



First Quantum Minerals Australia Nickel - Ravensthorpe Nickel Proposed licence amendments

| Risk ID | Activity / aspect | Potential hazards / emissions | Potential receptors | Risk pathway / causal factors | Potential adverse impact(s) | Inherent Risk | | | Proposed mitigation / management | Residual risk | | |
|---------|---|--|---|---|--|---------------|----------------------|-------------|---|---------------|-------|-----|
| | | | | | | Likelihood | Credible Consequence | Risk Rating | | | | |
| 1 | Disposal of tailings and other approved mineral wastes to TSF 1 and 2 | Dust | Mine workers and other human receptors Ambient air Vegetation surrounding TSF complex Infrastructure | Windblown dust from TSF during or after placement. | Salinity effects on vegetation or structures exposed to windblown dust; Smothering of vegetation by particulate matter; Adverse human health impacts from dust inhalation. | Possible | Minor | Medium | Dust will be managed in accordance with the existing DWER Licence L8008/2004/3 and existing Dust Management Plan requirements, including: - Operate equipment in existing disturbance areas - Dust suppression will be implemented as required (including use of water trucks, control of vehicle speeds) - Tailings surface maintained as a wet to moist condition during operation and is below the crest of embankments, reducing exposure to wind. - Minimise material movement during periods of high winds to reduce the potential for dust generation and lift off - Roads/tracks will be maintained and graded as required to minimise dust generation - Inspections of areas will be undertaken to ensure dust controls measures are being implemented and are effective. - Process residue / mineral wastes to be covered as soon as reasonably practicable after deposition, or as required by prevailing weather conditions. These management measures are expected to effectively mitigate the risk of dust emissions. | Unlikely | Minor | Low |
| 2 | Disposal of tailings and other approved mineral wastes to TSF 1 and 2 | Increase in salinity of seepage from TSF | Groundwater | Seepage of tailings pore water through TSF base or embankments | Mounding and capillary movement of groundwater results in salinisation in plant root zone surrounding TSF | Possible | Minor | Medium | Seepage from TSF1 and TSF2 will continue to be managed and monitored in accordance with the DWER Licence L8008/2004/3, including: - Conduct groundwater monitoring to monitor for changes in groundwater levels and characteristics in response to the other mineral wastes. - Conduct ongoing annual assessment of the groundwater quality against previous modelled predictions - Undertake regular inspections for seepage / salinisation - Install and operate a seepage collection system to manage potential shallow seepage water and contaminated runoff downstream of the embankment - Where groundwater monitoring indicates adverse impacts, an investigation will be conducted by a qualified specialist and additional seepage recovery or may be installed to mitigate impacts as required. WSP Static geochemical characterisation report (Attachment 8B) indicates that material wastes will not adversely impact surrounding groundwater. | Unlikely | Minor | Low |
| 3 | Disposal of mineral wastes to TSF 1 and 2 | Altered consolidation behaviour or geotechnical properties of tailings, as a result of mineral waste addition. | Shallow tailings layers | Changes in pH or salinity affect geotechnical behaviour of tailings | Modified strength, density of tailings affects rehabilitation timing | Possible | Minor | Medium | TSF 2 operational freeboard will be managed in accordance with the DWER Part V Licence L8008/2004/3, DEMIRS and ANCOLD guidelines, and existing RNO operating procedures for TSF 2. The TSF facility has been designed and will be constructed to meet appropriate geotechnical standards. In accordance with DEMIRS requirements mandatory audits (annual for TSF as it is a Category 1 facility) will be carried out. Observations made during the inspections will be recorded and appropriately reported. Defects identified during the inspections will be repaired or replaced as required. | Unlikely | Minor | Low |
| 4 | Disposal of mineral wastes to TSF 1 and 2 | Altered geochemistry of supernatant liquid: toxicity hazard | Birds | Birds accessing TSF drink or contact tailings supernatant water | Adverse health impacts on avifauna | Possible | Minor | Medium | Monitor supernatant liquid quality during tailings deposition Manage ponded area so as to minimise extent of supernatant water pond Undertake regular inspections Record fauna deaths if found during inspections Highly saline water has been shown to be a deterrent to birds for drinking - risk of ingestion is therefore considered unlikely. | Unlikely | Minor | Low |
| 5 | Vehicle movements on unsealed roads | Wheel generated dust | Fauna and Vegetation within ~100 m of roads | Dust lift off from road and vehicles | Smothering of vegetations | Possible | Minor | Medium | Dust will be managed in accordance with the existing DWER Licence L8008/2004/3 and existing Dust Management Plan requirements, including: - Operate equipment in existing disturbance areas - Dust suppression will be implemented as required (including use of water trucks, control of vehicle speeds) - Minimise material movement during periods of high winds to reduce the potential for dust generation and lift off - Roads/tracks will be maintained and graded as required to minimise dust generation - Inspections of areas will be undertaken to ensure dust controls measures are being implemented and are effective. These management measures are expected to effectively mitigate the risk of dust emissions. | Unlikely | Minor | Low |

| | | | | | | Likelihood | Credible Consequence | Risk Rating | | | | |
|--------------------------------------|--|--|---|---|---|------------|----------------------|-------------|---|----------|---------------|-----|
| 6 | Vehicle movements on unsealed roads | Noise and vibration | Mine workers; other human receptors | Noise and vibration from operation of mining equipment | Short term human nuisance impacts. | Unlikely | Insignificant | Low | Implementing Environmental Protection (Noise) Regulations 1997 and standard operating procedures are expected to effectively mitigate the risk of noise from vehicles No additional noise risks from normal mine operation are proposed due to this amendment Therefore no specific controls are proposed | Unlikely | Insignificant | Low |
| 7 | Disposal of general and putrescible waste in Halley's pit void | Odour | Mine workers; other human receptors | Odour emissions from decomposing waste | Loss of amenity | Unlikely | Insignificant | Low | Landfill will be operated in accordance with the Environmental Protection (Rural Landfill) Regulations 2002 Landfill is sited far from potential sensitive receptors for odour Regular covering of waste disposed of within landfill trenches Regular inspections of landfill area | Unlikely | Insignificant | Low |
| 8 | Disposal of general and putrescible waste in Halley's pit void | Seepage of leachate | Groundwater | Water in contact with waste exits walls or base of pit void. | Increase in groundwater BOD, nutrients or other soluble contaminants | Unlikely | Insignificant | Low | Separation from groundwater is >4m from landfill disposal trench locations Regular covering of wastes Earthen bunds around waste trenches to prevent surface water ingress to waste disposal area. | Unlikely | Insignificant | Low |
| 9 | Disposal of general and putrescible waste in Halley's pit void | Vermin attracted to landfill | Fauna / fauna habitats | Birds, rodents or other fauna enter waste storage areas | Proliferation of nuisance fauna | Possible | Minor | Medium | Regular covering of waste disposed of within landfill trenches Regular inspections of landfill area. Collection of windblown litter when detected on inspections and disposed of to landfill Regular feral animal management is undertaken | Unlikely | Minor | Low |
| 10 | Disposal of general and putrescible waste in Halley's pit void | Windblown litter | Landscape | Liftoff of packaging materials or other light weight materials stored in landfill. | Loss of visual amenity. | Possible | Minor | Medium | Regular covering of waste disposed of within landfill trenches Earthen bunds around waste trenches to prevent windblown waste Regular inspections of landfill area. Collection of windblown litter when detected on inspections and disposed of to landfill | Unlikely | Minor | Low |
| 11 | Disposal of general and putrescible waste in Halley's pit void | Differential settlement of waste | Landscape | Differential settlement of general and putrescible wastes results in uneven surface after backfilling of pit void | Ponding of surface water in local low points; | Unlikely | Minor | Low | Regular covering of waste disposed of within landfill trenches Compaction of final waste trenches with a minimum of 1m of cover material Final waste trenches rehabilitated in accordance with the approved mine closure plan | Unlikely | Minor | Low |
| 12 | Disposal of general and putrescible waste in Halley's pit void | Exposure of buried wastes after mine closure | Humans, fauna, landscape | Insufficient thickness of final cover at placement; erosion of cover layer | Visual amenity / Contamination of surrounding environment | Possible | Minor | Medium | Waste trenches have adequate separation from final external surfaces at closure to ensure no waste exposure Regular covering of waste disposed of within landfill trenches Compaction of final waste trenches with a minimum of 1m of cover material Final waste trenches rehabilitated in accordance with the approved mine closure plan | Unlikely | Minor | Low |
| 13 | Disposal of tyres, conveyors, other rubber materials in Halley's pit void | Fire / smoke hazard | Air, human receptors | Ignition of stored tyres / rubber result in smoke emissions | Short term reduction in air quality; human health impacts. | Unlikely | Minor | Low | Tyres and rubber materials are to be disposed of within dedicated trenches separate from general and putrescible waste Regular covering of tyres and rubber materials No more than 100 tyres or rubber equivalent is to be left uncovered within a landfill trench Implement Emergency Response Plan in the event of a fire | Rare | Minor | Low |
| Existing condition amendments | | | | | | | | | | | | |
| 14 | Change description of water stored in mine turkey nest dam (Condition 7, Table 3, map reference 19) from 'saline' to 'stormwater'. | Seepage or Discharge of water from impoundments if design freeboard allowance is exceeded. | Groundwater Soil surface in mine operations areas | Seepage of stored water through dam base or embankments. | Groundwater mounding | Unlikely | Minor | Low | Monitor water transfers to storage and periodically reconcile with site water balance Conduct routine groundwater monitoring | Rare | Minor | Low |
| 15 | Modify freeboard requirement from stormwater storage structures (Condition 8, third bullet point) | Discharge of water from impoundments if design freeboard allowance is exceeded. | Access roads and other infrastructure in mine operations area. | Release of water via spillway and/or by overtopping of embankment | Flooding of operational areas | Possible | Insignificant | Low | Review freeboard design specifications Check that as-built structure meet design Install readily visible water level indicators and monitor freeboard Regular stormwater dam inspection and sampling program Include freeboard criteria in dam operating strategy Communicate operational requirements to project personnel | Rare | Insignificant | Low |
| 16 | Make provision for telemetric methods (or similar remote monitoring techniques) to be used in place of - daily visual monitoring of the seawater pipeline (Condition 9, Table 4) | Release of saline water to the environment | Ground surface in proximity to failed pipe section | Pipeline rupture, joint failure, deliberate or accidental mechanical impact to pipeline. | Salt contamination of soil surface; Adverse impact on vegetation health | Unlikely | Minor | Low | Prepare and communicate documented pipe integrity monitoring procedure Remote monitoring of pipelines via telemetry systems (e.g. SCADA) Set alarm system to alert operators to loss of containment Alarms / procedures to reflect/be informed by water balance between transfer stations | Rare | Minor | Low |
| 17 | Modify Condition 24 so that water suppression is only required at Shoemaker-Levy primary crusher when crusher is operating | Dust from ore handling and crushing | Ambient air Mine operations personnel and visitors, Fauna and Vegetation within ~100 m | Crushing generates airborne dust | Increase in suspended or deposited dust Adverse impact on surrounding vegetation or human health | Possible | Minor | Medium | Implement dust suppression systems during crushing operations only or if required by prevailing wind conditions Ensure water truck is available when crusher operations are planned and in progress to manage dust emissions Include requirement for dust suppression in crusher operating instruction and communicate procedure to relevant project personnel. | Rare | Minor | Low |