Chapter 4.1
Waste and Materials Management

BACKGROUND

The mining process uses materials that, if mismanaged, create risks to human health, safety and the environment. Fuels used by heavy machinery, chemicals, such as solvents used to clean or maintain equipment, and wastes from onsite sewage treatment facilities can be harmful to living organisms if spilled or otherwise released to the environment. Mining also generates large volumes of waste materials that may be associated with risks to health, safety and the environment, depending on the chemical characteristics of the material and how it is managed.

Most mined material will remain on the site as wastes in two general forms: waste from processing ore into a concentrate or final product (e.g., tailings, spent heap leach materials, etc.), and soil and rock removed during mining that will not be processed for minerals (e.g., overburden, waste rock, sub-economic ore, etc.). These waste materials may contain target minerals and other constituents including sulfide and other metal-bearing minerals. In addition, some tailings may contain process chemicals, and waste rock may contain nitrogen-based explosives compounds.

If water treatment is necessary to remove metals or other constituents from mine-impacted waters before discharging water to the environment, the process may generate waste sludges that contain high concentrations of metals or other contaminants.

Mining-related wastes have the potential to contaminate water bodies, air and soil. Water contamination is the most prevalent problem associated with mine wastes and hazardous materials used or generated as a result of mining activities. Mining wastes may also pose a risk to nearby communities, as the storage of any large volumes of any material behind dams and/or in constructed impoundments holds the potential for catastrophic failure.

TERMS USED IN THIS CHAPTER

Acid Rock Drainage (ARD) ■ Affected Communities ■ Alternatives Assessment ■ Best Available/Applicable Practice (BAP) ■ Best Available Technology (BAT) ■ Collaboration ■ Competent Professional ■ Conceptual Site Model (CSM) ■ Consultation ■ Critical Control ■ Existing Mine ■ Facility ■ Heap Leach ■ Host Country Law ■ Independent Review ■ Metals Leaching (ML) ■ Mine Closure ■ Mine Waste Facility ■ Mining Impacted Waters (MIW) ■ Mining Project ■ Mitigation ■ Mitigation Hierarchy ■ Operating Company ■ Post-Closure ■ Practicable ■ Process Water ■ Risk Control ■ Stakeholder ■ Tailings ■ Waste Rock ■ Water Balance ■

These terms appear in the text with a dashed underline. For definitions see the Glossary of Terms at the end of the document.

There are, however, existing and emerging materials, technologies, and waste management practices that aim to prevent or greatly reduce the potential for contamination from hazardous materials and mine wastes and catastrophic failures of mine waste facilities. These include implementing best practices in the handling, storage and transport and disposal of potentially hazardous materials. Also, geochemical testing can be used to determine whether mining wastes like tailings and waste rock have the potential to generate acid and/or leach metals and other contaminants, and if the potential exists, then mitigation measures can be put in place to prevent acid generation and metals leaching.

Increasingly, mining companies are also implementing stronger accountability mechanisms such as ensuring waste facility decisions are approved at the highest levels of the company; more rigorous assessments of sources of potential contamination and physical risks posed by mine waste facilities; and independent review of waste facility siting, design, construction, operation and closure plans.

OBJECTIVES/INTENT OF THIS CHAPTER

To manage wastes and materials in a manner that minimizes their short- and long-term physical and chemical risks, and protects the health and safety of communities and future land and water uses.

SCOPE OF APPLICATION

RELEVANCE: This chapter is relevant for all mines.

IRMA recognizes that some of the requirements in the IRMA Standard are emerging best practices (see Notes at the end of the chapter for more information). Consequently, during IRMA's Launch Phase (2018 into 2019) we will not expect that all requirements in this chapter will have been completely fulfilled. Companies will be expected, however, to have started to develop the processes and procedures necessary to fully meet the chapter requirements within a reasonable timeframe (e.g., 1 to 2 years). When IRMA launches its full certification program in late 2019, it is expected that the requirements in this chapter will be required to be met in order to achieve certification.

Waste and Materials Management Requirements

4.1.1. Policy and Governance

4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities.

4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum:

a. Having the policy approved by senior management and endorsed at the Director/Governance level of the company;
b. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities;
c. Having procedures and/or protocols in place to implement the policy; and
d. Allocating a sufficient budget to enable the effective implementation of the policy.

4.1.2. Safe Management of Materials Other Than Mine Wastes

4.1.2.1. The operating company shall:

a. Identify all materials, substances and wastes (other than mine wastes)[196] associated with the mining project that have the potential to cause impacts on human health, safety, the environment or communities; and
b. Document and implement procedures for the safe transport, handling, storage and disposal of those materials, substances and wastes.

[196] Mine wastes are not included in requirement 4.1.2.1, as they are the primary focus of the rest of this chapter (see criteria 4.1.1 and 4.1.3 – 4.1.6). For the purposes of this chapter, "mine waste" include tailings, waste rock, spent ore from heap leaches, wastes generated during mineral processing (e.g., residues and used processing fluids, wastes from thermal processing – including mercury wastes in Chapter 4.8). It does not include chemicals that go into mineral processing that have not been used.

4.1.3. Mine Waste Source Characterization and Impact Prediction

4.1.3.1. The operating company shall identify all existing and/or proposed mine waste facilities that have the potential to be associated with waste discharges or incidents, including catastrophic failures, that could lead to impacts on human health, safety, the environment or communities.

4.1.3.2. The operating company shall perform a detailed characterization for each mine waste facility that has associated chemical risks. Characterization shall include:[197]

a. A detailed description of the facility that includes geology, hydrogeology and hydrology, climate change projections, and all potential sources of mining impacted water (MIW);[198]
b. Source material characterization using industry best practice to determine potential for acid rock drainage (ARD) or metals leaching (ML). This shall include:
    i. Analysis of petrology, mineralogy, and mineralization;
    ii. Identification of geochemical test units;
    iii. Estimation of an appropriate number of samples for each geochemical test unit; and
    iv. Performance of comprehensive geochemical testing on all samples from each geochemical test unit.
c. A conceptual model that describes what is known about release, transport and fate of contaminants and includes all sources, pathways and receptors for each facility;[199]
d. Water balance and chemistry mass balance models for each facility;[200]
e. Identification of contaminants of concern for the facility/source materials, and the potential resources at risk from those contaminants.[201]

4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following:

a. Detailed engineering reports, including site investigations, seepage and stability analyses;
b. Independent technical review (see 4.1.6);
c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment;
d. Descriptions of facility design criteria;
e. Design report(s);
f. Short-term and long-term placement plans and schedules for tailings and waste rock or other facilities that are subject to stability concerns;
g. Master tailings placement plan (based on life of mine);

[197] See also IRMA Chapter 4.2, criteria 4.2.2

[198] Mining impacted water, also referred to as mining influenced water or MIW, includes acid rock drainage (ARD), neutral mine drainage, saline drainage, and metallurgical process waters of potential concern. A key characteristic of most of these waters is that they contain elevated metals that have leached from surrounding solids (e.g., waste rock, tailings, mine surfaces, or mineral surfaces in their pathways). This fact is commonly acknowledged by the phrase "metal leaching" (ML), frequently resulting in acronyms such as ARD/ML. Note that in Australia, the term acid and metalliferous drainage (AMD) is used as a synonym for ARD.

[199] This information will feed into the Conceptual Site Model required in IRMA Chapter 4.2, requirement 4.2.2.3.a.

[200] This information should feed into the site-wide water balance model in IRMA Chapter 4.2, requirement 4.2.2.3.b.

[201] This should be done using the results from 4.1.3.2.a-d and also hydrogeochemical/hydrogeological modeling as per IRMA Chapter 4.2, if relevant. (See Chapter 4.2, requirement 4.2.2.3.c).

h. Internal and external inspection reports and audits, including, if applicable, an annual dam safety inspection report;

i. Facility water balances (see 4.1.3.2.d); and

j. Dam breach inundation (if applicable) and waste rock dump runout analyses.

4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[202]

4.1.3.5. Use of predictive tools and models for mine waste facility characterization shall be consistent with current industry best practice, and shall be continually revised and updated over the life of the mine as site characterization data and operational monitoring data are collected.

4.1.4. Waste Facility Assessment

4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes:

a. Identification of potential chemical risks (see 4.1.3.2) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle;

b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle;

c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and

d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c).

4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices.[203] The assessment shall:

a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle, including mine closure objectives and post-closure land and water uses;

b. Identify possible alternatives for siting and managing mine wastes, avoiding a priori judgements about the alternatives;

c. Carry out a screening or "fatal flaw" analysis to eliminate alternatives that fail to meet minimum specifications;

d. Assess remaining alternatives using a rigorous, transparent decision-making tool, such as Multiple Accounts Analysis (MAA) or its equivalent, that takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative;

e. Include a sensitivity analysis to reduce potential that biases will influence the selection of final site locations and waste management practices; and

f. Be repeated, as necessary, throughout the mine life cycle (e.g., if there is a mine expansion or a lease extension that will affect mine waste management).

---

[202] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

[203] Alternatives assessment is a process to identify and objectively and rigorously assess the potential impacts and benefits (including environmental, technical and socio-economic aspects) of different options so that an informed decision can be made.

For more on alternatives assessment see: Environment Canada. 2016. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html; and Mining Association of Canada. 2017. Guide to the Management of Tailings Facilities, p. 46. http://mining.ca/sites/default/files/documents/MAC-Guide-to-the-Management-of-Tailings-Facilities-2017.pdf.

4.1.5. Mitigation of Risks and Management of Mine Waste Management Facilities

4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP).[204]

4.1.5.2. Mitigation of chemical risks related to mine waste facilities shall align with the mitigation hierarchy as follows:

a. Priority shall be given to source control measures to prevent generation of contaminants;
b. Where source control measures are not practicable or effective, migration control measures shall be implemented to prevent or minimize the movement of contaminants to where they can cause harm; and
c. If necessary, MIW shall be captured and treated to remove contaminants before water is returned to the environment or used for other purposes.

4.1.5.3. For high-consequence-rated mine waste facilities, a critical controls framework shall be developed that aligns with a generally accepted industry framework, such as, for example, the process outlined in Mining Association of Canada's Tailings Management Guide.[205]

4.1.5.4. Mine waste management strategies shall be developed in an interdisciplinary and interdepartmental manner and be informed by site-specific characteristics, modeling and other relevant information.

4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes:

a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues and process waters, including the recycling of process waters;[206]
b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices;
c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility;
d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and

---

[204] There are several reference documents that contain useful information on best available technologies (BAT) including, for example: European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf; and MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include: Australian National Committee on Large Dams (ANCOLD), which has information at: www.ancold.org.au; and the Canadian Dam Association's Dam Safety Guidelines (2007) and Application of Dam Safety Guidelines to Mining Dams (2014). Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

[205] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). Section 4.4.3. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

[206] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost.

4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to:

a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.5.5);
b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.5.3);
c. Inform updates to the risk management process (see 4.1.4.1.c) and the OMS manual (see 4.1.5.7); and
d. Inform the management review to facilitate continual improvement (see 4.1.5.8).

4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety and prevents or otherwise minimizes harm to the environment and communities.

4.1.5.8. The operating company shall implement an annual management review to facilitate continual improvement of tailings storage facilities and all other mine waste facilities where the potential exists for contamination or catastrophic failure that could impact human health, safety, the environment or communities. The review shall:

a. Align with the steps outlined in the Mining Association of Canada's Tailings Management Protocol[207] or a similar framework; and
b. Be documented, and the results reported to an accountable executive officer.

4.1.6. Independent Review of Mine Waste Management Facilities

4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[208] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[209]

4.1.6.2. Reviews shall be carried out by independent review bodies, which may be composed of a single reviewer or several individuals. At high-risk mine waste facilities a panel of three or more subject matter experts shall comprise the independent review body.

4.1.6.3. Independent reviewers shall be objective, third-party, competent professionals.

4.1.6.4. Independent review bodies shall report to the operation's general manager and an accountable executive officer of the operating company or its corporate owner.

4.1.6.5. The operating company shall develop and implement an action plan in response to commentary, advice or recommendations from an independent review, document a rationale for any advice or recommendations that will not be implemented, and track progress of the plan's implementation. All of this information shall be made available to IRMA auditors.[210]

---

[207] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

[208] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that could result in impacts on human health, safety, the environment, or the livelihoods of communities

[209] Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

[210] Non-disclosure agreements will be signed by IRMA auditors, but even so, confidential business information may be withheld as long as the company provides to auditors a description of the confidential information or materials that are being withheld and an explanation of the reasons

4.1.7. Stakeholder Engagement in Mine Waste Management

4.1.7.1. Stakeholders shall be consulted during the screening and assessment of mine waste facility siting and management alternatives (see 4.1.4.2), and prior to the finalization of the design of the facilities.

4.1.7.2. Emergency preparedness and response plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and prepared in consultation with potentially affected communities and workers and/or workers' representatives, and in collaboration with first responders and relevant government agencies.[211]

4.1.7.3. Emergency and evacuation drills (desktop and live) related to catastrophic failure of mine waste facilities shall be held on a regular basis.[212]

4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies.

4.1.8. Additional Considerations

4.1.8.1. At the present time, mine sites using riverine, submarine and lake disposal of mine waste materials will not be certified by IRMA.

NOTES

This chapter aims to align with requirements in the Mining Association of Canada's (MAC) 2017 Tailings Management Protocol and Guide to the Management of Tailings Facilities (Tailings Guide).[213] The IRMA Standard, however, applies the MAC protocol and guidance to mine waste facilities other than tailings storage facilities, as other large mine waste facilities such as waste rock or heap leach facilities (which are used to process/extract metals from ores, but also end up as long-term waste sites) need to be similarly managed to protect human health, safety, the environment and communities in the short- and long-term.

The MAC Tailings Management Protocol is one of the most recent standards being applied for tailings management at the global level. It was updated based on recommendations from external independent experts and an internal working group following a 2014 tailings dam failure at a Canadian mine. The changes in the new 2017 MAC Tailings Management Protocol and Tailing Guide have been viewed by leading experts and MAC companies as an important step in preventing future tailings disasters and adverse effects on the environment, human health and safety.[214]

The 2017 version of the MAC Tailings Management Protocol does not take effect for MAC members until 2019. IRMA recognizes that the MAC Tailings Protocol, and therefore some of the requirements in the IRMA Standard, are new. Consequently, during IRMA's Launch Phase (2018 into 2019) we will not expect that all requirements will have been completely fulfilled. Companies will be expected, however, to have started to develop the processes and procedures necessary to fully meet the chapter requirements within a reasonable timeframe. When IRMA Launches

for classifying the information as confidential; and if a part of a document is confidential, only that confidential part shall be redacted, allowing for the release of non-confidential information. (See IRMA Chapter 1.1, requirement 1.1.6.4)

[211] See also IRMA Chapter 2.5—Emergency Preparedness and Response for related requirements.

[212] Ibid.

[213] Mining Association of Canada. 2017. Toward Sustainable Mining (TSM) Tailings Management Protocol. http://mining.ca/towards-sustainable-mining/protocols-frameworks/tailings-management-protocol; and Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). http://mining.ca/documents/guide-management-tailings-facilities-third-edition

[214] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). pp. iii - v. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

it full certification program later in 2019, all requirements in the chapter will need to be met in order to achieve certification (though at that point some requirements may have been revised based on Launch Phase learning).

IRMA's leadership believes that riverine tailings disposal is not consistent with IRMA's guiding principles. IRMA participants have divergent views on the issue of waste disposal into lakes and oceans. Further work is required to determine the specific requirements under which such disposal methods could be considered, and we welcome contributions from interested parties to help advance this debate.

CROSS REFERENCES TO OTHER CHAPTERS	
CHAPTER	**ISSUES**
1.1—Legal Compliance	Some host countries may have laws relating to the management of mine wastes and other materials or substances transported and used at mine site. As per Chapter 1.1, if such host country laws exist, a company is required to abide by those laws. However, if IRMA requirements are more stringent than host country law, the company is required to also meet the IRMA requirements, as long as complying with them would not require the operating company to violate host country law.
1.2—Community and Stakeholder Engagement	4.1.7 addresses stakeholder engagement related to mine waste management. Any engagement with stakeholders must conform with requirements in Chapter 1.2. For example, 1.2.4 ensures that communications and information are in culturally appropriate formats and languages that are accessible and understandable to affected communities and stakeholders, and provided in a timely manner, and 1.2.2.2 requires dialogue and meaningful engagement that includes providing stakeholders with feedback on how stakeholder input has been taken into account.
1.4—Complaints and Grievance Mechanism and Access to Remedy	As per Chapter 1.4, the operating company is required to have an operational-level grievance mechanism available to stakeholders, including procedures for filing complaints, and having complaints recorded, investigated and resolved in a timely manner. Stakeholders who have complaints related to an operating company's waste and materials management can raise complaints through the company's operational-level grievance mechanism.
2.1—ESIA and Management	Potential impacts on the environment or communities from mine wastes and materials such as chemicals should be scoped, at least in a general manner, during the ESIA process (see 2.1.3). In 2.1.3.3, screening of potential impacts on wildlife should include those related to mine waste management and the storage, transport and disposal of potentially hazardous materials.
2.5—Emergency Preparedness and Response	The protection of communities and workers from catastrophic failures of mine waste facilities and during emergencies related to the transport and storage of hazardous materials (e.g., spills) should be addressed in Emergency Response Planning. Chapter 2.5 mandates coordination between the mine and emergency responders in potentially affected communities.
2.6—Planning and Financing Reclamation and Closure	As per Chapter 2.6, the planning of reclamation and closure of mine waste facilities shall begin early in the mine development process, include progressive remediation of waste facilities, and take into consideration post-closure land-use, long-term stability, long-term water treatment, backfilling of pits and underground workings. There must also be financial surety provided to cover the costs of reclamation and closure of mine waste facilities.
3.2—Occupational Health and Safety	Risks to workers related to mine waste management and handling of other materials (e.g., chemicals, other wastes) should be evaluated as part of the occupational health and safety risk assessment process in Chapter 3.2.
3.3—Community Health and Safety	Risks to communities from incidents/failures/accidents related to mine waste or other materials (e.g., chemicals, other wastes) should be evaluated as part of the Community Health and Safety Assessment in Chapter 3.3.

CROSS REFERENCES TO OTHER CHAPTERS	
4.2—Water Management	Mine waste management has potential implications for water management. As a result, Chapter 4.2, similar to 4.1, addresses characterization of wastes, water balance, chemical modeling and Conceptual Site Models (see 4.2.2), prevention of water contamination through management of mine wastes (see 4.2.3), and mitigation and monitoring of waters that may be contaminated by mine wastes (see 4.2.3 and 4.2.4, respectively).
4.4—Air Quality Management	Mine waste facilities may contribute to air quality emissions (e.g., particulate matter/dust). Chapter 4.2 addresses the assessment of potential emissions, and the mitigation and monitoring of actual emissions.
4.6—Biodiversity, Ecosystem Services and Protected Areas	Mine wastes and other materials (e.g., chemicals, other wastes) may pose risks to threatened or endangered species, biodiversity, ecosystem services or protected areas. These risks may be identified and evaluated during the screening, and if necessary, assessment processes in Chapter 4.6. The risks may also be identified during the Waste Facility Assessment process in Chapter 4.1 (criteria 4.1.4). Mitigation strategies may be developed as per 4.1.5, or developed as part of or integrated into the Biodiversity Management Plan (see 4.6.4). Any assessment and mitigation development processes should include input from experts and stakeholders that have expertise in biodiversity, ecosystem services or protected areas issues.
4.7—Cyanide Management	Chapter 4.7 requires that discharges to surface waters (e.g., from cyanide-bearing wastes) shall not contaminate water. If cyanide is used at the mining project, risk controls to manage cyanide must be included in the OMS plan (4.1.5.5.a), and monitoring for potential impacts on wildlife from cyanide-containing wastes take place as per 4.1.5.5.c.
4.8—Mercury Management	Chapter 4.8 contains requirements related to mercury wastes, which, if they are derived from thermal processing of ore or concentrate, are considered mine wastes. If such wastes are being considered for on-site storage (e.g., co-disposal in tailings impoundments), requirement 4.8.2.3.a requires a risk-based evaluation (this may be done as part of the risk assessment in 4.1.4.1), and allows on-site storage if the risk of long-term contamination is low. If disposal is to occur, however, the tailings storage facility must be lined as per 4.8.2.3.b. If mercury wastes are stored or disposed of on-site, relevant information should be included in the (include in OMS plan) as per 4.1.5.5.a. As per requirement 4.8.2.2, if wastes are not disposed of on site, they shall only be sold for an end use listed in Annex A (Products) or Annex B (Processes) of the Minamata Convention on Mercury or sent to a regulated repository.