EXECUTIVE SUMMARY

The Ghana Manganese Company (GMC) Limited owns and operates the Nsuta Manganese Mine located in the Tarkwa-Nsuaem Municipal Assembly (TNMA) of the Western Regional Administrative Area in the South West of Ghana. The mine has been in operation for hundred (100) years and has a total concession area of 175km^2. Its current mining activities fall within an area of 6.48km^2 whiles' historical working areas and various infrastructures such as the Nsuta Village, Mine Offices, Workshops and the Essikuma Manganese area add-up to a total land-take of 14.21km^2 at Nsuta in the Dadwen Extension of the concession.

The **Communication on Progress** (COP) Report is a report on the activities of the mine during the year 2015. The report will highlights mining operations, processing plant, fuel, energy, water management and Corporate Social Responsibility (CSR) of the Ghana Manganese Company Limited.

During the year under review inspectors from the Minerals Commission (MINCOM), Environmental Protection Agency (EPA) and Water Resources Commission (WRC) visited the mine as part of their mandatory quarterly inspections, and recommendations made were sent to management for redress. Thirty-two (32) students from University of Jos-Nigeria under the auspices of the University of Mines and Technology (UMaT) visited the mine to familiarize themselves with the mine's geology.

GMC was rated BLUE in the 2014 AKOBEN Audit by the Environmental Protection Agency (EPA) and came second in category for Best Performer in Environmental Management in the maiden edition of the Ghana Mining Industry Awards held on the 3rd December 2015.

Community Assistance projects such as crop compensation rates amendment, switch from Bursary to Scholarship awards implementation, stakeholder engagements, road maintenance works, donations, infrastructural support programmes, land encroachment prevention activities and progress made on the Pit C-North project were all undertaken during the year under review.

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Managing Director
Ghana Manganese Company Limited

1.0 INTRODUCTION

Ghana Manganese Company (GMC) Limited is located at Nsuta near Tarkwa in the Tarkwa-Nsuaem Municipal Assembly. It is the only manganese producing mine in Ghana. Nsuta town is 4km from Tarkwa, the seat of the Tarkwa-Nsuaem Municipal Assembly (TNMA).

The mining method employed is exclusively open-cast; comprising drilling, blasting, loading and hauling. Thereafter, the ore is processed (crushed and screened with no chemical addition) and stockpiled for transportation by rail and road to Takoradi Port for shipment.

The management of Ghana Manganese Company Limited, conscious that mining and its associated activities affect the environment in which it operates, therefore ensures that within its economic limits and the need to be internationally competitive, the Company's activities are carried out with due cognizance of the environment.

In 2015, GMC's mining operations was focused on Pit C, especially on central-east and the south-western sectors in compliance with the pit and waste dump designs of the Life of Mine (LOM) plan. African Mining Services (AMS) was contracted to assist with the mining activities on the mine as GMC did not have the equipment capacity to expand the pits in line with increased stripping ratios.

GMC's business outlook was heavily impacted upon by the global downturn in commodity prices over the past year's performance in operations. Commodities like oil, gold, copper, iron ore and manganese suffered in the global turmoil and softening Chinese growth environment.

During the 2nd half of 2015 we experienced continuous decline in demand for manganese ore coming from China. The emergence of new manganese mining operations in South Africa may have contributed to the global structural oversupply of manganese ore. This resulted in increased competition among manganese ore suppliers on a shrinking off-take market, resulting in a continuation of price reduction.

Obviously, since GMC is not operating in isolation it was clearly affected by these global trends. Prior to the return of our big Chinese client (TMI) in May 2015, GMC had absorbed a price reduction of 27% on FOB basis, which negatively impacted our revenue base. We experienced a rather erratic demand during the remainder of 2015 with no exports in December 2015. For the full year, GMC only exported 1.3Mt, even slightly below the 2014 FY export volume.

2.0 BRIEF DESCRIPTION OF COMPANY'S ACTIVITIES

2.1 Mining

During the year under review GMC's mining operations were focused on Pit C, especially on central-east and the south-western sectors.

Manganese Carbonate ore was the main ore body exploited during the year under review with the budgeted stripping ratio of 1: 9.43 (tonne: tonne).

2.2 Mining Operations

Total ore mined during the year under review was 1,288,624 tonnes. This represents 98.7 % of the total budgeted figure of 1,305,244 tonnes (ref. table 1 below).

Table 1: Shows Total ore mined for 2015

PIT C	Tonnage Mined
Central West North	-
Central West	1,158,859
Central East	73,270
South West	-
South East	56,495
Total	1,288,624

Table 2: Shows Total waste mined for 2015

PIT C	Tonnage Mined
Central West North	-
Central West	10,145,640
Central East	613,006
South West	1,131,941
South East	110,447
Total	12,001,034

Total waste mined during the year under review was 12,001,034 tonnes. This represents 97.5% of the total budgeted figure of 12,302,476 tonnes (ref. table 2 above), resulting in an ore to waste stripping ratio of 1: 9.31 (tonne: tonne).

During the year, African Mining Services (AMS) was also contracted to assist with the mining activities and the total material mined is represented in table 3 below. They were engaged from July to December 2015.

Table 3: Shows AMS total material mined

PIT C	Tonnage of Waste Mined
Central W. North	-
Central West	1,480,896
Central East	29,066
South West	300,795
South East	12,596
Total	1,823,353

The following new equipment were obtained from the first quarter of 2015:

- 1 x Toyota Pickup WR 1512-15
- 1 x IVECO fuel Tanker GR 673-15

Plate 1: Shows Toyota Pickup WR 1512 – 15

Plate 2: Shows Iveco Fuel Tanker GR 673 – 15

2.3 Topsoil and Subsoil Management

During the year under review, sub-soils totaling 21,111 metric tonnes were generated from development of Pit C Central West (9,115), Central East (8,189) and South West (3,807) and stockpiled at the Hill B soft dump for future closure reclamation/rehabilitation works.

To control erosion of the stockpile, calopogonium seeds (leguminous cover crop) were broadcasted on its slopes. Regular inspections at the mine face were conducted to ensure that benches, berms and waste dump parameters complied with the Minerals and Mining (Health, Safety And Technical) Regulations, 2012 (LI 2182) and EPA Akoben Criteria during the year under review. Plates 3 and 4 below show topsoil and sub-soil management on the mine.

Plates 3 and 4: Show topsoil and subsoil management on the mine

2.4 Explorations Activities at GMC for the Year 2015

Ghana Manganese Company Limited (GMC) takes responsibility for the planning and execution of infill and exploration bore hole drilling programmes on the mine.

The geology section of the mining department carried out infill and exploration borehole drilling programme on the mine in 2015.

2.4.1 Exploration Sites

During the year 2015, exploration and infill borehole drilling were executed in Pit C Central East.

2.4.2 Diamond Drilling Information

Three (3) wire-line core drill rigs were used for the infill and exploration drilling within the period (i.e. Atlas Copco wire-line core drilling rigs, model CS14; Christensen). Its purpose was to investigate the possible extension of the manganese carbonate ore zones and also bridge the gabs between ore bodies in the mine pits which were not captured in previous drilling activities. Depth to be drilled varied, depending on the extent to which the ore body began and terminated within the earth crust.

2.4.3 Breakdown of the Drilling Activities on Pit C Central East

Exploration drilling was also initiated and executed at Pit C Central East to investigate the possible extension of the manganese carbonates ore body from the mine pit towards further east under the historical soft waste dump and possible link of Manganese Carbonate ore body to that of Pit C Central West. This exercise has brought about an increase in the ore reserves previously calculated for the pit.

2.5 Development of PIT C

The LOM pit shell was extended to enable maximum extraction of the ore body. The areas which fell within the pit shell needed to be developed to open up so as to achieve the aims of the extended life of the mine. The pit was re-designed as per what standard bench heights and slope to reach the ultimate pit bottom. See Plates 5 and 6, Pit C Development in 2014 and stage of Pit C in 2015.

Plate 5: Shows Pit C Development in 2014 *Plate 6: Shows stage of Pit C in 2015*

2.5.1 Waste dump development

As part of GMC's development schedule to increase the dumping space, topsoil striping activities were carried out on the adjoining hills to the ballast (hard) waste dump. See plates 7 and 8 for waste dump developments.

Plate 7: Shows Waste Dump development *Plate 8: Shows Waste Dump development*

3.0 CARBONATE PROCESSING PLANT

During the year under review, 1,509,741 tonnes of manganese ore was crushed in the processing plants (i.e. CP and CPE). Only slight structural changes were undertaken in the plant as well as in the Takoradi Port. Total cost for structural changes in Carbonate Plant operation was $116,209.88. See figure 1, a graph of mining rate compared with crushing rate in 2015.

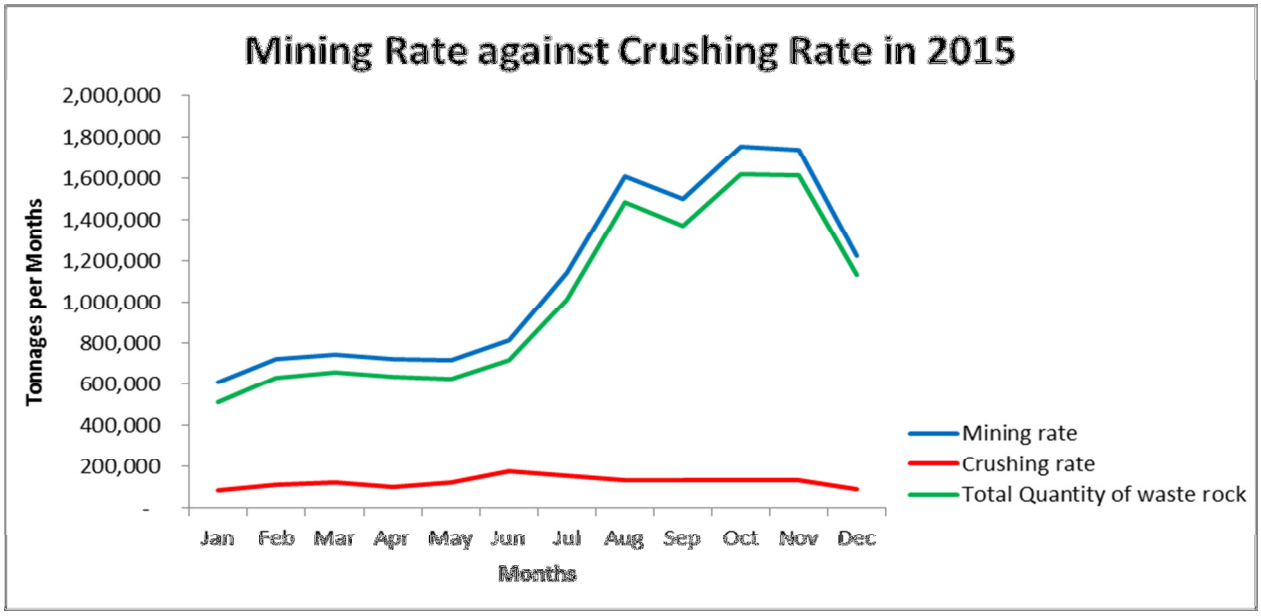

Figure 1: Shows a graph of mining rate compared with Crushing in 2015

3.1 Installation of dust suppression systems

New dust suppression systems were installed at the bottom section of the carbonate plant and the CPE respectively. Further, the old damaged steel tank structure was replced with a modern HDPE tanks which do not contribute to pump damage by iron residuals anymore. New water Poly-tanks for primary dust suppression system were also installed. Investments were made in booster pumps, High-Pressure pumps, nozzles and piping. See Plates 9 and 10 showing High-Pressure nozzles for fog making and High-Pressure booster pumps respectively.

Plate 9: Shows High-Pressure nozzles for fog making

Plate 10: Shows High-Pressure booster pumps

3.2 Air Cannons Installation

They are permanently installed on bins, silos, hoppers and used for prevention of chocks and caked materials in chutes; the operating pressure in the range of 5 – 10 bar. The compressed air

contained in the pressure vessel instantly releases, and the achieved blast, called the impact force, evacuates the material sticking to the walls.

The air releases (firing) using an automatic sequencer. The importance of these air cannons is to eliminate or reduce downtime operation on manually clearing of chokes or caked materials in chutes. See Plates 11 and 12, Air cannons delivery to store and Installed Air cannons for clearing chokes and clogging at secondary section (fines chutes).

3.2.1 Operating Principles

An air cannon or blaster is a de-clogging device composed of two (2) main elements.

- A pressure vessel (storing air pressure)
- A triggering mechanism

Plate 11: Shows Air cannons delivery to store

Plate 12: Shows Installed Air cannons for clearing chokes and clogging at secondary section (fines chutes)

4.0 MAJOR ENVIRONMENTAL PROJECTS FOR 2015

4.1 Investigation of Arsenic Level Stream

From January 2015, regular analyses of water samples, from the mine pits and surrounding streams, detected arsenic levels above World Health Organization limits which is 20ppb arsenic. High levels were particularly manifested in all the pits and were also found in the main reservoir and the confluence between the Kawere stream and the WP sump. Arsenic levels in the new tailings dam, within the Kawere upstream from Nsuta and in the Tarkwa Banso Lake were within WHO limits.

In response to the high arsenic levels, GMC selected rock samples from the three lithologies encountered in Pit C greenstone, tuff and manganese carbonate ore. All samples were taken from

cored holes and were examined and described by GMC geological staff. Visible arsenopyrite was not observed. See Plates 13 and 14, a geologist, and a geologist and an environmentalist conducting visible examination of the core rock samples respectively. Following description, the samples were sent to SGS in South Africa for multielement analysis by the ICP method.

Plates 13 and 14: Show a geologist, and a geologist and an environmentalist conducting visible examination of rock samples respectively

The presence of high arsenic was not explained by run-offs during high rainfall from waste material surrounding the mine. There was no evidence to suggest it was a product from insecticides or fertilizers used in farming. Very strong relationship between arsenic and manganese carbonate ore was a proof of a genetic relationship during precipitation of the ore. The further strong association between arsenic and tuffaceous metasediments was related to the porous and permeable nature of this lithology which formed the host for manganese ore. The highly anomalous cadmium-arsenic association reflected the geochemistry of the hydrothermal system responsible for the precipitation of manganese within the tuffaceous metasediments.

The environmental department was very mindful of the arsenic levels and carried out systematic monitoring of pits, streams and water supplies surrounding the mine; and finally, the dominant fault direction through the mine trends NNE – SSW. Water migrated along these faults thus the possibility existed for contamination of the water table NNE – SSW from the mine. After implementation of measures to stop occurrence of Arsenic in the stretch of Kawere stream, levels at all monitoring points except Main Reservoir dropped significantly.

4.2 Installation of Hydrometric Station

The Kawere River is a tributary of the Bonsa River which is one of the major sub-catchment of the Ankobra River System. The river takes its source from the hills and wetlands at Ndadeeso near Aboso and flows southwards and passes through Kwabedu, a suburb of Tarkwa. The river then flows through Nsuta into a large pond constructed by the Ghana Manganese Company Ltd.

The catchment is generally a low lying flood plain with hills along the north-western and eastern boundaries with a maximum elevation of 183 metres above mean sea level. The Kawere River has a catchment area of approximately 3.53 sqkm with a stream length of approximately 19.33 km. Ndadeeso, Aboso, Asamankakraba, Boboobo, Abontiakoon, Tarkwa, Kwabedu, Bogrekrom, Brenua-Akyenmu, Nsuta-Zongo, Nsuta, and Akyem are the main communities within the Kawere catchment.

As part of the recommendations of the Water Resources Commission, a water flow meter, water level indicator and a diver was installed on the Kawere stream to determine the volume of water passing through GMC concession annually. Results obtained from the instruments will be submitted to the Water Resources Commission (WRC) and also recorded for GMC Water Balance and the hydrological assessment.

A gauging site was selected in the stream for the purpose of measuring discharge in the stream continuously known as either stream gauging station or a hydrometric station. Stream flow is expressed in dimensions of cubic meters per second (m^3/s). A pressure transducer diver data logger system was installed for continuous recording of water levels. The system consists of a submersible diver which continuously records a column of water pressure above it at a predefined interval. Plates 15 and 16 present Staff of MacWES installing the staff gauges.

Plates 15 and 16 present Staff of MacWES installing the staff gauges

Hydrologic monitoring stations (gauging stations) were placed at locations where the river channel was stable so that the river's cross-section did not change significantly over time. Water

level readings were taken continuously, and at times on a periodic basis as often as hourly in some cases, but daily and sometimes even less often using visual inspection of a gauge plate or staff gauge, paper chart on a chart recorder or digitally with a data logger. To relate water levels to flow, a rating curve was developed to allow one to estimate discharge based on water level. In order to create the rating curve, the flow for a variety of water level conditions was calculated.

4.3 Fume-hood in Assay Laboratory

The Assay Laboratory installed a new JohnDec Fume-hood Scrubber as a replacement of the old existing fume-hood in November 2015.

The JohnDec Fume hoods are designed to provide personnel protection from toxic or volatile chemicals by continuously delivering airflow away from the user to the work area. Air is then filtered and/or treated by the building's exhaust system before exiting the facility. It consists of a cabinet, operating bench top, baffle-wall, back and top panels, safety glass window with balance weight that is movable up and down, lighting, pH monitor (that monitors the pH of solutions leaving the working area to the environment) and ducts fixed high up into the sky (that releases water vapour into the atmosphere.

During its operations a concentrated sodium hydroxide is also introduced to neutralize the acid produced during the digestion process. It was designed for occupational safety and ergonomics and for long term use. Plates 17 and 18 are pictures of the new fume-hood installed at the Assay Laboratory/Department.

Plates 17 and 18: Show pictures of the new fume-hood installed at the Assay Laboratory/Department

4.3.1 Functions

- The fume chamber clears/reduces the harmful gas produced in the analysis;
- Protects the health of laboratory personnel from inhaling toxic gases;
- Ensures high-level safety and superior operatibility;
- Protects the environment from acidic and basic wastes that would have ended up in the ecosystem;
- Improves the sanitary condition of working and operating efficiency.

4.4 Reclamation of Waste Dump

Care and maintenance works at the Pit B and Carbox Stockpile reclamation sites proceeded steadily in the year under review. In 2015, daily agronomic practices mostly slashing in the plantations, weeding around the palm trees and application of NPK (15:15:15) fertilizer were done. Pruning of dead branches to improve aeration were carried out in the plantations to promote healthy growth and high yield. See plates 19 and 20 showing current state of the palm trees and fruits harvested.

Plate 19: Shows current state of the palm trees

Plate 20: Shows palm fruits harvested

It was observed that fruit bunches became bigger at the latter part of the fruiting season, that was around July.

4.4.1 Sale of Palm Fruits from Reclaimed Sites

Palm fruits were harvested either weekly or bi-weekly from Hill B and Taysec oil palm plantations by farm-hands drawn from nearby communities and conveyed to a buyer at Nsuta.

Major harvesting spanned from January to July. For the year 2015, 4,906 bunches were sold for an amount of GH¢ 9,141.00.

4.5 Tree Seedling Nursery

At the nursery, tree species such as Acacia alata, and Roystonea regia (Royal palm) were raised in poly bags. In all 50 Royal palms and 48 Acacia alata seedlings out of the three hundred (300) nursed survived due to the drought situation being experienced.

4.5.1 Tree Planting (Trans-planting)

Twelve (12) Acacia trees were planted on GMC's concession boundary near the hatchery to serve as a demarcation to avoid encroachment.

4.6 Environmental Incidence in 2015

On 26th October, 2015 at about 8:05am the workshop was inspected as part of the daily environmental inspections. On reaching the CAT oil storage area, it was noticed that sawdust had been spread all over the entrance and behind the oil drums. See Plates 21 and 22, IBC storage tanks and dirty oil drums in front of the CAT Machine shop respectively.

Plate 21: Shows IBC storage tanks in front of CAT Machine shop

Plate 22: Shows dirty oil drums in front of CAT Machine shop

Investigations revealed that a drum containing waste oil was left opened with a funnel on it after work and heavy downpour (65mm) on that day went straight into the drum resulting in the leak of the waste oil from the drum to the drainage system. The spilled oil moved through the gutter in front of the EME/Light Duty workshop, through the culvert across the road into the oil/water separator and was contained in the oil/water separator demonstrating the efficiency of the oil/water separator. See Plates 23 and 24 showing drainage leading to the oil/water separator and scoping and cleaning the oil from the drains.

Plate 23: Shows Drain leading to the oil/water separator

Plate 24: Shows scoping and cleaning the oil from the drains

However, the Environmental and HD/EME Departments responded quickly to the incident by scoping and cleaning the oil from the drains and the oil/water separator, thus, preventing the oil to enter into the external environment. See Plates 25 and 26, cleaning works at the workshop and meeting with the maintenance workshop emplooyees respectively.

Plate 25: Shows cleaning works at the Workshop

Plate 26: Shows a meeting with the maintenance workshop employees to prevent future occurrence

The meeting that was held with the maintenance workshop workforce was chaired by Mr. Frank Lagin, the Workshop Manager, and the following recommendations were made to prevent future occurrences:

1. Full dirty oil drums should be conveyed to the oil storage shed as early as practicable; and
2. Environmental department should intensify inspections of the workshop.