



Otjozondu Mining

The Namibian Manganese Company

Submitted to: **Otjozondu Namibia (Pty) Ltd**

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# REPORT:

## OTJIOZONDU MINE ENVIRONMENTAL COMPLIANCE AUDIT

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# 1 INTRODUCTION

## 1.1 BACKGROUND

The Otjiozondou Manganese Project is a brownfield's manganese production area, known as the Otjiozondou Manganese Field. The Project is owned by Otjiozondou Mining (Pty) Ltd (Otjiozondou). Mining at Otjiozondou has taken place intermittently since the 1950s and continues today. The project is located approximately 220km north-east of Windhoek, Namibia and near the villages of Otjiozondou and Hochfeld, midway between Otjiozondou and Okondjatu on the M112 secondary road.

An approved Environmental Management Plan (EMP) is in place for the mine and Environmental Compliance Consultancy (ECC) was engaged to conduct an environmental compliance audit on the mining operations, focussing on legal compliance to the Namibian legislation, and the mine's on-site environmental performance.

## 1.2 PURPOSE OF THIS REPORT

This report lists the findings of the site audit conducted at Otjiozondou mine on 12 May 2023. It is regarded as the first step of a gap analysis for Otjiozondou in assessing environmental performance of its operations. All gaps identified in these findings will be addressed to ensure compliance with the Namibian legislation and international best practices. For each non-conformance identified there are recommended corrective action plans for implementation, and monitoring procedures will also be highlighted to ensure future compliance.

## 1.3 SCOPE OF THE AUDIT

The scope for the site audit was limited to the operational area of the mine as currently owned by Otjiozondou Mining (Pty) Ltd. This included the following areas:

- Domain 1 Surface roads and infrastructure
- Domain 2 Open pit and mining area
- Domain 3 Waste rock dumps
- Domain 4 Processing plant
- Domain 5 Tailings storage facility
- Domain 6 Bioremediation sites
- Domain 7 Workshops
- Domain 8 Non-mineralized waste
- Domain 9 Storm water management and pollution control dam

## 1.4 ENVIRONMENTAL COMPLIANCE CONSULTANCY

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## 1.5 ENVIRONMENTAL COMPLIANCE AUDIT

A site audit was conducted at Otjiozondou to verify the on-site compliance with various pieces of Namibian environmental legislation and international environmental best practices. The evidence viewed and collected on site is compiled into a list of findings in Tables 1 – 12. The table lists findings in each area of operation and suggested actions from the auditors on how to correct these activities to comply.

1.6 DOMAIN 1 – SURFACE ROADS AND INFRASTRUCTURE

Table 1 summarises the findings of the compliance audit for the Surface and roads infrastructure. There is a main road D2317, a haul road connecting the processing plant and the main pit area as well as several other access tracks on and around the mine.

**Table 1 - A list of findings for the surface road and infrastructure**



Findings	Visual evidence	Recommended actions
<p>Vehicular restrictions are not sensitised to road users, as there are no sufficient road signs withing the access and haul roads.</p> <p>Reverse parking is not enforced within the mine, however given the nature of mine operations, reverse parking is a basic mine safety practice the requires enforcement.</p>		<p>Traffic safety signs should be installed and be visible to all road users. These should cover speed restrictions, warning on heavy vehicles using the road, stop signs as well as parking area demarcation within the pit area.</p> <p>Reverse parking signages should be installed within the plant area and at visitors parking.</p>




1.7 DOMAIN 2 – OPEN-PIT AND MINING AREA


Table 2 summarises the findings of the compliance audit for the open pit and mining area.

**Table 2 - A list of findings for the open pit and mining area**

Findings	Visual evidence	Recommended actions
<p>The pit and mining area access road does not have enough traffic signage as well as warning signs on the nature of the mining pit one is entering into.</p>		<p>A traffic management system for the pit and mining area should be developed with enough planning for all areas that requires traffic signage.</p>
<p>At the Pit and mining safety area no induction is conducted to visitors on arrival; regarding their health and safety is not guaranteed.</p>		<p>There is need to ensure that all new employees and visitors to the mining site should undergo a rigorous HSE sensitisation session.</p>
<p>It is observed that the rocks from the pit walls are not stable which causes a safety concern for the people entering the pit area.</p>		<p>It is suggested that a concurrent mining plan has to be revised in order to have safety once one is entering the pit.</p>

Findings	Visual evidence	Recommended actions
<p>Oil leakages from heavy equipment and machinery can be observed around the pit and mining area. The machinery has no drip trays to collect waste oil.</p>		<p>The pit and mine area does not have a workshop area; hence plant, equipment and vehicle repairs and servicing should be conducted at a designated workshop area.</p> <p>All idle equipment should have oil collection trays, to ensure that there are is no localised ground contamination.</p>
<p>There are no shower and toilet facilities designated for the pit and mine area.</p>		<p>Designated ablution facilities should be commissioned at the pit area.</p>
<p>There is no firefighting equipment for fire suppression within the pit area, as there is a risk of firebreak but there are no fire suppression alternatives in place.</p>		<p>There should be firefighting equipment installed at the pit area, including a fire hydrant located in proximity to the pit and vehicle parking area.</p>
<p>There is inadequate fallout dust collection and monitoring system in place, to</p>		<p>Two dust collection buckets in close proximity to the mining pit are potentially affected by road</p>





Findings	Visual evidence	Recommended actions
monitor pit and mining dust.		generated dust. Hence there is need to site dust collection buckets downwind.
There is no defined waste management system in place within the domain as general housekeeping is not being done with plastics lying around.		The waste management SOP needs to be set up and more waste drums should be placed around the mining and pit area
Emergency assembly, medical aid box and emergency exit map are not clearly marked.		A pit area should have a clearly marked emergency assembly point, and an information board at the assembly point clearly showing emergency escape routes. These should be implemented on site.

1.8 DOMAIN 3 – WASTE ROCK AND NON-MINERALISED WASTE

Table 3 summarises the findings of the compliance audit for the waste rock dumps.



**Table 3 - A list of findings from the waste rock dumps.**

Findings	Visual evidence	Recommended actions
<p>Waste rock dump inspection is not being conducted frequently, where the mixing of waste rock and topsoil material is taking place.</p>		<p>Topsoil conservation should be strictly enforced, and so this may be used for rehabilitation purposes.</p>
<p>Waste rock stockpiles are encroaching into the vegetated area.</p>		<p>A land clearing permit should be obtained for the whole area anticipated to be covered by the waste rock dump.</p>
<p>There are no defined heavy vehicles and machinery access roads for the bulldozing and levelling of waste rock areas.</p>		<p>Access roads should not be randomly constructed, but rather planned in advance.</p>

1.9 DOMAIN 4 – PROCESSING PLANT

Table 4 summarises the findings of the compliance audit for the processing plant.


**Table 4 - A list of findings for the processing plant.**

Findings	Visual evidence	Recommended actions
<p>The generator powering the processing plant area is still not bunded adequately. Hydrocarbon spills from the generator have been noted, and contaminated soil and water remediation have not been employed.</p>		<p>A bunded generator facility needs to be installed</p>
<p>There is inadequate firefighting equipment on the processing plant, and some fire extinguishers is still not serviced.</p>		<p>A fire safety company should be appointed to service existing fire extinguishers.</p>
<p>Crushing and screening dust fall out is currently not being monitored.</p>		<p>There are dust collection buckets, however they not being actively monitored. A dust collection and analysis schedule every month should be implemented.</p>

1.10 DOMAIN 5 – SOLID WASTE STORAGE AND DISPOSAL

Table 5 summarises the findings of the compliance audit for the solid waste disposal site.

**Table 5 - A list of findings for the waste disposal site**

Findings	Visual evidence	Recommended actions
<p>The solid waste disposal site is not well managed and there are no adequate waste collection and separation mechanisms in place.</p>		<p>A solid waste management plan has to be developed in order to have waste separation mechanisms in place.</p>

1.11 DOMAIN 6 – TAILINGS STORAGE FACILITY

Table 6 summarises the findings of the compliance audit for the tailings storage facility.

**Table 6 - A list of findings for the tailings storage facility**

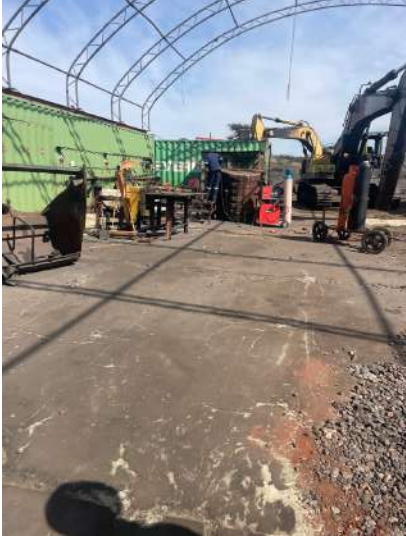

Findings	Visual evidence	Recommended actions
<p>No dust suppression on the tips. No dust monitoring data was available to know if it is needed.</p>		<p>It is suggested that the dust monitoring procedures should be updated to ensure that the monitoring complies with Namibian and international standards. Data from this monitoring should guide further dust suppression interventions.</p>



1.12 DOMAIN 7 – WORKSHOPS

Table 7 summarises the findings of the compliance audit for the workshops.

**Table 7 – A list of findings for the workshops**

Findings	Visual evidence	Recommended actions
<p>The concrete slab is old and extremely cracked, such that it needs to be replaced as soon as possible. In addition, there is still possibility of prolonged soil contamination on the workshop area and contamination extend should be conducted on the soil profile.</p>		<p>Soil profile contamination extend should be conducted on the area around the workshop area. A new concrete slab should be installed on the workshop area.</p>
<p>There is no oil and wastewater collection and separation mechanism installed on the workshop area</p>		<p>It is recommended that an oil separator should be installed.</p>
<p>The fuel storage facility is self-bunded, but the dispensation area also requires a concrete slab installed on this area.</p>		<p>It is suggested that a concrete slab should be cast on the fuel dispensation area to impede oil contamination.</p>



1.13 DOMAIN 6 – BIOREMEDIATION SITES

Table 8 summarises the findings of the compliance audit for the bioremediation site.

**Table 8 – A list of findings for the bioremediation site**

Findings	Visual evidence	Recommended actions
There is no bioremediation site at Otjiozondou mine.		

1.14 DOMAIN 9 – STORMWATER MANAGEMENT AND POLLUTION CONTROL DAM

Table 9 summarises the findings of the compliance audit for the storm water management and pollution control dam.


**Table 9 – A list of findings for the stormwater management and pollution control dam**

Findings	Visual evidence	Recommended actions
The SWMPCD is currently out of use.		

1.15 DOMAIN10 – OFFICE COMPLEX AND EMPLOYEE ACCOMMODATION

Table 10 summarises the findings of the compliance audit for the OCEA.

**Table 10 - A list of findings for the OCEA**


Findings	Visual evidence	Recommended actions
<p>There is general good housekeeping within the office and administration areas. The toilets are cleaned and in good working order. Firefighting equipment is insufficient in this area, and some fire extinguisher designated areas do not have any extinguishers installed.</p>		<p>Old firefighting equipment should be replaced and strategic areas for fire hydrants should also be identified.</p>
<p>Emergency assembly and map is still not visible to all visitors.</p>		<p>An emergency escape map should be drafted and installed on strategic areas within the mining facility.</p>
<p>There is insufficient waste collection system on the employee accommodation area.</p>		<p>Waste separation should be conducted, and adequate waste bins should be provided for, within the office area and employees accommodation facilities.</p>
<p>Employees from the old housing, must walk over 200 m to access shower and toilets, it is advisable that a closer toilet and</p>		<p>Adequate sanitation facilities should be provided for the employees' accommodation facilities.</p>


Findings	Visual evidence	Recommended actions
bathroom facility be installed in proximity		

### 1.16 GENERAL

Table 11 summarises the findings in general related to the Otjiozondou mine.

**Table 11 - Lists the findings of the general area.**

Findings	Visual evidence	Recommended actions
Stormwater management on the processing plant needs to be implemented and installed, with adequate control and designs		A stormwater management plan should be commissioned on the processing plant area as it is required.
A solid waste separation, storage, management and disposal plan should be implemented.		A review of all environmental related SOPs should be conducted, including the solid waste management SOP.
The workshop area will need to have a separate wash bay area and a repair area. All these areas should be bunded and spill controlled by an oil separator system. Old machines and equipment need to be removed from the workshop area and kept in a well bunded area or removed from site.		<ul style="list-style-type: none"> <li>- An upgrade of the workshop area will have to be conducted and the wash-bay and service bay should be separated.</li> <li>- An oil interceptor system should be installed to manage all waste oil before it is disposed of into the environment.</li> </ul>
Oil and fuel contamination around		The soil around the workshop area and

Findings	Visual evidence	Recommended actions
<p>the processing plant, waste disposal site and workshop area warrant for a full investigation on oil contamination on the soil profile and a remediation action suggested before upgrading/remodelling the existing workshop area.</p>		<p>below the cracked so a slab should be sampled and analysed, so that a decision for remediation can be made, before the workshop area upgrade is conducted.</p>
<p>There are no sanitation facilities (clean water, bathroom and toilet) in the pit area.</p>		<p>It is suggested that facilities should be provided for in the mining area.</p>
<p>Oil spills in the pit area are an indication of equipment repairs at undesignated areas and that equipment and vehicles could be operating whilst having leakages. This can contaminate the soil and water resources.</p>		<p>Heavy equipment, machinery and vehicles should be provided for with drip trays to minimised groundwater contamination.</p>

## 2 CONCLUSION

The site wide audit conducted at Otjiozondou mine and a number positive and negative findings were identified. It should be noted that only a sample of the total area could be visited and checked, and that areas of non-conformance might have been missed due to the sampling effect. It is up to the mine to ensure that all relevant areas are further inspected to check for non-compliance highlighted in this report.

The most critical findings were:

- Oil and fuel contamination from the workshop area, waste disposal site and the processing plant generator.
- Solid waste storage and disposal is in a poor state and needs to be rectified through a clean-up and implementation of the solid waste management SOP.
- Firefighting equipment is inadequate in all domains.
- Access control for wild and domesticated animals need to be implemented, as there are no current controls in place.
- Groundwater and surface water monitoring is not currently being conducted, meaning there is no track record of potential contamination.
- No dust monitoring results were available for the facility.
- Inadequate knowledge on HSSE issues amongst employees would need to be addressed through rigorous training and induction.



## **APPENDIX A – ENVIRONMENTAL MANAGEMENT PLAN**

## **APPENDIX B – ENVIRONMENTAL CLEARANCE CERTIFICATE**