental Management Act and Waste Discharge Regulation

65. In July 2004, the *Environmental Management Act* (“*EMA*”) ¹²⁸ came into force. It combined the former *Waste Management Act* and the former *Environment Management Act* to create a single statute governing environmental protection and management in the Province.¹²⁹ The *EMA* governs effluents introduced to the environment from wastewater treatment plants, pulp mills and mines.¹³⁰
66. The *EMA* is less prescriptive than the former *Waste Management Act*.¹³¹ Formerly, the introduction of wastes into the environment by any industry, trade or business was strictly prohibited absent a permit or other authorization from the provincial Ministry of Environment.¹³² The *EMA* no longer contains this pollution prohibition. Under the *EMA*, only the industries, trades, businesses, operations or

¹²⁶ State of Freshwater Ecosystems (2007), *supra*, CAN194780 at 113.

¹²⁷ Environment Canada Ecological Monitoring, *supra*.

¹²⁸ *Environmental Management Act*, SBC 2003, c. 53.

¹²⁹ On May 13, 2003, the provincial government introduced Bill 57 to repeal and replace the *WMA* with a more results-based environmental regime, the *Environmental Management Act*. For commentary, see West Coast Environmental Law, “Bill 57 – Environmental Management Act 2003: Deregulating British Columbia’s main pollution law,” available online at <http://wcel.org/sites/default/files/publications/Deregulation%20Backgrounder%20-%20Bill%2057.pdf> [hereinafter “WCEL, Bill 57”] at 1.

¹³⁰ Section 1 of the *EMA* defines “effluent” as “a substance that is introduced into water or onto land and that (a) injures or is capable of injuring the health or safety of a person, (b) injures or is capable of injuring property or any life form, (c) interferes with or is capable of interfering with visibility, (d) interferes with or is capable of interfering with the normal conduct of business, (e) causes or is capable of causing material physical discomfort to a person, or (f) damages or is capable of damaging the environment” [s.1(1)].

¹³¹ *Waste Management Act*, RSBC 1996, c. 482.

¹³² BC MOE, Environmental Protection Division, Waste Discharge Implementation Guide, http://www.env.gov.bc.ca/epd/main/pdf/WDR_implement_guide.pdf [hereinafter “Waste Discharge Implementation Guide”] at 5.

activities prescribed in Schedules 1 and 2 of the *Waste Discharge Regulation*¹³³ are prohibited from discharging waste into the environment.¹³⁴ Under the *EMA*, prohibitions against releasing waste into the environment apply to a smaller subset of industries and activities than before 2004.

67. Section 6 of the *EMA* is the primary provision governing the disposal of waste into the environment. If an industry, trade, business, activity or operation is not “prescribed” by the *Waste Discharge Regulation*, section 6 does not apply.
68. The *Waste Discharge Regulation* establishes “a tiered approach to waste discharge authorization.”¹³⁵ First, it prescribes the industries, trades, businesses, operations and activities that require some form of authorization before discharging waste into the environment under subsections 6(2) and (3) of the *EMA*. Second, it prescribes the industries, trades, business, operations and activities that may be exempt from subsections 6(2) and 6(3) through compliance with an approved code of practice.¹³⁶
69. These prescribed industries, trades, businesses, operations and activities are set out in Schedules 1 and 2 of the *Waste Discharge Regulation*. Schedule 1 industries may not be made subject to a “code of practice.”¹³⁷ Rather, Schedule 1 industries must obtain waste discharge authorizations either through a section 14 permit, section 15 approval, order or compliance with another regulation.¹³⁸

¹³³ *Waste Discharge Regulation*, BC Reg. 320/2004.

¹³⁴ West Coast Environmental Law (“WCEL”), a non-profit organization offering environmental law services in BC, expressed its concern about the repeal and replacement of the *Waste Management Act*. WCEL estimated, in 2003, that the new regime would eliminate 80 percent or more of existing waste permits. See WCEL, Bill 57, *supra* at 1.

¹³⁵ Waste Discharge Implementation Guide, *supra* at 5.

¹³⁶ *Ibid.* at 8.

¹³⁷ Under *EMA*, a “code of practice,” except in Part 3 [*Municipal Waste Management*], refers to a code of practice established by the minister under *EMA* section 22 [s.1(1)]. Codes of practice are enforceable, standard industry- or activity-wide regulations governing the discharge of waste from a prescribed industry, trade, business, operation or activity. They may set standards for the quality of the discharge, include conditions of operation and discharge, and monitor discharges or ambient sites around operations. See *ibid.* at 11.

¹³⁸ Waste Discharge Implementation Guide, *ibid.*, at 11.

70. In contrast, Schedule 2 industries that introduce waste into the environment in accordance with a code of practice are exempt from subsections 6(2) and (3) of the *EMA*.¹³⁹ No site-specific permit or other waste discharge authorization is required for those Schedule 2 industries.¹⁴⁰
71. The municipal wastewater management,¹⁴¹ pulp and paper,¹⁴² and mining¹⁴³ industries are prescribed under Schedule 1,¹⁴⁴ and thus require some form of waste discharge authorization under the *EMA*.
72. Section 3 of the *Waste Discharge Regulation* specifies other industries, businesses, trades, operations and activities that are exempt from the *EMA* and the *Regulation*. These exemptions include the discharge of domestic sewage to a sewerage system (provided that the *Sewerage System Regulation* applies to that sewerage system, the domestic sewage is not discharged into surface water or marine waters, or the discharge is from a sewerage system serving a single family residence or a duplex). Also exempted are various activities governed by a permit under section 10 of the *Mines Act*.¹⁴⁵

¹³⁹ Waste Discharge Regulation, s.4(1); *ibid.* at 11.

¹⁴⁰ Waste Discharge Implementation Guide, *ibid.* at 6.

¹⁴¹ “Municipal sewage management” is defined as the management of domestic sewage, domestic waste water or liquid waste originating primarily from residences, but that may include contributions from (a) holding tanks in recreational vehicles, boats and houseboats, (b) commercial, institutional and industrial sources, and (c) inflow and infiltration, but does not include an operation exempted from the Act under section 3 [domestic sewage] of this regulation [*Waste Discharge Regulation*, s.2, Schedule 1].

¹⁴² The “pulp industry” refers to establishments engaged in manufacturing wood pulp. [*Waste Discharge Regulation*, s.2, Schedule 1].

¹⁴³ Schedule 1, section 2, defines the “mining and coal mining industry” as establishments engaged in the mining of, or activities related to the mining of, metals, non-metals, coal, gemstones or industrial mineral ores or in beneficiating mineral ores but does not include (a) establishments located in areas or places defined as “exploration sites” in section 65 of the Act, or (c) gravel, sand, crushed rock or dimensional stone quarries [*Waste Discharge Regulation*, s.2, Schedule 1].

¹⁴⁴ Industries, trades, businesses, operations or activities not prescribed in Schedule 1 or 2 of the *Waste Discharge Regulation* do not require ministry authorization to discharge waste into the environment. They continue to be governed by the general prohibition against causing pollution under subsection 6(4) of the *EMA*.

¹⁴⁵ Waste Discharge Regulation, s.3. A person is exempt from subsections 6(2) and 6(3) of the Act in relation to the discharge to the environment of coarse coal refuse, waste rock or overburden if the coarse

73. Under sections 81 and 82 of the *EMA*, the Minister may exercise pollution prevention orders against a municipality if satisfied that a municipal activity or operation is performed in a manner that is likely to release a substance that will cause pollution.¹⁴⁶ A pollution prevention order may not be issued to an operation in compliance with a permit, approval, order, waste management plan, operational certificate, regulations or authorization made under the regulations.¹⁴⁷
74. With respect to pollution abatement, if the Minister considers that a municipality is causing pollution, he or she may exercise the pollution abatement powers that a director may exercise.¹⁴⁸ Pollution abatement orders may be issued even if an operation is in compliance with a waste management plan or operational certificate, the regulations, a permit, approval or order.¹⁴⁹
75. Section 79 governs spills. It empowers the Minister to order a person who has control of a polluting substance to undertake a risk assessment, prepare and test a contingency plan, and construct works to lessen the risk of escape. According to provincial guidance materials, the practice of the ministry is for a director to handle spill responses informally, with cooperation of business and industry, without resorting to a ministerial order under section 79.¹⁵⁰

Water Act

coal refuse, waste rock or overburden is managed in accordance with a permit issued under section 10 of the *Mines Act* [s.3(10)].

¹⁴⁶ S.81(1) and s.82.

¹⁴⁷ S.81(4). See also Waste Discharge Implementation Guide, *supra* at 9, 12 and 39.

¹⁴⁸ S.84 and s.83(2).

¹⁴⁹ S.85(3). See also Waste Discharge Implementation Guide, *supra* at 39.

¹⁵⁰ Waste Discharge Implementation Guide, *ibid.* at 39.

76. The BC *Water Act*¹⁵¹ provides for the allocation and management of surface water. It authorizes the development of water management plans, under Part 4 of the Act.¹⁵² The Minister of the Environment may designate an area for the purpose of developing a water management plan if a plan will assist in addressing or preventing risks to water quality – including expressly with respect to fish and fish habitat.¹⁵³ A proposed water management plan must be submitted to the Minister for review and approval by the Lieutenant Governor-in-Council.¹⁵⁴

International Agreements and Protocols

77. Some international instruments have implications for the wastewater, pulp and mining sectors. One key example is the *Stockholm Convention on Persistent Organic Pollutants*, which aims to protect human health and the environment from persistent organic pollutants.¹⁵⁵ The *Stockholm Convention* focuses on the management of sixteen persistent organic pollutants that threaten the environment, including through certain restrictions on their use and production.
78. There is no legally binding international instrument governing marine pollution from land-based sources.
79. In 1995, Canada adopted the non-binding Global Programme of Action (“GPA”) for the Protection of the Marine Environment from Land-based Activities. At the same time, Canada signed the *Washington Declaration on the Protection of the*

¹⁵¹ *Water Act*, RSBC 1996, c. 483.

¹⁵² BC MOE, Water Stewardship, *supra*.

¹⁵³ S.61.

¹⁵⁴ S.64.

¹⁵⁵ For a discussion of the Stockholm Convention, see the commission’s policy and practice report on International Law Relevant to the Conservation and Management of Fraser River Sockeye Salmon, Exhibit PPR2, available online at <http://www.cohencommission.ca/en/Exhibits.php> [hereinafter “International Law PPR”] at paragraph 168. Note that the International Law PPR refers to this treaty as the “POP Convention.”

Marine Environment from Land-Based Activities.¹⁵⁶ The *Washington Declaration* confirms the common goal of the signatories of “sustained and effective action to deal with all land-based impacts upon marine environment, specifically those resulting from sewage, persistent organic pollutants, radioactive substances, heavy metals, oils (hydrocarbons), nutrients, sediments mobilization, litter and physical alteration and destruction of habitat.”¹⁵⁷ It urges states to give “priority to the treatment of waste water and industrial effluents.”¹⁵⁸

80. In June 2000, Canada released its National Programme of Action for the Protection of the Marine Environment from Land-based Activities,¹⁵⁹ developed by Environment Canada, DFO and the provinces and territories.¹⁶⁰

C. MUNICIPAL WASTEWATER EFFLUENTS

81. This section of the Report provides a general overview of municipal wastewater effluents, beginning with an overview of some of the federal, provincial and municipal instruments regulating the impacts of municipal wastewater in the Fraser River Basin. It summarizes the types of municipal wastewater effluent, the levels of treatment available, and the potential impacts sewage and stormwater may have on water quality, with a particular focus on municipal effluent originating from Metro Vancouver.

82. In Canada, municipal wastewater effluent is regulated by a variety of regulatory approaches at the federal, provincial and municipal levels.¹⁶¹ Federal, provincial

¹⁵⁶ See *Washington Declaration on Protection of the Marine Environment from Land-Based Activities*, UN Doc A/51/116, Annex I, Appendix II. See the commission’s *International Law PPR* at paragraph 172.

¹⁵⁷ *Washington Declaration*, *ibid.* at paragraph 1, cited in *International Law PPR*, *supra* at paragraph 173.

¹⁵⁸ *Washington Declaration*, *ibid.* at paragraph 15, cited in *International Law PPR*, *ibid.*, at paragraph 173.

¹⁵⁹ Environment Canada, *Canada’s National Programme of Action for the Protection of the Marine Environment from Land-based Activities (NPA)*, available online at <http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=079B8501-BD2D-43E3-97AF-94E840A140E8>.

¹⁶⁰ Environment Canada, *CEPA Annual Report for Period April 2002 to March 2003*, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=B526F6B1-1&offset=9>. See also *A Guide to Understanding CEPA*, *supra* at Part 8.

and municipal levels of government share responsibility for managing the collection and treatment of municipal wastewater, the administration and performance of wastewater facilities, and controlling the environmental and health impacts of municipal effluents.¹⁶² Effluent from wastewater systems must comply with applicable federal legislation and with provincial or territorial legislation, permits and licenses. Sewage treatment levels differ across the country,¹⁶³ and permissible discharge limits for pollutants in municipal effluents differ both between and within provinces.¹⁶⁴

83. Nationally, two statutes regulate the impacts of municipal wastewater: the *Canadian Environmental Protection Act* and the *Fisheries Act*. *CEPA* governs the release of toxic substances to the environment and allows the federal government to regulate to control or eliminate the use of toxic substances. The general pollution prevention prohibition at subsection 36(3) of the *Fisheries Act* applies to municipal wastewater releases.¹⁶⁵ Compliance is not always or necessarily achieved by wastewater treatment plants, nor guaranteed by the standards set out in these facilities' provincial permits.¹⁶⁶
84. Provincial and territorial governments have responsibility for permitting municipal wastewater treatment facilities.¹⁶⁷ As discussed above, the *Environmental Management Act* applies to wastewater discharges in British Columbia.

¹⁶¹ Contaminants and Nutrients in the Coastal Zone: Impacts on Water Quality, CAN025059 [hereinafter "Contaminants and Nutrients in the Coastal Zone"] at 8. CCME, Environmental Risk-Based Approaches for Managing Municipal Wastewater Effluent (MWWWE) (April 2005), available online at http://www.ccme.ca/assets/pdf/mwwwe_cnsltn_ermm_conrpt_e.pdf [hereinafter "Risk-Based Approaches for Managing MWWWE"] at 3.

¹⁶² State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 49.

¹⁶³ WSER RIAS, *supra*.

¹⁶⁴ Wastewater Fact Sheet, *supra*; *ibid*.

¹⁶⁵ CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284.

¹⁶⁶ CCME, Review of Existing Municipal Wastewater Effluent (MWWWE) Regulatory Structures in Canada: Executive Summary, available online at http://www.ccme.ca/assets/pdf/mwwwe_es_hrf_consrpt_e.pdf [hereinafter "CCME Review of Existing MWWWE Regulatory Structures: Executive Summary"] at 4.

¹⁶⁷ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 49.

85. Municipal governments across Canada have the mandate to provide sewage treatment, as well as to control discharges into the sewer systems.¹⁶⁸
86. Unlike metal mining effluents and pulp and paper effluents, the municipal wastewater sector is not currently governed by a specific regulation under section 36 of the *Fisheries Act*.
87. In March 2010, Environment Canada proposed draft Wastewater Systems Effluent Regulations which, if enacted, will apply nation-wide.¹⁶⁹ The WSER are based, in part, on the *Canada-Wide Strategy for the Management of Municipal Wastewater Effluents* published by the Canadian Council of Ministers of the Environment (“CCME Strategy”), discussed below.¹⁷⁰

Federal Regulatory Scheme

CCME Canada-Wide Strategy for the Management of Municipal Wastewater Effluents

88. Until the recent endorsement of the CCME Strategy by the federal government and most provincial and territorial governments, there was no harmonized approach to managing municipal wastewater in Canada.
89. In 2003, the CCME identified municipal wastewater effluents as a priority and agreed to begin development of a national strategy for the management of municipal wastewater.¹⁷¹ This work culminated in the federal government and most provincial and territorial governments endorsing the CCME Strategy in February 2009.¹⁷²

¹⁶⁸ *Ibid.* at 49.

¹⁶⁹ WSER, *supra*.

¹⁷⁰ CCME, *Canada-Wide Strategy for the Management of Municipal Wastewater Effluents* (February 17, 2009), CAN300922 [hereinafter “CCME Strategy”]; CESD 2009 Report, *supra*, Exhibit 35 at 32.

¹⁷¹ CCME Review of Existing MWWE Regulatory Structures in Canada, *supra*, BCP005284; Wastewater Fact Sheet, *supra*.

¹⁷² See CCME Strategy, *supra*, CAN300922 at 22; WSER RIAS, *supra*.

90. The CCME Strategy addresses issues related to the quality and quantity of wastewater system effluent and its associated risks, governance, costs and funding.¹⁷³ The CCME Strategy is intended to facilitate the development of an effective, efficient and harmonized regulatory framework for managing wastewater effluents throughout the country.¹⁷⁴ In particular, it is intended to harmonize limits for the discharge of specific substances and clarify the respective roles and responsibilities of federal and provincial governments.¹⁷⁵ It is also intended to improve environmental and human health, better protect fish and fish habitat, and provide guidance on and options for infrastructure funding.¹⁷⁶
91. The CCME Strategy requires secondary treatment or the equivalent as a minimum baseline standard for wastewater effluent across the country.
92. Secondary treatment is generally the minimum standard required in the United States (“US”) and the European Union.¹⁷⁷ The US *Clean Water Act* requires municipal wastewater treatment plants to use a minimum of secondary treatment.¹⁷⁸ Municipal wastewater effluents have been actively regulated in most American states for decades, and all system owners and operators have been expected to comply.¹⁷⁹ Wastewater treatment facilities in the US receive permits with caps on effluent discharges and with requirements for monitoring and reporting.¹⁸⁰ Minimum standards for municipal wastewater in the European Union are similar to US standards. All communities with populations larger than 15,000 are required to use secondary treatment or the equivalent.¹⁸¹

¹⁷³ CCME Strategy, *ibid.*, CAN300922 at 5.

¹⁷⁴ CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284; *ibid.*

¹⁷⁵ CCME Strategy, *supra*, CAN300922 at 2, 10-11.

¹⁷⁶ *Ibid.* at 2-3.

¹⁷⁷ *Ibid.* at 2-5; WSER RIAS, *supra*.

¹⁷⁸ WSER RIAS, *ibid.*

¹⁷⁹ Risk-Based Approaches for Managing MWWWE, *supra* at 4.

¹⁸⁰ WSER RIAS, *supra*.

¹⁸¹ *Ibid.*

93. The proposed federal WSER, discussed below, is built on years of consultation with stakeholders on the CCME Strategy.¹⁸² In 2002, Environment Canada held consultation sessions presenting a risk management strategy for wastewater effluent.¹⁸³ In October 2007, the CCME released a draft CCME Strategy for consultation.¹⁸⁴ At the same time, Environment Canada developed a consultation document titled “Proposed Regulatory Framework for Wastewater,” outlining the regulatory actions that the federal government proposed to take to implement the CCME Strategy.¹⁸⁵ Stakeholder feedback indicated a desire for preventive or control actions for pollutants and contaminants in wastewater and a federal-provincial-territorial agreement on the management of wastewater effluent.¹⁸⁶
94. In 2010, the BC Ministry of Environment commenced a review of provincial regulations to ensure that provincial discharge requirements meet or are more stringent than those in the CCME Strategy and the proposed WSER.¹⁸⁷

Proposed Wastewater Systems Effluent Regulations

95. Canada has determined to implement the CCME Strategy – at least in part – through the development of wastewater system effluent regulations under subsection 36(5) of the *Fisheries Act*. The draft WSER were published, with a Regulatory Impact Analysis Statement (“RIAS”), in the *Canada Gazette*, Part I on March 20, 2010. This was followed by a 60-day public comment period.¹⁸⁸

¹⁸² *Ibid.*

¹⁸³ *Ibid.*

¹⁸⁴ CESD 2009 Report, *supra*, Exhibit 35 at 32.

¹⁸⁵ *Ibid.* at 32; WSER RIAS, *supra*.

¹⁸⁶ WSER RIAS, *ibid.*

¹⁸⁷ *Municipal Sewage Regulation*, Policy Intentions Paper for Consultation, available online at <http://www.env.gov.bc.ca/epd/codes/msr/pdf/msr-intentions-paper.pdf> [hereinafter “MSR Policy Intentions Paper”] at 2.

¹⁸⁸ WSER RIAS, *supra*.

96. The stated objective of the proposed WSER is “to reduce the risks to ecosystem health, fisheries resources and human health by decreasing the level of harmful substances deposited to Canadian surface water from wastewater effluent.”¹⁸⁹
97. These proposed regulations are based on the national effluent quality standards and the implementation timelines established in the CCME Strategy.¹⁹⁰ They specify conditions that must be met by any wastewater system with a capacity to deposit 10 cubic meters or more of effluent daily from its final discharge point into fish-bearing waters.¹⁹¹ They create standards for effluent toxicity, effluent monitoring, receiving environment monitoring, record-keeping and reporting.¹⁹²
98. In the proposed WSER, the prescribed ‘deleterious substances’ that could be discharged from wastewater treatment plants include BOD matter, suspended solids, total residual chlorine and un-ionized ammonia.¹⁹³ The permissible levels and concentrations of these substances are based on quarterly or monthly averages depending on the annual average daily volume of effluent deposited from the final discharge point of the wastewater system.¹⁹⁴
99. The WSER are designed to ensure the minimum national effluent quality achieved by a secondary level of wastewater treatment. According to the RIAS, “[s]uch a level of treatment removes over 95% of the total mass of conventional pollutants in wastewater (*i.e.*, BOD matter, suspended solids and nutrients). Significant amounts of non-conventional pollutants and bacteria that may be present are also removed through such treatment.”¹⁹⁵

¹⁸⁹ *Ibid.*

¹⁹⁰ According to Environment Canada, the proposed Regulations also would help respond to the National Programme of Action (NPA), Canada’s response to the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA), adopted by Canada in 1995. Wastewater Fact Sheet, *supra*; *ibid.*

¹⁹¹ S.2.

¹⁹² WSER RIAS, *supra*.

¹⁹³ S.1.

¹⁹⁴ See s.8, Table.

¹⁹⁵ WSER RIAS, *supra*.

100. Initially, a transitional authorization would be available to a wastewater treatment system owner or operator not yet employing secondary treatment or not yet otherwise achieving the equivalent effluent quality.¹⁹⁶ The authorization would establish the conditions under which the sewage facility may continue to operate.¹⁹⁷ Under these transitional provisions, municipal sewage facilities will have different timelines to meet the minimum effluent standard, depending on the level of risk assessed.
101. Pursuant to subsection 23(2) and Schedule 3, excerpted below, the WSER proposes a “point system” by which to calculate each facility’s implementation timeline for meeting the minimum effluent standards:

¹⁹⁶ S.20.

¹⁹⁷ Ss.21, 24, 25, 29, 32.

Item	Column 1 Averages and Water	Column 2 Characteristics	Column 3 Points
1.	Annual average daily volume of effluent, expressed in m ³ , deposited during the year in question	(a) > 10 and ≤ 500 (b) > 500 and ≤ 2 500 (c) > 2 500 and ≤ 17 500 (d) > 17 500 and ≤ 50 000 (e) > 50 000	5 points 10 points 15 points 25 points 35 points
2.	Average carbonaceous biochemical oxygen demand (CBOD) due to the quantity of biochemical oxygen demanding matter in the effluent, and average concentration of suspended solids (SS) in the effluent, both expressed in mg/L, deposited during the year in question	(CBOD + SS)/5	points as per formula in column 2
3.	Average concentration of total residual chlorine, expressed in mg/L, deposited during the year in question	> 0.02	10 points
4.	Average annual concentration of un-ionized ammonia, expressed in mg/L as nitrogen (N), deposited during the year in question	≥ 1.25 at 15°C ± 1°C	20 points
5.	Water where effluent is deposited via the final discharge point (highest value of any that apply)	(a) open marine waters (b) marine port waters (c) lake, reservoir (d) enclosed bay, marine estuary (e) watercourse with bulk flow ratio >100 (f) watercourse with bulk flow ratio ≥10 and ≤100 (g) watercourse with bulk flow ratio <10 (h) shellfish harvesting area within 500 m of the point of entry where effluent is deposited in the water via the final discharge point	5 points 10 points 20 points 20 points 15 points 20 points 25 points 20 points

Table 1. System of Points – Final Discharge Point.¹⁹⁸

¹⁹⁸ WSER, Schedule 3.

102. Using this proposed point system, wastewater systems operating under a transitional authorization would have to upgrade to meet the proposed effluent quality standards by these proposed timelines:

- “High risk” facilities with 70 or more points under Schedule 3 would be required to meet the proposed effluent quality standards by December 31, 2019 (10 years in the CCME Strategy);
- “Medium risk” facilities with 50 or more points under Schedule 3, by December 31, 2029 (20 years in the CCME Strategy); and
- “Low risk” facilities with less than 50 points under Schedule 3,¹⁹⁹ by December 31, 2039 (30 years in the CCME Strategy).²⁰⁰

103. The point system that Environment Canada presented in public consultations on its proposed regulatory framework, in 2007-2008, defined a high risk facility as one that exceeded 65 points, not 70 points.²⁰¹

104. The CCME Strategy and Environment Canada consultations did not include specific definitions for discharge locations in the point system.²⁰²

Environment Canada adopted definitions for final discharge points in the WSER:

- “enclosed bay” includes fjords and, if there is limited water exchange from a strait to the open ocean, that strait
- “marine port waters” means the waters of a well-flushing sea port.
- “open marine waters,” in relation to a final discharge point, means salt waters in an area defined by an arc of 135° extending 20 km from the final discharge point, if there is no land within that area.²⁰³

¹⁹⁹ Or more than 50 points under Schedule 3 but also having combined sewer overflow points for which points are allocated under Schedule 4 with at least one such combined sewer overflow (“CSO”) point that exceeds a Schedule 3 discharge point value [s.23(2)(c)(ii)].

²⁰⁰ Ss.21(5) and 23(2) and Schedules 3 and 4; CCME Strategy, *supra*; WSER RIAS, *supra*.

²⁰¹ Environment Canada, National Report Wastewater Consultations (November 2007 to January 2008), available online at http://www.ec.gc.ca/eu-ww/25DDE2CB-3551-42C6-B624-16B3BAEBFB3C/National%20Report%20JULY%202008_FINAL.pdf [hereinafter “National Report Wastewater Consultations”] at 31.

²⁰² CCME Strategy, *supra*; *ibid*.

²⁰³ Schedule 3, s.1.

105. It is left to the owner or operator of a municipal wastewater system to apply this point system and identify what upgrade timeline it must meet, as part of its application for a transitional authorization under the WSER.²⁰⁴
106. Table 1 of the RIAS assesses the total number of wastewater treatment facilities in Canada that need upgrading to meet the proposed national effluent quality standards.²⁰⁵ The RIAS identifies British Columbia as having eight “high risk” facilities and five “medium risk” facilities; the specific facilities and their locations are not provided. The RIAS does not identify any single wastewater treatment facility in British Columbia as falling into the “low risk” category.²⁰⁶
107. Under the proposed WSER, in addition to meeting effluent quality standards for four deleterious substances,²⁰⁷ wastewater treatment facilities will be required to undertake Environmental Effects Monitoring (“EEM”).²⁰⁸ Schedule 2 details the proposed EEM requirements.²⁰⁹ Specifically, facilities will be required to do certain water quality and biological monitoring studies,²¹⁰ depending on a risk analysis. Facilities demonstrating no impacts in two consecutive cycles will no longer be required to conduct environmental effects monitoring.²¹¹
108. Members of the regulated community, and other stakeholders, made written submissions on the proposed regulations in the spring of 2010. For example, Lake Ontario Waterkeeper, Ottawa Riverkeeper and Fraser Riverkeeper expressed concerns about the proposed regulations, including that “the

²⁰⁴ S.22.

²⁰⁵ Information for the analysis was provided by the CCME's Economics and Funding Task Group. WSER RIAS, *supra*.

²⁰⁶ See Table 1 – National ranking of wastewater facilities in Canada, *ibid*.

²⁰⁷ *I.e.*, BOD, TSS, total residual chlorine and un-ionized ammonia.

²⁰⁸ Briefing Note for Cohen Inquiry: Wastewater and Sewage Contamination, CAN295568 [hereinafter “Briefing Note for Cohen Inquiry”] at 2.

²⁰⁹ See also s.14.

²¹⁰ Schedule 2, Items 2-14.

²¹¹ WSER RIAS, *supra*.

regulation would decriminalize sewage discharges that are currently illegal under the *Fisheries Act* and “would allow wastewater systems to discharge substances in quantities and locations that would otherwise violate s.36(3).”²¹²

109. In contrast, other national and local environmental organizations expressed support in principle for the proposed WSER. However, they advocated that the draft regulations be strengthened, notably by shortening the implementation timelines.²¹³

110. Metro Vancouver submitted comments directly to the federal Ministers of the Environment and of Finance and to the provincial Ministers of Environment and of Community and Rural Development. Metro Vancouver expressed its support of these elements in the proposed WSER:

- The national effluent quality minimum standard of a secondary level of wastewater treatment;
- A one-window approach to harmonize federal and provincial regulations for wastewater discharge, to be implemented through bilateral administrative agreements between federal and provincial governments; and
- A science-based risk management approach.²¹⁴

111. However, Metro Vancouver expressed concern about funding for and costs of implementing the WSER. It questioned Environment Canada’s financial cost-benefit analysis in the RIAS. It advised the Ministers that, as a result of the lack of clarity regarding senior government cost sharing, the Metro Vancouver Board had passed a resolution that it “cannot commit to the Iona Wastewater Treatment

²¹² This submission provides 16 recommendations to Environment Canada. Letter of May 19, 2010 from Lake Ontario Waterkeeper, Ottawa Riverkeeper, and Fraser Riverkeeper to Environment Canada’s Director General, Public and Resources Sectors Directorate, CAN434413 at 2, 9-18.

²¹³ Letter dated May 19, 2010 from Ecojustice Canada, Canadian Environmental Law Association, Georgia Strait Alliance, the T. Buck Suzuki Foundation, Friends of the Earth, and Great Lakes United to Environment Canada’s Director General, Public and Resources Sectors Directorate.

²¹⁴ Letter dated May 4, 2010 from Metro Vancouver Board to federal and provincial Ministers, CAN434412 at 1.

Plant and the Lions Gate Wastewater Treatment Plant upgrades, as required in the CCME Strategy and the Regulations, without a funding formula that includes the senior levels of government funding contribution."²¹⁵

112. Metro Vancouver also provided Environment Canada staff with detailed technical comments on WSER. It recommended clarification on combined sewer overflows, sanitary sewer overflows and acute lethality test procedures; and it advocated that some monitoring/testing protocols are inappropriate for marine/estuary discharges.²¹⁶
113. In March 2010, Environment Canada envisioned that the final version of the WSER would be enacted by the end of 2010.²¹⁷ This has not yet occurred.

Canadian Environmental Protection Act

114. In 2001-2002, Environment Canada conducted a risk analysis of three deleterious substances found in wastewater treatment plant discharges: ammonia dissolved in water, inorganic chloramines and chlorinated wastewater effluents. These substances were listed as toxic under Schedule 1 of *CEPA*.²¹⁸
115. Environment Canada then proposed the use of pollution prevention plans under section 56 of *CEPA* to regulate these three substances. According to the federal government, this was seen as a first step in an overall strategy to managing municipal wastewater effluent in Canada, “[a]lthough it would have been possible

²¹⁵ *Ibid.* at 1-2. See similar concerns expressed about cost-sharing in a letter from the Squamish-Lillooet Regional District, dated May 31, 2010, to Environment Canada’s Director General, Public and Resources Sectors Directorate.

²¹⁶ Letter dated May 14, 2010 from Metro Vancouver Board to Director General, Public and Resources Sectors Directorate, Environment Canada with technical comments attached.

²¹⁷ Environment Canada, “Government of Canada delivers on wastewater rules: proposed regulations released,” available online at <http://www.ec.gc.ca/eu-ww/default.asp?lang=En&n=BC799641-1>. See also Briefing Note for Cohen Inquiry, CAN295568, *supra* at 1.

²¹⁸ Annual Report, 2002-2003, *supra* at 22; CCME Review of Existing MWW Regulatory Structures in Canada, *supra*, BCP005284 at 6.

to regulate the three substances as deleterious under s.36(5) of the *Fisheries Act*.”²¹⁹

116. In December 2004, the Minister released two final instruments under *CEPA* related to wastewater effluent:²²⁰ the *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents* (“Inorganic Chloramines and Chlorinated Wastewater Effluents Notice”)²²¹ and *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents* (“Ammonia Guideline”).²²² These instruments outline performance objectives for chlorine and chlorine compounds and for ammonia in wastewater effluent. The Ammonia Guideline requires that the concentration of ammonia deposited from treated or untreated wastewater effluent to surface water frequented by fish not be acutely lethal.²²³
117. Finally, for federal facilities, *CEPA* contains treatment system performance objectives for ammonia, chlorinated wastewater effluents and inorganic chloramines.²²⁴

²¹⁹ Annual Report 2002-2003, *supra*, CAN014475 at 22-3.

²²⁰ WSER RIAS, *supra*.

²²¹ Environment Canada, Inorganic Chloramines and Chlorinated Wastewater Effluents: Pollution Prevention Planning Notices, available online at

<http://www.ec.gc.ca/planp2-p2plan/default.asp?lang=En&n=022AA832-1>. See also *Canada Gazette*, Part I, Vol. 138, No. 49 (December 4, 2004), available online at <http://www.ec.gc.ca/planp2-p2plan/022AA832-8405-466D-9A9D-03BA7B2A9ABD/g1-13849.pdf> [hereinafter “*Canada Gazette*, Part I (December 4, 2004)”] at 13.

²²² *Canada Gazette*, Part I (December 4, 2004), *ibid.* at 5. For the purposes of the Ammonia Guideline, “effluent” means untreated or treated wastewater that is released from the outfall(s) of a wastewater system, excluding combined sewer overflows from the wastewater system. Environment Canada, *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents*, available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=B7CE1A5E-1&offset=1&toc=show> [hereinafter “Ammonia Guideline”].

²²³ An “acutely lethal concentration of ammonia” is defined as “a level of ammonia in an effluent at 100% concentration that kills more than 50% of the rainbow trout subjected to it over a 96-hour period when tested in accordance with the acute lethality test. Ammonia Guideline, *ibid.*

²²⁴ Annual Report, 2002-2003, *supra* at 22; CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284 at 6.

Provincial Regulatory Scheme

118. Generally, under the *EMA*, sewage facilities²²⁵ require authorization under either a permit, liquid waste management plan (“LWMP”) or a regulation.²²⁶
119. The Province of British Columbia has moved to performance-based requirements for wastewater treatment facilities under the *Municipal Sewage Regulation* (“MSR”),²²⁷ initially established under the previous *Waste Management Act* and now pursuant to the *EMA*.²²⁸ However, as discussed further below, not all local governments in the province are subject to the MSR.

Municipal Sewage Regulation

120. The Province manages many municipal wastewater systems through the MSR. The MSR was developed in 1999 to establish requirements for municipalities and private sewage dischargers for the treatment and discharge of domestic sewage, wastewater or municipal liquid waste.²²⁹

²²⁵ Under the *EMA*, a “sewage facility” is “works operated by a municipality to gather, treat, transport, store, utilize or discharge sewage” [s.23]. A “waste management facility” means a facility for the treatment, recycling, storage, disposal or destruction of a waste, or recovery of reusable resources, including energy potential from waste [s.1(1)].

²²⁶ A “permit” is a permit issued under section 14 [*permits*] or under the regulations [s.1(1)]. For those communities and service providers whose discharge pre-dates the MSR, they must comply with conditions of a permit that authorizes the discharge. Working With the Coastal Shore – Coastal Shore Stewardship, CAN025073 at 20.A “waste management plan” means a plan that contains provisions or requirements for the management of recyclable material or other waste or a class of waste within all or a part of one or more municipalities [s.1(1)]. “Manage” or “management” includes the collection, transportation, handling, processing, storage, treatment, utilization and disposal of any substance [s.23]. “Municipal liquid waste” refers to either (a) effluent that originates from any source and is discharged into a municipal sewer system, (b) effluent from residential sources that is discharged to the ground, or (c) effluent specified by a director to be included in a waste management plan [s.23].

²²⁷ *Municipal Sewage Regulation*, BC Reg. 129/99.

²²⁸ CCME Review of Existing MWWWE Regulatory Structures: Executive Summary, *supra* at 4.

²²⁹ BC MOE, Amendments to the Municipal Sewage Regulation, available online at http://www.env.gov.bc.ca/epd/codes/msr/mun_sew_reg.htm [hereinafter “Amendments to the MSR”]; BC MOE, Compliance Guideline: Meeting the Intent and Requirements of the Municipal Sewage Regulation, available online at <http://www.env.gov.bc.ca/epd/mun-waste/regs/msr/guidance/pdf/compliance-guideline.pdf> [hereinafter “MSR Compliance Guideline”].

121. Guidance documents on administrative, technical and scientific matters involving the MSR include: Compliance Guidelines: Meeting the Intent and Requirements of the Municipal Sewage Regulation;²³⁰ Environmental Impact Study Guideline: A Companion Document to the Municipal Sewage Regulation;²³¹ Authorization of Existing Unauthorized Municipal Sewage Discharges Policy and Procedure;²³² and De-permitting Municipal Sewage Discharges Policy and Procedure.²³³
122. The provincial Ministry of Environment has proposed a regulatory amendment to support discharge prohibitions in local governments' approved LWMPs.²³⁴ The amendment process is taking place in three stages. In the first stage, regulators have focused on reclaimed water and registration requirements and additional housekeeping amendments to the MSR.²³⁵ The second stage will address discharges to ground and water and harmonizing the MSR with the CCME Strategy.²³⁶ Finally, implementation and compliance strategies, as well as design, management, operations, environmental impact studies and other matters will be considered and discussed in an intentions paper in 2011.²³⁷

²³⁰ *Ibid.* The *Compliance Guidelines* (2001) presents a range of compliance options under the MSR, from voluntary actions to legal court proceedings.

²³¹ BC Ministry of Environment, Lands and Parks (as it then was), *Environmental Impact Study Guideline – A Companion Document to the Municipal Sewage Regulation* (December 2000), available online at <http://www.env.gov.bc.ca/epd/mun-waste/regs/msr/guidance/pdf/EIS-Guideline-Dec2000.pdf>.

²³² BC MOE, "Authorization of Existing Unauthorized Municipal Sewage Discharges Policy and Procedure" available online at <http://www.env.gov.bc.ca/epd/mun-waste/regs/msr/guidance/discharge-policy-procedure.htm>.

²³³ BC MOE, *De-permitting Municipal Sewage Discharges Policy and Procedure* (March 2, 2000), available online at <http://www.env.gov.bc.ca/epd/mun-waste/regs/msr/guidance/depermit-policy-procedure.htm>.

²³⁴ MSR Policy Intentions Paper, *supra* at 2-3.

²³⁵ The intentions paper for the first stage of amendments was posted in December 2009 and is available online. See MSR Policy Intentions Paper, *supra*; Amendments to the MSR, *supra*. For a summary of public comments, see *Municipal Sewage Regulation Intentions Paper: Summary of Public Comments*, available online at <http://www.env.gov.bc.ca/epd/codes/msr/pdf/msr-comments.pdf>.

²³⁶ On the CCME Strategy, see the discussion below.

²³⁷ Amendments to the MSR, *supra*.

Liquid Waste Management Plans and Operational Certificates under the EMA

123. In some circumstances, local governments may be exempted from compliance with the MSR. A local government may instead be encouraged, or directed by the Minister, to develop for ministerial approval a LWMP for the development and operation of its wastewater facilities over a number of years.²³⁸ In addition to treatment plants, LWMPs address other liquid waste management issues like stormwater, on-site sewage systems and source control.²³⁹
124. Local governments draft their own LWMPs, in cooperation with and for approval of the provincial government, and must conduct a comprehensive public review and consultation process.²⁴⁰ The Ministry of Environment has published *Guidelines for Developing a Liquid Waste Management Plan* (2005).²⁴¹
125. The Lieutenant Governor-in-Council may make regulations respecting the development, content, amendment, approval and review of liquid waste management plans and operational certificates.²⁴² There are no such regulations.
126. If a liquid waste management plan is approved by the Minister of Environment, a director may, “in accordance with the regulations,” issue an operational certificate to a local government with or without conditions. An operational certificate can be

²³⁸ S.24. For an example of a currently proposed LWMP, see Metro Vancouver, Integrated Liquid Waste and Resource Management: A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities, MVA000003 [hereinafter “MV Proposed Integrated Liquid Waste and Resource Management Plan”] at 6.

²³⁹ The *Guidelines for Developing a Liquid Waste Management Plan* (2005), first published in 1992, govern the preparation of LWMPs in BC. BC MOE, Environmental Protection Division, Guidelines for Developing a Liquid Waste Management Plan, BCP005200; Stormwater Planning: A Guidebook for British Columbia, BCP002164 [hereinafter “Stormwater Planning”] at ES-1.

²⁴⁰ Ss.24 and 27. See also Stormwater Planning, *ibid.*

²⁴¹ Guidelines for Developing a Liquid Waste Management Plan, BCP005200, *supra.*

²⁴² S.38(1)(a).

used to govern the design, operation, maintenance, performance and closure of sewage treatment facilities.²⁴³

127. An operational certificate is issued under subsection 28(1) of the *EMA*. It forms part of and must not conflict with the approved waste management plan.²⁴⁴ In effect, an operational certificate serves as and is equivalent to a standard *EMA* permit, and a director has the same powers and authorities in relation to each.²⁴⁵
128. The Province largely relies on local governments to monitor and report on their own wastewater effluent discharges, whether under the MSR or under an LWMP with an operational certificate.²⁴⁶ In the past, Ministry of Environment officials conducted regular testing. They now may conduct more occasional spot checks to assess the credibility of data in municipal reports.²⁴⁷

Municipal Source Control / Sewer Use Bylaws

129. Many municipalities have increasingly sought to control the substances that enter municipal sewer systems. This is principally accomplished through “sewer use bylaws,” which is sometimes referred to as source control.²⁴⁸ Sewer use bylaws²⁴⁹ and source control programs²⁵⁰ are the primary legal instruments used by local governments to control and limit the industrial, commercial and institutional sources of wastes discharged to their sewer systems.²⁵¹

²⁴³ S.28(1), s.1.1 (definition of “operational certificate”).

²⁴⁴ S.28(2).

²⁴⁵ Ss.14 and 28(3).

²⁴⁶ CCME Review of Existing MWWWE Regulatory Structures: Executive Summary, *supra* at 4. Waste treatment facilities still operating under the former permit system also commonly have monitoring and reporting criteria specified in the permit.

²⁴⁷ CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284 at 73.

²⁴⁸ National Sewage Report Card (2004), *supra*, CON000115 at 16.

²⁴⁹ CCME Review of Existing MWWWE Regulatory Structures in Canada, *supra*, BCP005284 at 31.

²⁵⁰ *Ibid.* at 71.

²⁵¹ A sewer-use by-law is an instrument used by a province and/or municipality to control inputs to their sewer systems. Canadian Water and Wastewater Association, FAQ – Municipal Wastewater Services, available online at http://www.cwwa.ca/faqwastewater_e.asp.

130. Under the *EMA*, regional districts, in certain circumstances, may make bylaws regarding the direct or indirect discharge of wastes into any sewer or drain connected to the district's sewerage facilities. Such a bylaw may impose conditions on the discharge into sewers of waste produced on non-residential property and may provide that its contravention is an offense punishable by a fine not exceeding \$10,000.²⁵²
131. For example, the Greater Vancouver Sewerage and Drainage District ("GVS&DD") has enacted Sewer Use Bylaw No. 299,²⁵³ pursuant to the *EMA* and the *Greater Vancouver Sewerage and Drainage District Act*.²⁵⁴ The purposes of Sewer Use Bylaw No. 299 include:
- (a) protecting the sewers and sewage facilities from damage and promoting the efficient and cost-effective operation of the sewers and sewage facilities;
 - (b) promoting biosolids quality;
 - (c) protecting human health and safety;
 - (d) assisting the District's efforts to remain in compliance with laws and regulatory instruments to which it is subject; and
 - (e) protecting the environment.²⁵⁵

²⁵² S.30. As an example, the GVRD Sewer Use Bylaw is discussed below.

²⁵³ The Greater Vancouver Sewage and Drainage District ("GVS&DD") and the Greater Vancouver Regional District ("GVRD") have together done business under the name Metro Vancouver since September 2007. The GVRD consists of the following municipalities and unincorporated areas: Abbotsford (park purposes only), Anmore, Belcarra Bowen Island, Burnaby, Coquitlam, Delta, Electoral Area A, Langley City, Langley Township, Lions Bay, Maple Ridge, New Westminister, North Vancouver City, North Vancouver District, Pitt Meadows, Port Coquitlam, Port Moody, Richmond, Surrey, Tsawwassen, Vancouver, West Vancouver and White Rock. GVS&DD excludes Abbotsford, Anmore, Belcarra, Bowen Island, Lions Bay and Tsawwassen from the above list. See Metro Vancouver, About Metro Vancouver, available online at <http://www.metrovancouver.org/about/Pages/default.aspx> [hereinafter "About Metro Vancouver"]. See also Metro Vancouver, FAQs, available online at <http://www.metrovancouver.org/about/Pages/faqs.aspx>.

²⁵⁴ *Greater Vancouver Sewerage and Drainage District Act*, SBC 1956, c.59.

²⁵⁵ Greater Vancouver Sewage and Drainage District Sewer Use Bylaw No. 299, 2007, available online at http://www.metrovancouver.org/boards/bylaws/Bylaws/GVSDD_Bylaw_299.pdf [hereinafter "Sewer Use Bylaw No. 299"] at s.1.

132. Discharging, or permitting or causing the discharge, of “non-domestic wastes” into a GVS&DD sewer is prohibited,²⁵⁶ unless authorized by a waste discharge permit, trucked waste authorization, order or code of practice.²⁵⁷
133. As part of the CCME Strategy,²⁵⁸ the Canadian Council of Ministers of the Environment produced a Model Sewer Use Bylaw to assist communities across Canada in implementing source controls for contaminants discharged to sewers.²⁵⁹ This Model Bylaw contains a number of contaminants not addressed in Sewer Use Bylaw No. 299, such that Metro Vancouver is contemplating updating its bylaw to address additional contaminants.²⁶⁰

Water Quality Guidelines and Objectives

134. The Province uses provincial water quality guidelines as well as water quality objectives derived from those guidelines for specific water bodies with site-specific requirements.²⁶¹
135. Approved *Water Quality Guidelines* (2010) exist in British Columbia for several substances.²⁶² Water quality guidelines for dioxins and furans appear to be under development by the Ministry of Environment.²⁶³

²⁵⁶ GVS&DD owns, maintains, and operates the trunk sewers and major wastewater treatment plants in the region. The municipal members of the GVS&DD, on the other hand, own and maintain collector sewers and manage stormwater systems. See e.g. MV Proposed Integrated Liquid Waste and Resource Management Plan, *supra*, MVA000003 at 6.

²⁵⁷ Ss.5.1 and 5.2. Non-domestic waste is defined as all wastewater except domestic waste, sanitary waste, storm water, uncontaminated water and septic tank waste [s.2].

²⁵⁸ CCME Strategy, *infra*.

²⁵⁹ CCME, Model Sewer Use Bylaw Guidance Document (February 3, 2009), available online at http://www.ccme.ca/assets/pdf/pn1421_model_sewer_use_bylaw_e.pdf [hereinafter “Model Sewer Use Bylaw Guidance Document”]. See also CCME Strategy, *supra*, CAN300922 at 2, 8.

²⁶⁰ Metro Vancouver, Sewer Use Bylaw Review, available online at <http://www.metrovancouver.org/boards/bylaws/Pages/bylawreview.aspx>.

²⁶¹ CCME Review of Existing MWWE Regulatory Structures in Canada, *supra*, BCP005284 at 73; Lower Fraser River Report (2004), *supra* at 1.

²⁶² BC MOE, Environmental Protection Division, Water Quality Guidelines (Criteria) Reports, available online at http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html.

136. The Compendium of Working Water Quality Guidelines for British Columbia (2006) provides site-specific guidelines.²⁶⁴ These have their basis in the broader province-wide guidelines, but are adapted for more sensitive water use at specific locations. These guidelines take into account site characteristics that may influence the toxic action of the substance of concern.²⁶⁵ The 2006 *Compendium* are working guidelines. They provide benchmarks for substances that have not yet been fully assessed and formally approved by the Province. They reflect guidelines from various Canadian and North American agencies, the primary source being the CCME.²⁶⁶
137. The Derivation of Water Quality Guidelines to Protect Aquatic Life in British Columbia outline the procedure used to derive water quality guidelines.²⁶⁷
138. Water quality objectives are established for those water bodies and water, sediment and/or biota quality measurements that may be affected by human activity. Water quality criteria describe attributes of water, biota or sediment that

²⁶³ BC MOE, Environmental Protection Division, A Compendium of Working Water Quality Guidelines for British Columbia (August 2006), BCP001451 [hereinafter “Working Water Quality Guidelines Compendium”] at 3-4.

²⁶⁴ The Working Water Quality Guidelines Compendium, *supra*, BCP001451 at 3 states that the 2006 Compendium and the 2006 BC Water Quality Guidelines (Criteria), supersede the following documents:

- Preliminary Working Criteria for Water Quality, October 1982.
- Working Criteria for Water Quality, April 1985.
- Approved and Working Criteria for Water Quality, April 1987, March 1989, May 1991, February 1994 and April 1995.
- A Compendium of Working Water Quality Guidelines for British Columbia: 1998 Edition and updated August 23, 2001.
- British Columbia Approved Water Quality Guidelines (Criteria) 1998 Edition and updated August 24, 2001.

²⁶⁵ Working Water Quality Guidelines Compendium, *supra*, BCP001451 at 2.

²⁶⁶ *Ibid.* at 2.

²⁶⁷ BC MOE, Water Stewardship Division, Science and Information Branch, Derivation of Water Quality Guidelines to Protect Aquatic Life in British Columbia (June 2010), available online at <http://www.env.gov.bc.ca/wat/wq/pdf/wq-derivation.pdf>.

should not be exceeded in order to prevent harm from occurring to a water use in a freshwater, marine or estuarine environment.²⁶⁸

139. Objectives are set in the Lower Fraser River for water, sediment and fish quality to reflect specific and sensitive uses of the water, including uses by aquatic life. As of 2004, water quality objectives for the Lower Fraser River had been set for dissolved oxygen, suspended solids, pH, ammonia, nitrite, bacteria, copper, lead, manganese and zinc. Sediment quality objectives have been set for dioxins and furans, chlorophenols, PCBs, PAHs, chromium and nickel. Likewise, fish tissue objectives were set for dioxins and furans, chlorophenols, PCBs and a specific PAH, benzo(a)pyrene.²⁶⁹

Municipal Wastewater Disposal Practices

What are Municipal Wastewater Effluents?

140. Municipal wastewater effluents represent one of the largest sources of pollutants, by volume, entering Canadian waters. The top 15 water polluters in Canada, according to data in Environment Canada's National Pollutant Release Inventory ("NPRI"), were all municipal waste treatment facilities.²⁷⁰
141. Municipal wastewater effluents consist of two basic types of liquid wastes. The first type is sanitary sewage. Sanitary sewage typically contains human and other organic wastes originating from homes, industries and businesses.²⁷¹ Community sewer systems collect these wastes and transport them to wastewater treatment plants, where the effluents usually receive some level of treatment before being discharged into a receiving body of water.

²⁶⁸ Lower Fraser River Report (2004), *supra*, BCP000363 at 1.

²⁶⁹ Lower Fraser River Report (2004), *supra*, BCP000363 at 7.

²⁷⁰ National Sewage Report Card (2004), *supra*, CON000115 at 11.

²⁷¹ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 13.

142. The second type of municipal wastewater is stormwater. Stormwater contains many of the same compounds found in sewage, in addition to surface runoff (e.g. rain that drains off rooftops, lawns, roads and other surfaces). Most stormwater is directed from storm drains into storm sewers and is then discharged into the nearest stream, river, lake or ocean.²⁷²
143. In Canada, communities have either combined sewer systems, which combine raw sewage and stormwater together into one sewer, or separate sewer systems for sanitary sewage and stormwater.²⁷³ Stormwater carried in separate storm sewer systems is discharged directly into receiving waters without treatment. As a result, the quantity and quality of stormwater entering aquatic ecosystems in Canada is difficult to quantify and is poorly documented.²⁷⁴
144. Older municipal systems commonly collect both wastewater and stormwater in a combined sewer system. In some communities like Vancouver,²⁷⁵ combined systems are connected to wastewater treatment facilities, where both stormwater and sanitary sewage receive treatment. One disadvantage with combined systems is that, during periods of heavy precipitation, the wastewater flows become too high. When combined systems become overloaded, the wastewater is typically directed to CSOs, allowing raw sewage and untreated stormwater to overflow at many exit points upstream of the treatment facility and to enter receiving waters directly without any treatment.²⁷⁶ Municipalities with combined sewer systems typically experience several overflows at CSOs annually.²⁷⁷

²⁷² CCME Review of Existing MWWE Regulatory Structures in Canada, *supra*; Wastewater Fact Sheet, *supra*; *ibid.*

²⁷³ CCME Review of Existing MWWE Regulatory Structures in Canada, *supra*; Wastewater Fact Sheet, *supra*.

²⁷⁴ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 23.

²⁷⁵ Map, Combined Sewer Overflows in Greater Vancouver, CON000109. See Appendix A of this Report, *infra*.

²⁷⁶ Johannessen and Ross 2002, Exhibit 833, *supra* at 27; State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 23-4.

²⁷⁷ State of Municipal Wastewater Effluents in Canada, *ibid.*, CAN025061 at 24.

145. From the mid-1950s onwards, most municipalities in Canada began to separate sanitary wastes from stormwater runoff, in an effort to improve the treatment of sanitary sewage.²⁷⁸ For example, Metro Vancouver is separating sewers at the rate of replacement of aging infrastructure,²⁷⁹ replacing approximately one percent of the system per year.²⁸⁰

²⁷⁸ *Ibid.* at 13.

²⁷⁹ *Ibid.* at 65.

²⁸⁰ At this rate, combined sewers will not be eliminated in Metro Vancouver until 2050. *Ibid.* at 55.

Wastewater Treatment

146. In contrast to the US and Europe,²⁸¹ in Canada the level of treatment that municipal wastewater receives varies widely nationwide.²⁸² Wastewater treatment plants vary in treatment level and design according to financial considerations, community needs and the quantity and quality of wastewater to be treated.²⁸³
147. Generally, the treatment level that effluent receives determines the concentrations of the contaminants released directly into aquatic environments. The concentrations of many contaminants are reduced through treatment.²⁸⁴
148. Conventional wastewater treatment is categorized into three basic levels: 'primary,' 'secondary' and 'tertiary.'²⁸⁵ Each treatment level provides progressively greater removal of solids, metals and certain contaminants.²⁸⁶
149. All wastewater treatment plants begin with a rudimentary screening process: "preliminary treatment," or "pre-treatment."²⁸⁷ This is a physical process whereby sewage effluent is simply screened to remove large solids, such as wood and rags and other debris, before the wastewater is released untreated into the receiving environment. Pre-treatment is also a precondition to additional

²⁸¹ For information on secondary treatment requirements in the US and European Union, see the discussion of the CCME Strategy above.

²⁸² The Municipal Water Use Database ("MUD") survey collects water- and wastewater-related information from Canadian municipalities having populations of 1,000 or more, every two or three years. Municipalities self-report their wastewater treatment levels based on the definitions provided in the MUD survey. Therefore, some municipalities may report treatment levels that are different from those reported by other agencies (*i.e.*, provinces/territories, regions, and non-governmental organizations) based on differences in treatment level definitions. Furthermore, MUD occasionally amalgamates several different treatment facilities for a municipality into one overall level of treatment, when more than one facility exists in a municipality. State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 17.

²⁸³ WSER RIAS, *supra*.

²⁸⁴ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 13-4, 20, 28.

²⁸⁵ Toxicological Evaluation of Emerging Chemicals in MWWs, *supra*, CAN310554 at 24, 26.

²⁸⁶ Johannessen and Ross 2002, *supra*, Exhibit 833 at 27.

²⁸⁷ WSER RIAS, *supra*; Toxicological Evaluation of Emerging Chemicals in MWWs, *supra*, CAN310554 at 25.

treatment at a wastewater treatment plant.²⁸⁸ In this case, raw wastewater is passed through mechanically raked bar screens.²⁸⁹ Smaller inorganic material, such as sand and stones, are settled and removed by a grit removal system.²⁹⁰

150. “Primary treatment” is the most basic form of treatment, following pre-treatment. Primary treatment relies on a mechanical process to physically remove organic solids. Lighter organic materials are floated, or suspended, in water and flow into primary clarifiers, or sedimentation tanks, where heavier organic solids settle due to gravity. The settled solids, called primary sludge, are removed, along with any materials skimmed off the water surface (e.g. scum, oils and grease).²⁹¹ ‘Enhanced primary treatment’ adds inorganic or organic flocculants to the process, to attempt to clarify and improve the effluent quality.²⁹²
151. “Secondary treatment” follows upon preliminary treatment and/or primary treatment. Secondary-treated effluent is subjected to biological treatment that uses bacteria and other microorganisms to digest, break down and remove organic matter and suspended solids. In aeration tanks and bioreactors, the effluent is mixed with oxygen and a controlled population of bacteria that are naturally present in wastewater.²⁹³ The wastewater is then directed to secondary clarifiers, where it may be held for several hours, depending on the technology used. The solids, or sludge, eventually settles to the bottom before being pumped to anaerobic digesters. The remaining secondary-treated effluent is then discharged directly into the receiving environment. In some cases the secondary effluent may first be disinfected.²⁹⁴

²⁸⁸ Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 25.

²⁸⁹ Johannessen and Ross 2002, *supra*, Exhibit 833 at 27.

²⁹⁰ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 16.

²⁹¹ WSER RIAS, *supra*; Wastewater Fact Sheet, *supra*; Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 25-6; Johannessen and Ross 2002, *supra*, Exhibit 833 at 27.

²⁹² Toxicological Evaluation of Emerging Chemicals in MWWEs, *ibid.*, CAN310554 at 26.

²⁹³ WSER RIAS, *supra*; State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 17; Johannessen and Ross 2002, *supra*, Exhibit 833 at 27; Toxicological Evaluation of Emerging Chemicals in MWWEs, *ibid.*, CAN310554 at 26.

²⁹⁴ State of the Municipal Wastewater Effluents in Canada, *ibid.*

152. Secondary treatment plants employ different technologies, and the efficacy of secondary treatment at removing contaminants from effluents can depend on the technology used. As indicated in studies in Europe and the United States in 2007, secondary treatment plants using trickling filters are less effective at removing EDCs and emerging contaminants than are secondary treatment plants using activated sludge technology (and less effective than plants which have an additional tertiary step of biological nutrient removal).²⁹⁵
153. “Tertiary treatment” describes a variety of additional physical, chemical or biological processes such as filtration techniques. Tertiary treatment is employed to remove those suspended, colloidal and dissolved constituents that remain after conventional secondary treatment, such as metals, organic chemicals and nutrients,²⁹⁶ or to achieve a particular level of desired effluent quality.²⁹⁷
154. Before treated effluent is released into the environment, it may also be disinfected. “Disinfection” is commonly done by adding chlorine. Wastewater treatment plants may then dechlorinate the effluent prior to discharge to avoid excess chlorine escaping to the environment. Many plants have moved instead to use ultraviolet radiation or ozone, given the cost of dechlorination and concerns over the ecological and health impacts of the addition of chlorine.²⁹⁸
155. “Advanced” or “quaternary” treatment is used for enhanced source water protection or for water reuse applications. This level includes processes like reverse osmosis, membrane filtration and activated carbon technologies.²⁹⁹

²⁹⁵ SFU Proceedings. Speaking for the Salmon. March 30-31, 2010 at 131-133.

²⁹⁶ Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 26; State of the Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 17.

²⁹⁷ WSER RIAS, *supra*; Johannessen and Ross 2002, *supra*, Exhibit 833 at 27.

²⁹⁸ State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 17.

²⁹⁹ National Sewage Report Card (2004), *supra*, CON000115 at 14; Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 26.

156. Wastewater treatment plants can vary considerably in effluent quality. This is true even for those providing the same level of treatment, for example due to facility design. Even individual facilities may show variations in their effluent quality, as the flow level fluctuates, the seasons change and local water consumption increases. Land use is the biggest factor determining effluent quality in the case of stormwater and CSOs.³⁰⁰
157. In British Columbia, in 1999, the proportion of population served by secondary or advanced sewage treatment increased significantly, to about 63 percent, when the Annacis Island Waste Treatment Plant was upgraded.³⁰¹ Today, approximately 36 percent of the province's population served by sewers still receive less than secondary treatment.³⁰² Effluent released to British Columbia's coastal waters tends to be treated less than releases to freshwater bodies.³⁰³ Of the communities discharging directly into BC coastal waters, about 80 percent of the population served by sewers receive only primary treatment.³⁰⁴
158. According to Environment Canada, about 90 wastewater treatment facilities currently operate in the Fraser River basin.³⁰⁵ Millions of cubic metres of effluents, with varying treatment levels, are discharged daily from wastewater systems throughout the basin.³⁰⁶

³⁰⁰ Wastewater treatment plants are more efficient when processing relatively undiluted sewage, in which toxic substances are more concentrated. State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 28.

³⁰¹ *Ibid.* at 17; *Alive and Inseparable, supra*, CAN025074 at 8.

³⁰² WSER RIAS, *supra*.

³⁰³ *Ibid.*

³⁰⁴ In comparison, in the Prairie provinces, secondary and tertiary treatment are mainly used, and in Ontario mostly tertiary. As of 1999, over 94 percent of the sewered populations in Ontario and across the Prairies had secondary or advanced treatment. State of Municipal Wastewater Effluents in Canada, *supra*, CAN025061 at 17, 19.

³⁰⁵ Briefing Note for Cohen Inquiry, *supra*, CAN295568 at 1.

³⁰⁶ WSER RIAS, *supra*.

159. According to Technical Report 2, the highest density of wastewater treatment facilities is in the Lower Fraser River area, where several plants are located.³⁰⁷

Area of interest	Number of facilities	Treatment level	Volume (m ³ /day)
Nechako	3	Secondary	5,022
Upper Fraser	10	Primary or secondary	56,760
Thompson	7	Secondary or tertiary	66,070
Lower Fraser	10	Secondary	1,475,000
Lower Fraser (Iona)	1	Primary	1,530,000

Table 2. Examples of wastewater treatment plants in the Fraser River Basin.³⁰⁸

160. The highest volume of municipal wastewater effluent in the province appears to be discharged into the Georgia Basin.³⁰⁹ More than 0.58 trillion litres of municipal effluents are released annually into the Georgia Basin,³¹⁰ and daily volumes increased by more than 60 percent between 1983 and 1999.³¹¹

³⁰⁷ Technical Report 2, *supra*, Exhibit 826 at 57.

³⁰⁸ See *ibid.*, at 57, Table 3.15 at 237-39.

³⁰⁹ *Alive and Inseparable, supra*, CAN025074 at 8.

³¹⁰ Toxicological Evaluation of Emerging Chemicals in MWWEs, *supra*, CAN310554 at 6.

³¹¹ *Alive and Inseparable, supra*, CAN025074 at 8, 36.

D. PULP AND PAPER MILL EFFLUENTS

Federal Regulatory Scheme

Overview of 1992 Regulatory Framework

161. This section of the Report begins with an overview of the federal and provincial regulatory framework governing pulp effluents, the subject of specific regulations under the federal *Fisheries Act*,³¹² *CEPA*,³¹³ and British Columbia's *Environmental Management Act*.³¹⁴ It briefly summarizes the sources of pulp effluent discharged into the Fraser River watershed and other potential impacts to water quality arising from the pulp and paper industry, as well as the improvements made in the industry since the 1980s. Impacts from pulp mills not related to water quality are not the subject of this Report.
162. The *Pulp and Paper Effluent Regulations* ("PPER") were developed under section 36 of the *Fisheries Act*.³¹⁵ The PPER regulate effluent discharges from pulp and paper mills to Canadian fisheries waters. Environment Canada is responsible for administering and enforcing these regulations.³¹⁶
163. The PPER were enacted in 1992, as part of a concerted federal effort to improve pulp and paper mill effluent quality. The PPER revoked and replaced an earlier set of regulations passed in 1971, which were seen as technologically outdated and difficult to apply to expanded, modified or pre-1971 mills.³¹⁷

³¹² *Pulp and Paper Effluent Regulations*, SOR/92-269.

³¹³ *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations*, SOR/92-267 and *Pulp and Paper Mill Defoamer and Wood Chip Regulation*, SOR/92-268.

³¹⁴ *Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulation*, BC Reg. 470/90.

³¹⁵ SOR/92-269.

³¹⁶ List of Treaties, Acts, Regulations, Agreements, Policies, Programs and Procedures Related to the Management of Fish and Fish Habitat on the Pacific Coast of Canada: Submitted by DFO to Cohen Commission of Inquiry (May 17, 2010), CAN185556 at 4.

³¹⁷ See *Pulp and Paper Effluent Regulations* and Regulatory Impact Analysis Statement, *Canada Gazette*, Part II, Vol. 126, No. 11, SOR/DORS/92-269 at 1997, available online at http://www.collectionscanada.gc.ca/databases/canada-gazette/093/001060-119.01-e.php?document_id_nbr=11004&f=p&PHPSESSID=3f61j9hkm7ldgj4m19t0eh9q5.

164. The main changes to the PPER from the predecessor regulation were the establishment of new effluent quality requirements with more stringent limits for some effluent variables; the extension of the regulations to all mills that deposited effluent in receiving waters; new procedures for the routine monitoring and reporting of deposits; and an Environmental Effects Monitoring (EEM) program.³¹⁸ The new federal efforts caused the discharge of dioxins and furans above prescribed levels to be prohibited, pulp mills to conduct annual monitoring, and crab and shellfish fisheries in affected areas to be closed.³¹⁹
165. In addition to the PPER, the federal government enacted two regulations under CEPA: the *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* and the *Pulp and Paper Mill Defoamer and Wood Chip Regulations*.³²⁰
166. The above federal regulatory framework was developed under the CCME. Federal regulatory limits were intended to serve as national baseline standards, which the provinces could adopt or enhance with more stringent limits.³²¹

Pulp and Paper Effluent Regulations

167. The PPER prescribes certain deleterious substances in pulp and paper mill effluent,³²² and in effluent from off-site treatment facilities.³²³ The PPER

³¹⁸ The 1971 regulations applied only to mills built after their promulgation and covered less than ten percent of mills. Office of the Auditor General of Canada, 1993 Report of the Auditor General (Chapter 26), available online at http://www.oag-bvg.gc.ca/internet/English/parl_oag_199312_26_e_5965.html [hereinafter "1993 Report of the Auditor General"] at paragraph 26.21.

³¹⁹ *Alive and Inseparable, supra*, CAN025074 at 136.

³²⁰ Environment Canada, National Assessment of Pulp and Paper Environmental Effects Monitoring Data: Historical Overview of the Pulp and Paper Mill Effluents, available online at <http://www.ec.gc.ca/inrenwri/default.asp?lang=En&n=C5BD35C5-1&offset=3&toc=show> [hereinafter "National Assessment of Pulp and Paper EEM Data"].

³²¹ Environment Canada, Smart Regulation Final Report, available online at <http://www.ec.gc.ca/eseeeem/default.asp?lang=En&n=27EDDF4A-1&offset=2&toc=show>.

³²² "Effluent" means (a) waste water treated by an off-site treatment facility, or (b) waste water from a mill, other than waste water from the treatment of intake water, including process water, gas scrubbing water,

authorizes the deposit of limited quantities of these prescribed deleterious substances under certain circumstances.³²⁴

168. Specifically, the PPER prescribes three deleterious substances: BOD, TSS and effluent that is acutely lethal to fish.³²⁵ It prohibits the discharge of acutely lethal effluent.³²⁶ It sets out discharge limits – the maximum allowable quantities that may be authorized – for BOD and TSS.³²⁷ These quantities are determined by formulae set out in the regulation, as well as by other conditions.³²⁸ If these regulatory conditions are not met, the discharge is unauthorized and may constitute an offense.³²⁹
169. In 2004, the PPER was amended to streamline monitoring and reporting requirements.³³⁰ The 2004 amendments also embedded the EEM requirements under Schedule IV.1. The EEM technical requirements found in the Aquatic Environmental Monitoring Requirements (revised EPS/1/RM/18) and the Pulp and Paper Aquatic Environmental Effects Monitoring Requirements (Annex 1) were also largely integrated into Schedule IV of the PPER.³³¹

boiler blow-down water, wash-down water, cooling water, leachate from any site at the mill where solid residues generated by any mill are treated or disposed of, and leachate from any site at the mill where wood chips or hog fuel are stored [s.2].

³²³ “Off-site treatment facility” refers to “a facility that treats effluent from a mill if the facility is neither owned nor operated by the owner of a mill” [s.2].

³²⁴ S.6.

³²⁵ “Acutely lethal,” in respect of effluent, means that the effluent at 100 percent concentration “kills more than 50 per cent of the rainbow trout subjected to it during a 96-hour period, when tested in accordance with the acute lethality test” [s.2].

³²⁶ S.6(5).

³²⁷ The authority to deposit BOD matter and suspended solids, as conferred by subsections 6(1) and (2), does not confer any authority to deposit acutely lethal effluent [s.6(5)], unless the discharge is to a treatment facility [ss.6(3) and (4)]. For BOD and TSS, the regulation establishes maximum daily and monthly discharges for each mill, based on its production rate (e.g. tonnes per day).

³²⁸ Ss.14, 19-21.

³²⁹ PPER, s.7(4) and *Fisheries Act*, s.36(4).

³³⁰ Towards a Fisheries and Oceans Canada National Freshwater Monitoring Plan, *supra*, CAN261146 at 38.

³³¹ Environment Canada, Environmental Effects Monitoring, available online at http://www.ec.gc.ca/eseem/default.asp?lang=En&n=3D1EC15C-1#PPgeneral_information1.

170. The objective of the PPER's EEM program is to evaluate the effects of pulp and paper effluent on fish, fish habitat and the use of fisheries resources.³³² Mill owners and operators are required to conduct environmental effects monitoring to study the potential effects of effluent on the fish population, fish tissue and benthic invertebrates.³³³ The PPER EEM program requires biological monitoring studies and sublethal toxicity testing, using prescribed methods and at prescribed intervals.³³⁴
171. In August 2008, further amendments to the PPER were enacted. According to Environment Canada, the purpose of the amendments was to make the pulp and paper EEM requirements more effective and efficient as well as to enhance the regulation's clarity and consistency, and not to reduce effluent quality requirements.³³⁵ These amendments were based on operational experience gained through EEM implementation, input from a multi-stakeholder group of policy experts working on the "Smart Regulation Initiative on Improving the Effectiveness and Efficiency of Pulp and Paper Environmental Effects Monitoring" and feedback on the draft PPER amendments from stakeholders.³³⁶

³³² Environment Canada, Pulp and Paper Technical Guidance for Environmental Effects Monitoring, 2010 (Chapter 1), available online at <http://www.ec.gc.ca/eseee-em/default.asp?lang=En&n=A2CA9EEF-1> at 1-1.

³³³ S.28(1).

³³⁴ Ss.29 and 30, and Schedule V.1.

³³⁵ Environment Canada, Publication of the Regulations Amending the *Pulp and Paper Effluent Regulations* in *Canada Gazette*, Part II, pursuant to the *Fisheries Act*, available online at <http://www.ec.gc.ca/eseee-em/default.asp?lang=En&n=F48A13B2-1> [hereinafter "PPER Amendments"].

³³⁶ In January 2005, in response to stakeholder feedback on the EEM program, Environment Canada launched the Smart Regulation Project on Improving the Effectiveness and Efficiency of Pulp and Paper Environmental Effects Monitoring, which brought together a group of policy experts from the federal government, industry, and the Aboriginal and environmental communities. Annual Report to Parliament, 2007-2008, CAN180495 at 48-9; Environment Canada, Final Report for Smart Regulation Initiative for Environmental Effects Monitoring, available online at <http://www.ec.gc.ca/eseee-em/default.asp?lang=En&n=27EDDF4A-1> [hereinafter "Final Report for Smart Regulation Initiative for EEM"]; PPER Amendments, *supra*.

172. DFO has anticipated that this EEM program will be expanded to other sectors, including municipal wastewater.³³⁷

Regulations under the Canadian Environmental Protection Act

173. Under *CEPA*, the *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* and the *Pulp and Paper Mill Defoamer and Wood Chip Regulations* aim to prevent the formation of chlorinated dioxins and furans during the pulp bleaching process.³³⁸

174. The *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* prohibit the release of any measurable concentrations of 2,3,7,8-TCDD, a particularly toxic dioxin, or of 2,3,7,8-TCDF, a particularly toxic furan, in effluent from mills using chlorine or chlorine dioxide to bleach pulp.³³⁹

175. Mill operators must take 24-hour composite samples of their final effluent,³⁴⁰ and must report the concentrations of all toxic congeners of dioxins and furans in the final effluent samples as well as the flow rate of the final effluent.³⁴¹ The Minister of the Environment may request that the mill operator report on specified tests to determine the presence of dioxins and furans, on the effect of operating conditions in the mill on the concentration of those contaminants, and on toxicological studies on the effluent.³⁴²

³³⁷ DFO FWMP Steering Committee, Towards a Fisheries and Oceans Canada National Freshwater Monitoring Plan, CAN261146 [hereinafter "Towards a Fisheries and Oceans Canada National Freshwater Monitoring Plan"] at 38-9.

³³⁸ National Assessment of Pulp and Paper EEM Data, *supra*.

³³⁹ S.4(1). "Chlorine bleaching plant" is defined in the Regulation as "a plant in a mill where pulp is bleached by chlorine or chlorine dioxide" [s.2].

³⁴⁰ The "final effluent" is "any water that contains intermediate effluent that is released from a mill and discharged directly into the environment or into an off-site treatment system" [s.2].

³⁴¹ Ss.6(1) and (2). See also Schedule II for information on the concentrations of substances.

³⁴² S.7.

176. Under the federal Coastal Mills Dioxin and Furan Trend Monitoring Program, mills on the British Columbia coast must monitor dioxins and furans around their effluent outfalls. Environment Canada specifies the locations, species and numbers of samples to be collected each year. The data is reviewed by DFO, who conducts a health risk assessment to evaluate the need for fisheries closures and advisories. Health Canada likewise conducts a human health risk assessment with the data for consumption of Dungeness crab.³⁴³
177. The *Pulp and Paper Mill Defoamer and Wood Chip Regulations* are intended to reduce possible precursors to toxic dioxin and furan.³⁴⁴ They impose quality requirements for defoamers³⁴⁵ used in chlorine bleaching processes,³⁴⁶ prohibit defoamers with concentrations of dioxins and furans exceeding certain levels to be manufactured, imported or sold for use by pulp mills;³⁴⁷ and prohibit the manufacture of pulp from wood chips treated with polychlorinated phenols.³⁴⁸

Provincial Regulatory Scheme

Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulation

178. In parallel with federal government initiatives described above, British Columbia developed a provincial regime dealing with pulp and paper mill effluent under the *Environmental Management Act*. Enacted in 1990s, the *Pulp Mill and Pulp and*

³⁴³ *Alive and Inseparable, supra*, CAN025074 at 136.

³⁴⁴ 1993 Report of the Auditor General, *supra* at paragraph 26.29.

³⁴⁵ A “defoamer” is any product that contains dibenzofuran or dibenzo-para-dioxin and that is added to the water-pulp mixture during the manufacture of pulp in a mill to prevent the production of foam or reduce the amount of foam that would otherwise be produced [s.2].

³⁴⁶ S.4(1). “Chlorine bleaching process” means a process using chlorine, chlorine dioxide or chlorine bleach to bleach pulp in a mill [s.2].

³⁴⁷ S.4(2).

³⁴⁸ S.4(3). “Polychlorinated phenols” means phenol and salts of phenol in which at least two phenyl hydrogen atoms are replaced by chlorine atoms [s.2]. Polychlorinated phenols can contain dioxins and furans. They are used as fungicides to preserve and protect wood. If a mill uses chips from wood treated with these chemicals, dioxins and furans can be released in the final product as well as in the effluent discharged from the mill. 1993 Report of the Auditor General, *supra* at paragraph 26.31; National Assessment of Pulp and Paper EEM Data, *supra*.

Paper Mill Liquid Effluent Control Regulation sets quality requirements for final effluent respecting dioxins, furans, BOD, TSS and acute lethality.³⁴⁹

179. Under this regulation, a bleached kraft pulp mill, a bleached sulphite pulp mill, or a pulp and paper mill that uses chlorine or chlorine compounds for pulp bleaching is prohibited from discharging into the environment effluent with concentrations of adsorbable organic halide (“AOX”) exceeding a prescribed amount.³⁵⁰ The quality of the final effluent must meet the standards prescribed in Column 3 of Schedule 2.³⁵¹
180. The sampling methods used to determine regulatory compliance are set out under section 3. Each permittee mill is required to sample each effluent outfall at various minimum frequencies and report the data to a director.³⁵² A permittee who contravenes these provisions or intentionally submits false monitoring data commits an offence.³⁵³
181. In November 2001, the Province launched a process to develop a provincial pollution prevention strategy to eliminate the formation of dioxins and furans by coastal pulp and paper mills. The Province engaged mill operators and other stakeholders to collaborate with the Pulp and Paper Research Institute of Canada on a research and testing program to better understand the creation of dioxins and furans and to identify and assess possible strategies or measures that will reduce, minimize or prevent their formation. The program is funded by Natural Resources Canada and all facility operators covered by this standard.³⁵⁴

³⁴⁹ *Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulation*, BC Reg. 470/90

³⁵⁰ Ss.2(1) and (1.1).

³⁵¹ S.2(3).

³⁵² Ss.5(1), (4) and (5).

³⁵³ Ss.9(1) and (2).

³⁵⁴ BC MOE, Canada-wide Standards for Dioxins and Furans: BC Pulp and Paper Boilers Burning Salt-laden Wood: Implementation Plan, available online at http://www.env.gov.bc.ca/epd/industrial/pulp_paper_lumber/pulp_paper_boilers.htm.

Pulp and Paper Effluent Disposal Practices

182. Ten pulp and paper mills currently operate in the Fraser River Basin. Two mills are located near Prince George, two near Quesnel, one near Kamloops and five near Vancouver.³⁵⁵ All ten mills are located along the migration corridor of Fraser River sockeye.³⁵⁶
183. Pulp mills also operate on the shores of the Strait of Georgia and in other marine areas through which Fraser sockeye may migrate. Six pulp and paper mills operated in the Strait of Georgia during the period from 1990 to 2010.³⁵⁷ In 2003, mills were still operational at Port Mellon and Squamish on the mainland as well as at Crofton, Elk Falls, Gold River, Harmac and Port Alberni on Vancouver Island.³⁵⁸ Squamish and Elk Falls closed in 2006 and 2010 respectively.³⁵⁹

Contaminants in Pulp and Paper Effluents

184. The commission's Technical Report 2 identified 12 general categories of substances in pulp and paper effluents.³⁶⁰ Among these are dioxins and furans. Highly persistent and bioaccumulative, these have been identified by Environment Canada as a concern not just for fish, but for communities located downstream from mills, particularly those with high fish consumption.³⁶¹

³⁵⁵ The Northwood Pulp Mill and Prince George Pulp and Paper Mills-Canfor Pulp Limited partnership operate near Prince George; the Quesnel River Pulp and Cariboo Pulp and Paper Company-West Fraser Mills Ltd. are located near Quesnel; Cellulose Fibres-Domtar Pulp and Paper Products Inc. is near Kamloops; and five mills operate near Vancouver, including Norampac Burnaby-Cascades Canada Inc.; Buckeye Canada-Delta Division; and Kruger Products L.P. which has three locations. See Technical Report 2, *supra*, Exhibit 826 at 40-1.

³⁵⁶ Johannessen and Ross 2002, *supra*, Exhibit 833 at 33-34; Technical Report 2, *supra*, Exhibit 826 at 124. See also Figure 3.1 and Table 3.1.

³⁵⁷ Cohen Commission Technical Report 12: Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia, Exhibit 735, available online at <http://www.cohencommission.ca/en/Exhibits.php> [hereinafter "Technical Report 12"] at 30, 38. Technical Report 12 also includes Exhibits 735A and 735-1 to 735-3.

³⁵⁸ Alive and Inseparable, *supra*, CAN025074 at 137, Table 1.

³⁵⁹ Technical Report 12, *supra*, Exhibit 735 at 30, 38.

³⁶⁰ *Ibid.* at 42.

³⁶¹ National Assessment of Pulp and Paper EEM Data, *supra*.

185. Effluents from mills using a chlorine bleaching process may also contain chlorinated acids, alcohols, aldehydes, ketones, sugars, aliphatic hydrocarbons, aromatic hydrocarbons, chlorophenols, chloroguaiacols, chlorocatechols, chlorovanallins, chlorosyringols and chlorinated syringaldehydes.³⁶²
186. Most pulp and paper products are wood-based.³⁶³ Kraft pulping primarily involves chemical processes, using sulphur chemicals to remove fibre and often bleaching with chlorine compounds.³⁶⁴ Mechanical pulping involves physical processes, shredding trees into pulp with grind stones and/or heat and frequently bleaching the pulp with hydrogen peroxide or other chlorine-free alternatives.³⁶⁵ Semi-chemical pulping combines chemical and mechanical methods to manufacture corrugated cardboard.³⁶⁶
187. The chemical makeup of pulp mill effluents is variable, depending on the type of wood fibre, bleaching process and level of treatment used.³⁶⁷ The pulp and paper industry releases a wide range of compounds into receiving waters. Fibre and suspended solids, colour and turbidity, and organic and nutrient enrichment are three conventional pollutants in pulp and paper effluents.³⁶⁸

Improvements in Pulp and Paper Effluents in British Columbia

188. In the late 1980s and 1990s, the pulp mill industry was estimated to discharge 38 percent of all effluents entering the Fraser River basin, with the majority from six

³⁶² Table 3.2, Technical Report 2 provides a listing of many of the substances that are typically found in bleached kraft pulp mill effluent, at 41.

³⁶³ National Assessment of Pulp and Paper EEM Data, *supra*.

³⁶⁴ *Ibid.*

³⁶⁵ Delores Broten and Jay Ritchlin, Reach for Unbleached Foundation, The Pulp Pollution Primer (1999), available online at <http://www.rfu.org/cacw/PulpPrimer.htm>; National Assessment of Pulp and Paper EEM Data, *supra*.

³⁶⁶ National Assessment of Pulp and Paper EEM Data, *ibid.*

³⁶⁷ Technical Report 2, *supra*, Exhibit 826 at 41.

³⁶⁸ National Assessment of Pulp and Paper EEM Data, *supra*.

mills located upriver at Prince George, Quesnel and Kamloops (the two mills in the Lower Fraser were relatively small volume mills).³⁶⁹ Between 1987 and 1989, dioxins and furans were found in high concentrations in fish and shellfish collected near pulp mills on the British Columbia coast. An investigation revealed the chemicals were being generated as a by-product of the pulp and paper industry, and specifically as a result of the pulp bleaching process.³⁷⁰ Soon after, Canada and the Province introduced regulations to control the release of dioxins and furans, as described above.

189. A major impetus for change in the pulp industry came when the Province enacted regulations establishing requirements for the reduction of AOX in pulp effluents.³⁷¹ These regulations are described above. Initially the aim was to reduce AOX discharges to zero by 2002, but this timeline was amended to match targets in the United States.³⁷²
190. The pulp industry began exploring alternatives to the bleaching process and new technologies. Pulp mills refined their production methods and upgraded their effluent treatment systems in response to concerns over dioxin and furan concentrations and to meet impending federal and provincial requirements.³⁷³
191. Treatment processes used for pulp effluent include primary, secondary and, less commonly, tertiary treatment.³⁷⁴ The primary treatment of pulp effluent, whereby solids were removed from water by allowing them to settle out, has been common practice since the 1950s. The secondary treatment process involves reacting the effluent with oxygen and microorganisms to remove oxygen-

³⁶⁹ Johannessen and Ross 2002, *supra*, Exhibit 833 at 27.

³⁷⁰ Alive and Inseparable, *supra*, CAN025074 at 135.

³⁷¹ *Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulation*, BC Reg. 470/90.

Alive and Inseparable, *supra*, CAN025074 at 136.

³⁷² Technical Report 2, *supra*, Exhibit 826 at 41.

³⁷³ *Ibid.* at 125; Alive and Inseparable, *supra*, CAN025074 at 140.

³⁷⁴ National Assessment of Pulp and Paper EEM Data, *supra*.

consuming materials. In Canada, secondary treatment processes most commonly used are aerated stabilization basins and activated sludge.³⁷⁵

192. According to the provincial and federal governments and scientific experts, as a result of effluent treatment upgrades and changes in chlorine use, the chemical composition and toxicity of these discharges have improved dramatically and the threat to the environment has been significantly reduced.³⁷⁶
193. Measures taken to eliminate the discharge of dioxins to the marine environment, in response both to regulatory measures and changes in mill technology, appear to have been effective.³⁷⁷ Between 1989 and 1999, there appears to have been a 95 percent drop in total daily loading from all 139 coastal BC pulp and paper mills for 2,3,7,8-TCDD in effluents. After 1999, 2,3,7,8- TCDD was not detectable in the effluent of any mills. By 2004, total daily loadings for the furan 2,3,7,8-TCDF also declined by more than 99 percent.³⁷⁸ In the late 1990s, early signs of recovery in fish reproductive parameters were documented at a number of the mills with modernized processes.³⁷⁹ The improvement in effluent quality was reflected in a rapid decline in dioxin and furan concentrations in sediments and local crab populations.³⁸⁰ Over 46 percent of the shellfish harvesting areas previously closed due to dioxin and furan contamination had been reopened by 1995.³⁸¹ Similarly, levels of PCBs, mercury, DDE and other organochlorine pesticides have fallen.³⁸² According to the federal and provincial governments,

³⁷⁵ *Ibid.*

³⁷⁶ BC MOE, Toxic Contaminants: Are Measures to Reduce Pulp and Paper Effluent Effective? available online at http://www.env.gov.bc.ca/soe/et02/06_toxic/halide.html.

National Assessment of Pulp and Paper EEM Data, *supra*. See also Johannessen and Ross 2002, *supra*, Exhibit 833 at 34.

³⁷⁷ *Alive and Inseparable, supra*, CAN025074 at 136, 140.

³⁷⁸ *Ibid.* at 140.

³⁷⁹ National Assessment of Pulp and Paper EEM Data, *supra*.

³⁸⁰ *Alive and Inseparable, supra*, CAN025074 at 140.

³⁸¹ *Ibid.* at 9.

³⁸² *Ibid.* at 8-9.

by 2002, six mills required annual monitoring; by 2004, only three did.³⁸³ Coastal pulp mills no longer discharge detectable levels of dioxins to marine waters.³⁸⁴

194. Concentrations of certain endocrine disrupting compounds in pulp effluent have also been shown to decline with secondary treatment.³⁸⁵ The extent to which the improvements made in pulp production processes in the 1990s have reduced releases of EDCs or other contaminants, however, has not been fully evaluated.³⁸⁶

Ongoing Concerns

195. Despite these improvements, concerns remain about the long-term impacts of many of the contaminants originating from pulp mills, including impacts on Fraser River sockeye and their habitats. Complexity in both the chemical composition of effluents and the variability of biological systems make the assessment of their environmental impacts difficult. Much remains unknown about the concentrations and effects of a number of natural biological chemicals, such as resin acids and plant hormones.³⁸⁷ Persistent toxins such as PCBs, dioxins and furans remain in the marine environment.³⁸⁸ The response of PBDEs to improvements in pulp mill processes is not yet well understood.³⁸⁹
196. Because effluent testing tends to focus primarily on acute toxicity, less is known about the sub-lethal and long-term effects of contaminants in pulp effluents.³⁹⁰ Endocrine disruption caused by pulp effluent is one sub-lethal effect of particular

³⁸³ *Ibid.* at 136.

³⁸⁴ *Ibid.* at 136, 140.

³⁸⁵ Technical Report 2, *supra*, Exhibit 826 at 42.

³⁸⁶ *Ibid.* at 42; Johannessen and Ross 2002, *supra*, Exhibit 833 at 34.

³⁸⁷ Johannessen and Ross 2002, *ibid.*, Exhibit 833 at 35.

³⁸⁸ *Alive and Inseparable*, *supra*, CAN025074 at 9.

³⁸⁹ *Ibid.* at 9; Johannessen and Ross 2002, *supra*, Exhibit 833 at 34.

³⁹⁰ [Draft] Pacific Salmon – Environment and Habitat Issues, *supra*, CAN001363 at 9; Johannessen and Ross 2002, *ibid.*, Exhibit 833 at 35.

concern. Disruption of the endocrine system may result from a combination of EDCs, such as natural plant hormones, heavy metals, chlorinated compounds and surfactants (e.g. alkylphenol ethoxylates).³⁹¹ Although secondary treatment of pulp mill effluent breaks down many contaminants, some by-products from the break-down process may be endocrine disruptors themselves. Some experts have opined that this possibility has not yet been adequately investigated.³⁹²

E. MINING EFFLUENTS

Overview of Mining in the Fraser River Watershed

197. This section of the Report provides a general overview of mining effluent, beginning with a summary of the types of mining that occur in the Fraser River watershed. It focuses on metal mining, the subject of specific regulations under the *Fisheries Act*.³⁹³ It briefly summarizes the sources of effluent and other potential impacts to water quality arising from mining activity. Impacts from mines not related to water quality, such as the disruption of physical elements of fish habitat, are not the subject of this Report.³⁹⁴

Mining Activity in the Fraser River Watershed

198. Mining activity in British Columbia can be classified under a number of different categories. Technical Report 3 identifies six categories of mining: (1) placer; (2) construction aggregate (sand, gravel, stone); (3) industrial minerals (limestone, gypsum, silica and others); (4) oil and gas; (5) coal; and (6) metal (gold, silver,

³⁹¹ Johannessen and Ross 2002, *ibid.*, Exhibit 833 at 34.

³⁹² Technical Report 2, *supra*, Exhibit 826 at 126; *ibid.*

³⁹³ The regulations are the *Metal Mining Effluent Regulations*, SOR/2002-222, discussed below in this Report.

³⁹⁴ Management of these other habitat impacts is addressed in this Report only to the extent that regulations, policies and practices in place to monitor or mitigate water quality impacts indirectly manage or mitigate other kinds of impacts. For a review of habitat management, see the commission's policy and practice report entitled "The Department of Fisheries and Oceans' Habitat Management Policies and Practices," Exhibit PPR8, available online at <http://cohencommission.ca/en/Exhibits.php> [hereinafter "Habitat Management PPR"].

copper, molybdenum and others).³⁹⁵ This Report also identifies, as a seventh category, exploration activity for all types of mines.

199. The exact number of mines in the Fraser River watershed is difficult to determine. Under the provincial *Mines Act*,³⁹⁶ a mine includes any excavation or mechanical disturbance of the ground to explore for or produce coal, mineral bearing substances, placer minerals, rock, limestone, earth, clay, sand or gravel. There is no minimum size and the definition includes exploratory drilling and abandoned mines. Technical Report 2 identifies 28 “major” mining operations in the Fraser River Basin, including some that are not currently operating, some in the permitting phase and some for which operating status was not available.³⁹⁷
200. The occurrence of mining activity in the watersheds of spawning streams varies substantially across sockeye salmon conservation units.³⁹⁸ The majority of sockeye conservation units have little or no mining activity in the watersheds of tributary spawning streams.³⁹⁹ However, some mines discharge directly into migratory habitat (e.g. the Fraser River) or indirectly into rearing habitat (e.g. Fraser Lake).

³⁹⁵ Cohen Commission Technical Report 3: “Evaluating the Status of Fraser River Sockeye Salmon and Role of Freshwater Ecology in their Decline,” Exhibit 562 [hereinafter “Technical Report 3”] at 30. In addition, placer mining is mining for “ore of metal and every natural substance that can be mined and that is either loose, or found in fragmentary or broken rock that is not talus rock and occurs in loose earth, gravel and sand,” as defined in the *Mineral Tenure Act*, RSBC 1996, c. 292, s.1. Placer mining may take place on the surface or underground.

³⁹⁶ *Mines Act*, RSBC 1996, c. 293.

³⁹⁷ Technical Report 2, Exhibit 826, *supra* at T-23 to T-26.

³⁹⁸ Technical Report 3, Exhibit 562, *supra* at 32.

³⁹⁹ As opposed to rearing and migration habitat. *Ibid.* at 32-33.

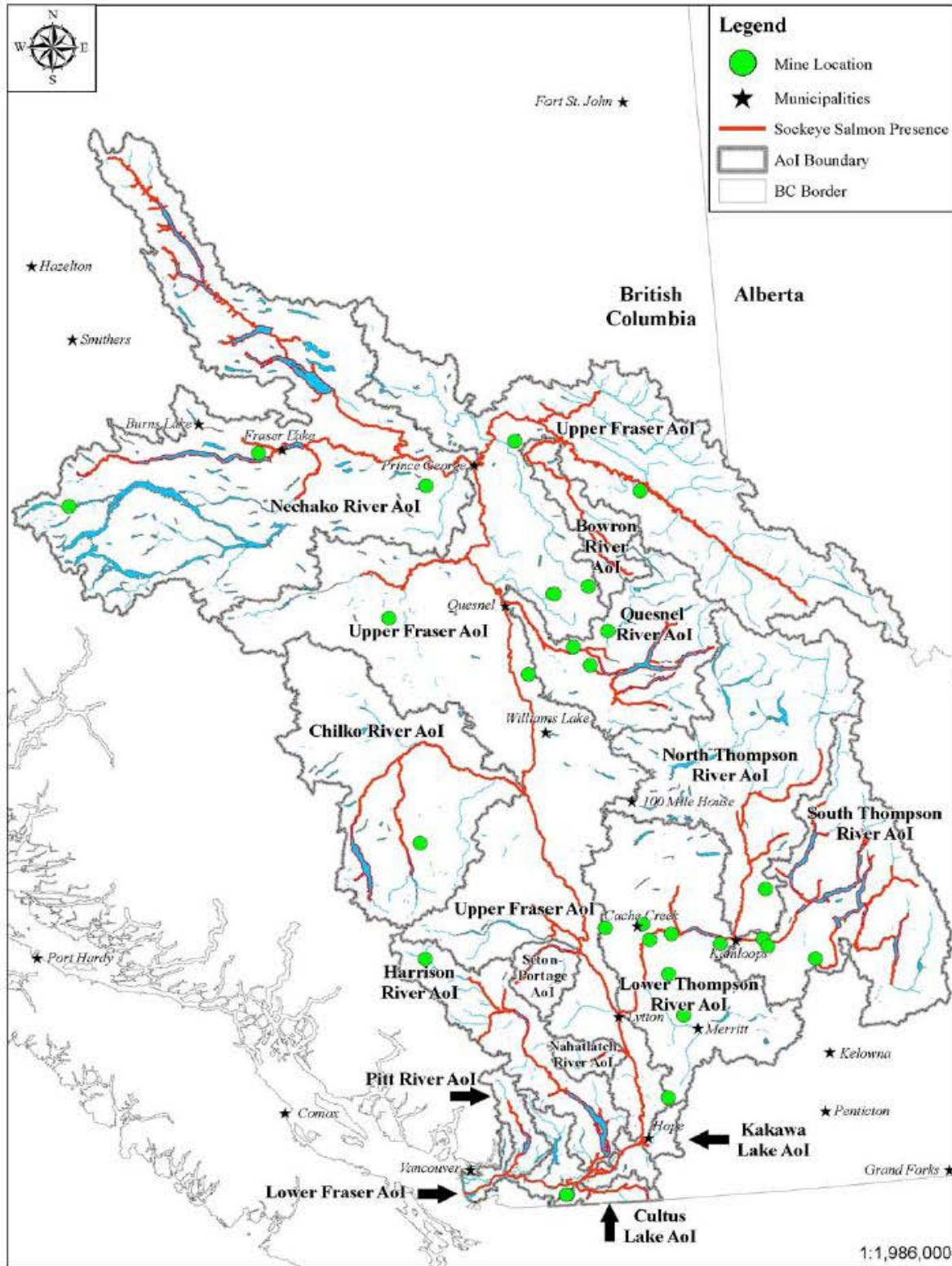


Figure 1. Map showing major mines in the Fraser River watershed.⁴⁰⁰

⁴⁰⁰ Technical Report 2, *supra*, Exhibit 826, Figure 3.6 at F-11.

Metal Mines in the Fraser River Watershed

201. There are currently six active metal mines in the Fraser River watershed.⁴⁰¹
202. The **Endako** mine is an open pit molybdenum mine approximately 160 km west of Prince George and 8.5 km southwest of the village of Endako.⁴⁰² Its processing capacity is 31,000 tons of ore per day, although upgrades are expected to increase that to 55,000 tons per day by the end of 2011.⁴⁰³ Mine life remaining is estimated at 16 years.⁴⁰⁴ Endako discharges effluent indirectly into Fraser Lake, a sockeye rearing lake.⁴⁰⁵
203. The **Huckleberry** open pit mine is located 123 km southwest of Houston. It processes 15,000 tonnes of ore per day.⁴⁰⁶ In 2009, it produced approximately 46 million lbs of copper, 14,000 lbs of molybdenum, 267,000 ounces of silver and 3,500 ounces of gold.⁴⁰⁷ Plans are being studied to extend the mine's life, currently to mid-2012.⁴⁰⁸

⁴⁰¹ BC Ministry of Energy and Mines, Operating Mines and Selected Major Exploration Projects in BC, 2010, available online at <http://www.empr.gov.bc.ca/mining/geoscience/publicationscatalogue/openfiles/2011/pages/2011-1.aspx>. Some sources also list Craigmont as an industrial mineral/metal mine, but Craigmont produces magnetite (an industrial mineral) by processing the tailings of an historic copper mine (www.craigmontmines.com). See e.g. Natural Resources Canada, List of Mining and Mineral Processing Operations in Canada, available online at <http://mmsd.mms.nrcan.gc.ca/stat-stat/mine-mine/met-met-eng.aspx>; Technical Report 2, *supra*, Exhibit 826 at Table 3.7.

⁴⁰² BC Ministry of Energy and Mines, BC MINFILE No 093k 006, MINFILE, available online at <http://minfile.gov.bc.ca/Summary.aspx?minfilno=093K++006>; Endako Mines, Endako Mines: Location, available online at <http://www.endakomines.com/main2.htm>.

⁴⁰³ BC Ministry of Energy, Mines and Petroleum Resources, British Columbia Mines & Mineral Exploration Overview 2009, BCP002566 at 8; Thompson Creek Metals, Endako Mine, available online at http://www.thompsoncreekmetals.com/s/Endako_Mine.asp.

⁴⁰⁴ Technical Report: Endako Molybdenum Mine (February 2011), available online at http://www.thompsoncreekmetals.com/i/pdf/Technical_Report_Endako_Molybdenum_Feb2011.pdf.

⁴⁰⁵ Technical Report 2, *supra*, Exhibit 826 at 99.

⁴⁰⁶ Imperial Metals, Huckleberry Mine, available online at <http://www.imperialmetals.com/s/HuckleberryMine.asp>.

⁴⁰⁷ *Ibid.*

⁴⁰⁸ *Ibid.*

204. **Gibraltar** is an open pit copper and molybdenum mine located between Williams Lake and Quesnel. It is undergoing a major expansion and modernization to increase its mill capacity to 55,000 tons per day.⁴⁰⁹ The mine life is estimated at 25 years.⁴¹⁰ Since June 2009, Gibraltar has been permitted to discharge effluent directly into the Fraser River.⁴¹¹
205. The **Mount Polley** mine is located approximately 57 km northeast of Williams Lake. It reopened in 2005 after a three and a half year hiatus.⁴¹² Processing 20,000 tonnes of ore per day, the mine produces copper and molybdenum, along with significant amounts of gold and silver.⁴¹³ Current reserve estimates provide for a mine life to 2015.⁴¹⁴
206. The **QR (Quesnel River)** gold mine is located 73 km east of Quesnel, near the Gibraltar and Mount Polley mines. It employs both open pit and underground mining.⁴¹⁵ Mining at QR has been sporadic since the mid-1990s.⁴¹⁶ Production shut down in December 2008, but was restarted in early 2010.⁴¹⁷ The QR mill can process 900 tonnes of ore per day.⁴¹⁸
207. The **Highland Valley** copper mine, approximately 65 km southwest of Kamloops, is the largest open pit copper mine in Canada and one of the largest in the world

⁴⁰⁹ Commissioning “expected to take place in early 2011.” Taseko Mines, Gibraltar, available online at <http://www.tasekomines.com/tko/Gibraltar.asp>.

⁴¹⁰ *Ibid.*

⁴¹¹ 2009 Environmental and Reclamation Report (March 2010), BCP002412 at 7 (at ii in original).

⁴¹² MINFILE, BC MINFILE No 093A 008, available online at <http://minfile.gov.bc.ca/Summary.aspx?minfilno=093A++008>.

⁴¹³ Imperial Metals, Mount Polley Mine, available online at <http://www.imperialmetals.com/s/MountPolleyMine.asp>.

⁴¹⁴ *Ibid.*

⁴¹⁵ MINFILE, BC MINFILE No 093A 121, available online at <http://minfile.gov.bc.ca/Summary.aspx?minfilno=093A++121>.

⁴¹⁶ Barkerville Gold, Technical Report: Prefeasibility Study on the Quesnel River (QR) Mine, available online at http://www.barkervillegold.com/i/pdf/reports/qrmine/qrmine_43101.pdf at 21.

⁴¹⁷ Barkerville Gold, QR Mine & Mill, available online at http://www.barkervillegold.com/s/QR_Mine_Mill.asp.

⁴¹⁸ *Ibid.*

in terms of tonnage mined and milled.⁴¹⁹ It covers a surface area of approximately 34,000 ha.⁴²⁰ The mill processed 138,800 tonnes of ore per day in 2005, producing both copper and molybdenum.⁴²¹ The mine is expanding its pits to permit mining until 2019.⁴²²

Other Types of Mines in the Fraser River Watershed

208. Although metal mines comprise the largest mines in BC, significant other mining activity takes place in the Fraser River watershed.
209. The Ministry of Energy and Mines identifies “at least 40” producing industrial mineral mines or quarries in British Columbia, and it is possible to identify at least 11 of these in the Fraser River watershed (and a greater number of exploration projects).⁴²³ With respect to industrial mineral mines, Technical Report 3 assesses that risks to sockeye are lower because most of the minerals are not linked to alluvial deposits and processing does not depend on large volumes of water.⁴²⁴
210. Technical Report 3 identifies 450 construction aggregate mines in the Fraser River watershed (not all of which are active).⁴²⁵ Sand and gravel deposits

⁴¹⁹ Infomine, Highland Valley Copper, available online at <http://www.infomine.com/minesite/minesite.asp?site=hvc>.

⁴²⁰ *Ibid.*

⁴²¹ *Ibid.*

⁴²² *Ibid.*

⁴²³ Ministry of Energy and Mines, Industrial Minerals & Specialty Metals, available online at <http://www.empr.gov.bc.ca/Mining/Geoscience/IndustrialMinerals/Pages/default.aspx>; Ministry of Energy and Mines, Operating Mines and Selected Major Exploration Projects in BC, 2010, available online at <http://www.empr.gov.bc.ca/mining/geoscience/publicationscatalogue/openfiles/2011/pages/2011-1.aspx>; Ministry of Forests, Mines and Lands, Exploration and Mining in British Columbia 2010, available online at <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/ExplorationinBC/Documents/2010/BCEx-Mining2010.pdf>.

⁴²⁴ Technical Report 3, Exhibit 562, *supra* at 31.

⁴²⁵ *Ibid.*

generally do not have acid generating constituents, meaning effluent is less of a concern.⁴²⁶

211. Technical Report 3 identifies 2965 placer mining claims in the Fraser River watershed that were active at some point between 2000 and 2009.⁴²⁷ Placer mining is mining for minerals (typically gold) from loose substrate (typically gravel in a river bed). Placer operations generally have smaller footprints than metal mines. However, the impacts on fish habitat from placer mining activity are “potentially severe” because of the proximity of deposits to existing streams.⁴²⁸
212. Oil, gas and coal deposits have been identified in the Fraser River watershed, but there is no production at present.⁴²⁹

Mines Beyond the Fraser River Watershed

213. Mines not situated directly within the Fraser River watershed may still have indirect impacts on Fraser River sockeye habitat. For example, the Mount Milligan gold-copper mine, currently under construction, is located just outside of the Fraser River watershed. However, it proposes to transport ore concentrate to a rail load-out facility near Fort St. James, which is in the Fraser River watershed.⁴³⁰
214. Transportation of mining products can pose a risk to fish and fish habitat. For example, in 2006, a train derailed near Lytton and spilled 800 tons of

⁴²⁶ BC Ministry of Energy and Mines, *Aggregate Operators Best Management Practices Handbook for BC* (2002), available online at <http://www.empr.gov.bc.ca/MINING/MINERALSTATISTICS/MINERALSECTORS/CONSTRUCTIONAGGREGATES/REPORTSANDPUBLICATIONS/Pages/AggregateOperators.aspx> at 9-11.

⁴²⁷ *Ibid.*

⁴²⁸ Technical Report 3, Exhibit 562, *supra* at 30.

⁴²⁹ *Ibid.* 31-2.

⁴³⁰ Canadian Environmental Assessment Agency, *Comprehensive Study Report for the Proposed Mount Milligan Gold-Copper Mine* (18 September 2009), available online at <http://www.ceaa-acee.gc.ca/050/documents/38855/38855E.pdf>.

metallurgical coal into the Thompson River. The spill occurred during the late summer Fraser River sockeye run.⁴³¹

Basic Metal Mining Terminology

215. All six metal mines in the Fraser River watershed conduct open pit mining.⁴³² An open pit metal mine typically includes one or more pits that are mined to extract the ore. Ore is a mixture of minerals and rock (“waste material”) from which at least one mineral can be extracted at a profit.⁴³³ Often the ore is buried in and under a layer of rock that must be removed to access the ore. This waste rock is typically stored above ground in large, free-draining piles.⁴³⁴ Alternatively, it is submerged under water.⁴³⁵
216. Ore is processed at a mill to extract the valuable minerals from the much larger amounts of material of no economic value. Ore is ground or crushed for coarse size reduction. Further processing occurs through physical separation processes (gravity, magnetics, flotation) or chemical separation (leaching with cyanide or sulphuric acid).⁴³⁶ A number of chemical reagents are used to aid flotation.⁴³⁷
217. The residue remaining after the separation process is a slurry that usually includes crushed rock, metals and processing chemicals and is termed “tailings.”

⁴³¹ BC MOE, CN Rail Thompson River Coal Spill (Lytton), available online at http://www.env.gov.bc.ca/eemp/incidents/2006/lytton_06.htm.

⁴³² As noted above, the QR mine also conducts underground activity.

⁴³³ Mineral Exploration and Mining in British Columbia presentation to Xats’ull First Nation (March 19, 2011), BCP002126 [hereinafter “Mineral Exploration and Mining in BC”] at 3; BC Wild and Environmental Mining Council of BC, Acid Mine Drainage: Mining & Water Pollution Issues in BC, available online at MiningWatch <http://www.miningwatch.ca/en/acid-mine-drainage-mining-and-water-pollution-issues> [hereinafter “Acid Mine Drainage”] at 3.

⁴³⁴ *Ibid.*

⁴³⁵ BC Ministry of Water, Land and Air Protection, Environmental Indicator: Mitigating Environmental Impacts in British Columbia (2002), available online at http://www.env.gov.bc.ca/soe/et02/10_mitigation/technical_report/Mitigation_2002.pdf [hereinafter “MOE Environmental Indicator Report”] at 9.

⁴³⁶ Environment Canada, Environmental Code of Practice for Metal Mines (2009), available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1> at 30.

⁴³⁷ *Ibid.*

Tailings are usually diverted to large tailings impoundment areas commonly known as “tailings ponds.” In a tailings pond, heavy metals and suspended solids gradually settle to the bottom before the surface water is discharged into the watershed. This water is termed tailings supernatant. Tailings impoundment areas may be built in natural features like water bodies or topographical depressions, or built using dams or exhausted mine pits.

Effluent Sources and Potential Ecological Impacts

218. Impacts on water quality in receiving waters can be associated with the construction or operation of the following mine components:
- Camp facilities, including buildings and equipment;
 - Sewage treatment facilities;
 - Wastewater treatment facilities;
 - Tailings containment areas;
 - Open pits;
 - Waste rock piles;
 - Roads and storage yards;
 - Airstrips; and
 - Quarries and soil borrow areas.⁴³⁸
219. From many of these mine components there may be intentional effluent releases, such as discharges from tailings impoundments, or unintentional releases, such as fuel spills and containment breaches.⁴³⁹
220. Together, these intentional and unintentional releases result in the following types of contaminants typically associated with wastewater effluent discharges and other activities conducted at mine sites:
- Conventional variables (e.g. alkalinity, conductivity, hardness, pH and total suspended solids);
 - Microbiological variables (e.g. faecal coliforms and enterococci);
 - Major ions (potassium, sodium and sulphate);

⁴³⁸ Technical Report 2, *supra*, Exhibit 826 at 21.

⁴³⁹ *Ibid.*

- Nutrients (e.g. nitrate, nitrite, ammonia and phosphorus);
- Metals (aluminum, arsenic, boron, barium, cadmium, copper, chromium, iron, lead, mercury, manganese, molybdenum, nickel, antimony, selenium, strontium, silver and zinc);
- Cyanides (strong acid dissociable and weak acid dissociable);
- Petroleum hydrocarbons (oil and grease, alkanes, diesel-range organics);
- Monoaromatic hydrocarbons (e.g. benzene, toluene, ethylbenzene and xylene); and
- Polycyclic aromatic hydrocarbons (e.g. parent PAHs, alkylated PAHs, total PAHs).⁴⁴⁰

221. This Report addresses three separate mining-related sources of such contaminants: metal leaching and acid rock drainage; pollution from processing chemicals; and erosion and sedimentation.

Metal Leaching and Acid Rock Drainage

222. Acid rock drainage is a natural process that occurs when sulphide minerals in rock are exposed to air and water.⁴⁴¹ At mines, the process can be greatly magnified when large quantities of rock containing sulphide minerals are excavated and exposed to the elements.⁴⁴² Sulphide weathering produces acidic compounds that dissolve in water.⁴⁴³ The acid will leach from the rock until the sulphides are leached out, a process that can take hundreds or thousands of years.⁴⁴⁴ Under acidic conditions, many metals become highly soluble.⁴⁴⁵ When water washes over the rock, metals leach out and flow downstream. Although metals can become mobile in neutral pH conditions, leaching is accelerated in

⁴⁴⁰ *Ibid.* at 22.

⁴⁴¹ BC MOE, Metal Leaching and Acid Rock Drainage, available online at http://www.env.gov.bc.ca/soe/et02/10_mitigation/minesites.html [hereinafter "Metal Leaching and Acid Rock Drainage"].

⁴⁴² Acid Mine Drainage, *supra* at 4.

⁴⁴³ Metal Leaching and Acid Rock Drainage, *supra*.

⁴⁴⁴ Acid Mine Drainage, *supra* at 4.

⁴⁴⁵ Metal Leaching and Acid Rock Drainage, *supra*.

the low pH conditions created by acid rock drainage.⁴⁴⁶ As such, the common term for this process is “metal leaching and acid rock drainage.”

223. Dissolved metals from metal leaching and acid rock drainage can be toxic to fish and can adversely affect ecosystem health.⁴⁴⁷ They can be absorbed and accumulate in plant and animal tissue.⁴⁴⁸ There are more than 60 mines in British Columbia, most of which are no longer in production, with the ongoing potential to generate sufficient metal leaching and acid rock drainage to significantly affect the receiving environment.⁴⁴⁹ In addition, active metal mines in the Fraser River watershed, such as the Gibraltar Mine, generate acid rock drainage.⁴⁵⁰
224. British Columbia has identified at least three strategies for avoiding environmental impacts from metal leaching and acid rock drainage:
- flooding waste rock and tailings in a constructed impoundment, old mine workings, or natural water bodies to limit oxidation by preventing air exposure;
 - using soil and other engineered cover technologies to reduce exposure to water and oxygen; and
 - blending waste materials to create a neutral composite.⁴⁵¹
225. The Province has also identified other practices that have proven beneficial in the mitigation of metal leaching and acid mine drainage, including the following:
- avoiding problematic materials;
 - segregating waste;
 - diverting upstream drainage;
 - using lime amendments during processing;
 - changing mine processing;
 - selectively timing drainage discharge;

⁴⁴⁶ Acid Mine Drainage, *supra* at 4.

⁴⁴⁷ Metal Leaching and Acid Rock Drainage, *supra*.

⁴⁴⁸ *Ibid.*

⁴⁴⁹ *Ibid.* Not all of these mining operations are in the Fraser River Basin.

⁴⁵⁰ *E.g.* Gibraltar mine. See Report of Inspector of Mines Reclamation/Environment (2008), BCP002413 at 2.

⁴⁵¹ MOE Environmental Indicator Report, *supra* at 9.

- locating facilities to assist drainage collection, minimizing leaching and maximizing natural dilution and attenuation; and
- various forms of drainage treatment.⁴⁵²

226. Often, mines use a combination of different mitigation strategies, either for intentional effluent releases or in the case of accidents. Flooding waste material is the most common mitigation strategy at newer mines, while collection and treatment of drainage is the most common strategy at older mines.⁴⁵³ Chemical treatment of water to remove metals is an effective, yet costly, mitigation solution.⁴⁵⁴

227. In addition to acid mine drainage, flooding waste material by using a natural water body, such as a lake, as a tailings impoundment area can have obvious impacts to fish habitat. However, it can be a desirable option to mining companies, because man-made impoundments are believed by some to be more expensive to build and maintain and more prone to leak, overflow or fail.⁴⁵⁵ The use of natural water bodies as tailings impoundments can be a controversial topic.⁴⁵⁶

Pollution from Processing Chemicals

228. Mine tailings often contain the same acid-forming minerals and heavy metals found in waste rock material, along with the processing chemicals, mixed with

⁴⁵² *Ibid.*

⁴⁵³ *Ibid.* at 10. The MOE Environmental Indicator Report notes that Gibraltar uses dry covers and drainage treatment while Huckleberry, Mount Polley and QR use underwater disposal. *Ibid.* at 11.

⁴⁵⁴ *Ibid.* at 10.

⁴⁵⁵ Acid Mine Drainage, *supra* at 11.

⁴⁵⁶ Schedule 2 to the *Metal Mining Effluent Regulations* is briefly described above. For differing views on this practice, see e.g. First Nations Energy & Mining Council, *The State of Mineral Exploration and Mining in British Columbia*, a background report for BC First Nations Mining Summit (2008), available online at <http://fnbc.info/fnmc/publications/reports> at 20; MiningWatch Canada, *Canada's Valuable Fresh Water is Not for Dumping Toxic Wastes*, a press release with background (2008), available online at http://www.miningwatch.ca/en/MMER_coalition_formed.

water in a slurry.⁴⁵⁷ Tailings may be highly acidic or alkaline and may contain metals, cyanide, ammonia, suspended solids, thiosalts and other contaminants.⁴⁵⁸ Environmental risks to fish habitats arise if heavy metals and suspended solids do not completely settle out before the tailings supernatant is discharged into the watershed. Other risks to fish habitat include dam failure, wildlife entrapment and seepage into surface and groundwater.⁴⁵⁹

Erosion and Sedimentation

229. Mine development disturbs soil and rock in the course of constructing and maintaining roads, pits and waste impoundment areas. Erosion, in the absence of adequate control measures, can carry sediment into nearby water bodies and fish habitats. Excessive sediment from mining activities can increase turbidity, reduce light penetration and productivity and lower densities of benthic invertebrates.⁴⁶⁰ Along migration routes, turbidity can reduce mortality of smolting juveniles.⁴⁶¹ The impact of sediment appears to be greater on stream spawning habitat than lake and migration habitat.⁴⁶²

Regulation of Mine Effluent

230. This section of the Report sets out provincial and federal regulations, policies and programs relevant to the environmental impacts of mine effluents. It is organized into sections on exploration, permitting, operation and reclamation.

231. The provincial *Mines Act* is the primary statute governing mining in British Columbia. A permit under section 10 of the *Mines Act* is generally required

⁴⁵⁷ *Ibid.*

⁴⁵⁸ Environment Canada, Environmental Code of Practice for Metal Mines (2009), available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1> at 37.

⁴⁵⁹ *Ibid.* at 40.

⁴⁶⁰ Technical Report 3, Exhibit 562, *supra* at 30.

⁴⁶¹ *Ibid.*

⁴⁶² *Ibid.*

before starting any work at a mine.⁴⁶³ A mine proponent must file a plan outlining the details of the proposed work and a program for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine.⁴⁶⁴

232. The *Mines Act* requires a “health, safety and reclamation committee” to produce a “health, safety and reclamation code” (“Code”), approved by an Order in Council.⁴⁶⁵ The Code applies to all mines in British Columbia.⁴⁶⁶ It covers topics like occupational health and explosives for operating mines, but also mineral exploration and mine reclamation and closure. Sections of the *Mines Act* and the Code are designed to protect land and watercourses, particularly through the permitting process.⁴⁶⁷
233. The provincial *Environmental Management Act* governs waste management and effluent discharges,⁴⁶⁸ including mine effluent. The BC Ministry of Energy and Mines (or predecessor ministries) and Ministry of Environment have jointly developed policies and guidelines on the management of mine effluent, particularly acid rock drainage.⁴⁶⁹
234. Federally, the *Metal Mining Effluent Regulations* (“MMER”) are enacted pursuant to subsection 36(5) and other provisions of the *Fisheries Act*.⁴⁷⁰ The MMER authorize metal mines to deposit deleterious substances into fish-bearing waters, under certain conditions. They apply to metal mines with an effluent flow rate

⁴⁶³ As noted above, a mine is broadly defined to capture any mechanical exploration work.

⁴⁶⁴ *Mines Act*, s.10(1).

⁴⁶⁵ *Ibid.*, s.34.

⁴⁶⁶ Code, s.1.1.1.

⁴⁶⁷ BC Ministry of Energy and Mines, Handbook for Mineral and Coal Exploration in British Columbia (2008/09) at 54 [hereinafter “Exploration Handbook”].

⁴⁶⁸ *Ibid.*

⁴⁶⁹ *Ibid.*

⁴⁷⁰ *Metal Mining Effluent Regulations*, SOR/2002-222, Preamble.

exceeding 50 cubic metres per day.⁴⁷¹ The MMER are described below in the 'Operation' section, following a description of exploration and permitting.

Exploration

235. Part 9 of the Code applies to mineral exploration activities that require an Exploration Activities and Reclamation Permit under section 10 of the *Mines Act*, including drilling, trenching and excavating using machinery, blasting and disturbing the ground by mechanical means.⁴⁷² Prior to undertaking proposed exploration activities, a mine proponent must submit a Notice of Work, which includes a management plan.⁴⁷³
236. The Code often describes the target outcome, but does not provide guidance on how to achieve it.⁴⁷⁴ To address this gap, the Province created the Handbook for Mineral and Coal Exploration in British Columbia (the "Exploration Handbook"), a compilation of recommended management practices. Its intent is to "ensure exploration activities are planned and implemented with due regard to worker health and safety and protection of the environment using project and location specific recommended practices."⁴⁷⁵
237. Part 9 of the Code addresses mining exploration in riparian areas. It establishes riparian setbacks on streams, wetlands and lakes.⁴⁷⁶ Mineral exploration activities are permitted in these areas, although works within a riparian setback

⁴⁷¹ S.2(a).

⁴⁷² Exploration Handbook, *supra* at 3.

⁴⁷³ Code, *supra*, s.9.2.1. Part 9 of the Code does not apply to, nor is a permit required for, exploration activities that generally do not involve mechanical disturbance of the surface. These exploration activities include: prospecting using hand-held tools; geological and geochemical surveying; airborne geophysical surveying; ground geophysical surveying without the use of exposed, energized electrodes; hand trenching without the use of explosives; and establishment of grid lines that does not require the felling of trees unless permitted under the definition. See Exploration Handbook, *supra* at 3-4.

⁴⁷⁴ Exploration Handbook, *ibid.*, at 2.

⁴⁷⁵ *Ibid.* at ii. The *Mines Act* and Code prevail over the Exploration Handbook. See *ibid.* at iii.

⁴⁷⁶ *Ibid.* at 20.

must be addressed in a management plan.⁴⁷⁷ If instream activity is unavoidable, the Exploration Handbook refers prospectors and others involved in mineral exploration to DFO operational statements.⁴⁷⁸

238. Part 9 also generally addresses protection of community watersheds, soil conservation to support vegetation regrowth, minimizing risks of erosion-related events, remediation for erosion-related events that harm to fish habitat, road construction, stream crossings, water management, storage and use of fuel and lubricants and reclamation.⁴⁷⁹ The Exploration Handbook provides more specific guidance in these areas.
239. The Exploration Handbook suggests that those involved in mineral exploration should design a program on metal leaching and acid mine drainage with prediction, prevention, mitigation and monitoring strategies.⁴⁸⁰ Generally the Code does not require metal leaching and acid mine drainage programs for exploration activity.

Mine Permitting Process

240. All proposed mines require approval through a section 10 permit under the *Mines Act*.⁴⁸¹ An overview of the mine permitting process is presented in Figure 2 below.

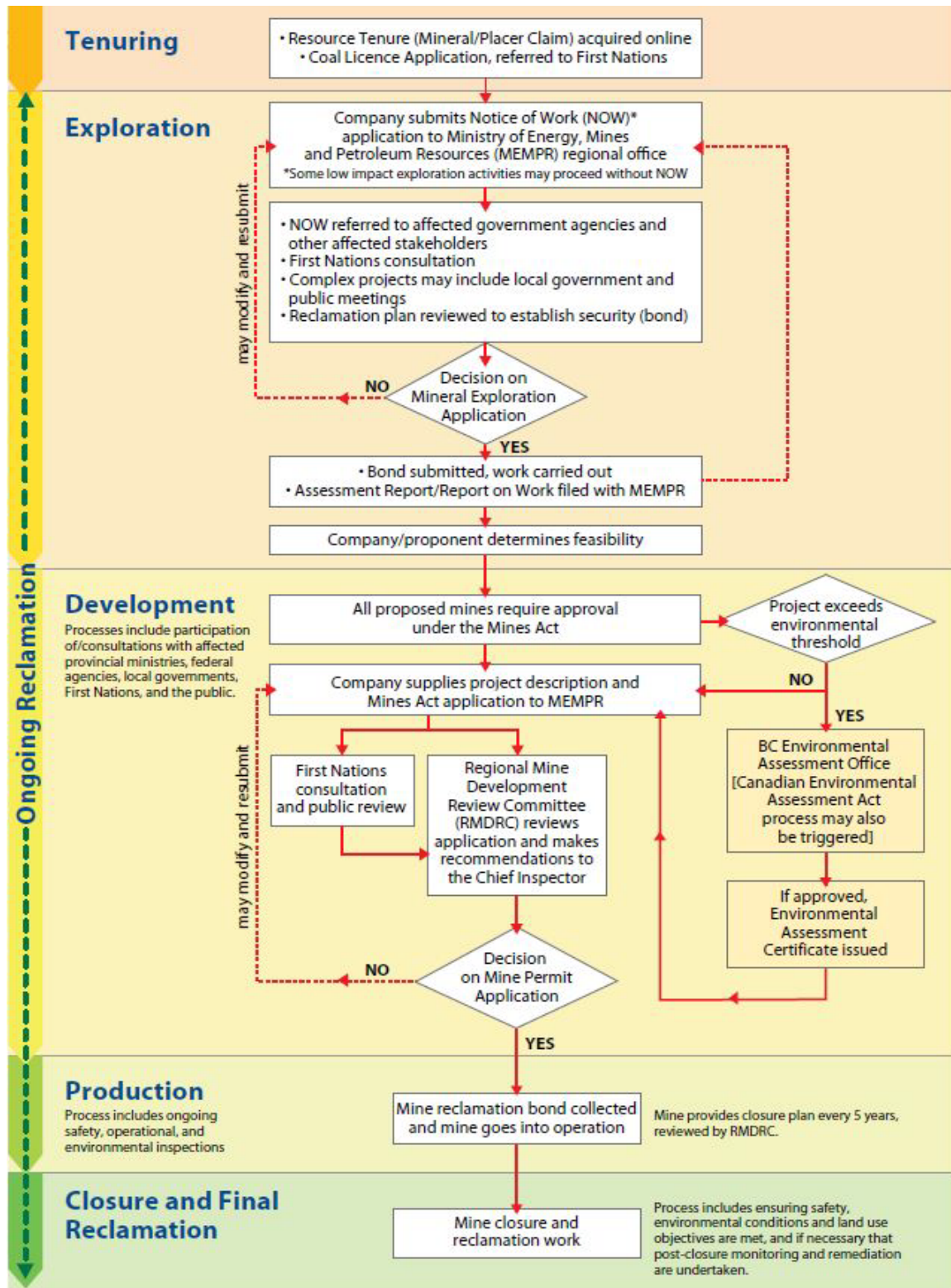
⁴⁷⁷ Code, *supra*, s.9.5.1(3).

⁴⁷⁸ Exploration Handbook, *supra* at 21. The Department's operational statements are discussed in the Habitat Management PPR, *supra*, Exhibit PPR8. For a list of the Operational Statements applicable in Pacific Region, and an example of an operational statement, see Appendices 4 and 5 of the Habitat Management PPR, Exhibit PPR8. See also the Freshwater Urbanization PPR, *supra*.

⁴⁷⁹ Code, *supra*.

⁴⁸⁰ Exploration Handbook, *supra* at 54. See also s.10.1.9 of the Code.

⁴⁸¹ Or an exemption from the permit requirement under section 10.



This process applies only to the requirements under the Mines Act and Health, Safety and Reclamation Code for Mines in British Columbia (Code). Other legislation, statutes, bylaws, etc. may be applicable to the operation and the company may be required to obtain approvals, permits or otherwise comply with them.

Figure 2. Life stages of a mine and permitting process for mines in British Columbia. ⁴⁸²

⁴⁸² Opportunities to Explore: British Columbia Mining and Minerals 2009, available online at

Environmental Assessment

241. The provincial *Environmental Assessment Act* (“BC EAA”) replaced the Mine Development Review Process in 1995.⁴⁸³ Proposed mines that meet or exceed threshold criteria require an environmental assessment certificate prior to issuance of a *Mines Act* permit. The threshold criteria are set out in Part 3 of the *Reviewable Projects Regulation*.⁴⁸⁴ A summary is presented in Table 3 below. For modifications to existing mines, there are separate thresholds in Part 3 of the *Reviewable Projects Regulation*.

<i>Project Category</i>	<i>Criteria</i>
1 Coal Mines	(1) A new mine facility that, during operation, will have a production capacity of $\geq 250\,000$ tonnes/year of clean coal or raw coal or a combination of both clean coal and raw coal.
2 Mineral Mines	(1) A new mine facility that, during operations, will have a production capacity of $\geq 75\,000$ tonnes/year of mineral ore.
3 Sand and Gravel Pits	(1) A new pit facility that will have a production capacity of (a) $\geq 500\,000$ tonnes/year of excavated sand or gravel or both sand and gravel during at least one year of its operation, or (b) over a period of ≤ 4 years of operation, $\geq 1\,000\,000$ tonnes of excavated sand or gravel or both sand and gravel.

https://trade.britishcolumbia.ca/Sectors/Documents/opportunities_explore_sept1109.pdf [hereinafter “Opportunities to Explore: BC Mining and Minerals 2009”] at 26.

⁴⁸³ Ministry of Energy and Mines, Application Requirements for a Permit Approving the Mine Plan and Reclamation Program Pursuant to the *Mines Act* (March 1998), available online at <http://www.empr.gov.bc.ca/Mining/Permitting-Reclamation/Guidance/PermitAppReqs/Pages/default.aspx> [hereinafter “BC Mine Permit Application Requirements”].

⁴⁸⁴ *Reviewable Projects Regulation*, BC Reg. 370/2002.

4 Placer Mineral Mines	(1) A new mine facility that, during operations, will have a production capacity of $\geq 500\,000$ tonnes/year of pay-dirt.
5 Construction Stone and Industrial Mineral Quarries	(1) A new quarry facility or other operation that (a) involves the removal of construction stone or industrial minerals or both, (b) is regulated as a mine under the <i>Mines Act</i> , and (c) during operations, will have a production capacity of $\geq 250\,000$ tonnes/year of quarried product.
6 Off-shore Mines	(1) A new off-shore mine facility.

Table 3. Mine criteria to trigger a BC environmental assessment.⁴⁸⁵

242. The provincial environmental assessment process is intended to provide a means of identifying potential effects of major projects and an evaluation of opportunities to prevent or mitigate impacts.⁴⁸⁶ For a mine proponent, the process begins with baseline studies and meetings with government, First Nations and the public to consider design and impacts, before submitting an application.⁴⁸⁷ The Environmental Assessment Office reviews the application and provides comments. Figure 3 illustrates the major stages in the environmental review process. If a Project Approval Certificate is issued, the project may proceed, but must still obtain other necessary permits, licences and approvals.⁴⁸⁸ Project information is available through an electronic registry.⁴⁸⁹

⁴⁸⁵ As set out in Part 3 of the *Reviewable Projects Regulation*, *ibid.*

⁴⁸⁶ BC Mine Permit Application Requirements, *supra.*

⁴⁸⁷ Mineral Exploration and Mining in BC, *supra*, BCP002126 at 37.

⁴⁸⁸ BC Mine Permit Application Requirements, *supra.*

⁴⁸⁹ Project Information Centre, available online at http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html.

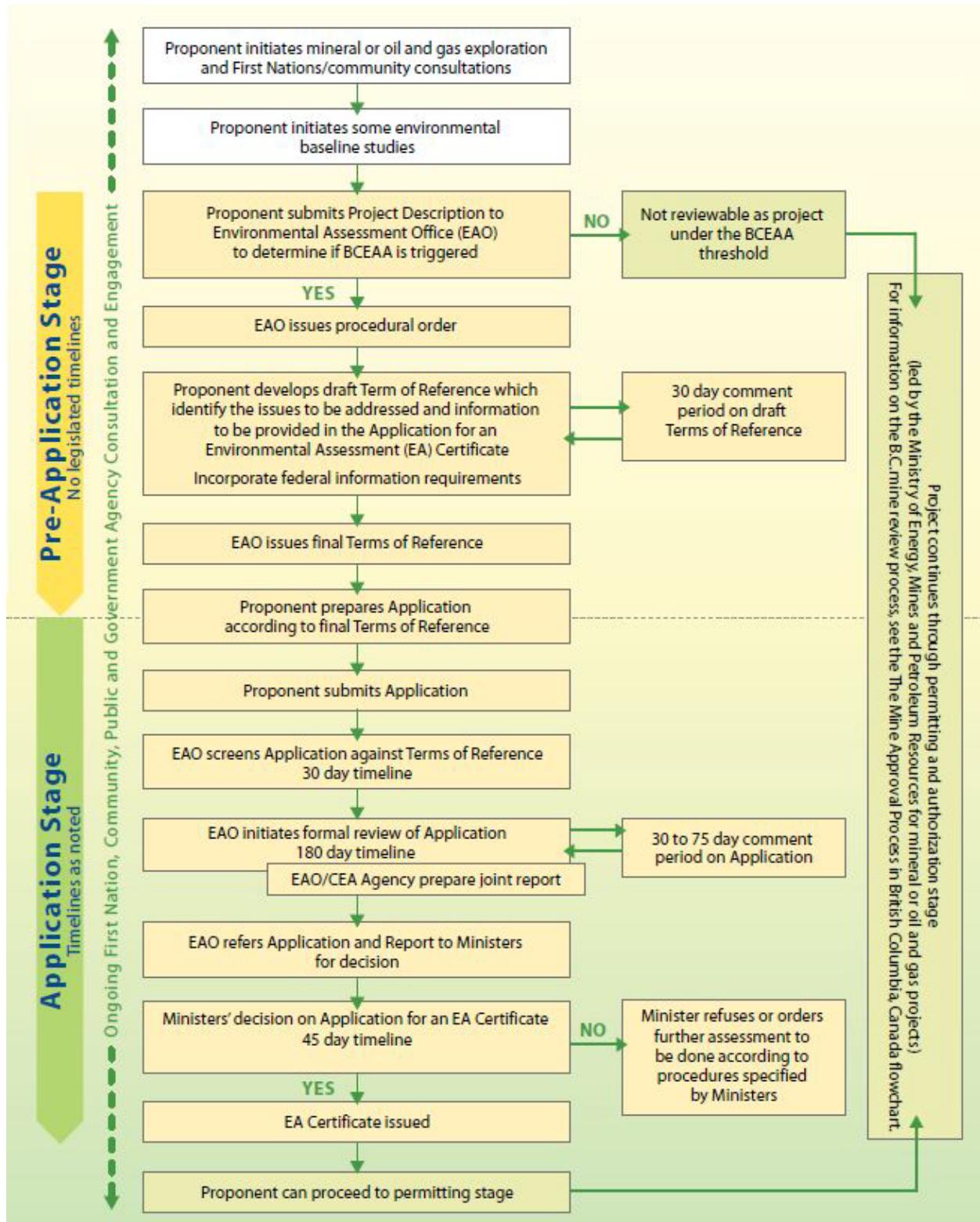


Figure 3. Environmental assessment process under the BC EAA.⁴⁹⁰

⁴⁹⁰ Opportunities to Explore: BC Mining and Minerals 2009, *supra* at 27.

243. A proposed mine may also trigger an environmental assessment under the *Canadian Environmental Assessment Act* (“CEAA”).⁴⁹¹ For example, if a proposed mine would harm fish habitat and thus require an authorization under subsection 35(2) of the *Fisheries Act*, or if it would involve a tailings impoundment area under Schedule II of the MMER, then an environmental assessment must be conducted under CEAA. The CEAA assessment process and the Department’s policies and practices on environmental assessment are discussed in the Habitat Management PPR.⁴⁹²

244. Where an environmental assessment is required under CEAA, Item 16 of the *Comprehensive Study List Regulations* sets out the classes of metal mine projects for which a comprehensive study is required:

- 16.** The proposed construction, decommissioning or abandonment of
- (a) a metal mine, other than a gold mine, with an ore production capacity of 3,000 t/d or more;
 - (b) a metal mill with an ore input capacity of 4,000 t/d or more;
 - (c) a gold mine, other than a placer mine, with an ore production capacity of 600 t/d or more;
 - (d) a coal mine with a coal production capacity of 3 000 t/d or more; or
 - (e) a potash mine with a potassium chloride production capacity of 1,000,000 t/a or more.

245. Likewise, Item 17 of the *Comprehensive Study List Regulations*⁴⁹³ applies to the expansion of the above categories of mines in Item 16, and Item 18 sets out further classes of mines requiring comprehensive study:

- 18.** The proposed construction, decommissioning or abandonment, or an expansion that would result in an increase in production capacity of more than 35 per cent, of
- (a) an asbestos mine;
 - (b) a salt mine with a brine production capacity of 4,000 t/d or more;

⁴⁹¹ *Canadian Environmental Assessment Act*, SC 1992, c. 37.

⁴⁹² See the Habitat Management PPR, Exhibit PPR8, *supra*.

⁴⁹³ *Comprehensive Study List Regulations*, SOR/94-638.

- (c) an underground salt mine with a production capacity of 20,000 t/d or more;
- (d) a graphite mine with a production capacity of 1,500 t/d or more;
- (e) a gypsum mine with a production capacity of 4,000 t/d or more;
- (f) a magnesite mine with a production capacity of 1,500 t/d or more;
- (g) a limestone mine with a production capacity of 12,000 t/d or more;
- (h) a clay mine with a production capacity of 20,000 t/d or more;
- (i) a stone quarry or gravel or sand pit with a production capacity of 1,000,000 t/a or more; or
- (j) a metal mine located offshore or on the ocean bed.

246. Finally, under *CEAA*, a proposed metal mine may also be referred to a Review Panel or a Joint Review Panel for an independent environmental assessment.⁴⁹⁴

Mines Act Permit

247. Regardless of whether any environmental assessment is required, mine proponents require a permit under section 10 of the *Mines Act*.⁴⁹⁵ To get the permit, proponents of placer mines, sand and gravel pits and quarries file a Notice of Work in accordance with parts 6.1.1, 6.1.2 and 10.1.1 of the Code.⁴⁹⁶ For coal or hard rock mineral mines, the proponent submits a detailed mine plan and reclamation program.⁴⁹⁷ An important issue in a detailed mine plan is often the potential for acid rock drainage and metal leaching.⁴⁹⁸

248. Information requirements under the Code for a *Mines Act* permit application include:

- a map or air photo showing the location and extent of the mine;
- particulars of the design, construction, operation and closure of mine components, taking into consideration the safety of the public, mine workers, and the protection of the environment;
- particulars of the nature and present uses of the land to be used for the mine;

⁴⁹⁴ *CEAA*, ss.33-35 and 40-42. The proposed Prosperity Mine was assessed by a Review Panel.

⁴⁹⁵ BC Mine Permit Application Requirements, *supra*.

⁴⁹⁶ *Ibid*. For an example, see BCP002361.

⁴⁹⁷ Information requirements for these applications are summarized in parts 6.1.2-6.1.5, 9.1, 9.2 and 10.1.2 of the Code.

⁴⁹⁸ BC Mine Permit Application Requirements, *supra*.

- particulars of the nature of the mine and the extent of the area to be occupied by the mine;
- a program for the protection and reclamation of the land and watercourses during the construction and operational phases of the mining operation;
- a conceptual final reclamation plan for the closure or abandonment of the mining operation;
- an estimate of the annual cost of outstanding reclamation obligations over the planned life of the mine including the cost of long-term monitoring and abatement; and
- any other relevant information that may be required by an Inspector.⁴⁹⁹

249. The proponent's mine plan and reclamation program is reviewed by a Regional Mine Development Committee, led by the provincial Ministry of Energy and Mines. The committee assists the Chief Inspector of Mines in reviewing permit applications.⁵⁰⁰ It often includes the same agency technical reviewers involved in the environmental assessment.⁵⁰¹

250. Proponents post a reclamation bond before receiving a mine permit.⁵⁰² The size of the bond depends on the estimated costs of reclaiming the land and watercourses, which may be tens of millions of dollars.⁵⁰³

251. If all requirements are met, a permit is issued under section 10 of the *Mines Act*, approving the mine plan, reclamation program and any design reports.⁵⁰⁴ The permit may contain any conditions the Chief Inspector considers necessary.⁵⁰⁵ Typical conditions include adherence to the *Mines Act* and the Code and adherence to certain guidelines such as the Metal Leaching and Acid Rock

⁴⁹⁹ *Ibid.* See also part 10 of the Code.

⁵⁰⁰ *Mines Act*, s.9.

⁵⁰¹ BC Mine Permit Application Requirements.

⁵⁰² Mineral Exploration and Mining in BC, *supra*, BCP002126 at 49.

⁵⁰³ *Ibid.*

⁵⁰⁴ BC Mine Permit Application Requirements, *supra*.

⁵⁰⁵ S.10(3).

Drainage Guidelines.⁵⁰⁶ The permit may specify the need for other permits, such as those governing timber cutting, road use and water use.⁵⁰⁷ Waste discharge permits and federal *Fisheries Act* authorizations are discussed below.

Operation (Waste Discharge and Monitoring)

252. The provincial Ministry of Environment and the Ministry of Energy and Mines together regulate the environmental impacts of the mining industry in British Columbia. Environment Canada also regulates effluent discharges of mines through its responsibility for the pollution prevention provisions of the *Fisheries Act*.⁵⁰⁸

Provincial Regulatory Scheme

253. In 2009, the Ministry of Environment and the Ministry of Energy and Mines developed a Memorandum of Understanding on the Regulation of Impoundments and Diversions on a Mine Site (the “Mine Site MOU”).⁵⁰⁹ It covers tailings storage facilities, flooded impoundments, water storage facilities, sedimentation control ponds, sludge storage ponds and diversion channels.⁵¹⁰

254. The Mine Site MOU recognizes that the Ministry of Energy and Mines is generally responsible for the health and safety of mine workers and the public, as well as “the protection and reclamation of the surface of the land and watercourses on the mine site.”⁵¹¹ The Ministry of Energy and Mines also

⁵⁰⁶ See example permit at BCP002591 and example amended work system and reclamation permit at BCP002589. The Metal Leaching and Acid Rock Drainage Guidelines are discussed in a later section of this Report.

⁵⁰⁷ For another example of a *Mines Act* permit, see BCP002478.

⁵⁰⁸ Natural Resources Canada, The Minerals and Metals Policy of the Government of Canada, available online at <http://www.nrcan.gc.ca/smm-mms/poli-poli/pdf/mmp-eng.pdf>.

⁵⁰⁹ BC MOE, Memorandum of Understanding – Regulation of Impoundments and Diversions on a Mine Site, BCP005042 [hereinafter “Impoundments MOU”]. At the time, the Ministry of Energy and Mines was the Ministry of Energy, Mines and Petroleum Resources.

⁵¹⁰ Impoundments MOU, *supra*, BCP005042 at 2.

⁵¹¹ *Ibid.* at 3.

ensures sufficient security is posted and that the mine, including tailings ponds and flooded impoundments, are properly reclaimed.⁵¹² The Ministry of Environment, namely its Environmental Protection Division, is made responsible for the protection of human health and the environment from any adverse effects of mine wastes or impoundments, the use of hazardous materials and the management of contaminated sites.⁵¹³ The Ministry of Environment is responsible for regulating the quantity and quality of discharges to the environment from mining activities, and will refer all applications for waste management permits and amendments dealing with mine tailings discharges to the Ministry of Energy and Mines for advice.⁵¹⁴

Waste Discharge Permits

255. Subsection 120(3) of the *EMA* makes it an offence to discharge waste from a prescribed industry or activity without authorization. Mining is a prescribed industry under Schedule 1 of the *EMA*, and therefore most mines require a waste discharge permit.⁵¹⁵ Waste discharge permits are issued by the Environmental Protection Division and may be subject to requirements for the protection of the environment.⁵¹⁶ For mines, the permits typically include requirements related to surface runoff, mine drainage and monitoring and reporting. Permits provided by the Province to the commission included conditions relating to the following:

- Temperature – e.g. “the discharge shall be suspended during any time that both the Fraser River mean daily temperature at Marguerite exceeds 19 degrees Centigrade and the tailings impoundment supernatant mean daily temperature exceeds the Fraser River Temperature;”
- Season – e.g. “the discharge authorization shall be suspended during the period November 11 to April 9, inclusive, unless [...]”

⁵¹² *Ibid.* at 4.

⁵¹³ *Ibid.* at 3.

⁵¹⁴ *Ibid.* at 4.

⁵¹⁵ The “mining and coal mining industry” is defined by section 2 of the Waste Discharge Regulation to exclude gravel, sand crushed rock or dimensional stone quarries, and exploration sites.

⁵¹⁶ S.14(1).

- Characteristics of the discharge at the point of discharge, e.g. maximum concentrations of TSS, sulphate, ammonia, numerous metals and toxicity (rainbow trout 96-hr LT50 bioassay – minimum 50% survival in 100% effluent concentration for 96 hour exposure);
- Annual median concentrations for certain metals (copper, cadmium);
- Authorized works that must be completed and in operation when the discharge commences (pumps, tailings impoundment areas, mine drainage collection systems, oil/water separators, pipelines, etc.);
- Maximum authorized rate of discharge to the tailings impoundment area
- Requirement to maintain works in good working order;
- Requirement to maintain an environmental emergency response plan and an adaptive management plan;
- Posting of security with the Minister of Finance;
- Monitoring and reporting requirements
 - Sampling and analysis, in accordance with procedures described in guidelines⁵¹⁷ and according to a table within the permit;
 - Biological, toxicity and environmental effects monitoring program;
 - Flow measurement:
 - tonnes of solids discharged into the tailings impoundment each day;
 - cubic metres of water discharged to the tailings impoundment each day;
 - cubic metres of effluent discharged to the Fraser River on a continuous basis;
 - Quarterly reports submitted to the province within 60 days of the end of each three month period, containing field measurements, water and effluent sample analyses, flow measurements, toxicity testing and quality assurance data; and
 - Annual environmental and reclamation report, summarizing the quarterly reports and including an evaluation of the impacts of the mine on the receiving environment, among other reporting requirements.⁵¹⁸

256. Waste discharge permits may be amended in accordance with section 16 of the *EMA*. For example, in 2009, the Ministry of Environment amended Gibraltar

⁵¹⁷ Permits refer to the “British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples, 2003 Edition (Permittee)” or the most recent edition, or to suitable alternative procedures as authorized by the Director.

⁵¹⁸ These are given as examples only; the list is not exhaustive. For an example permit under the *EMA*, see BCP003048 or BCP001632. For an example annual environmental and reclamation report, see BCP002406 through BCP002412.

Mine's permit to authorize the discharge of supernatant from its tailings facility directly into the Fraser River.⁵¹⁹

Other Sections of the EMA and Regulations

257. Part 5 of the *EMA* relates to remediation of mineral exploration sites and mines. It removes mines, in specified circumstances, from application of the *EMA*'s contaminated sites provisions.⁵²⁰ Previous owners and operators are exempt in many circumstances from liability for site cleanup.
258. Subsection 3(10) of the *Waste Discharge Regulation* exempts mines from subsections 6(2) and 6(3) of the *EMA* in relation to the discharge of coarse coal refuse, waste rock or overburden if managed in accordance with a permit issued under section 10 of the *Mines Act*. This exemption does not include tailings.⁵²¹
259. The *Placer Mining Waste Control Regulation* likewise exempts small-scale placer mining using no chemicals for processing from subsections 6(2) and 6(3).

Guidelines and Policies

260. The Ministry of Energy and Mines has developed Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia.⁵²² The primary purpose of these guidelines is to describe generic requirements for, as well as common errors, omissions and constraints related to, a mine's metal leaching and acid rock drainage program.⁵²³ Operating mines are instructed to maintain a detailed inventory of the location, mass and potential for metal leaching and acid rock

⁵¹⁹ Permit #PE-00416, BCP003048.

⁵²⁰ S.45.

⁵²¹ Waste Discharge Regulation, s.3(1).

⁵²² Ministry of Energy and Mines, Guidelines for Metal Leaching and Acid Rock Drainage (1998), available online at <http://www.empr.gov.bc.ca/Mining/Permitting-Reclamation/ML-ARD/Pages/default.aspx>.

⁵²³ Ss.1.1, 2 and 11.5; *ibid*.

drainage of all wastes and exposed materials.⁵²⁴ The Ministry has also published the Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia,⁵²⁵ largely derived from the Guidelines.⁵²⁶

261. Other guidelines include a 234-page document of best management practices specific to construction of aggregate mines, produced by the Ministry of Energy and Mines,⁵²⁷ and a 15-page document for assessing sedimentation ponds used to control surface runoff in mining, produced by the predecessor of the Ministry of Environment.⁵²⁸

Federal Regulatory Scheme

Subsection 36(3) of the Fisheries Act and the Metal Mining Effluent Regulations

262. In 2002, the *Metal Mining Effluent Regulations* were enacted under subsection 36(5) and other provisions of the *Fisheries Act*.⁵²⁹ The “fundamental objective of the new MMER is to improve the management of metal mine effluents with a view toward improving the protection of fish, fish habitat and fisheries.”⁵³⁰
263. The MMER repealed, and were intended to augment the environmental requirements of, the 1977 *Metal Mining Liquid Effluent Regulations*

⁵²⁴ S.11.3; *ibid.*

⁵²⁵ Ministry of Energy and Mines, Policy for Metal Leaching and Acid Mine Drainage at Minesites in British Columbia (1998), available online at <http://www.empr.gov.bc.ca/Mining/Permitting-Reclamation/ML-ARD/Pages/default.aspx>.

⁵²⁶ Guidelines for Metal Leaching and Acid Rock Drainage (1998), *supra*, s.1.3.

⁵²⁷ BC Ministry of Energy and Mines, Aggregate Operators Best Management Practices Handbook for BC (2002), available online at <http://www.empr.gov.bc.ca/MINING/MINERALSTATISTICS/MINERALSECTORS/CONSTRUCTIONAGGREGATES/REPORTSANDPUBLICATIONS/Pages/AggregateOperators.aspx> at 9-11.

⁵²⁸ BC Ministry of Environment, Lands and Parks (as it then was), Guidance for Assessing the Design, Size and Operation of Sedimentation Ponds Used in Mining (undated), available online at http://www.env.gov.bc.ca/epd/industrial/mining/pdf/settling_ponds.pdf.

⁵²⁹ Metal Mining Effluent Regulations and Regulatory Impact Analysis Statement, *Canada Gazette*, Part II, Vol. 136, No. 13 (June 19, 2002), available online at <http://canadagazette.gc.ca/archives/p2/2002/2002-06-19/pdf/g2-13613.pdf> [hereinafter “MMER RIAS”] at 1412.

⁵³⁰ MMER RIAS, *ibid.*, at 1455.

("MMLER").⁵³¹ In contrast to the MMER, these earlier regulations did not apply to mines that commenced operation prior to 1977 or to mines, like gold mines, that use cyanide in the milling process.⁵³²

264. The MMER apply to all operating metal mines that have an effluent flow rate exceeding 50 cubic metres per day.⁵³³ Mines to which the MMER do not apply remain subject to the general prohibition against depositing deleterious substances in subsection 36(3) of the *Fisheries Act*.

265. Of the six metal mines in the Fraser River watershed, three are subject to the MMER: Endako, Huckleberry and Gibraltar Mines.⁵³⁴

266. Where certain conditions are met, the MMER authorize the owner or operator of a mine to deposit effluent containing a deleterious substance into water frequented by fish, which deposit would otherwise be prohibited by subsection 36(3) of the *Fisheries Act*.⁵³⁵ The conditions require that:

- (a) the concentration of the deleterious substance in the effluent does not exceed authorized limits set out in Schedule 4;⁵³⁶
- (b) the pH of the effluent is equal to or greater than 6.0 but is not greater than 9.5; and
- (c) the deleterious substance is not an acutely lethal effluent.⁵³⁷

⁵³¹ *Ibid.* at 1444.

⁵³² *Ibid.*

⁵³³ S.2. Note the effluent must be deposited in water frequented by fish, per subsection 36(3).

⁵³⁴ Environment Canada, Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* in 2009 (2010), available online at <http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=A0E3B5E2-DA9C-4B9C-9F13-19F4BA3BDB00> [hereinafter "Summary Review of Performance of Metal Mines Subject to the MMER in 2009"].

⁵³⁵ MMER, s.4. Authorization is further conditional on compliance with ss.6-27.

⁵³⁶ Deleterious substance is defined at s.1 to mean a substance prescribed under section 3 except as otherwise prescribed by the MMER.

⁵³⁷ S.4. This may also be permitted under a transitional authorization, subject to s.36. Acutely lethal effluent is defined at s.1 to mean an effluent at 100% concentration that kills more than 50% of the rainbow trout subjected to it over a 96-hour period when tested in accordance with the acute lethality test. An acute lethality test is defined at s.1 to mean the test to determine the acute lethality of effluent to rainbow trout as set out in Reference Method EPS 1 /RM/13.

267. The MMER can be described as comprising three elements. The first element relates to the parameters in (a) and (b) above. Schedule 4 prescribes eight deleterious substances that may be discharged from metal mines: arsenic, copper, cyanide, lead, nickel, zinc, radium 226 and TSS. It prescribes the maximum authorized concentrations of these eight deleterious substances. The MMER do not authorize other deleterious substances to be deposited.⁵³⁸
268. The second element is that effluent must be non-acutely lethal.⁵³⁹ Mines must conduct monthly testing in accordance with specific procedures.⁵⁴⁰ Frequency of testing can be reduced or increased depending on test results.⁵⁴¹
269. Mines submit annual reports summarizing effluent monitoring results. When an effluent monitoring test indicates that the limits in Schedule 4 were exceeded, the mine must indicate the cause(s) of the non-compliance and remedial measures planned or implemented.⁵⁴² When a mine fails a rainbow trout acute lethality test, the mine must indicate remedial measures planned or implemented.⁵⁴³
270. The third element of the MMER is the requirement for mines to conduct Environmental Effects Monitoring. The EEM program is intended to evaluate the effects of mining effluent on the aquatic environment and in particular on fish, fish habitat and fisheries.⁵⁴⁴ The EEM program “builds on the experience of the EEM program developed and implemented under the 1992 *Pulp and Paper Effluent Regulations*.”⁵⁴⁵

⁵³⁸ With the exception of Schedule II Tailings Impoundment Areas.

⁵³⁹ MMER, s.4(1)(c).

⁵⁴⁰ S.14(1). The procedures are specified in Reference Method EPS 1/RM/13.

⁵⁴¹ Ss.15 and 16.

⁵⁴² Schedule 6, Part 4, s.1.

⁵⁴³ Schedule Part 4, s.2.

⁵⁴⁴ MMER RIAS, *supra* at 1447.

⁵⁴⁵ *Ibid.*

271. Two types of EEM studies are required: (1) effluent and water quality monitoring; and (2) biological monitoring.⁵⁴⁶
272. The EEM program's effluent and water quality monitoring consists of effluent characterization, sublethal toxicity testing and water quality monitoring.⁵⁴⁷ For effluent characterization, testing is done for aluminum, cadmium, iron, molybdenum, ammonia, nitrate and, in some circumstances, mercury.⁵⁴⁸ For sublethal toxicity testing, testing must be conducted for "a fish species, an invertebrate species, a plant species and an algal species."⁵⁴⁹ For water quality monitoring, testing is conducted for pH, hardness, alkalinity, temperature, dissolved oxygen concentration, as well as the concentration of the deleterious substances in Schedule 4 noted above.⁵⁵⁰ Results of effluent and water quality monitoring are reported annually.⁵⁵¹
273. The EEM program's biological monitoring requires a site characterization and benthic invertebrate monitoring. In contrast, fish monitoring is not necessarily required. A fish population study is only required if the effluent in the exposure area exceeds certain concentrations. A fish tissue study is only required if EEM effluent characterization studies identify a certain concentration of mercury.⁵⁵²
274. As part of this biological monitoring, MMER mines are required to:

⁵⁴⁶ Schedule 5, s.2. Effluent and water quality studies required are set out in Part 1 of Schedule 5. Biological studies required are set out in Part 2 of Schedule 5.

⁵⁴⁷ Schedule 5, s.3.

⁵⁴⁸ Schedule 5, s.4.

⁵⁴⁹ Schedule 5, s.5. These four types of species are for mine effluents discharged into freshwater; marine discharges do not require a plant species to be tested. If required to assess fish populations and/or fish tissue, the mine owner or operator selects the species to be studied, providing a scientific rationale for the selection; see Schedule 5, s.12.

⁵⁵⁰ Schedule 5, s.7.

⁵⁵¹ Schedule 5, s.8.

⁵⁵² Schedule 5, s.9.

- submit study designs detailing their intended biological monitoring studies;⁵⁵³
- conduct the biological monitoring described by their study design;⁵⁵⁴
- assess the data collected;⁵⁵⁵ and
- submit reports after each field study.⁵⁵⁶

275. MMER mines must also conduct *Daphnia magna* monitoring tests.⁵⁵⁷

276. In December 2005, Environment Canada initiated a national review of the EEM program. The results of this review are published in the Metal Mining Environmental Effects Monitoring Review Team Report.⁵⁵⁸ The 2007 report contains 42 recommendations to improve EEM studies. Another report, also produced in 2007, presents a national assessment of EEM data collected in 2004 and 2005.⁵⁵⁹

277. Finally, in addition to the parameters, the non-acutely lethal requirement and the EEM program, the MMER also includes provisions related to tailings impoundment areas. Specifically, MMER allows the deposit of waste rock or effluent that contains *any* concentration of a deleterious substance and that is of *any* pH into a natural water body that is designated as a tailings impoundment area in Schedule 2. Eighteen bodies of water are listed in Schedule 2. No mines in the Fraser River watershed currently use a Schedule 2 tailings impoundment

⁵⁵³ Schedule 5, ss.10-14.

⁵⁵⁴ Schedule 5, ss.15, 20.

⁵⁵⁵ Schedule 5, s.16.

⁵⁵⁶ Schedule 5, ss.8, 17, 18, 21, 22.

⁵⁵⁷ S.17. The test methods are set out in Reference Method EPS 1 /RM/13/.

⁵⁵⁸ ***Environment Canada, Review Team Report from Metal Mining Environmental Effects Monitoring Program (August 2007), available online at <http://www.ec.gc.ca/eseem/default.asp?lang=En&n=2DAFFC56-1>.***

⁵⁵⁹ Environment Canada, National Assessment of Phase 1 Data from the Metal Mining Environmental Effects Monitoring Program (December 2007), available online at <http://www.ec.gc.ca/eseem/default.asp?lang=En&n=3D80AB10-1>. The second national assessment of data is expected to be released by the end of summer 2011.

area. Mines must submit a compensation plan before depositing a deleterious substance into a Schedule 2 tailings impoundment area.⁵⁶⁰

278. In 2009, Environment Canada produced an Environmental Code of Practice for Metal Mines. Designed to support the MMER, these guidelines recommends various practices to mitigate identified environmental concerns. It “applies specifically to metal mines but will provide useful guidance for all sectors of the mining industry.”⁵⁶¹ Mines are advised, but not required, to comply with the Environmental Code of Practice for Metal Mines.

Monitoring Compliance with the MMER

279. In February 2005, Environment Canada launched the Regulatory Information Submission System (“RISS”).⁵⁶² It is an internet-based application that allows ‘regulatees’ to submit information to Environment Canada. Metal mines are required to submit quarterly and annual effluent monitoring results, as well as EEM results, through the RISS report.⁵⁶³ Under the RISS, submitted data are processed instantly, enabling Environment Canada to collect, store and analyze data to evaluate compliance with the MMER.⁵⁶⁴ Enforcement staff can review pollutant releases on a sector-wide basis and are given automatic notification of infractions in their region.⁵⁶⁵
280. The RISS helps Environment Canada publish annually a Summary Review of Performance of Metal Mines Subject to the MMER (“Metal Mine Summary Review”).⁵⁶⁶ The Metal Mine Summary Review describes the performance of

⁵⁶⁰ S.27.1.

⁵⁶¹ Environment Canada, Environmental Code of Practice for Metal Mines (2009), available online at <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1> at 1.

⁵⁶² Regulatory Information Submission System (n.d., no author), CAN014669 [hereinafter “RISS”] at 1, 2.

⁵⁶³ MMER, s.23. Use of the RISS is also required for pulp mills in BC per s.9(3) of the PPER.

⁵⁶⁴ RISS, *supra*, CAN014669 at 1.

⁵⁶⁵ *Ibid.*

⁵⁶⁶ The reviews dating back to 2003 are available on Environment Canada’s website at <http://www.ec.gc.ca/Publications/default.asp>.

each mine in meeting MMER requirements. It is based largely on the quarterly and annual reports submitted to Environment Canada through the RISS. The performance for the last four years of the three mines in the Fraser River subject to the MMER is summarized in the following four paragraphs.

281. In 2009, there were no reported exceedances for metals, pH or TSS from the three MMER mines in the Fraser River watershed.⁵⁶⁷ Gibraltar and Huckleberry did not fail any rainbow trout or *Daphnia magna* monitoring tests.⁵⁶⁸ Endako failed two out of 24 *Daphnia magna* monitoring tests.⁵⁶⁹
282. In 2008, Endako exceeded the limits for total suspended solids twice.⁵⁷⁰ Huckleberry exceeded limits for pH (high) three times.⁵⁷¹ Huckleberry also failed *Daphnia magna* monitoring on three out of fifteen tests.⁵⁷² Gibraltar was not subject to the MMER in 2008.
283. In 2007, Endako had no reported exceedances. Huckleberry exceeded limits for total suspended solids three times and pH (high) once.⁵⁷³ Huckleberry failed two of seventeen *Daphnia magna* monitoring tests.⁵⁷⁴
284. In 2006, Endako exceeded limits for total suspended solids three times. Huckleberry had no exceedances.⁵⁷⁵ Huckleberry failed two of thirteen *Daphnia magna* monitoring tests.⁵⁷⁶

⁵⁶⁷ Environment Canada, Summary Review of Performance of Metal Mines Subject to the MMER in 2009 (2010), Table C1.

⁵⁶⁸ *Ibid.*, Table C2.

⁵⁶⁹ *Ibid.*, Table C2.

⁵⁷⁰ Environment Canada, Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* in 2008 (2010), Table D1.

⁵⁷¹ *Ibid.*, Table D1.

⁵⁷² *Ibid.*, Table D2.

⁵⁷³ Environment Canada, Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* in 2007 (2009) Table D1.

⁵⁷⁴ *Ibid.*, Table D2.

⁵⁷⁵ Environment Canada, Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* in 2006 (2008), Table D1.

285. As noted above, when a mine exceeds the concentrations set out in Schedule 4, the mine's annual report to Environment Canada must indicate the cause of the non-compliance and the remedial measures planned or implemented.⁵⁷⁷ Environment Canada does not require a "pass" for the *Daphnia magna* monitoring test, so failures do not necessarily result in remedial measures.⁵⁷⁸

Federal Inspections and Enforcement

286. Environment Canada enforces the MMER in accordance with the Compliance and Enforcement Policy.⁵⁷⁹ In verifying compliance with the MMER, inspectors use "a range of possible responses to offences, including warnings, inspector's directions, ticketing, ministerial orders, injunctions, prosecution and civil suits[.]"⁵⁸⁰

287. Inspections for MMER compliance are conducted by a combination of on-site inspections and off-site by review of submitted reports.⁵⁸¹ The number of site inspections conducted nationally, between 2002 and 2010, to assess MMER compliance is as follows:⁵⁸²

⁵⁷⁶ *Ibid.*, Table D2.

⁵⁷⁷ MMER, Schedule 6, Part 4.

⁵⁷⁸ See the footnote for any page of Appendix D of the 2009 Metal Mine Review, *ibid.* It is not clear whether remedial measures result for pH exceedances.

⁵⁷⁹ Summary Review of Performance of Metal Mines Subject to the MMER in 2009, *supra* at 5. For a description of the Compliance and Enforcement Policy, see the Habitat Enforcement PPR, *supra*.

⁵⁸⁰ Summary Review of Performance of Metal Mines Subject to the MMER in 2009, *supra* at 5.

⁵⁸¹ See, e.g. Inspection Report for the Huckleberry Mine, stating "Quarterly report received," CAN347329. Compare to on-site Inspection Report for the Endako Mine, CAN346940. See also Environment Canada, Summary of MMER Inspections, Compliance and Investigations from 2002 to 2010 (spreadsheet) (n.d.) [hereinafter "MMER Inspections, Compliance and Investigations, 2002 to 2010"], *infra*.

⁵⁸² MMER Inspections, Compliance and Investigations, 2002 to 2010, *supra*.

INSPECTIONS						
All Regions				Pacific & Yukon Region		
Fiscal Year	On-Site	Off-Site	Total	On-Site	Off-Site	Total
02-03	5	126	131	0	17	17
03-04	76	415	491	8	29	37
04-05	69	540	609	12	47	59
05-06	95	481	576	14	52	66
06-07	78	409	487	8	45	53
07-08	78	613	691	10	42	52
08-09	83	546	629	14	34	48
09-10	60	422	482	7	43	50
Total	544	3552	4096	73	309	382

288. Regarding inspections, Environment Canada observed in 2008 that the provincial Ministry of Environment “has significantly reduced its inspections of mines, so it is no longer possible to conduct coordinated site inspections. As a general procedure, the enforcement officer will contact the MOE official and advise that Environment Canada will be conducting an on-site inspection at a specific mine.”⁵⁸³

289. The documented annual incidences of non-compliance with the MMER’s effluent monitoring and reporting requirements is as follows:⁵⁸⁴

COMPLIANCE		
All Regions		Pacific & Yukon
Fiscal Year	Non-Compliance	Non-Compliance
02-03	51	5
03-04	190	17
04-05	201	23
05-06	49	6
06-07	75	5

⁵⁸³ Environment Canada, National Enforcement Plan 2008-2009, CAN348173 at 17.

⁵⁸⁴ MMER Inspections, Compliance and Investigations, 2002 to 2010, *supra*.

07-08	146	10
08-09	90	6
09-10	62	5
Total	864	77

290. The number of charges laid or prosecutions brought under the MMER in the Pacific and Yukon Region between 2002 and 2010 is as follows:⁵⁸⁵

INVESTIGATIONS Pacific & Yukon only	
FY	Charges/Prosecutions
02-03	0
03-04	1
04-05	2
05-06	0
06-07	0
07-08	1
08-09	1
09-10	0
Total	5

Criticisms of the MMER and the Application of Section 36 to Mining

291. Prior to the enactment of the MMER, there were concerns about a lack of enforcement of the *Fisheries Act* against metal mines. In 1998, three environmental groups filed a submission with the Commission for Environmental Cooperation (“CEC”).⁵⁸⁶ The submission alleged that Canada had systematically failed to enforce subsection 36(3) against mining operations in British Columbia, in particular for violations caused by acid rock drainage. In response to the submission, the CEC agreed to prepare a Factual Record. The Factual Record

⁵⁸⁵ *Ibid.* National numbers were not provided.

⁵⁸⁶ The CEC was established under the North American Agreement on Environmental Cooperation to address regional environmental concerns, prevent conflicts and promote the effective enforcement of environmental law. Commission for Environmental Cooperation, About the CEC, available online at <http://www.cec.org/Page.asp?PageID=924&SiteNodeID=310>.

considered only whether Canada was failing to effectively enforce subsection 36(3) at the historic Britannia Mine in British Columbia.⁵⁸⁷

292. Before the MMER came into force, there was a six year consultation process, after which the draft regulations were published in the Canada Gazette, Part 1 for formal public comment. Environment Canada received 23 submissions. British Columbia did not make a formal submission.⁵⁸⁸

293. Submissions by the mining industry, consistent with earlier consultations, emphasized that:

- the MMER should be harmonized with provincial regulatory requirements;
- the new, more stringent standard for TSS would be challenging to meet and may not have environmental benefits;
- there should be no upper pH limit; and
- some mines would need a longer transitional period to achieve compliance.⁵⁸⁹

294. Submissions by citizens and environmental non-profit organizations reiterated the views expressed in six years of consultations on the MMER, suggesting that:

- the permissible limits for the prescribed deleterious substances were too high, specifically for metals, and would not adequately protect fish and fish habitat;
- the list of deleterious substances should be expanded to include additional metals and, at a minimum, cadmium and mercury;
- there should be an explicit regulatory trigger to require more stringent site-specific requirements, if environmental effects were determined by EEM; and
- there should be specific regulatory requirements for all monitoring, inspection, prosecution and EEM data to be made public, in a timely manner.⁵⁹⁰

295. In a 2007 petition to the Auditor General, MiningWatch Canada asserted that the levels of metals being discharged to fish habitat by MMER mines have not

⁵⁸⁷ CEC Factual Record at 57-59, *supra*.

⁵⁸⁸ MMER RIAS, *ibid*, at 1457-1461. See also Mining Watch, Metal Mining Effluent Regulations, available online at <http://www.miningwatch.ca/en/home/issue/metal-mining-effluent-regulations>.

⁵⁸⁹ MMER RIAS, *ibid*.

⁵⁹⁰ *Ibid*. at 1459-1460.

reduced since the MMLER was introduced in 1977 and the MMER was introduced in 2002, while such levels have steadily declined in other countries.⁵⁹¹ Environment Canada responded to the Auditor General that the metal contaminant levels specified in the MMER are appropriate, given that they represent the minimum national standards that must be in place for all MMER metal mines, regardless of the type of metal that is being mined.⁵⁹² Environment Canada further responded that it encourages provinces and territories to evaluate these standards taking site-specific circumstances into account and to implement more stringent effluent requirements.⁵⁹³

296. Despite the apparent lack of charges and prosecutions under MMER,⁵⁹⁴ the mining industry in British Columbia has voiced criticism of subsection 36(3).⁵⁹⁵ In a 2006 position paper, BC industry organizations urged amending subsection 36(3) to bring it into line with provincial legislation that, in their view, requires enforcement authorities to *prove* that a discharge caused harm to the environment.⁵⁹⁶ The mining industry has also urged the federal government to enter into agreements that would delegate the administration of subsection 36(3) to the provinces.⁵⁹⁷

⁵⁹¹ MiningWatch Canada, Petition to the Office of the Auditor General of Canada, Environmental Impact of Federal Metal Mining Effluent Regulations (2007-2008), available online at http://www.oag-bvg.gc.ca/internet/English/pet_219_e_30005.html. Environmental non-profit organizations have also been critical of Schedule 2 of the MMER. See e.g. Mining Watch, Metal Mining Effluent Regulations, available online at <http://www.miningwatch.ca/en/home/issue/metal-mining-effluent-regulations>.

⁵⁹² *Ibid.*

⁵⁹³ *Ibid.*

⁵⁹⁴ As summarized in the preceding section of this Report.

⁵⁹⁵ Joint BC Industry Position Paper on Reform of the *Fisheries Act* (August 2006), CAN410931 at 26-28. See also Commission for Environmental Cooperation, Factual Record: BC Mining Submission (2003), available online at CEC http://www.cec.org/Storage/68/6172_98-4-FFR_en.pdf [hereinafter "CEC Factual Record"] at 57-9.

⁵⁹⁶ As discussed above in this Report, under subsection 36(3), for an offence to be proven, a deleterious substance must only be deposited directly or indirectly into water frequented by fish. Actual harm to fish or fish habitat is not necessary to establish the offence. *R. v. Kingston (City)* 70 O.R. (3d) 577 (Ont. CA).

⁵⁹⁷ CEC Factual Record, *supra* at 57-9.

Reclamation

297. Under the Code, reclamation activities are to occur throughout the life of a mine, not only after mine closure.⁵⁹⁸ A mine application must include operational reclamation plans for the next five years, as well as a conceptual final reclamation plan and an estimate of the total expected reclamation costs.⁵⁹⁹ The Code lists a number of reclamation standards, including standards relating to revegetation, land use, watercourses, slope stability and removal of structures and equipment.⁶⁰⁰
298. Watercourses must be restored to a condition that ensures their productive capacity is not less than existed prior to mining, unless evidence “demonstrates, to the satisfaction of the chief inspector, the impracticality of doing so.”⁶⁰¹ The Code states that if water quality from any component of the mine results in exceedances of applicable provincial water quality standards in the receiving environment, the Chief Inspector of Mines may require remediation for as long as necessary.⁶⁰² The Chief Inspector also may demand monitoring to demonstrate that reclamation objectives are being achieved.⁶⁰³
299. Demonstrating that reclamation occurs throughout the life of the mine, in 2009, the Gibraltar Mine reported disturbing 5.6 hectares of land, but harrowing, seeding and fertilizing 17.5 hectares.⁶⁰⁴ The Code instructs mines to submit an annual report of their reclamation and environmental monitoring work.⁶⁰⁵

⁵⁹⁸ S.10.1.4; see also Ministry of Energy and Mines, Six Essential Phases of Mining, available online at <http://www.empr.gov.bc.ca/Mining/Pages/SixEssentialPhasesofMining.aspx>.

⁵⁹⁹ Code, ss.10.1.4(6), (7) and (8).

⁶⁰⁰ Code, s.10.7.

⁶⁰¹ Code, s.10.7.12. Note “productive capacity” is not defined in the Code and does not appear anywhere else in the Code or the *Mines Act*.

⁶⁰² Code, s.10.7.29.

⁶⁰³ Code, s.10.7.30.

⁶⁰⁴ Gibraltar Mines Ltd., 2009 Environmental and Reclamation Report (March 2010), BCP002412.

⁶⁰⁵ Code, s.10.1.4(5).

Examples of such reports have been provided by the Province to the commission.⁶⁰⁶

300. Within the Ministry of Energy and Mines, the reclamation section inspects mine reclamation activity and enforces the reclamation provisions of the *Mines Act* and Code, throughout the mine's operation and closure.⁶⁰⁷ Under the *Mines Act*, the Chief Inspector must publish a report showing results in achieving the *Act's* purposes.⁶⁰⁸
301. Federally, the MMER defines "recognized closed mines." A mine may become a recognized closed mine after a three year period during which a closed mine meets certain requirements, including conducting a biological monitoring study and an interpretive report.⁶⁰⁹
302. Mine regulators from each province collaborate on the National Orphaned/Abandoned Mines Initiative ("NOAMI"). NOAMI serves to put forward recommendations to mining ministers on collaborative approaches and partnerships in implementing remediation programs for orphaned and abandoned mine sites in Canada.⁶¹⁰ An advisory committee consists of representatives of federal, provincial and territorial governments and environmental organizations. British Columbia has two representatives; Environment Canada has one.⁶¹¹

⁶⁰⁶ See e.g. Gibraltar mines Environmental and Reclamation Reports for 2004 through 2009 at BCP002406 through BCP002412.

⁶⁰⁷ See inspector report examples at BCP002412, BCP002604, BCP002605. See also the Chief Inspector's Annual Reports, *infra*.

⁶⁰⁸ S.36. Annual reports from 2000 to 2008 are available online at Ministry of Energy and Mines <http://www.empr.gov.bc.ca/Mining/HealthandSafety/CI/Pages/default.aspx>.

⁶⁰⁹ MMER, s.32 and Schedule 5, ss.23-26.

⁶¹⁰ NOAMI, Action Plan 2006, available online at <http://www.abandoned-mines.org/pdfs/ConfReportsPlans/NOAMlstatreport2006-e.pdf>.

⁶¹¹ NOAMI, NOAMI Advisory Committee, available online at NOAMI <http://www.abandoned-mines.org/committee-e.htm>.

APPENDIX A Combined Sewer Overflow Locations in Greater Vancouver



APPENDIX B List of Documents and Websites Cited by this Policy and Practice Report

Ringtail Documents

	Doc ID	Main Date	Title
1	BCP000363	1-Mar-2004	Status of Water, Sediment and Fish Quality in the Lower Fraser River (Hope to the mouth), from 1971 to 2003
2	BCP001451	1-Aug-2006	A Compendium of Working Water Quality Guidelines for British Columbia
3	BCP001632	4-May-2005	Permit #PE-11678
4	BCP002126	19-Mar-2008	Mineral Exploration and Mining in British Columbia
5	BCP002164	1-May-2002	Stormwater Planning: A Guidebook for British Columbia
6	BCP002361	30-Nov-2007	Sand and Gravel/Quarry Operation Notice of Work and Reclamation Program
7	BCP002412	1-Mar-2010	Gibraltar Mines Ltd. - 2009 Environmental and Reclamation Report
8	BCP002413	18-Jul-2008	Report of Inspector of Mines Reclamation
9	BCP002478	12-Nov-2004	Permit #M-40 - Approving Work System and Reclamation Program
10	BCP002566	1-Jan-2009	Mines & Mineral Exploration Overview 2009
11	BCP002589	21-Jul-1999	Permit M-40
12	BCP002591	31-Oct-1989	Permit M-40
13	BCP002604	22-Jun-2006	Report of Reclamation Inspector
14	BCP002605	11-Oct-2007	Report of Reclamation Inspector
15	BCP003048	12-Jun-2009	Permit PE-00416 - Amended
16	BCP005042	14-May-2009	Memorandum of Understanding - Regulation of Impoundments and Diversions on a Mine Site
17	BCP005284	24-Mar-2005	Review of Existing Municipal Wastewater Effluent (MWW) Regulatory Structures in Canada - Final Report
18	BCP005200		Guidelines for Developing a Liquid Waste Management Plan
19	CON000109		CSO Locations in Greater Vancouver
20	CON000115	1-Sep-2004	The National Sewage Report Card: Grading the Sewage Treatment of 22 Canadian Cities
21	CAN001363	1-Sep-1995	Discussion Paper Prepared for Pacific Policy Roundtable - Pacific Salmon - Environment and Habitat Issues
22	CAN014475	1-Jan-2003	Annual Report - 2002-2003 - Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the Fisheries Act
23	CAN014669	11-Aug-2008	Regulatory Information Submission System (RISS)

24	CAN015844	31-Mar-2005	Annual Report - April 1 2004 to March 31 2005 - Annual Report to Parliament on the Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the Fisheries Act
25	CAN024153	1-Jan-2000	Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia
26	CAN025059		Contaminants and Nutrients in the Coastal Zone: Impacts on Water Quality
27	CAN025061	1-Jan-2001	The State of Municipal Wastewater Effluents in Canada
28	CAN025073		Working With The Coastal Shore - Coastal Shore Stewardship
29	CAN025074	1-Jan-2006	Alive and Inseparable - British Columbia's Coastal Environment: 2006
30	CAN180495	1-Jan-2008	Annual Report to Parliament: On the Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the Fisheries Act: April 1, 2007 to March 31, 2008
31	CAN185556	17-May-2010	List of Treaties, Acts, Regulations, Agreements, Policies, Programs and Procedures Related to the Management of Fish and Fish Habitat on the Pacific Coast of Canada
32	CAN194780	12-Jan-2007	The State of Freshwater Ecosystems in Selected Canadian Watersheds
33	CAN261146	1-Jun-2008	Towards a Fisheries and Oceans Canada National Freshwater Monitoring Plan
34	CAN295568	23-Apr-2010	Briefing Note for Cohen Inquiry - Wastewater and Sewage Contamination
35	CAN300922	17-Feb-2009	Canada-wide Strategy for the Management of Municipal Wastewater Effluent
36	CAN310554	31-Mar-2009	Toxicological Evaluation of Emerging Chemicals in Municipal Wastewater Effluents within the Georgia Basin
37	CAN346940	18-Aug-2010	Inspection Report - 5008-2006-10-31-001
38	CAN347329	18-Aug-2010	Inspection Report - 5008-2010-02-18-010
39	CAN348173	2-Dec-2008	Environmental Enforcement Directorate Enforcement Branch, Environment Canada National Inspection Plan 2008-2009
40	CAN410931	1-Aug-2006	Fisheries Act Renewal 2006 - Joint BC Industry Position Paper
41	CAN434412	4-May-2010	Environment Canada's Proposed Wastewater Systems Effluent Regulations
42	CAN434413	19-May-2010	Watershed Systems Effluent Regulations, Fisheries Act Notice Published in the Canada Gazette, Part 1 on March 20, 2010
43	FNC000043	30-Mar-2010	Speaking for the Salmon, Summit on Fraser River Sockeye Salmon: Understanding Stock Declines and Prospects for the Future
44	MVA000003	1-May-2010	Integrated Liquid Waste and Resource Management: May 2010

Commission Exhibits

1. Cohen Commission Exhibit 35
2. Cohen Commission Exhibit 562
3. Cohen Commission Exhibit 693
4. Cohen Commission Exhibit 735
5. Cohen Commission Exhibit 735A
6. Cohen Commission Exhibit 735-1
7. Cohen Commission Exhibit 735-2
8. Cohen Commission Exhibit 735-3
9. Cohen Commission Exhibit 826
10. Cohen Commission Exhibit 833
11. Cohen Commission Exhibit PPR2
12. Cohen Commission Exhibit PPR3
13. Cohen Commission Exhibit PPR8
14. Cohen Commission Exhibit PPR9
15. Cohen Commission Exhibit PPR14

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APPENDIX C

List of Abbreviations

Ammonia Guideline – *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents*

AOX – adsorbable organic halide

BC EAA – British Columbia *Environmental Assessment Act*

BC MOE – BC Ministry of Environment

BOD – biochemical oxygen demand

CCME – Canadian Council of Ministers of the Environment

CCME Strategy – CCME *Canada-Wide Strategy for the Management of Municipal Wastewater Effluents*

CCREM – Canadian Council of Resource and Environment Ministers

CEAA – *Canadian Environmental Assessment Act*

CEC – Commission for Environmental Cooperation

CEPA – *Canadian Environmental Protection Act*

CESD 2009 Report – Commissioner of the Environment and Sustainable Development's Spring 2009 Report

Code – health, safety and reclamation code (*Mines Act*)

Compliance and Enforcement Policy – Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*, November 2001

CSO – combined sewer overflow

DFO – Fisheries and Oceans Canada

DO – dissolved oxygen

EDC – endocrine disrupting compound or chemical

EEM – environmental effects monitoring

EMA – *Environmental Management Act*

EMAN – Ecological Monitoring and Assessment Network

GPA – Global Programme of Action

GVRD – Greater Vancouver Regional District

GVS&DD – Greater Vancouver Sewerage and Drainage District

HADD – harmful alteration, disruption or destruction

Inorganic Chloramines and Chlorinated Wastewater Effluents Notice – *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents*

LWMP – liquid waste management plan

MMER – *Metal Mining Effluent Regulations*

MMLER – *Metal Mining Liquid Effluent Regulations*

MSR – *Municipal Sewage Regulation*

MUD – Municipal Water Use Database

MWWS – Municipal Water and Wastewater Survey

NOAMI – National Orphaned/Abandoned Mines Initiative

NPRI – National Pollutant Release Inventory

PAH – polycyclic aromatic hydrocarbon

PBDE – polybrominated diphenyl ether

PCB – polychlorinated biphenyl

PPER – *Pulp and Paper Effluent Regulations*

PPR – Policy and Practice Report

RIAS – regulatory impact analysis statement

RISS – Regulatory Information Submission System

TSS – total suspended solids

Waste material – mixture of minerals and rock

WCEL – West Coast Environmental Law

WQI – CCME Water Quality Index

WSER – Wastewater Systems Effluent Regulations