



Chapter 4.4 Noise and Vibration

BACKGROUND

Mining can create significant noise and/or vibration through blasting in both open pit and underground mines; ore and waste rock truck traffic on the mine site; ore stockpiling, screening, and crushing; and truck or rail traffic bring consumables to the mine site and shipping product from the mine for final processing.

Studies have shown that there are direct links between noise and health. Problems related to noise include stress-related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity.²³¹

Many noises can be moderated or partially managed by employing mitigation measures, including berms, mufflers, sequenced blasting, planning, timing, and communications. However, effective noise control may be challenging due to a mine's typically large geographic footprint, especially when a mine is located near communities.

Studies have also demonstrated that vibrations, such as those created by blasting, can sometimes be felt in nearby communities and even cause damage to buildings or the contents of buildings, such as items on walls or shelves.²³² (This chapter does not seek to cover worker-related vibration issues, which are covered under IRMA Chapter 3.2—Occupational Health and Safety).²³³ However, vibration impacts from blasting can be mitigated, for example, by controlling charge weight diameter and charge coupling within boreholes, or controlling the direction of blast initiation.²³⁴

TERMS USED IN THIS CHAPTER

Affected Community ■ Baseline Ambient Noise Levels ■ Competent Professionals ■ Grievance ■ Grievance Mechanism ■ Ground Vibration ■ Host Country Law ■ Lin Peak/Linear Peak ■ Mining Project ■ Mining-Related Activities ■ Mitigation ■ New Mine ■ Noise Receptor ■ Operating Company ■ Peak Particle Velocity ■ Stakeholder ■ Threatened Species ■ Worker ■

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

OBJECTIVES/INTENT OF THIS CHAPTER

To preserve the health and well-being of nearby noise receptors and the amenity of properties and community values, and to protect offsite structures from vibration impacts.

²³¹ For example, see various documents on US EPA Noise Pollution Clearinghouse website: www.nonoise.org/epa.htm; Also, see various publications on World Health Organization website: www.euro.who.int/en/health-topics/environment-and-health/noise/publications

²³² See, for example: Victoria (Australia) State Government. Ground Vibration and Airblast Limits for Blasting in Mines and Quarries. <http://earthresources.vic.gov.au/earth-resources-regulation/licensing-and-approvals/minerals/guidelines-and-codes-of-practice/ground-vibration-and-airblast-limits-for-blasting-in-mines-and-quarries>; and Office of Surface Mining Reclamation and Enforcement: "Blasting Vibration." <https://www.osmre.gov/resources/blasting/docs/Citizens/KentuckyBlasting.pdf>; and "Blasting Vibrations and Their Effects on Structures." <https://www.osmre.gov/resources/blasting/docs/USBM/Bul656BlastVibrationsStructures.pdf>. The Office of Surface Mining information comes from coal-mining sources, which are not included in IRMA, but it provides an exemplary discussion of blasting vibration and its impacts.

²³³ The structural vibration issues in this chapter (4.4) relate to buildings and structures. Chapter 3.2 includes job related vibration such as caused by sitting on a vibrating seat (such as operating heavy machinery) or hand vibration while working on a vibrating machine with one's hands. See e.g. <http://www.ohsrep.org.au/hazards/vibration/effects-of-vibration>; and https://www.ccohs.ca/oshanswers/phys_agents/vibration/vibration_effects.html

²³⁴ See e.g. Controlling the Adverse Effects of Blasting. OSMRE Presentation, available at: <https://www.osmre.gov/resources/blasting/docs/WYBlasterCertModules/8AdverseEffectsBlasting.pdf>

SCOPE OF APPLICATION

RELEVANCE: This chapter is relevant for all mines applying for IRMA certification. Worker-related noise impacts are addressed in Chapter 3.2, Occupational Health and Safety.

Noise and Vibration Requirements

4.4.1. Noise and Vibration Screening

4.4.1.1. The operating company shall carry out screening to determine if there may be significant impacts on offsite human noise receptors from mining project's noise and/or vibration. Screening is required at all new mines, and also at existing mines if there is a proposed change to the mine plan that is likely to result in a new source of noise or vibration or an increase in existing noise or vibration levels.

4.4.1.2. If screening identifies potential human receptors of noise from mining-related activities, then the operating company shall document baseline ambient noise levels at both the nearest and relevant offsite noise receptors.²³⁵

4.4.2. Management and Mitigation of Impacts on Human Receptors

4.4.2.1. If screening or other credible information indicates that there are residential, institutional or educational noise receptors that could be affected by noise from mining-related activities, then the operating company shall demonstrate that mining-related noise does not exceed a maximum one-hour LAeq (dBA) of 55 dBA during the hours of 07:00 to 22:00 (i.e., day) and 45 dBA at other times (i.e., night) at the nearest offsite noise receptor. These hours may be adjusted if the operating company can justify that alternative hours are necessary and/or appropriate because of local, cultural or social norms.²³⁶

4.4.2.2. The following exceptions to 4.4.2.1 apply:

- a. If baseline ambient noise levels exceed 55 dBA (day) and/or 45 dBA (night), then noise levels shall not exceed 3 dB above baseline as measured at relevant offsite noise receptors; and/or
- b. During periods of blasting the dBA levels may be exceeded as long as the other requirements in 4.4.2.4 are met.

4.4.2.3. If screening or other credible information indicates that there are only industrial or commercial receptors that may be affected by noise from mining-related activities, then noise measured at the mine boundary or nearest industrial or commercial receptor shall not exceed 70 dBA.

4.4.2.4. If screening or other credible information indicates that noise or vibration from blasting activities may impact human noise receptors, then blasting operations at mines shall be undertaken as follows:²³⁷

²³⁵ Relevant offsite human noise receptors should include the closest receptors to the mine, but also any others that have the potential to be affected by noise or vibrations.

Topography and meteorology (e.g., prevailing wind directions, temperature inversions) should be considered, when evaluating which receptors might be relevant. (Australian Department of Industry, Innovation and Science. Leading Practice Sustainable Development Program: 3.0 Noise. <https://industry.gov.au/resource/Programs/LPSD/Airborne-contaminants-noise-and-vibration/Noise/Pages/Meteorological-effects-on-the-propagation-of-noise.aspx>)

²³⁶ The dBA noise limits in 4.2.2.1 and 4.4.2.2, are from IFC Environmental, Health and Safety General Guidelines (2007). As per IFC guidelines, the dBA decibel levels for receptors should be measured out of doors. (IFC. 2007. General Environmental, Health and Safety Guidelines. Noise Management. p. 53 (footnote 54) <https://www.ifc.org/wps/wcm/connect/06e3b50048865838b4c6f66a6515bb18/1-7%2BNoise.pdf?MOD=AJPERES>)

²³⁷ These requirements are based on the Australia and New Zealand Environment Council's "Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration." ANZEC, 1990. Available at: www.environment.nsw.gov.au/resources/noise/anzecblasting.pdf

- a. A maximum level for air blast overpressure of 115 dB (Lin Peak) shall be exceeded for no more than 5 % of blasts over a 12-month period;
- b. Blasting shall only occur during the hours of 09:00 to 17:00 on traditionally normal working days; and
- c. Ground vibration (peak particle velocity) shall neither exceed 5 mm/second on 9 out of 10 consecutive blasts, nor exceed 10 mm/second at any time.

4.4.2.5. Mines may undertake blasting outside of the time restraints in 4.4.2.4.b when the operating company can demonstrate one or more of the following:

- a. There are no nearby human noise receptors that will be impacted by blasting noise or vibration;
- b. Alternative hours are necessary and/or appropriate because of local, cultural or social norms; and/or
- c. Potentially affected human receptors have given voluntary approval for the expanded blasting hours.

4.4.2.6. If a credible, supported complaint is made to the operating company that noise or vibration is adversely impacting human noise receptors, then the operating company shall consult with affected stakeholders to develop mitigation strategies or other proposed actions to resolve the complaint. Where complaints are not resolved then other options, including noise monitoring and the implementation of additional mitigation measures, shall be considered.

4.4.2.7. All noise- and vibration-related complaints and their outcomes shall be documented.

4.4.3. Reporting

4.4.3.1. When stakeholders make a noise-related complaint, the operating company shall provide relevant noise data and information to them. Otherwise, noise data and information shall be made available to stakeholders upon request.

NOTES

This chapter focuses on the impacts of noise and vibrations on human noise receptors. Noise-related impacts on wildlife receptors should be screened in the Environmental and Social Impact Assessment process in IRMA Chapter 2.1, and if significant impacts are identified then those impacts should be mitigated as per the ESIA process (including consultations with relevant stakeholders, such as government biologists, wildlife conservation organizations, academic experts and community members whose livelihoods or sustenance may be affected by impacts on wildlife). Any related monitoring should occur as per the Environmental and Social Monitoring program.

If noise of vibration may potentially impact threatened species, those impacts should be further evaluated during the Biodiversity, Ecosystem Services and Protected Areas screening process (IRMA Chapter 4.6).

CROSS REFERENCES TO OTHER CHAPTERS	
CHAPTER	ISSUES
1.1—Legal Compliance	As per IRMA Chapter 1.1, if there are <u>host country laws</u> governing noise from mining operations, the company is required to abide by those laws. If IRMA requirements are more stringent than <u>host country law</u> , the company is required to also meet the IRMA requirements, as long as complying with them would not require the operating company to violate <u>host country law</u> .
1.2—Community and Stakeholder Engagement	Consultations with <u>stakeholders</u> related to the development of noise <u>mitigation</u> plans shall conform to the <u>stakeholder engagement</u> requirements in Chapter 1.2. Reporting shall conform with the Communications and Access to Information requirements in 1.2.4 , which require that communications and information be in culturally appropriate formats and languages that are <u>accessible</u> and understandable to <u>affected communities</u> and <u>stakeholders</u> , and provided in a timely manner.
1.4—Complaints and Grievance Mechanism and Access to Remedy	As per Chapter 1.4, the <u>operating company</u> is required to have an operational-level <u>grievance mechanism</u> available to <u>stakeholders</u> , including procedures for filing mining-related complaints, and having those complaints recorded, investigated and resolved in a timely manner. Noise impacts not anticipated in the screening process/ESIA or not adequately <u>mitigated</u> may result in complaints by <u>stakeholders</u> . These should be documented and addressed through the operational-level <u>grievance mechanism</u> (if not resolved through informal dialogue or other means).
2.1—Environmental and Social Impact Assessment and Management	Potential noise impacts, such as impacts on sensitive wildlife species and populations, should be evaluated as part of the ESIA scoping process (see requirement 2.1.3.3). Where potentially significant impacts on wildlife populations are identified, the <u>operating company</u> should develop <u>mitigation</u> strategies to reduce the impacts on wildlife, and monitoring program to determine if <u>mitigation</u> measures are being effective (as per the requirements in 2.1.7 and 2.1.8).
3.2—Occupational Health and Safety	Chapter 4.4 pertains to the impacts of mine-related noise on local communities. The impacts of harmful noise on workers are covered in Chapter 3.2.
4.6—Biodiversity, Ecosystem Services and Protected Areas	If noise or vibration may potentially impact <u>threatened or endangered species</u> , those impacts should be further evaluated during the Biodiversity, Ecosystem Services and Protected Areas screening process (see criteria 4.6.2).