Benmarc Environmental (Pty) Ltd
Dust Management Experts
101 Vlamboom Street, Kathu
Northern Cape, 8446
+27 11 679 3051
info@benmarc.co.za
BBBEE Level 2 Certified
Mining Charter Compliant

STUDY ON THE REDUCTION OF WATER USED FOR MATERIAL HANDLING DUST SUPPRESSION

Introduction

Benmarc has been actively providing wet dust mitigation solutions to the South African Mining Industry since 1997. The objective provides acceptable emission levels while minimizing the amount of water required. The available water fit for human consumption in the Northern Cape has declined systematically over the years. The region's full revolving capacity is 146,300,000m3, whereas in 2018 the actual revolving level was measured at 81,000,000m3.

To this end Benmarc, through their Research and Development Department, has developed chemical and chemical technology. A key consideration is the improvement of the dust suppression chemicals to increase the ability of water to spread over dry surfaces. This then reduces the amount of water needed to suppress the forming of airborne dust particles during mining operations.

Objective

In line with the worldwide concern regarding the availability of water, the ultimate objective was to reduce the amount of water needed for effective dust control on material handling systems without increasing the amount of chemical addition and maintaining biodegradability and environmental sustainability.

Approach

Benmarc embarked on a mission to research and develop a more effective chemical that would require less water to effectively suppress dust. Once the chemical could be produced on large scale, testing on real world situations would follow. In addition to researching a cost-effective chemical, Benmarc Engineering Department also focused on the state-of-the-art delivery system.

Research and Development

Several companies were involved in sourcing and perfecting a chemical compound that would outperform the original BM515E and BM210E that were currently in use.

In order to short-list possible solutions, initial testing in the USA focused on the time it took for super fines to drop to the bottom of a glass filled with water/chemical mixture. This would indicate the level of the ability of the solution to wet surfaces. Following the preliminary testing, the mine provided a batch of fines for further laboratory evaluation using European and Australian standards to determine if a reduction in the "dust number" manifested itself with the application of the new chemical compound.

Where it has been proven that 7.8L of water (no chemical) is required to suppress the dust generated by one ton of ore (tested on iron ore), the original chemical has reduced the need to just over 5L/ton. Through the R&D effort a reduction to 3.7L/Ton was achieved.

Implementation

In order to test effectiveness, several spray nozzles were changed out to reduce the water addition while the chemical addition remained unchanged. At the same time, the emissions during stacking were visually observed and TSI dust monitoring conducted at material conveying impact points, over a period of two months from the start of the program.

Monitoring of Water Addition

Benmarc monitored the water and total moisture added to the material stream as part of the deliverable functions and reports submitted at the monthly review meetings conducted.

Results

Benmarc successfully reduced water consumption at the mine by 26% thus saving water and electricity costs.