
Sustainability at Manganese Metal Company (MMC)

1. Corporate Sustainability

Manganese Metal Company (MMC) is committed to carrying out its operations through the promotion of economically, socially and environmentally sustainable development. MMC strives to embed sustainability into all aspects of the business while fulfilling its obligation of being a good corporate citizen as it is imperative to maintain the social and legal licences to operate.

MMC takes great pride that while striving to produce the best quality manganese to its customers; it operates well within the sustainable development parameters with focus placed on the following though not limited to;

- Technological – adopting environmentally friendly technologies while enhancing production and keeping up with the latest technologies to meet the requirements of the customers.
- Ecological - where the environment is likely to be impacted, advanced technologies are adopted as weapons to protect the environment and conserve the natural resources such that the ecological processes, biological diversity and life-support systems of the environment are maintained.
- Economical - while maintaining productivity and profitability, the environment and the natural resources are not compromised but rather enhanced such that social upliftment and community empowerment is realised locally and globally.

MMC being the only Electrolytic Manganese facility in South Africa and located in Mbombela, Mpumalanga Province; it produces 30,000tons per annum of Electrolytic Manganese through a [selenium free process](#).

Adding selenium to the electrolytic manganese manufacturing process, improves the efficiency with which electricity is utilized to convert manganese in solution to manganese metal. However, selenium is one of the 12 most hazardous substances as defined by the Environmental Protection Agency - Toxicity Characteristic Leaching Procedure (EPA-TCLP) test. There are also additional costs associated with the treatment and disposal facilities necessary to comply with the environmental regulations associated with selenium. Thus MMC decided to not use the selenium technology as the short term cost benefit is far outweighed by the risk of poisoning humans and the natural ecosystems.

2. Environmental Sustainability

The environmental impact of this hazardous residue disposal is much less when using high-grade manganese ore as the starting material for electrolytic manganese metal production. The waste product is pressed into Larox Filter cake, whereby moisture content is reduced significantly before the waste is disposed. Using a 44% manganese content ore, the main waste product is approximately 17% manganese (Mn) filter cake, which still contains high levels of Fe, Si and NH₃.

The now stringent environmental laws globally, require sound technologies to ensure waste is disposed safely. This has resulted in a significant increase in the environmental cost for disposal associated with the production of manganese metal. This increase in environmental cost has closed down capacity in Japan and the USA, leaving only two producing countries in the world since 2002 and onwards i.e. China and South Africa.

2.1. MMC's Residue Management Facilities

The South African legislation has classified MMC's waste product as hazardous. MMC then made a substantial environmental investment in 2004 when a Hazardous Waste Management Facility was constructed to ensure its core business operations did not affect the environment negatively. MMC holds a valid permit to operate a Hazardous Residue Management Facility (RMF) named Kingston Vale which started operating in 2006.

2.1.1. Kingston Vale Residue Management Facility

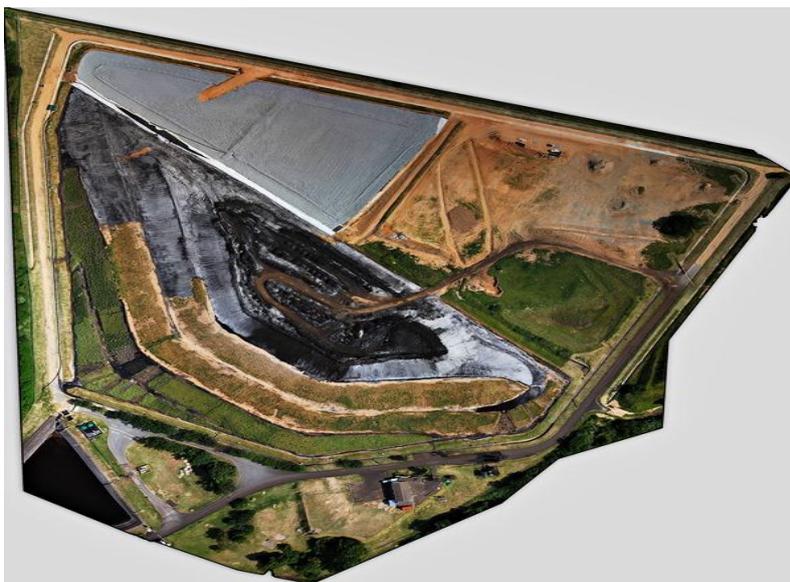


Plate.1: A view of the Kingston Vale Residue Management Facility

MMC commissioned a source-pathway-receptor study, and through a risk based approach obtained an approval from the Authorities for a custom designed facility, which was the first such state of the art facility to be constructed in South Africa. The Kingston Vale RMF has received three authorisations from the Government for the disposal of manganese residue:

- Permit number 16/2/7/X205/B26/Y2/P482 under section 20(1) of the Environment Conservation Act, 1989 (Act 73 of 1989) (ECA);
- Record of Decision in terms of section 22 of the ECA dated 10 October 2001: In terms of this authorisation, the Site has to be operated in accordance with the facility's EMP; and
- Authorisation from the Mpumalanga Development Tribunal in terms of the Development Facilitation Act (Act 67 of 1993), as amended in May 2006: This authorisation allows for the disposal of manganese residue generated in the Mbombela area.

2.1.2. Pappas Quarry (PQ) Residue Management Facility

MMC operated the PQ landfill facility since early 1980's to 2005. The site is currently under care and maintenance with a temporary capping system in place. The Waste Management License for Pappas Quarry was received from the Department of Water Affairs. The Waste Management Licence stipulates the procedure that will be followed for the closure of this historic Residue Management Facility.



Plate. 2: A view of the Pappas Quarry Residue Management Facility

2.2. Integrated Waste and Water Management Plan

MMC developed an Integrated Water and Waste Management Plan (IWWMP) for the MMC plant operations, the Pappas Quarry and Kingston Vale waste sites in Mbombela. The IWWMP is a plan to improve water and waste management. The plan and related work is focussed on the waste water management of the MMC site. The continuous development of the IWWMP is prompted by constant improvement and company sustainability as well as the ISO 14001 requirements.

The IWWMP strategy objectives focus on process and waste water processes which include the closing of process water circuits and improving the recycling and reuse of individual circuits; the investigation and implementation of water pinching measures in ongoing to aid with the closing of process water circuits and improving the recycling and reuse of individual circuits, to reduce process water usage in general. Water management includes water reuse by means of filtering and water recycling by means of treatment and water pinching.

All waste produced at MMC is listed. Complete records are filed according to the amount of waste discharged and the final location of disposal. The cradle to grave management principle is applied at MMC, to ensure that the waste is discarded in a responsible manner.

2.3. Water Treatment Works

MMC operates an Effluent Treatment Plant (ETP) as well as a Mechanical Vapour Recompression (MVR) plant in an effort to treat the liquid effluents from the MMC operations and leachate from its two RMFs.

MMC operations produce effluent containing manganese and ammonium sulphates. The South African discharge standard for manganese is 0.1 mg/l, and for ammonia (as N) 6 mg/l. To comply with the manganese and ammonia discharge standards, MMC partially treats its effluent and contaminated storm water, as well as the leachate emanating from its waste facility Kingston Vale, to a level which is acceptable to be discharged into the sewer. MMC is currently investigation a reverse osmosis technology which aims to precipitate Mn and remove Calcium and magnesium from the waste water/leachate as a treatment step with the aim of re-using the product for other MMC processes.

2.4. Environmental Monitoring

MMC adheres to a strict monitoring protocol where surface and ground water samples are taken monthly. Other environmental monitoring includes undertrains



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samples and leakage detection, biomonitoring which includes soil, vegetation and river health assessments. Air quality is also monitored and stakeholder engagement meetings are held quarterly with neighbouring communities in the vicinity of the two RMFs. External audits are also conducted by external consultants while internal audits/ inspections are done monthly through the compliance department at MMC.