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ArcelorMittal - External Environmental Performance Assessment

Audit Report

Version - Final

March 2017

ArcelorMittal South Africa Limited

GCS Project Number: - 17-0022

Client Reference: - 6019951577/2017.01.11

GDACE Reference: GAUT 002/02-03/138

RoD for Coke Oven Clean Gas and Water Project



GCS (Pty) Ltd. Reg No: 2004/000765/07 Est. 1987

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THIS SERVES AS THE FINAL REPORT FOR SUBMISSION TO THE CLIENT

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EXECUTIVE SUMMARY

Background

ArcelorMittal South Africa (ArcelorMittal) Vanderbijlpark Works was established in 1942 and commenced production in 1952. ArcelorMittal South Africa Vanderbijlpark Works (Vanderbijlpark Works) is one of the largest steel producers in South Africa. The Vanderbijlpark Works manufacture steel products by charging raw materials such as iron ore, coke and dolomite into blast furnaces to produce liquid iron. The liquid iron is refined in basic oxygen furnaces to produce liquid steel. The liquid steel is further processed into various rolled and coated steel products.

A Record of Decision (RoD) was issued to ArcelorMittal for the for the Coke Oven Clean Gas and Water Project (RoD number: GAUT 002/02-03/138) in terms of Regulations 1182 and 1183 and promulgated under Sections 21, 22, 26 and 28 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989) (ECA). The RoD was issued by the Gauteng Department of Agriculture, Conservation and Environmental (GDACE) in 2004.

The following conditions are requirements of the RoD in terms of the ECA as issued by the GDACE:

- Condition 3.4 (b): A bi-annual Environmental Performance Audit conducted by an independent, accredited auditor must be submitted to the Department for review, the first audit being due 6 (six) months after commissioning of the COG and water cleaning project, and every 6 (six) months thereafter.

GCS Water and Environment (Pty) Ltd. (GCS) was contracted by ArcelorMittal to conduct an independent Environmental Performance Assessment (EPA Audit) for the Vanderbijlpark Works. The EPA Audit was carried out against all conditions included in the RoD.

Accordingly, the following activities were undertaken as part of the EPA Audit:

- Assessment and comparison of the current site activities with those described in the approved RoD;
- Comparison of environmental mitigation measures implemented on site to those required and committed to in terms of the approved RoD in order to assess whether these comply with the management objectives committed to in the RoD;
- Assessment of monitoring requirements to current monitoring practices;
- Assessment of relevant documentation pertaining to various compliance aspects; and

- Identification of current activities and facilities at the Vanderbijlpark Works, which are not specifically included in the approved RoD.

Audit Methodology

In line with conditions of ArcelorMittal's approved RoD, the Audit focused on all the conditions included as part of the RoD to ensure that the specified conditions are executed and adhered to.

The external audit process followed, included the following steps:

- **Step 1:** Conducting the opening meeting in order to:
 - Ensure mutual understanding of the objectives, as well as scope of the audit; and
 - Discuss the relevant documentation such as the audit checklist and site layout before conducting the on-site audit activities;
- **Step 2:** Conducting the on-site audit observation, using the prepared checklists; and
- **Step 3:** Conducting the closing meeting at the end of the audit.

The findings of the Audit are included in **Table 5.1** of this Report. The audit findings also include practical recommendations whereby the various non-compliance issues can be corrected.

All findings were ranked according to the following criteria:

- Compliance
- Minor Non- compliance
- Moderate Non- compliance
- Major Non- compliance

The following colour coding was used to indicate areas of compliance, minor non-compliance, moderate non-compliance, and major non-compliance:

	- Compliant;
	- Minor non-compliance;
	- Moderate non-compliance; and
	- Major non-compliance.
	- Noted/ Not applicable
	- Repeat Condition.

Key findings

From the auditing findings, it can be concluded that ArcelorMittal is 85% compliant with their RoD. Through the on-site meetings and observations, it is clear that they are aware of all the areas of concern. The Environmental Control Officer (ECO) conducts regular and thorough inspections and ensures that non-conformances are addressed as soon as possible. As a result of the plant not being fully operational and the monetary issues concern with the project the level of compliance at this stage is commendable. It is however crucial for ArcelorMittal to commission the sulphur removal section of gas cleaning plant and ensure the required measures are implemented to continuously operate the plant. However, it is clear that this is at the top of management's action plan.

A summary of the critical and moderate findings made during the EPA are presented overleaf.

Fugitive emissions

Battery doors are inspected on a daily basis and a maintenance schedule has been created. Repairs are done continuously.

The fugitive emissions are monitored according to the internationally accepted standard and recorded. Exposure monitoring at the batteries indicates that additional fugitive emission mitigation measures are required, above that already implemented. This can however not be attributed only towards doors but rather the fugitive battery emissions as a cumulative source. ArcelorMittal has however implemented management and mitigation measures such as specialised face masks and other measures to protect employees and reduce exposure. Other measures include battery tightening and charge emission reduction projects. The effectiveness of these measures should be assessed to determine whether it is sufficient to mitigate fugitive emissions.

It is recommended that the effectiveness of these measures should continuously be assessed, prioritised and implemented to determine whether it is sufficient to mitigate fugitive emissions.

Gas flaring

The Sulphur (Claus) plant is not operational and therefore only partially cleaned gas is flared when there is no use for it in the rest of the works as an energy source. From an environmental perspective, the SO₂ emissions load is the same whether the un-cleaned gas is flared or combusted at another plant for fuel or energy source. The Claus reactor has been non-operational for more than 4 years due to equipment failure and significant repairs and replacements are required. Flaring of sulphur-rich coke oven gas is taking place on a more

regular basis than just under prescribed maintenance conditions. However, this issue has been reported on and ArcelorMittal is continuously aware that urgent intervention is needed. ArcelorMittal is working with various specialists in order to find solutions for the issues relevant to this project. ArcelorMittal also noted that these solutions are top priority for them.

It is recommended that ArcelorMittal continuously work with all stakeholders on finding working solutions. Further, open communications with the Department on any progress should continue.

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1 INTRODUCTION

ArcelorMittal South Africa (ArcelorMittal) Vanderbijlpark Works was established in 1942 and commenced production in 1952. ArcelorMittal South Africa Vanderbijlpark Works (Vanderbijlpark Works) is one of the largest steel producers in South Africa. The Vanderbijlpark Works manufacture steel products by charging raw materials such as iron ore, coke and dolomite into blast furnaces to produce liquid iron. The liquid iron is refined in basic oxygen furnaces to produce liquid steel. The liquid steel is further processed into various rolled and coated steel products.

ArcelorMittal operates five coke batteries to produce metallurgical coke for the Blast Furnaces on site. Coke is an important input material into the iron making process. During the coke making process, gas and other by-products are formed. The Coke Batteries were built between 1945 and 1985 and the gas and water cleaning technologies were considered out dated and could not deliver clean gas, which resulted in various maintenance issues and other implications. ArcelorMittal commenced with the Coke Oven Clean Gas and Water Project (COCGAW) in the early 2000s in order to install new technology that would enable them to clean the coke oven gas for re-use in the works as fuel gas and also to comply with Environmental Best Practice Standards internationally.

The project scope is technical and complex and included various improvements and changes to the existing plant as well as the installation of new infrastructure. The project aimed to improve the current controls at the batteries, improve the gas collecting mains, upgrade of the primary cooling to improve naphthalene removal, installation of a new chiller plant, installation of a distillation plant and a sulphur removal plant. The water portion included the installation of new tar decanters, a gravel filter plant and scrubbers.

The construction of the plant commenced in 2005 and commissioned in 2010 at the cost of more than R 330 million. The project faced numerous delays and challenges. In 2010 the plant ran successfully and proved significant sulphur reduction in terms of emissions. Unfortunately, the plant was shut down at the end of 2010 due to technical and mechanical difficulties. From 2011, ArcelorMittal repaired the identified fault in the process and then attempted to re-commission the facility on a few occasions. The plant has not run for more than a few days at end without interruption. Currently the gas is only partially cleaned but no sulphur removal is taking place. The major concern is that the plant is not fully operational and ArcelorMittal is not removing sulphur from the coke oven gas which leads to the release of emissions (particularly SO₂) from the facility to the environment.

A Record of Decision (RoD) was issued to ArcelorMittal for the for the Coke Oven Clean Gas and Water Project (COCGW) (RoD number: GAUT 002/02-03/138) in terms of Regulations 1182 and 1183 and promulgated under Sections 21, 22, 26 and 28 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989) (ECA). The RoD was issued by the Gauteng Department of Agriculture, Conservation and Environmental (GDACE) in 2004.

The following conditions are requirements of the RoD in terms of the ECA as issued by the GDACE:

- Condition 3.4 (b): A bi-annual Environmental Performance Audit conducted by an independent, accredited auditor must be submitted to the Department for review, the first audit being due 6 (six) months after commissioning of the COG and water cleaning project, and every 6 (six) months thereafter.

GCS Water and Environment (Pty) Ltd. (GCS) was contracted by ArcelorMittal to conduct an independent Environmental Performance Assessment (EPA) Audit for the Vanderbijlpark Works. The EPA Audit was carried out against all conditions included in the RoD. The audit assessment was undertaken by Ms. Suzaan Rossouw from GCS. Suzaan is an Environmental Legal Advisor at GCS and her key area of expertise is in the South African environmental law and development sphere. Suzaan has experience in mining and non-mining related projects and provides professional training on South African environmental legislation. Suzaan has an in-depth understanding of the International Environmental Law sphere and the legal complexities that surround compliance with legislative requirements in Africa and abroad. She is also registered with the Environmental Law Association (ELA) of South Africa (Reg. No. 2016/137/GP).

A one (1) day site visit was undertaken at the Vanderbijlpark Works site on 18 February 2017. The site visit was initiated with a project kick-off meeting during which GCS met with Mr. Terrence Wilson, ArcelorMittal's Environmental Control Officer (ECO) for this project. Following the kick-off meeting, a comprehensive review of the RoD documentation and associated checklists was undertaken. This assessment monitored compliance in terms of document control, systems and procedures. Following the checklist audit and documentation review, the remaining time was spent on site observing and inspecting the activities being conducted.

Accordingly, the following activities were undertaken as part of the EPA Audit:

- Assessment and comparison of the current site activities with those described in the approved RoD;

- Comparison of environmental mitigation measures implemented on site to those required and committed to in terms of the approved RoD in order to assess whether these comply with the management objectives committed to in the RoD;
- Assessment of monitoring requirements to current monitoring practices;
- Assessment of relevant documentation pertaining to various compliance aspects; and
- Identification of current activities and facilities at the Vanderbijlpark Works, which are not specifically included in the approved RoD.

2 AUDIT PROCESS

The following steps formed the basis of the EPA Audit.

2.1 Step 1: What is the objective of the audit?

The objectives of any audit should be clearly defined and settled before either an internal or external audit begins. The setting of objectives is important, as it is against these objectives that ArcelorMittal will be reviewed and expected to improve.

The following objectives formed the basis for the EPA Audit:

- Ensuring legal compliance in terms of the approved RoD;
- Checking that the environmental management tools to achieve compliance are used correctly and efficiently;
- To check whether the environmental management tools are effectively fulfilling their intended purpose of environmental compliance;
- Ensuring environmental performance on a continuous basis, i.e. throughout the life cycle of the Vanderbijlpark Works site;
- Reducing environmental liability;
- To facilitate the transference of information or best practice between operating units;
- To increase environmental awareness among the employees; and
- To track the environmental accountability of managers.

2.2 Step 2: Scope of the audit

The conditions of the RoD stipulate that bi-annual performance assessments need to be undertaken to ensure compliance with the prescribed conditions as contained in the said documents.

This EPA Audit is taken to mean a regular, systematic, documented verification of whether ArcelorMittal is in compliance with the conditions of the approved RoD; the provisions of the

ECA and the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which superseded the ECA; and whether environmental performance objectives and targets are being met.

2.3 Steps 3: Information required to conduct the audit

Table 2.1 sets out the procedures that were used to obtain the audit information.

Table 2.1: Process to obtain audit information

ACTION	DESCRIPTION
Inspection	Inspection consists of examining records and documents. Inspection of records and documents provides audit evidence of varying degrees of reliability depending on their nature and source and the effectiveness of internal controls over their processing.
Observation	Observation consists of on-site observation of the activities being conducted on site.
Enquiry	Enquiry consists of seeking information of knowledgeable persons inside the organisation.
Confirmation	Confirmation consists of making enquiries to corroborate information contained in the RoD.
Computation	Computation consists of checking the accuracy of source documents and the site's records or performing independent checks of information relating to environmental aspects and impacts.

2.4 Steps 4: Conducting the audit

The audit consisted of comparing the information gathered during on-site interviews, from reports as well as assessing on-site activities with the conditions of the RoD. A checklist was developed based on the RoD conditions and used as an auditing tool to establish the audit results.

2.5 Steps 5: Evaluating the audit results

The results of the audit are presented and the auditor assesses the final compliance in relation to the realistic representation of on-site activities; taking into account South African Environmental Legislation. Through such an assessment, the auditor should determine whether the final compliance is a true representation of on-site activities and a final recommendation should be made regarding actual compliance.

2.6 Step 6: Presenting the audit results

The findings of the Audit are included in Table 5.1 of this Report. The audit findings also include practical recommendations whereby the various non-compliance issues can be corrected.

All findings were ranked according to the criteria indicated in **Table 2.2**. The colour coding assigned to the rankings is used to visually indicate areas of compliance, minor non-compliance, moderate non-compliance, and major non-compliance. Furthermore, to indicate which conditions are not applicable to the on-site activities and which are repeat conditions that have already been scored. Each colour coding has a value (score) attached to it.

Table 2.2: Ranking criteria and colour coding scores.

RANKING	SCORE
Compliant	2
Minor non-compliance	1
Noted/Not Applicable	0
Repeat Condition	-
Moderate non-compliance	-1
Major non-compliance	-2

All findings were ranked according to the following criteria:

Noted/Not-Applicable:

- The specific condition is not relevant to the current on-site activities.

Repeat Condition:

- The specific condition is a repeat of a previous condition.

Compliant:

- ArcelorMittal complies with the conditions as stated in the RoD.

Non-compliance:

- **Minor Non-compliance:**
 - Isolated observations demonstrating that full compliance to the environmental requirements on site have not been, or will not be, fully achieved.
- **Moderate Non-compliance:**
 - There is a substantial failure to meet the environmental requirements for the project, there is a possibility of substantial environmental degradation and/or pollution, and/or objective evidence was observed raising doubt as to the integrity of data or records inspected.
- **Major Non-compliance:**
 - There is a critical failure against legal requirements or management response that presents an immediate or significant risk that could result in prosecution and/or adverse legal findings due to failure to meet regulatory requirements; result in immediate injury or serious injury; result in prolonged business outage; and/or could result in serious damage to the project's reputation.

It must be noted that duplicate conditions are not scored due to the fact that this will negatively influence the scoring results. Duplicate conditions are marked as a Repeat Condition.

2.7 Step 7: Decision-making based on audit results

Decision-making, based on the audit results, must have the following objectives; to improve the present situation and to institute fair and reasonable corrective action. ArcelorMittal should make decisions based on the significance of the problem or non-compliance and the resources required to improve the situation.

2.8 Step 8: Instituting corrective action

It is recommended that an environmental action plan be implemented to address the Audit recommendations. The plan may include:

- Goals;
- Strategies;
- Performance indicators;
- Responsibilities; and
- A timetable for achievement.

An EPA Audit is an effective management tool on condition that the recommendations, as identified in this Audit, are considered and implemented. The Audit provides a basis for recommending actions to correct any deficiencies and to address any areas of environmental non-compliance recorded as part of the audit findings.

3 DETAILS OF THE AUDITOR

GCS, appointed by ArcelorMittal to conduct an external EPA Audit, has more than 30 years of experience and expertise in undertaking and compiling compliance Audits.

3.1 Project Team

The EPA Audit was undertaken by the GCS team presented in **Table 3.1**.

Table 3.1: GCS Team

NAME	DESIGNATION	RESPONSIBILITY
Suzaan Rossouw <ul style="list-style-type: none"> • LLB, LLM, specialising in Environmental Law and Governance • ELA (Reg. No. 2016/137/GP) 	Enviro-Legal Advisor	<ul style="list-style-type: none"> • Overall Legal Compliance • Site visits • Liaison with Client and Project Management • Environmental Legal Assessment • Compilation of Audit Report
Renee Janse van Rensburg <ul style="list-style-type: none"> • MSc Environmental Management • Pr. Sci. Nat. Reg No: 400099/06 • ELA (Reg. No. 216/141/GP) • IAIA • SSAG 	Manager: Environmental Authorisation and Assessment Unit	<ul style="list-style-type: none"> • Overall assistance • Report review • Technical and quality control

3.2 Assumptions and Limitations

The findings, results, observations, conclusions and recommendations given in this Audit are based on the Auditor's best legal and professional knowledge as well as available information.

Although GCS exercises due care and diligence in rendering services and preparing documents, GCS accepts no liability, and the client by receiving this document, indemnifies GCS and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by GCS and by the use of the information contained in this document.

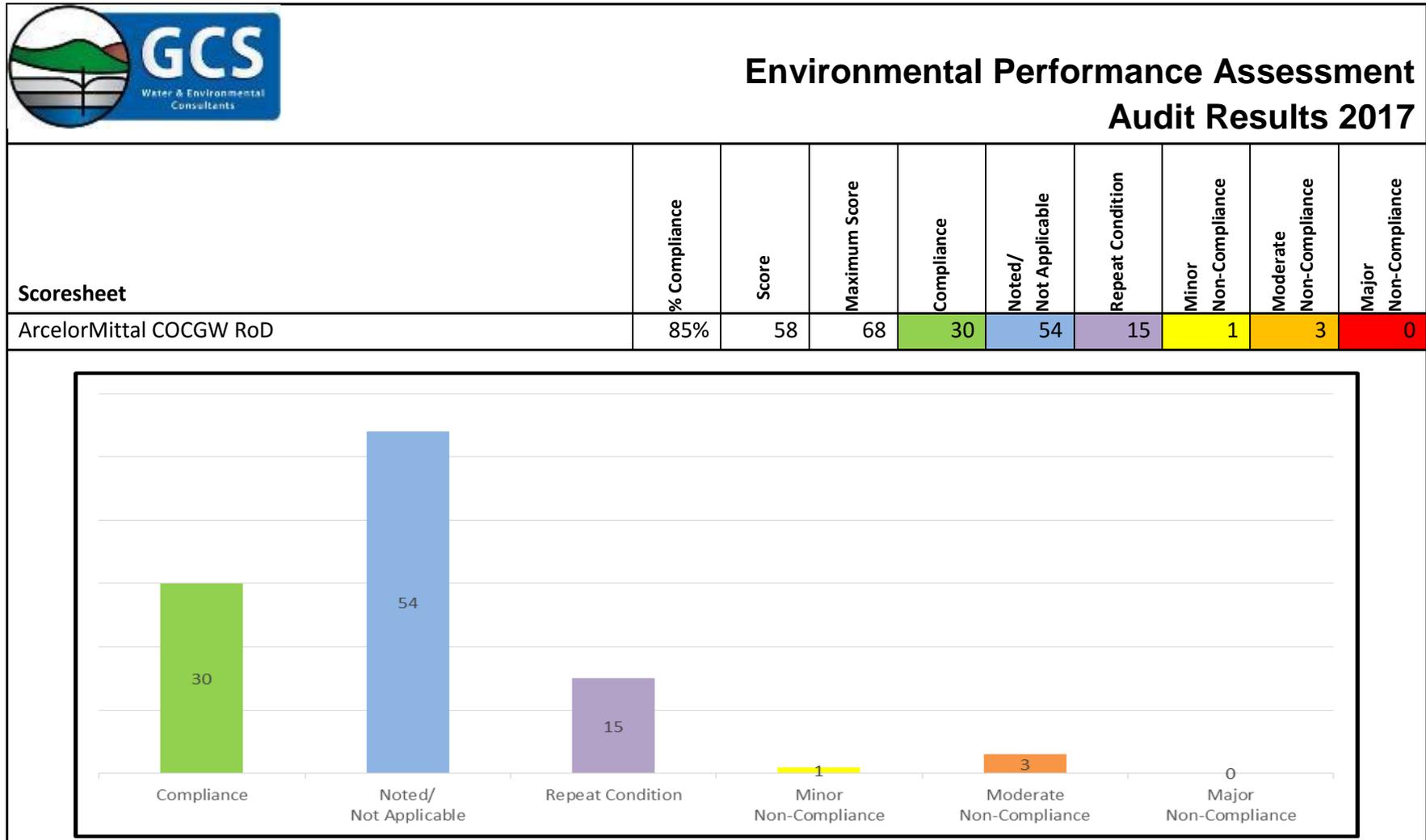
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Refer to Appendix A for the Declaration of Independence of the Auditor.

4 AUDIT SCORING RESULTS: 2017 ROD EPA AUDIT

Table 4.1 presents the percentage compliance of ArcelorMittal for the first 2017 RoD EPA Audit in tabular and graphic format.

Table 4.1: RoD EPA Audit Results 2017.



5 AUDIT FINDINGS - ECA RECORD OF DECISION

Table 5.1 overleaf represents the conditions, observations and recommendations, found in the ArcelorMittal Coke Oven Clean Gas and Water Project, February 2017 audit.

Table 5.1: Scoring Results of the EPA Audit in respect of conditions of the COCGW RoD (audit undertaken in February 2017).

No	Conditions	Status	Score	Observations	Recommendations
CONDITIONS					
1	Description and extent of the activity				
1.1	The authorisation applies in respect of the upgrading and operation of the coke oven gas (COG) and water cleaning systems at the existing coke ovens, as detailed in Sections 10-12 (p. 77-94) of the Process Review specialist study conducted by EBS cc., and in Section 4.12 (p.39-44) of the Scoping Report by SEF (Pty) Ltd. The activity falls within the ambit of sub regulations 1 c(ii), 8 and 9 of Government Notice R.1182 (as amended), promulgated under section 21 of the Act. The extent of the project is summarised as follows:	Noted/Not Applicable	0	Regarding various construction and project scope conditions, the following is observed: Various changes were made regarding the facility construction and operation, which have been approved by GDARD. On completion of the last infrastructure requirements, the water can be diverted to the BF Gas cleaning system as planned originally and therefore cleaner water used for quenching. During the previous audit it was reported that the last outstanding items to be constructed (NH ₃ Strippers) is towards improving the works water balance and does not influence the plant's operability.	No applicable recommendations.
1.2	PROJECT SCOPE				
(a)	<i>Proposed changes to coke ovens by-products plant</i> Upgrade and re-use of existing Gas Cleaning Plants, combining gas lines, and the upgrading of the coke oven gas (COG) collecting mains.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(b)	<i>Proposed changes to gas cleaning line</i> The 3 basic mechanisms of cleaning COG - condensation by cooling, separation by gravity, and absorption of components onto absorption media will remain the same.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving naphthalene removal and scrubbing conditions by reducing gas temperature.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	Conversion and installation of equipment to function as final coolers and provide chilled water.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving NH ₃ removal/absorption by upgrading existing scrubbers converting benzole scrubbers to NH ₃ scrubbers, and converting circulation to closed loop systems.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Installing two new distillation columns treatment of ammonia scrubbing water and one as de-acidifier to generate the required scrubbing media for H ₂ S removal, and treatment of NH ₃ , H ₂ S, HCN and CO ₂ vapour in the ammonia and H ₂ S plant.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Discontinuing ammonium sulphate manufacture and installation of a new plant to convert H ₂ S to elementary sulphur.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(c)	<i>Cleaning of excess process water</i>				
	The basic mechanisms of cleaning coke oven process water are separation by gravity, mechanical sludge remover, filtration and distillation. Ammonia, H ₂ S and HCN removed from water will be cracked to H ₂ , N ₂ and CO ₂ and elementary sulphur formed.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving the handling of various condensate streams by the handling of high and low tar containing streams.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving the operation of tar decanting systems, mainly through continuous discharge of crude tar together with constant water content.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving the efficiency of operation of the gravel filters, and replacing filters with a single unit of equal capacity.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	Improving H ₂ S and NH ₃ scrubbing efficiency, mainly through supporting desulphurisation with a quantity of de-acidified water, reducing ammonia content by means of stripped water, maintaining optimum scrubbing temperature, and integrating the two scrubbing systems.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Improving in H ₂ S and NH ₃ stripping efficiency by modifying existing equipment to handle flows from all gas cleaning plants by the coal water stripper for free and fixed ammonia, free ammonia stripper (NH ₃ scrubbing liquor), and de-acidifier (de-acidified water for. H ₂ S removal. Equipment will be designed to treat all excess coal water and scrubbing liquor streams.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
1.3 CONSTRUCTION/ UPGRADE/ DECOMMISSIONING ACTIVITIES					
(a)	<i>Modification of Gas Line 1</i>				
	Connection of excess coal water to primary cooler.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Modification of the tar discharge and re-collection system.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Separating scrubbing liquor from coal water stream.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(b)	<i>Primary Coolers - Gas Lines 3&4, and Gas Lines 6-9</i>				
	Gas Lines 3&4: Installation of a new primary cooler, and new chilled water station including cooling tower upgrade, improvements to the tar separation area (removal of the existing gas tar tank from line 4), and modifications to two existing primary	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	coolers, and decommissioning of old primary coolers for gas line 3.				
	Gas Lines 6-9: installation of 2 new primary coolers, followed by the modification of 3 existing coolers, and Improvements to the condensation plant.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(c)	<i>Chilled Water Station/ Cooling Water Supply Facilities</i>				
	Installation of a new chilled water station and chilled water plant.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Removal of old wash-oil tanks.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(d)	<i>Installation of a New Pre-Decanter/ Modification of Tar Decanters</i>				
	Upgrading tar separation facilities (lines 8&9), and removal of existing tar collecting tank.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Installation of a new pre-decanter, followed by the modification of tar decanters.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(e)	<i>Installation of a Gravel Filter Unit</i>				
	Re-use of two tanks as coal water tanks, and Installation of a new gravel filter.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(f)	<i>Upgrading of the Existing Ammonia Stills</i>				
	Integrating 3 of the 4 distillation columns, and modifying the existing acid storage tank into a caustic soda tank, including unloading and feeder pumps.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(g)	<i>Installation of the New Stripper/ De-acidifier System</i>				
	Installation of new distillation columns with corrosion resistant materials, and pipes and heat exchangers to tie-in the new stripping columns.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	Integration of existing tanks, and installation of one new tank for de-acidified water.				
(h)	<i>Scrubbing Facilities - Gas Lines 3&4</i>				
	Modification of 2 existing ammonia scrubbers, and installation of a new H ₂ S scrubber, including a final cooling stage.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Conversion of existing naphthalene scrubber to a final cooler together with installation of new heat exchangers.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(i)	<i>Scrubbing Facilities - Gas Lines 6-9</i>				
	Demolition of the existing and Installation of a new H ₂ S scrubber, and upgrading one existing ammonia scrubber.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
	Installation of heat exchangers and a new gas line.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(j)	<i>Elementary Sulphur Plant combined with NH₃ Cracking</i>				
	Installation of a combined plant for the production of elementary sulphur and cracking of nitrogen components.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
(k)	<i>Control System</i> The installation of a new system to control scrubbing and conversion units.	Noted/Not Applicable	0	This condition is noted. Refer to condition 1.1 for observations noted.	No applicable recommendations.
1.4	Specific Conditions				
a)	An updated project schedule with time-frames must be submitted to the Department 30 (thirty) calendar days prior to the commencement of construction activities. The schedule must clearly indicate the different phases of construction and commissioning and decommissioning (i.e. expected dates of commissioning of specific completed parts of the COG and water treatment systems) .	Compliance	2	This condition is adhered to and correspondence regarding the Project Schedule was sent to the Department on 26 November 2004.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
b)	The Department must be informed of both the start of construction and the start of commissioning at least 30 (thirty) calendar days prior to the commencement thereof.	Compliance	2	<p>This condition is adhered to and the Department was notified on 26 November 2004 of construction and on 22 January 2010 of commissioning.</p> <p>Kindly note however, that the Sulphur cleaning section of the plant has unfortunately been shut down due to mechanical and maintenance problems since December 2010. The facility has sent numerous letters to inform the department of expected start up again however the start-up was not successful. The status of Sulphur Plant is communicated to the department via the bi-annual external audit reports submitted.</p>	No applicable recommendations.
c)	A detailed Environmental Management Plan (EMP) for the implementation of the project must be submitted to the Department for approval 30 (thirty) calendar days prior to the commencement of construction activities. The EMP must specifically include, inter alia:	Compliance	2	The EMP was submitted to the Department on 3 November 2008. Further, an Operational EMP was submitted on 19 March 2012 and 23 April 2012.	No applicable recommendations.
i.	An auditable plan for monitoring all facets of the COG and water cleaning project implementation and operation, including decommissioning of all underground sumps, piping (underground and overhead), obsolete machinery, plants e.g. the benzol plant ammonium sulphate plant, tar separators etc., as well as taking of soil samples to indicate the levels of remediation required, and any remedial measures to be implemented.	Compliance	2	The decommissioning of infrastructure was addressed in the construction EMP that was approved by the department. The operational EMP contains auditable elements relating to the COCGAW project.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
ii.	A proposed surface and groundwater monitoring regime, which will be in line with the DWAF Water License. The graphically represented results of this monitoring are to be included in a bi-annual audit, which must be submitted to this Department for review to determine if the remedial measures have been successful or if further remediation is required.	Repeat Condition	-	<p>This condition is accordingly scored at condition 3.4 (xiii) below.</p> <p>Surface monitoring is being undertaken in line with the requirements of the Water Use License (WUL) issued to the Works.</p> <p>During the previous audit, it was established that no groundwater monitoring is conducted at CO-3D as the borehole is damaged. However, ArcelorMittal continued with monitoring at CO-1D as an alternative borehole. An extensive borehole repair programme has been finalised, which included the drilling of a new borehole in the vicinity of where the original CO-3D was located. This borehole will be used in future groundwater sampling runs in accordance with the WUL.</p>	No applicable recommendations.
iii.	Proposed methods of reducing spillages at the quench tower.	Compliance	2	The EMP addresses the spillages at the quench towers. ArcelorMittal reportedly installed an alarm system at all the quench towers to warn operators of high sump levels.	No applicable recommendations.
iv.	The EMP must include an air quality monitoring program based on the requirements of Condition 3.2(g).	Compliance	2	An air quality monitoring programme, which meets the requirements set out by the condition 3.2 (g), was submitted together with the EMP.	No applicable recommendations.
v.	A diagram indicating all unpaved surface areas, including bunds and storm-water channels, and any areas identified for storm-water and surface water management. Plans must be developed to ensure that all surface areas are protected from spillage	Compliance	2	This diagram was submitted together with the first bi-annual Environmental Performance Audit conducted in June 2010.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	and erosion, and that dust in the area of the coke ovens is reduced.				
vi.	A proposal to address significant pollution from cooling tower sumps.	Compliance	2	General operating procedures are covered in the EMP. Further, the whole area is bunded and sumps are placed strategically within these bunded areas. A bio-dosing program is also in place to reduce potential microbial health risks.	No applicable recommendations.
vii.	Handling procedures of sulphur and other by-products produced.	Compliance	2	Kindly note that currently no sulphur is generated due to downtime of the sulphur plant. Further, the EMP was updated to include the handling of all by-products, including coke breeze.	No applicable recommendations.
viii.	A waste management plan pertaining to any waste from the treatment process not reused or sold as by-products, including expected volumes and classification, the disposal thereof, and waste manifest system.	Compliance	2	The EMP addresses waste management, in addition ArcelorMittal also has a site wide Waste Management Procedure.	No applicable recommendations.
d)	A copy of the detailed HAZOP study to be conducted during the detail design phase of the project must be submitted to the Department 30 (thirty) calendar days before commissioning commences. The HAZOP must specifically include risks related to commissioning or decommissioning of any equipment, failure of treatment systems due to inefficient operation etc., emergencies and shutdowns, incidents such as spills, and potential discharges to the environment (air, water and land), and must propose operational and emergency procedures accordingly.	Compliance	2	A HAZOP study was completed in September 2002 and was submitted on 29 of May 2003 and again on 26 November 2004 to the Department.	No applicable recommendations.
e)	An auditable Preventative Maintenance Plan must be developed to ensure that all water systems and environmentally critical equipment such as	Compliance	2	An amendment application for the external verification of the Preventative Maintenance Plan (PMP), dated 29 July	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	exhausters, ESP's, scrubbers and strippers are maintained as required. This plan must be auditable and must conform to the original equipment manufacturer (OEM) specifications. The management of IVS are to commit to the budget to undertake the required preventative maintenance. A discussion on the implementation of and compliance with the maintenance plan must be included in the bi-annual audit reports.			<p>2009, was submitted to the Department on 7 August 2009. An amendment to this condition was received on 25 November 2009 to align the condition with OEM specifications.</p> <p>Critical maintenance requirements are continuously identified and are captured on the SAP system for tracking and action. A job card is created and managed on this internal system.</p>	
f)	Final design plans for new and upgraded containment areas (sumps, tar decanters etc.), buffer tanks and chemical storage tanks, as well as proof of the Department of Water Affairs and Forestry's (DWAF) approval thereof as applicable, must be provided 30 (thirty) calendar days prior to the commencement of construction thereof. The above design plans must include information on specific pollution prevention measures (e.g. bunding & liners), compliance with relevant SABS standards (specifically tanks), the sourcing of particular materials as required (e.g. clay for liners), time-frames for construction, and exact location on site.	Compliance	2	<p>The final design plans were submitted to the Department on 26 November 2014.</p> <p>It should however be noted that the designs were resubmitted to the Department of Water and Sanitation (DWS) and followed up by ArcelorMittal on many occasions. However, written approval has not been received to date. Minutes of meeting between the then DWS and Mittal are available in which this point was also raised.</p>	It is recommended that ArcelorMittal continues with their efforts in communicating with DWS for potential future containment infrastructure related to the project.
g)	The following air quality management, monitoring and reporting regime must be implemented and reported on in the bi-annual environmental performance audits as applicable. Note that emission sampling (as applicable) is not required for each of the seven coke oven stacks, but may be conducted on a single stack representative of the whole plant (a short motivation for using a	Compliance	2	The facility has chosen a representative stack for some sampling based on the age and performance of the battery. The worst-case performing battery was chosen from a precautionary approach for continuous or regular monitoring of dust and gas. Battery 4, 8 and 9 were chosen as the current Coke Strategy for the Works indicates that these	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	particular stack in terms of physical and gas flow characteristics, similarity to other stacks, differences between stacks etc. must however be provided). Note that conditions relevant to the coke ovens themselves are applicable to all the coke oven batteries on site (i.e. no. 1, 3, 41 6, 7, 8, 9):			3 batteries will most likely be in operation for longer opposed to the other batteries with a shorter remaining life span. The facility argued that they wish to collect data on the remaining batteries which will remain in operation in order to have a long term trend for these batteries, both approaches are reasonable.	
i.	The concentrations of the various constituents of the cleaned Coke Oven Gas must be monitored before and after combustion in the coke ovens. The results are to be graphically represented and included in the bi-annual audit report. The H ₂ S content of the gas must be between 0.8 and 1.5 g/Nm ³	Moderate non-compliance	-1	Monitoring results of the H ₂ S content in the gas indicates that the standard of 1.5 g/Nm ³ is frequently exceeded due to the sulphur plant, which removes H ₂ S from the gas, not being operational. For a further discussion on the concentrations of the cleaned Coke Oven Gas, refer to the observations under condition 1.4 (g)(vi). Also see Appendix C for the results graphically represented.	Refer to recommendations made under condition 1.4 (h) below.
ii.	The emissions from the stacks of the coke ovens must be analysed for dioxin and furan emissions within 6 months of decommissioning of the benzole plant. The results of this monitoring must be reported in the bi-annual audit.	Compliance	2	The benzole plant has been decommissioned. Results from dioxin and furan emission monitoring were previously submitted in 2006. The results confirmed that dioxins and furans are not of a concern at the Coke Battery stacks.	No applicable recommendations.
iii.	A plan for door maintenance/replacement of all the coke batteries (No.) and progress in achieving reduced fugitive emissions has to be developed. The plan must be supported by the results of personal monitors, and actual measurements at representative areas of the coke ovens.	Moderate non-compliance	-1	Battery doors are inspected on a daily basis and a maintenance schedule has been created. Repairs are done continuously. The fugitive emissions are monitored according to the internationally accepted	It is recommended that the effectiveness of these measures should continuously be assessed, prioritised and implemented to determine whether it is sufficient to mitigate fugitive emissions.

No	Conditions	Status	Score	Observations	Recommendations
				<p>standard and results kept on record.</p> <p>Exposure monitoring at the batteries indicates that additional fugitive emission mitigation measures are required, above that already implemented. This can however not be attributed only towards doors but rather the fugitive battery emissions as a cumulative source.</p> <p>ArcelorMittal has however implemented management and mitigation measures such as specialised facemasks and other measures to protect employees and reduce exposure. Other measures include battery tightening and charge emission reduction projects. The effectiveness of these measures should be assessed to determine whether it is sufficient to mitigate fugitive emissions.</p>	
iv.	The assumptions regarding improved air quality made with respect to this project must be confirmed by actual ambient air quality monitoring. The improvements achieved must be discussed in the bi-annual environmental performance audit reports. Attention must be paid to the recommendation contained in the air quality report to install additional PM10 and gaseous samplers within the zone of impact directly south of the IVS site.	Compliance	2	<p>Ambient air quality monitoring is conducted and the assumptions were assessed during the period when the plant was operational. Additional ambient PM10 and gas monitoring stations were installed as recommended.</p> <p>No comment can be made currently on the compliance, as the sulphur removal plant is not operational currently.</p>	No current recommendations. This condition is to be assessed after reinstating operation of the sulphur plant.
v.	The following monitoring must be undertaken within 6 months of the commissioning of the various treatment plants. Results must be included In the	Noted/Not Applicable	0	The relevant information was submitted and was applicable during another audit period. As such this condition is noted as	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	<p>first bi-annual environmental audit report, together with a plan for remediation should these emissions be significant.</p> <ul style="list-style-type: none"> - Monitoring for ammonia and hydrogen sulphide fumes from the tar decanters and liquid sumps and storage tanks. - Monitoring for benzene must be undertaken at the flushing liquor storage tanks. - Sampling frequency and parameters for sampling of the cooling tower water is to be determined. <p>Based on the understanding obtained from this sampling, emissions in the steam must be anticipated and sampling of steam must be undertaken to determine the impact on the environment of the present cooling process, determine if mitigation measures are required, and to develop reduction plans accordingly.</p>			<p>not applicable at this stage.</p> <p>The implementation of the Gravel Filter Plant and the caustic dosing (Ammonia Stripping) infrastructure is part of the medium to long-term plan to enable the facility to adapt its internal water balance and improve on quenching practices.</p> <p>The facility implemented the relevant water monitoring program and the data is available upon request.</p>	
vi.	<p>The composition of the approximately 15% of treated COG that would be flared, as well as the gas flare temperature, must be determined and reported on in the first bi-annual environmental audit. A discussion on the effective treatment of gas through flaring, and a plan to reduce the need for flaring the remaining 15% of COG must also be provided in the first audit.</p>	Noted/Not Applicable	0	<p>The gas quality was reported on in the first bi-annual audit report as required. As such this condition is noted as not applicable at this stage.</p> <p>It should be noted that partially cleaned gas is being flared due to the non-operational Sulphur Plant.</p> <p>Repairs to the plant have been prioritised. It was noted that it takes approximately three weeks for the plant to heat to the required temperature and leaks are only visible once the plant is operational.</p> <p>An investigation was undertaken at the end</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>of 2015 by external specialists to analyse the plant and propose a strategy to repair and re-commission the plant. Different options were provided to ArcelorMittal and they are currently investigating the feasibility thereof.</p> <p>Approval of funds for the extensive upgrade of the project is currently underway. Once funds have been allocated the sulphur plant will be refurbished and other infrastructure such as the ammonia stripper will be installed. Once funds are available, the preferred strategy will be initiated and the reparations will commence.</p> <p>Current improvement projects undertaken include the Battery tightening project initiated to close the cracks and gaps to reduce fugitive emissions. As well as the continuous ceramic welding program and clay initiatives, that aims at closing any gaps in the oven walls and doors.</p> <p>However, taking the above into account it is still clear that more than the allowed amount of flaring of sulphur-rich gas is undertaken at the plant. Kindly see Appendix C for the H₂S content in coke oven gas data.</p>	
vii.	Based on the assumptions made in the air quality report, and the results of actual isokinetic sampling and personal monitoring, a plan must be developed	Noted/Not Applicable	0	Airshed Planning Professionals was commissioned in 2011 to conduct the required assessment and develop the air	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	<p>with proposals on future emission sampling, including the frequency thereof and the constituents to be sampled for. This work must be undertaken by an external expert and a report with recommendations must be submitted with the first bi-annual audit. In order to ensure early detection of issues to be addressed and ensure the efficiency of treatment equipment, relevant air quality monitoring of COG must be undertaken after each step of commissioning a specific treatment technology.</p>			<p>quality monitoring plan for the Coke Ovens. The report was submitted as required, as such this condition is noted as not applicable at this stage.</p>	
viii.	<p>Based on emission results further emission reduction programs may have to be developed. These plans must consider international at standards and best practice, such as the US EPA's <i>Final rule to reduce toxic emissions from coke ovens</i> (February, 2003), and <i>NESHAP for Coke Ovens: Pushing, Quenching and Battery Stacks - Background information for proposed standards</i> (February 2001).</p>	Compliance	2	<p>ArcelorMittal has developed a Coke Strategy for the short, medium and long term. The facility also implements additional Emission Reduction Plans in line with the various Atmospheric Emissions Licenses (AEL). Further, strategies for emission reductions are continuously investigated. Kindly refer to Appendix B for the cumulative particulate matter emission reduction over time at ArcelorMittal Vanderbijlpark.</p> <p>The implementation of the plans, including the establishment of the Ammonia stripping plant, reportedly depends on resource availability.</p> <p>Approval of funds for the extensive upgrade of the project is currently underway. Once funds are available, the preferred strategy will be initiated and the reparations will commence. Once funds have been</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				allocated, the sulphur plant will be refurbished and other infrastructure such as the ammonia stripper will be installed.	
h)	The flaring of uncleaned gas at the relevant flares is only permissible during upset conditions when the Claus Reactor is shut down for inspection/maintenance for 3 weeks every three years, and must be undertaken at temperatures and atmospheric mixing conditions conducive to maximum dispersion of pollutants.	Moderate non-compliance	-1	<p>The Sulphur plant is not operational and therefore partially cleaned gas is flared when there is no use for it in the rest of the works as an energy source. From an environmental perspective, the SO₂ emissions load is the same whether the uncleaned gas is flared or combusted at another plant for fuel or energy source. The Claus reactor has been non-operational for more than 4 years due to equipment failure and significant repairs and replacements are required.</p> <p>Flaring is taking place on a more regular basis than just under upset conditions. However, this issue has been reported on and ArcelorMittal is continuously aware that urgent intervention is needed.</p> <p>ArcelorMittal is working with various specialists in order to find solutions for the issues relevant to this project. ArcelorMittal also noted that these solutions are top priority for them.</p>	It is recommended that ArcelorMittal continuously work with all stakeholders on finding working solutions. Further, open communications with the Department on any progress should continue.
i)	Detailed and up to date records must be kept of all incidents and complaints pertaining to the COG and water cleaning project, how these were managed, and the recurrence thereof prevented. These records must be made available to the Department	Compliance	2	Incident and complaints registers are available at access control. Incidents are also recorded and saved on the internal reporting system and/or noted in ECO reports/incident register.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	within 14 (fourteen) calendar days upon written request by the Department.			<p>The facility has an electronic incident management system (PIVOT) which manages the incidents. The system facilitates the investigation and mitigation measures between different responsible parties. The incident report was reviewed and none of the environmental incidents related to the COCGAW project.</p> <p>No incidents related to the project were recorded during the audit period.</p>	
j)	This Department and the Department of Water Affairs and Forestry must be informed of any major environmental and pollution incidents relating to the COG and water cleaning project within 24 (twenty four) hours of such incidents occurring.	Compliance	2	<p>No major or emergency incidents reported in the reporting period.</p> <p>Spills, should they occur, can be diverted to the coke plant sump and are therefore contained.</p>	No applicable recommendations.
k)	The use of the existing Maturation Dams for the storage or disposal of any effluent/sludge/waste is prohibited as from 6 months after commissioning of the completed coke oven by-products plant. An application for authorisation and draft plan for decommissioning and rehabilitation of the existing Maturation Dams must be submitted to the Department within 120 (one hundred and twenty) calendar days of commissioning of the COG and water cleaning project.	Compliance	2	<p>Submission of the application was not within the specified timeframe. However, this non-compliance was reported to the authorities.</p> <p>The Water Use License (WUL) and the COCGAW Project RoD had conflicting dates relating to the Maturation Dams application. ArcelorMittal notified GDARD that the timeframes as stipulated in the WUL will be followed as the Department of Water and Sanitation (DWS) was the competent authority at the time.</p> <p>The Department of Environmental Affairs (DEA) issued a Waste Management License</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>(WML) for the decommissioning of the maturation dams in February 2012. As such, the facility implemented various process changes in order to cease the use of the dams. The dams were taken out of operation in 2008, two years before the COCGAW project was commissioned. The remediation of the maturation dams are progressing very well. The dam consisted out of 3 dams of which the remediation of Dams 2 and 3 is 100% complete and Dam 1 about 60% complete. Soil is being remediated in-situ.</p>	
l)	<p>Planning with respect to addressing existing groundwater contamination identified in the Coke Plant area must continue. Confirmation of, or plans for the abstraction and/or treatment of contaminated groundwater or specific pollutants, including the feasibility of abstracting contaminated groundwater from the aquifer underlying the site as a source of water supply to the process, needs to be considered. Progress with respect to this matter must be reported on in the quarterly progress reports and bi-annual environmental performance audits thereafter.</p>	Compliance	2	<p>Various specialist investigations were undertaken and a Final Ground Water Management Plan (GWMP) (including a specific investigation at the Coke and Tarplant) was developed in May 2011 and was peer reviewed in 2012.</p> <p>A contaminated land assessment was undertaken in terms of the National Environmental Management: Waste Act, 2002 (Act No. 59 of 2008) (NEM:WA) part 8. All known active sources from the area have been eliminated and since inception of remedial actions, around 2007, which formed part of the original groundwater management plan, significant progress has been made in this regard. As such, it was decided to remodel the groundwater dynamics for the entire site to assess the success of remedial actions undertaken in</p>	<p>It is recommended that the prioritised action plan be drafted as soon as possible and that further continuous investigation for alternative technical solutions be undertaken.</p> <p>Furthermore, the contaminated land assessment should be finalised.</p>

No	Conditions	Status	Score	Observations	Recommendations
				the past decade. This modelling will tie in with the greater contaminated land assessment for ArcelorMittal, which will dictate possible contaminated land and groundwater initiatives going forward. Bunding initiatives has also been initiated, bunding of the high risk areas will further aid in better groundwater quality.	
m)	The recommendations contained in the specialist studies submitted in support of the application for authorisation of the COG and water cleaning project are regarded as an extension of the conditions of this authorisation. Implementation of or compliance with these recommendations must be discussed as part of the quarterly progress reports and bi-annual environmental performance audits thereafter.	Compliance	2	These recommendations have been included in the EMP and are also assessed as part of the internal audits.	No applicable recommendations.
n)	An Independent Environmental Control Officer (ECO) with an understanding of the coke oven operational and treatment processes must be appointed for the duration of construction and commissioning, to monitor and report on compliance with the conditions of this authorisation.	Compliance	2	Mr. Terrence Wilson has been appointed as the ECO.	No applicable recommendations.
1.3	General Conditions				
a)	Any changes to, or deviations from, the project description set out in this letter must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as It deems necessary to	Noted/Not Applicable	0	No changes have been made during the reporting period.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	evaluate the significance and impacts or such changes or deviations.				
b)	This Department may review the conditions contained in this letter from time to time and may, by notice in writing to the applicant, amend, add or remove a condition.	Noted/Not Applicable	0	This condition is noted.	No applicable recommendations.
c)	The applicant must notify the Department, in writing, at least 30 (thirty) days prior to the change of ownership, project developer or the alienation of any similar rights for the activity described in this letter. The applicant must furnish a copy of this document to the new owner, developer or person to whom the rights accrue and inform the new owner, developer or person to whom the rights accrue that the conditions contained herein are binding on them.	Noted/Not Applicable	0	The Department was notified of the name change in 2007 and change of contact person in February 2012. No other changes and associated amendments are outstanding in the current reporting period.	No applicable recommendations.
d)	Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.	Noted/Not Applicable	0	This condition is noted.	No applicable recommendations.
e)	Authorisation for the activity is granted in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) only and does not exempt the holder from compliance with other relevant legislation.	Noted/Not Applicable	0	This condition is noted. ArcelorMittal is aware of all the relevant legislation and receives updates regularly. The facility has a legal register in place with sufficient legal advisors to ensure they are aware of their legal requirements. The register is updated as required.	No applicable recommendations.
f)	The applicant shall be responsible for ensuring compliance with the conditions contained in this letter by any person acting on his behalf, including but not limited to, an agent, servant, or employee	Noted/Not Applicable	0	This condition is noted. An ECO has been appointed to ensure compliance with conditions of the	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
	or any person rendering a service to the applicant in respect the activity, including but not limited to, contractors and consultants.			authorisation and ensure contractors are informed of requirements.	
g)	Departmental officials shall be given access to the property referred to in 1 above for the purpose of assessing and/ or monitoring compliance with the conditions contained in this document at all reasonable times.	Noted/Not Applicable	0	This condition is noted. The Department has been granted access during a recent inspection of the property. A Green Scorpion site visit was undertaken on 27 October 2016 and 23 November 2016, specifically focussing on this authorisation.	No applicable recommendations.
h)	The applicant must notify the Department within 24 (twenty four) hours if any condition of this authorisation cannot, or is not, adhered to. The notification must be supplemented with reasons for non-compliance.	Noted/Not Applicable	0	This condition is noted. No additional non-compliances have been registered for the reporting period. The non-compliance and problems associated with the Elementary Sulphur Plant have been reported to the relevant authorities and have been highlighted as part of this audit.	No applicable recommendations.
1.4	Reporting requirements				
a)	A summarised quarterly progress report on the implementation of the COG and water cleaning project must be submitted to the Department, the first report being due 90 (ninety) calendar days after construction commences, and every 90 (ninety) calendar days thereafter. These progress reports must address, inter alia, the following:	Compliance	2	ArcelorMittal received a letter from GDARD on 8 February 2010 stating quarterly audits must continue, however these reports do not need to be submitted anymore. The quarterly audits were available and on record, the last report was generated in December 2016. Kindly see Appendix D for the Quarterly Progress Report.	No applicable recommendations.
i.	Up to date scheduling of implementation and associated time-frames.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
ii.	Records of any major incidents (see 3.2(i) above).	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
iii.	Decommissioning of infrastructure.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
iv.	Rehabilitation and disposal of contaminated waste material (soil, decommissioned equipment etc.), including the quantity and classification (general/hazardous) thereof.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
v.	Commissioning of any treatment infrastructure.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
vi.	Results on the monitoring of the efficiency of commissioned treatment infrastructure.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
vii.	Monitoring of activities in terms of the environmental management plan (see 3.2 (c) above).	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
viii.	Any steps taken to rectify areas of non-compliance with environmental requirements.	Repeat Condition	-	Refer to condition 1.4 for observations noted.	No applicable recommendations.
b)	A bi-annual Environmental Performance Audit conducted by an independent, accredited auditor must be submitted to the Department for review, the first audit being due 6 (six) months after commissioning of the COG and water cleaning project, and every 6 (six) months thereafter. The bi-annual audit must include, inter alia, the following (results in graph format as applicable):	Compliance	2	The previous external audit was conducted by Zantow Environmental in September 2016.	No applicable recommendations.
i.	Volume of water treated, volume re-used, volume discharged, and reduction in volume of fresh water intake achieved, i.e. updated water balance for the site.	Compliance	2	The whole ArcelorMittal Vanderbijlpark Works is a zero effluent discharge facility, as required in their WUL. Prior to this, treated effluent was discharged from the works through the Rietspruit canal into the Rietspruit River, which flows into the Vaal River. The facility constructed and commissioned	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>the Main Treatment Plant (MTP) as well as upgraded the existing Central Effluent Treatment Plant (CETP) in December 2005. This enabled ArcelorMittal to significantly decrease the raw water abstraction with approximately 50%. The MTP enabled ArcelorMittal Vanderbijlpark Works to treat its process effluent water that was previously discharged subject to the WUL applicable at the time. After treatment, the water is re-used in the process. The facility maintained their zero effluent status until 2011 when the system could no longer cope with the demand for high quality water and the excess low quality water was discharged. The sporadic discharge continued until end of September 2016 where after the zero effluent status was re-instituted. The facility installed additional salt removal capacity and made various process changes in order to optimise the system and reported during the audit that the water balance of the Works are not very tolerable of upsets. The most recent water balance for the Works is attached as Appendix E.</p> <p>The coke ovens are however only a portion of the facility's water balance. The coke ovens create coal water as a by-product from the reduction of the coal to coke. The coal water and other sources of effluent water are directed to the oil skimmer</p>	

No	Conditions	Status	Score	Observations	Recommendations
				<p>where some mechanical oil skimming occurs. The effluent is then pumped to the quench tower quench tower sump and used as quenching water. The Coke Plant water balance is attached as Appendix F.</p> <p>Further, the effluent discharged is attached as Appendix G and the fresh water abstraction data is attached as Appendix H. The data captured in these figures indicate that there was some effluent discharged in 2016 to date, due to water imbalances in the system. The facility reported the relevant discharges to the competent authority and the matter falls outside the scope of this audit. Not specifically related to the project. Further, an average of 50% reduction of water abstraction since 2005 has been achieved.</p>	
ii.	Results of improvements in air and water quality achieved.	Repeat Condition	-	Kindly see the various Appendixes attached.	No applicable recommendations.
iii.	Air quality monitoring and reporting as required by Condition 3.2(g).	Noted/Not Applicable	0	<p>Coke Oven Gas quality: Air quality monitoring, management and reporting is conducted according to the AEL, the applicable RoDs and the Air Quality Monitoring Plan (APP/10/AMSA-01 Rev1.1) prepared by Airshed Planning Professionals. The Coke and Over Gas Air Quality Monitoring Plan is attached as Appendix I.</p> <p>Coke Oven Stack Emissions: The partially cleaned gas is used as a fuel source at various users within the facility.</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>The coke oven gas is distributed to the users, which are able to utilise coke oven gas as energy source. The Coke Batteries are also a major user of the coke oven gas. The gas is combusted and emitted to atmosphere. The Coke battery stack dust emissions is attached as Appendix J.</p> <p>Fugitive Emissions: Fugitive Emissions is a concern at coke battery operations in general. The RoD required that a monitoring plan be developed to monitor and then improve the fugitive emission sources from the batteries. ArcelorMittal appointed Airshed Planning Professionals in 2011 to undertake such an investigation and recommend the monitoring requirements.</p> <p>Fugitive emissions by nature are a difficult element to monitor. The monitoring system that was put in place by ArcelorMittal is commendable. The different sources of fugitive emissions are addressed in the fugitive emissions monitoring plan that includes the doors, pipes and charging times and smoke observed.</p> <p>The occupational health monitoring undertaken in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) can be used as a monitoring program as well to determine the</p>	

No	Conditions	Status	Score	Observations	Recommendations
				<p>effectiveness of the mitigation measures implemented. The last available occupational health survey has indicated that additional fugitive emission mitigation measures are required. It should be noted that ArcelorMittal has implemented management and mitigation measures to protect employees and reduce exposure.</p> <p>Ambient Air quality: The ambient air quality around the facility is monitored by ArcelorMittal at four locations around the works. There is no limit for H₂S in terms of ambient air quality but it is generally known that H₂S has a distinct rotten egg smell which literature indicates can be detected as low as 45 parts per billion (ppb) but health risks only above 40 parts per million (ppm). It is clear that the ambient air quality in terms of H₂S is not considered a major issue around the facility after review of the data.</p> <p>The coke oven gas plants main positive effect would be a reduction in SO₂. As the plant is not operational, it was deemed unnecessary to include a full discussion on the SO₂ ambient air quality data monitored by the facility. Once the plant has been re-commissioned the SO₂ ambient data must be compared with the SO₂ ambient data measured prior to commissioning.</p>	

No	Conditions	Status	Score	Observations	Recommendations
iv.	Discussion on groundwater treatment (volumes, pollution stabilisation etc.).	Repeat Condition	-	Refer to observations and recommendations made under condition 1.4 (l).	No applicable recommendations.
v.	Discussions on the implementation (or not) of recommendations as contained in the Scoping Report and Specialist Studies.	Compliance	2	The condition contained in the Scoping Report and Specialist Studies have been included within the various inspection checklists as well as the EMP conditions.	No applicable recommendations.
vi.	Results of ground and surface water monitoring as provided for in the EMP.	Compliance	2	<p>Groundwater: Groundwater monitoring and management is conducted according to the ArcelorMittal WUL. The groundwater management plan has been finalised and peer reviewed to confirm assumptions and evaluate proposed recommendations, after which planning for remediation can commence. The facility is awaiting approval of the plan by the DWS. Currently, groundwater is not actively pumped or treated at the coke plant. The groundwater monitoring graphs and results are attached as Appendix K. Results are shown for points CO-03 and NW-8D as required in the WUL.</p> <p>From the analysis, it is clear the groundwater qualities in the specific areas are highly variable. This is expected according to the original Groundwater Management Plan as the plume moves and dilutes over distances. The impact measured cannot be attributed towards the COCGAW specifically and from a source and scale perspective is most likely not the major cause of the poor quality.</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>Surface water: In the event of process upset conditions, contaminated surface water can be diverted to the Coke Plant sump. The coke plant sump is a buffer dam and water from the dam can be reclaimed again for re-use as and when there is sufficient capacity in the system. The levels of the coke plant sump is managed and measured to ensure the sump does not overflow. Clean storm water is measured at the coke plant storm water drain but is combined with other areas inflows. The flow is measured continuously and the Electrical Conductivity is also monitored and used to detect potential spills into the storm water drains.</p>	
vii.	Quantities and handling of all by-products produced (sulphur, tar etc.).	Compliance	2	<p>The Coke Ovens generates Coke Breeze, liquid raw tar and tar sludge as by-products and waste streams. Liquid tar generated is pumped to the tar plant for further processing.</p> <p>Tar sludge is generated and mixed with coal dross at a temporary storage area from where it is collected and disposed by Enviroserv (Holfontein H:H Waste Disposal site). Safe disposal certificates are kept for the loads as removed. No liquid sulphur has been generated during the audit period as the plant is off line.</p>	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				<p>ArcelorMittal reported that the facility has constructed a plant to recycle and re-use the tar sludge back into the coke battery plant. The tar sludge is captured by the existing carousels system and is transported with the forklift to the new tar sludge recycling plant. The tar sludge is mixed in with the coal and used in the coke making process again. The recycling facility has been commissioned with the anticipated outcome of a reduction/elimination of the disposal of hazardous waste.</p> <p>Coke breeze is generated during the quenching process. Water is sprayed onto the hot coals when it is pushed out of the ovens. The coke breeze collects at the base of the quench tower. Some of the coke breeze is used for mixing with the tar sludge but the larger bulk, is transported by railway to the sinter plant for recycling.</p> <p>Specific waste stream quantities are attached as Appendix L.</p>	
viii.	Report on the success of the carousal system being implemented for the collection of tar from tar decanters (first audit only), as well as the method used to return the tar to the coke ovens. A mechanism to collect spillages from the carousal must be discussed, as well as the implementation of an alarm to indicate when the collection vessels are full.	Noted/Not Applicable	0	This condition is noted as not applicable at this stage.	No applicable recommendations.

No	Conditions	Status	Score	Observations	Recommendations
ix.	Discussion on the implementation of and compliance with the Preventative Maintenance Plan (see 3.2(e) above).	Repeat Condition	-	<p>Critical maintenance requirements are continuously identified and are captured on the SAP system for tracking and action. A job card is created and managed on this internal system.</p> <p>An example of a recent job card is attached as Appendix M.</p> <p>This condition is scored above at condition 3.2 (e).</p>	No applicable recommendations.
x.	Records of any major incidents (see 3.2(i) above),	Repeat Condition	-	<p>No major or emergency incidents reported in the reporting period.</p> <p>This condition is scored above at condition 3.2 (i).</p>	No applicable recommendations.
xi.	Quantity of waste generated, and the classification and management thereof.	Repeat Condition	-	This condition is scored above at condition 3.4 (vii).	No applicable recommendations.
xii.	Reporting on compliance with the provisions of this authorisation and the environmental management plan, and steps taken to rectify non-compliance.	Compliance	2	This external assessment measured compliance with all the conditions.	No applicable recommendations.
xiii.	Monitoring of relevant boreholes with respect to detecting any leaks/pollution from all facets of the COG and water cleaning.	Minor non-compliance	1	<p>A borehole improvement plan has been undertaken. Upgrade of the monitoring borehole network completed in 2010 and supplementary monitoring boreholes have been equipped with caps. New boreholes will be drilled to replace the damaged boreholes.</p> <p>For the current reporting period, monitoring of ground water at borehole CO-3D could not be undertaken as the borehole was damaged. Monitoring was however</p>	Refer to condition 1.4 (l) for recommendations.

No	Conditions	Status	Score	Observations	Recommendations
				done at CO-1D also located at the coke ovens as an alternative. An extensive borehole repair programme has been finalised, which included the drilling of a new borehole in the vicinity of where the original CO-3D was located. This borehole will be used in future groundwater sampling runs in accordance with the WUL.	
xiv.	Details of any failures in the treatment system and how these were managed.	Repeat Condition	-	This condition is scored above at condition 3.4 (x).	No applicable recommendations.
xv.	Details on the quality and quantity of any discharge (air, water and land), and reasons for discharge, how these were managed, and the recurrence thereof prevented.	Repeat Condition	-	Kindly see the various Appendixes attached.	No applicable recommendations.
1.5	Duration of authorisation				
	If the activity authorised by this letter does not commence within 6 (six) months from the date of signature of this letter, the authorisation will lapse and the applicant will need to re-apply for authorisation in terms of the above legislation or any amendments thereto.	Noted/Not Applicable	0	This condition is noted.	No applicable recommendations.
		Total Findings	103		

6 CONCLUSION AND RECOMMENDATIONS

GCS Water and Environment (Pty) Ltd. (GCS) was contracted by ArcelorMittal South Africa (ArcelorMittal) Vanderbijlpark Works to conduct an independent Environmental Performance Assessment (EPA Audit) for the Coke Oven Clean Gas and Water Project (COCGW) (RoD number: GAUT 002/02-03/138).

By conducting an EPA, ArcelorMittal recognises its potential impact on the environment and is committed to protecting and enhancing the environment for future generations by promoting sustainable practices and acting responsibly, considering environmental, social and economic factors in all decision-making processes.

The construction of the plant commenced in 2005 and commissioned in 2010 at the cost of more than R 330 million. The project faced numerous delays and challenges. In 2010, the plant ran successfully and proved significant sulphur reduction in terms of emissions. Unfortunately, the plant was shut down at the end of 2010 due to technical and mechanical difficulties. From 2011, ArcelorMittal repaired the identified fault in the process and then attempted to re-commission the facility on a few occasions. The plant has not run for more than a few days at end without interruption. Currently the gas is only partially cleaned but no sulphur removal is taking place. The major concern is that the plant is not fully operational and ArcelorMittal is not removing sulphur from the coke oven gas which leads to the release of emissions (particularly SO₂) from the facility to the environment.

From the auditing findings, it can be concluded that ArcelorMittal is 85% compliant with their RoD. Through the on-site meetings and observations, it is clear that they are aware of all the areas of concern. The Environmental Control Officer (ECO) conducts regular and thorough inspections and ensures that non-conformances are addressed as soon as possible. As a result of the plant not being fully operational and the monetary issues concern with the project the level of compliance at this stage is commendable. It is however crucial for ArcelorMittal to commission the sulphur removal section of gas cleaning plant and ensure the required measures are implemented to continuously operate the plant. However, it is clear that this is at the top of management's action plan.

A summary of the critical and moderate findings made during the EPA are presented in the sections that follow.

6.1 Fugitive emissions

Battery doors are inspected on a daily basis and a maintenance schedule has been created. Repairs are done continuously.

The fugitive emissions are monitored according to the internationally accepted standard and recorded. Exposure monitoring at the batteries indicates that additional fugitive emission mitigation measures are required, above that already implemented. This can however not be attributed only towards doors but rather the fugitive battery emissions as a cumulative source. ArcelorMittal has however implemented management and mitigation measures such as specialised facemasks and other measures to protect employees and reduce exposure. Other measures include battery tightening and charge emission reduction projects. The effectiveness of these measures should be assessed to determine whether it is sufficient to mitigate fugitive emissions.

It is recommended that the effectiveness of these measures should continuously be assessed, prioritised and implemented to determine whether it is sufficient to mitigate fugitive emissions.

6.2 Gas flaring

The Sulphur (Claus) plant is not operational and therefore only partially cleaned gas is flared when there is no use for it in the rest of the works as an energy source. From an environmental perspective, the SO₂ emissions load is the same whether the un-cleaned gas is flared or combusted at another plant for fuel or energy source. The Claus reactor has been non-operational for more than 4 years due to equipment failure and significant repairs and replacements are required. Flaring of sulphur-rich coke oven gas is taking place on a more regular basis than just under prescribed maintenance conditions. However, this issue has been reported on and ArcelorMittal is continuously aware that urgent intervention is needed. ArcelorMittal is working with various specialists in order to find solutions for the issues relevant to this project. ArcelorMittal also noted that these solutions are top priority for them.

It is recommended that ArcelorMittal continuously work with all stakeholders on finding working solutions. Further, open communications with the Department on any progress should continue.

APPENDIX A: *DECLARATION OF AUDITOR INDEPENDENCE*

DECLARATION OF THE ENVIRONMENTAL AUDITOR

I, Suzan ROSSON, declare that -

General declaration:

- I act as the independent environmental auditor in this assessment;
- I will perform the work relating to the assessment in an objective manner, even if this results in views and findings that are not favourable to the authorisation holder;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental auditing, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activities;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 34 of the Regulations when preparing this assessment and any report relating it;
- I have no, and will not engage in, conflicting interests in the undertaking of this assessment;
- I undertake to disclose to the holder and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the assessment is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the assessment;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will provide the competent authority with access to all information at my disposal regarding the assessment, whether such information is favourable to the holder or not;
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental auditor in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 48 of the Regulations and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of

the Environmental Impact Assessment Regulations, 2014;

- I have a vested interest in the proposed activity proceeding, such vested interest being:

- _____
 - _____
 - _____
 - _____

NONE



Signature of the environmental auditor

GCS (Pty) (Ltd)

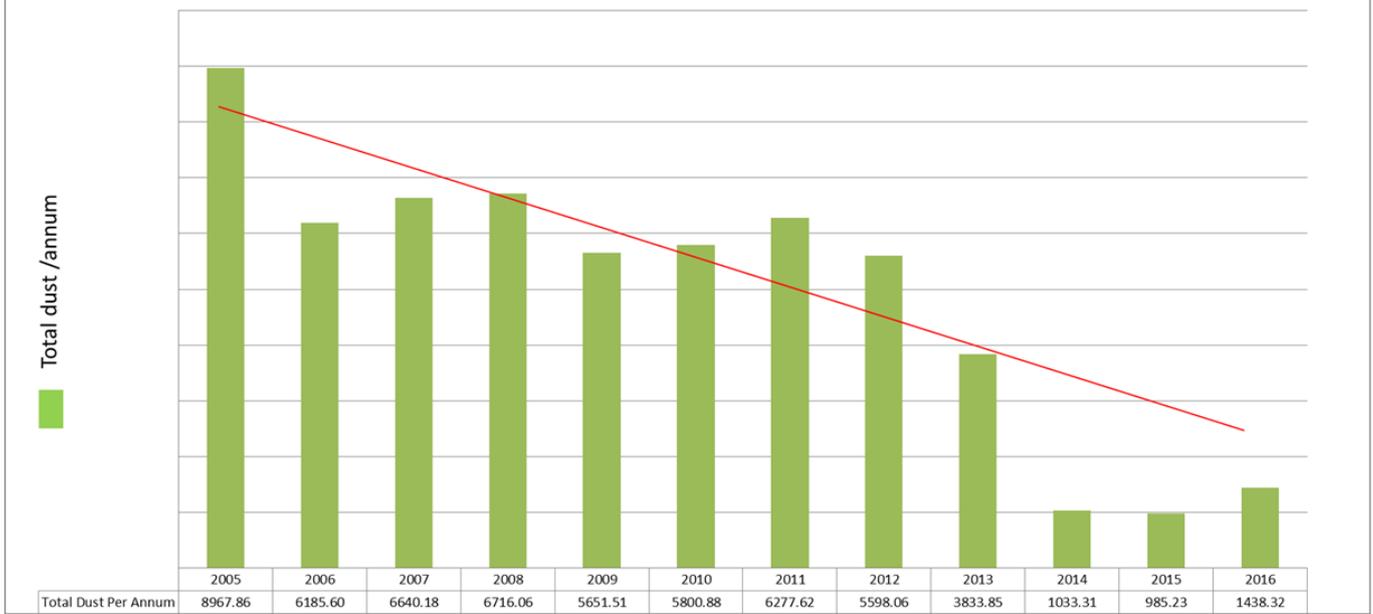
Name of company

16 . 01 . 2017

Date

APPENDIX B: *CUMULATIVE PARTICULATE MATTER EMISSION REDUCTION*

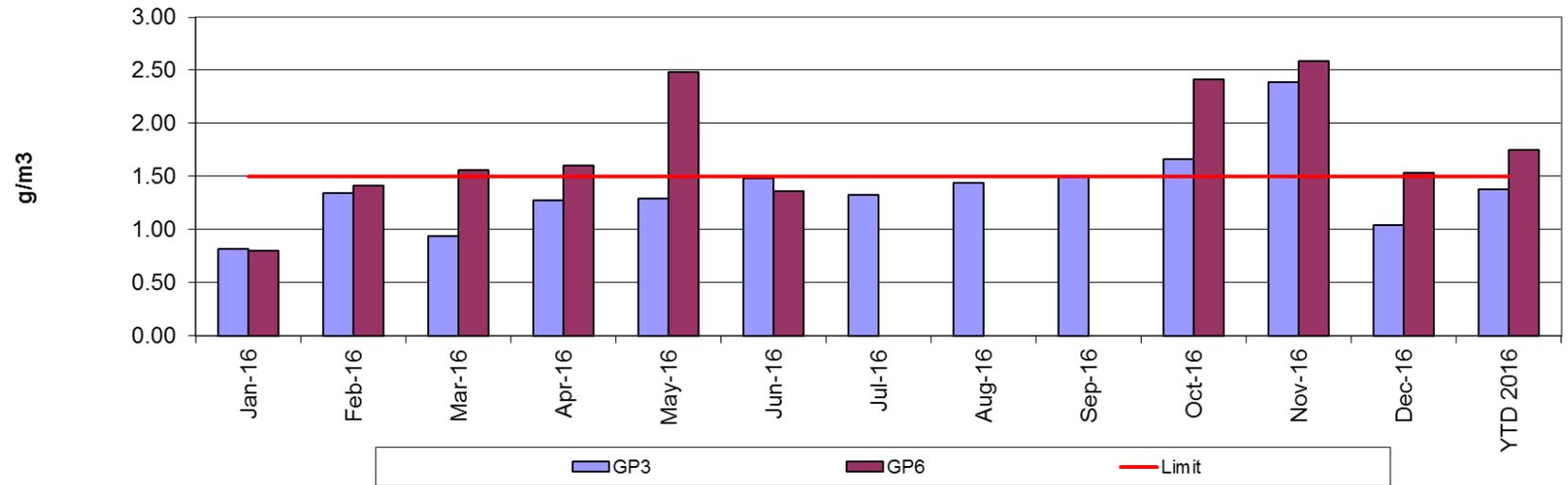
ArcelorMittal South Africa Vanderbijlpark Works Total Dust



Cumulative particulate matter emission reduction over time at ArcelorMittal Vanderbijlpark

APPENDIX C: *H2S RELEASE DATA.*

H2S in Coke Oven Gas



APPENDIX D: *QUARTERLY PROGRESS REPORT.*

ArcelorMittal South Africa

Vanderbijlpark Works

Cleaning of Coke Oven Gas and Water

Quarterly Progress Report (December 2016)



Contents

**ArcelorMittal South Africa
Vanderbijlpark Works
Cleaning of Coke Ovens Gas and Water Project**

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- B. Records of major incidents
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- D. Rehabilitation and disposal of contaminated material
- E. Commissioning
- F. Results on the monitoring of efficiency of commissioned plants
- G. Monitoring of construction activities in terms of the EMP
- H. Steps taken to rectify areas of non-compliance with environmental requirements
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A. Scheduling of implementation and time frames

1. Cleaning of Coke Ovens gas and water

The major Milestone Dates on the project are reflected below in Table 1: Milestone Summary.

Table 1: Milestone Summary

Item	Milestone Description	Planned Date	Forecast Date	Actual Date
1.	All contract Award Dates	04/10/29	04/10/29	Oct 04
2.	Primary cooling unit & scrubbing facilities GP3	06/06/28	06/07/28	July 06
3.	Primary cooling unit & scrubbing facilities GP6	06/07/12	06/08/30	Sept 06
4.	Chilled water station with cooling tower	06/06/28	06/08/30	Dec 06
5.	Ammonia stills & de-acidifier	06/07/19	06/08/30	Aug 08
6.	Elementary sulphur plant	06/07/19	07/02/28	Jan 10
7.	Process control system	06/06/07	07/02/28	Jan 10
8.	Project completion	06/10/31	07/03/05	Jan 10
9.	Installation of the Gravel Filter	08/12/31	08/12/31	Aug 12 (Note 1)
10.	Installation of ammonia strippers and caustic dosing facilities	15/12/31	Note 2	

Note 1: Commissioning of Gravel Filter unit commenced on 3 September 2013.

Note 2: CAPEX originally budgeted for 2nd phase of coal water treatment in 2016. However, due to integrated operations, the decision was made to incorporate the ammonia strippers into the broader by-products plant upgrade.

1.1 Status

One of the specialist recommendations transpiring from the EIA process for the project was that plans for addressing the existing groundwater contamination in the Coke Plant area must continue. A groundwater management plan has been developed for the Coke Plant area, which forms part of the overall groundwater management plan for the Works. ArcelorMittal is awaiting approval of this plan from the Department of Water and Sanitation. Since the area of concern is an operational area, the recommendations from the groundwater specialists is that monitoring of groundwater in the area should continue and that a health risk assessment should be conducted for employees carrying out tasks in the relevant coal bunker basements. The assessment was assigned to a third-party occupational hygiene practitioner and has subsequently been conducted. ArcelorMittal has received the report which concludes that "employees spend short periods of time at the bunkers. The results of this survey indicate no significant exposure risk to the substances measured and hence no further exposure control measures are required."

On the 15th March 2012, the Department was informed of the progress of the unanticipated temporary shut-down of the Elementary Sulphur Plant, which is an integral component of the coke oven gas cleaning facilities at the Works. The Department has requested feedback on the progress of start-up of the Plant, in a letter dated 3 May 2012, which will be provided once ArcelorMittal has performed all the necessary repairs and is in a position to safely operate the Plant. Feedback on the status of the Plant has been communicated to the Department via external audit reports submitted on a bi-annual basis. The compliance and enforcement section of the provincial authority requested a meeting and site visit to discuss the status of the Plant. In the meeting held on the 23rd November 2016, the history of Plant failures and

challenges were presented to the Department officials, together with the extensive actions implemented over the years in an attempt to reinstate operation of the Plant.

The assessment, conducted by overseas experts in the field, to identify the deficiencies of the Plant has been concluded. The detailed report highlighting the measures to be implemented to re-establish operation of the Plant has been received. Planning regarding the allocation of resources to repair/replace defective components of the gas cleaning infrastructure is currently in progress. Re-operation of the Plant has received the highest attention and is a top priority for Vanderbijlpark Works.

As previously reported, the Gravel Filter Plant was commissioned on 3 September 2013. Consequently, significant improvements in water quality (in terms of suspended solids and tar particles) have been achieved. The second phase of coal water treatment, i.e. ammonia stripping, was scheduled for execution in 2015, with operation of the new facility planned in 2016. Due to integrated operations of the gas plant infrastructure, the decision was made to incorporate the ammonia strippers into the broader by-products plant upgrade which is scheduled to commence in 2017, subsequent to funds approval.

The tar sludge recycling project has been commissioned and has been rolled out to all batteries on site.

The last bi-annual, external, environmental performance audit was conducted in August 2016.

B. Records of major incidents

Although technical interruptions in start-up of the Elementary Sulphur Plant remain a concern, no major environmental incidents have occurred during the last quarter.

C. Decommissioning of infrastructure

No further demolition work performed.

D. Rehabilitation and disposal of contaminated material

All equipment, tanks, vessels, and pipes that contained process liquids were flushed into the existing By-products process. The steel scrap was recycled back into the steel making process.

As per condition 3.2 k) the use of the maturation ponds was to cease 6 months after the commissioning date. Although the use of the maturation ponds is directly related to the commissioning of the Coke Oven Clean Gas and Water project, with changes to the water balance of the Works, the maturation ponds' usage ceased in March 2008.

The Maturation Ponds Rehabilitation Plan has been submitted to, and approved by, the Department of Water Affairs and Forestry (DWAf). Application for environmental authorisation to decommission the Maturation Ponds, in terms of the 2010 EIA Regulations, was submitted to the authorities. The application was transferred from the provincial authority to the national authority as mandated by the Waste Act, which delayed the issuing of the authorisation. ArcelorMittal subsequently received the Waste Management License from DEA for the decommissioning and remediation of the Maturation Ponds on 13 February 2012

E. Commissioning

Commissioning of the Project was completed in January 2010. Concerted effort is being placed on the start-up of the Elemental Sulphur Plant after extended down-time. Overseas experts were sourced in an attempt to identify the root cause of equipment failure experienced to date and provide feasible recommendations to resume operation of the Plant. Technical evaluations of the proposals were conducted to assess the feasibility of the various alternatives suggested in the specialist reports. CAPEX approval for this R250 million total by-products plant upgrade is currently in process.

**Quarterly Progress Report
December 2016**

F. Results on the monitoring of efficiency of commissioned plants

Results submitted to authorities.

G. Monitoring of construction activities in terms of the Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) was submitted and formed part of all the contractors' Site Safety Management Plans. ECO audits were conducted during the construction phase. An ECO audit, and follow-up inspections, was conducted during commissioning of the Project. The Gravel Filter Plant has been installed and has been commissioned. Regular inspections were undertaken to ensure that no breach of environmental regulations (legislation and authorisation) occur.

H. Steps taken to rectify areas of non-compliance with environmental requirements

Regular RoD audits are scheduled to ensure outstanding issues are resolved and potential future non-compliances are avoided.

Shut-down of the sulphur plant is receiving all the necessary attention. Getting the Elemental Sulphur Plant operational remains a level 1 priority. To date, in excess of R19 million has been spent in an attempt to get the Sulphur Plant operational again.

Due to the complexity of the gas cleaning process, overseas experts in process engineering were sourced to identify shortcomings and recommend corrective actions for re-operation of the Sulphur Plant. Significant CAPEX is currently being sourced to refurbish the by-products plant.

I. Feedback on implementation of specialist recommendations

RECOMMENDATION FROM SPECIALIST STUDIES	FEEDBACK
Process	
Balancing tanks to be installed prior to battery process water treatment facilities	Upgraded 4 x 1000 m ³ settling tanks prior to battery process water treatment. This will give sufficient buffer capacity to balance any process upsets in front of the treatment process – Completed
Monitor concentrations of cleaned COG and report.	Results reported in the first bi-annual report.
Monitor ambient levels of NH ₃ , H ₂ S and benzene, and take appropriate actions (as described in EIR) if found to be significant.	Results reported in the first bi-annual report.
The effluent stream sent to the Blast Furnaces should not be heated to the point where the NH ₃ is stripped and released to atmosphere.	Investigation completed.
All tar sludge should be returned to the coke ovens with the coal charge, using mechanical means and not by hand.	The tar sludge recycling project has been commissioned to address this point.
All solid waste should be classified according to the Minimum Requirements and disposed of accordingly. Records should be maintained of all waste sent offsite.	Implementation completed.
Scheduled preventative maintenance plan on all water systems to ensure segregation of process water, rainwater and indirect cooling water streams.	PMP implemented for all environmentally critical equipment.
Groundwater	
The feasibility of abstracting contaminated groundwater from the aquifer underlying the site, as a source of water supply to the process should	Investigation underway. The final ground water management plan for the Works was completed by groundwater

RECOMMENDATION FROM SPECIALIST STUDIES	FEEDBACK
be investigated.	specialists in 2011. A localised soil and groundwater study at the Coke Plant was also finalised to determine the exact extent of contamination and identify feasible remediation options. The recommendations from the groundwater specialists are that monitoring of groundwater in the area should continue and that a health risk assessment should be conducted for employees carrying out tasks in the relevant coal bunker basements. This health risk assessment has been concluded. Groundwater is monitored in accordance with the WUL – repair of damaged boreholes throughout the Works is in process.
The option of development of drains in the form of trenches to abstract the contaminated groundwater from the shallow perched aquifer system as part of the foundation design and groundwater containment/remediation options should be investigated.	Same as above.
The water in the cooling tower sumps should be sampled and analysed to determine the quality.	Done – results available
The existing monitoring boreholes should be properly capped to prevent contamination from surface soils and dust with samples that are taken in the boreholes.	Upgrade of monitoring borehole network completed in 2010. Supplementary monitoring boreholes have been equipped with caps. An order has been placed for the re-drilling of damaged boreholes on site, which is in progress.
The construction of the monitoring boreholes should be reviewed to confirm whether the borehole construction material influences the values for iron and manganese in the groundwater in the Coke Ovens area.	Completed. Golder Associates Africa (Pty) Ltd conducted a study to assess the monitoring network.
The resident groundwater pollution should be managed.	Investigation underway. The final ground water management plan for the Works was completed by groundwater specialists in 2011. A localised soil and groundwater study at the Coke Plant was also finalised to determine the exact extent of contamination and identify feasible remediation options. The recommendations from the groundwater specialists are that monitoring of groundwater in the area should continue and that a health risk assessment should be conducted for employees carrying out tasks in the relevant coal bunker basements. This health risk assessment has been concluded. Groundwater is monitored in accordance with the WUL – repair of damaged boreholes throughout the Works is in process.
A numerical groundwater flow and contaminant transport model should be developed.	Modelling conducted as part of the Groundwater Management Plan.
Surface water	
The mitigating measures for the construction and operational phase, as proposed in the document, should be made binding on ArcelorMittal South Africa Vanderbijlpark Works, its employees and external contractors.	Noted.
A detailed Environmental Management Plan covering <i>inter alia</i> surface water management should be drafted and made binding on ArcelorMittal South Africa Vanderbijlpark Works.	EMP submitted to GDACE. EMP updated as per Air Quality Monitoring Plan recommendations and submitted to authorities for approval. EMP has been submitted on numerous occasions in the past for approval. However, to date, no correspondence has been received from authorities. The EMP was re-submitted once

RECOMMENDATION FROM SPECIALIST STUDIES	FEEDBACK
	<p>again in March 2012, as per recommendation in January 2012 external audit report, for approval. No feedback has been received, thus assuming the EMP has been approved (as stated in March letter). GDARD did however acknowledge receipt of the EMP on 23 April 2012.</p> <p>As per recommendation from the July 2015 external audit report, the EMP was aligned with the requirements stipulated in the new EIA regulations (4 Dec 2014).</p>
The existing Coke and Gas Cleaning Plant surface water-monitoring programme should continue.	Monitoring programme will continue as per the Water Use Licence.
The process and products associated with the recycling of surplus water from the Coking Plant to the Blast Furnace need to be further investigated, in order to determine any potential negative impacts.	Surplus water is to be re-used in the coke making process. Should the need arise to direct surplus water to the Blast Furnaces, these items will be investigated.
Air Quality	
Install an additional PM10 and gaseous sampler (SO ₂ , NO _x and H ₂ S) within the zone of impact directly south of the MSVS site to monitor the impact on the surrounding communities.	Completed. Two ambient air monitoring stations were installed south and south-east of ArcelorMittal Vanderbijlpark Works during 2004. The third monitoring station at the northern boundary of the site was installed in 2007.
The monitoring of H ₂ S should act as a performance indicator to monitor the reductions in ambient H ₂ S concentrations.	<p>Results reported in the first bi-annual report.</p> <p>It must be noted that it is expected to have a reduction of SO₂ rather than H₂S. This is because the H₂S contained in the gas used as a fuel at the Works will be transformed to SO₂ emissions when burned.</p>
The emission rates of the most significant pollutants need to be measured.	Results reported in the first bi-annual report.
Recommendations from Air Quality Monitoring Plan	
Monitoring of fugitive emissions from Batteries i.t.o. EPA Method 303. Accreditation of in-house training to be investigated subsequent to the Department of Environmental Affairs (DEA's) finalization of an emission monitoring accreditation scheme.	Investigate training accreditation subsequent to finalization of DEA's emission monitoring accreditation scheme.
Measurement of benzene, NH ₃ , H ₂ S and volatiles in accordance with OHS Act to continue.	Occupational Hygiene Department to ensure that these measurements are conducted.
Measurement of H ₂ S before and after gas cleaning to be conducted on a quarterly basis to verify conformance to RoD Condition 3.2(g).	Currently conducted on an ad-hoc basis due to the sulphur plant being on shut-down. Regular monitoring has been arranged when Plant is operational.
Weekly analysis of quench water quality for comparison with future Minimum Emission Standards	Samples analysed on a weekly basis.

J. RoD compliance table summary

RoD Cond. #	Requirement	Status	Comply	Partial	Non-compliance	Comments	Action Plan
3.2 (a)	Updated project schedule with time-frames 30 calendar days prior to construction begins	Completed	X				
(b)	Inform about start of construction and commissioning	Completed	X				
(c)	Environmental Management Plan	Completed	X			Operational EMP submitted to authorities once again in March 2012 for approval. No feedback received, hence assuming approval as stated in cover letter. GDARD did however acknowledge receipt of the EMP on 23 April 2012.	
(d)	Hazop study	Completed	X				
(e)	Preventative Maintenance Plan	Completed	X			Amendment Application concerning external verification of PMP, dated 29 July 2009, was submitted on 7 Aug 2009	Condition amended. Compliance now possible
(f)	Final design plans for new and upgraded containment areas	Completed	X			Design plans re-submitted to DWA for approval	
(g)	Air quality management, monitoring and reporting	Completed	X			Air Quality Management Plan developed by air quality specialist. Results to be reported in Bi-annual Environmental Performance Audits	
(h)	Flaring of un-cleaned gas at Flare 5	Completed			X	Sulphur Plant shutdown extended due to issues mentioned above	Expedite repairs and start-up of Sulphur Plant
(i)	Records of incidents	Ongoing	X			Incidents are registered in the Work's internal reporting system and/or noted in ECO reports/incident register	

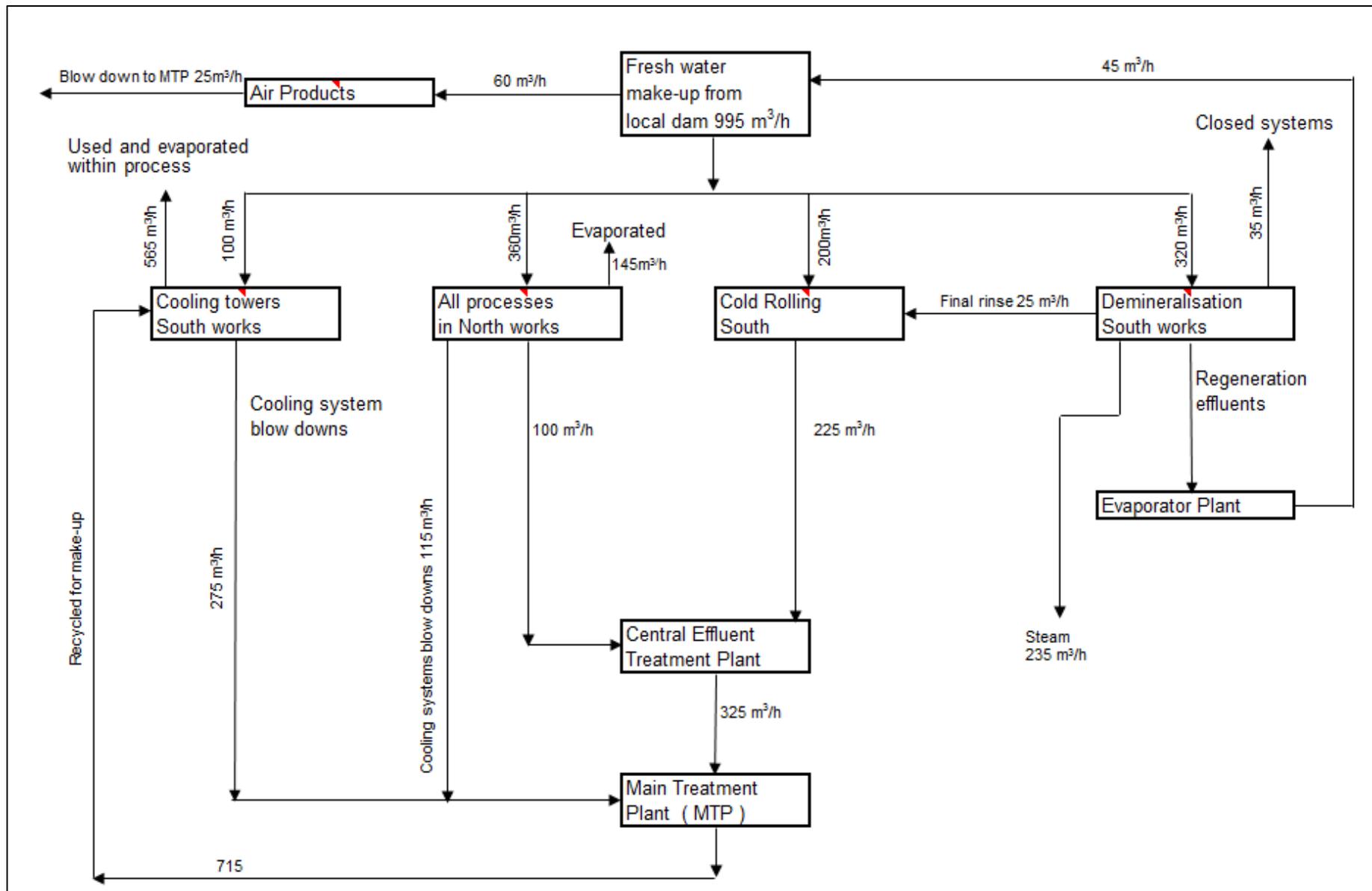
RoD Cond. #	Requirement	Status	Comply	Partial	Non-compliance	Comments	Action Plan
(j)	Inform about major incidents	Ongoing	X			No major or emergency incidents to date	
(k)	Use of maturation dams to cease 6 months after commissioning	Completed ahead of schedule.	X			Application for Environmental Authorisation for decommissioning and remediation of dams submitted. Waste Management License for decommissioning and remediation of dams received on 13 Feb 2012.	
(l)	Groundwater contamination plans	Continuing	X			The final ground water management plan for the Works was completed by groundwater specialists in 2011. A localised soil and groundwater study at the Coke Plant was also finalised to determine the exact extent of contamination and identify feasible remediation options. Both groundwater management plans were peer reviewed. Awaiting approval of groundwater management plans by Department of Water and Sanitation.	Since the area of concern is an operational area, the recommendations from the groundwater specialists is that monitoring of groundwater in the area should continue and that a health risk assessment should be conducted for employees carrying out tasks in the relevant coal bunker basements. The assessment was assigned to a third-party occupational hygiene practitioner who has subsequently issued the report.
(m)	Recommendations from specialist studies		X			See table above	
(n)	Independent Environmental Control Officer during construction and commissioning		X			ECO appointed	
Reporting requirements							
3.4 (a)	Quarterly Progress Report		X				
(b)	Bi-annual Environmental Performance Audit		X				

K. CONCLUSIONS

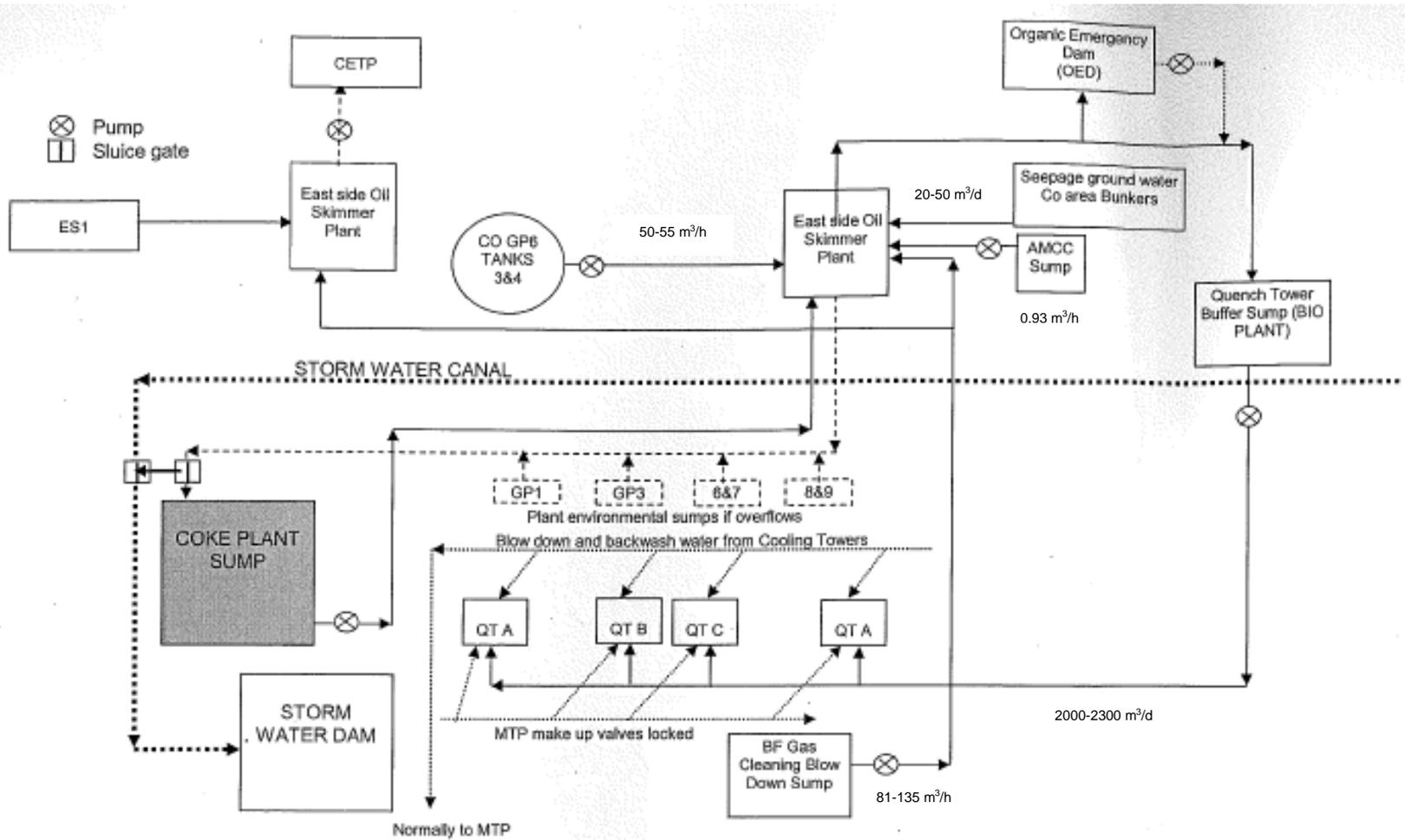
Quarterly progress reporting will continue in terms of Condition 3.4(a). However, as per letter dated 8 February 2010, these progress reports are only required to be submitted upon request by GDARD. The first bi-annual report was submitted in July 2010.

---END---

APPENDIX E: *UPDATED WATER BALANCE*

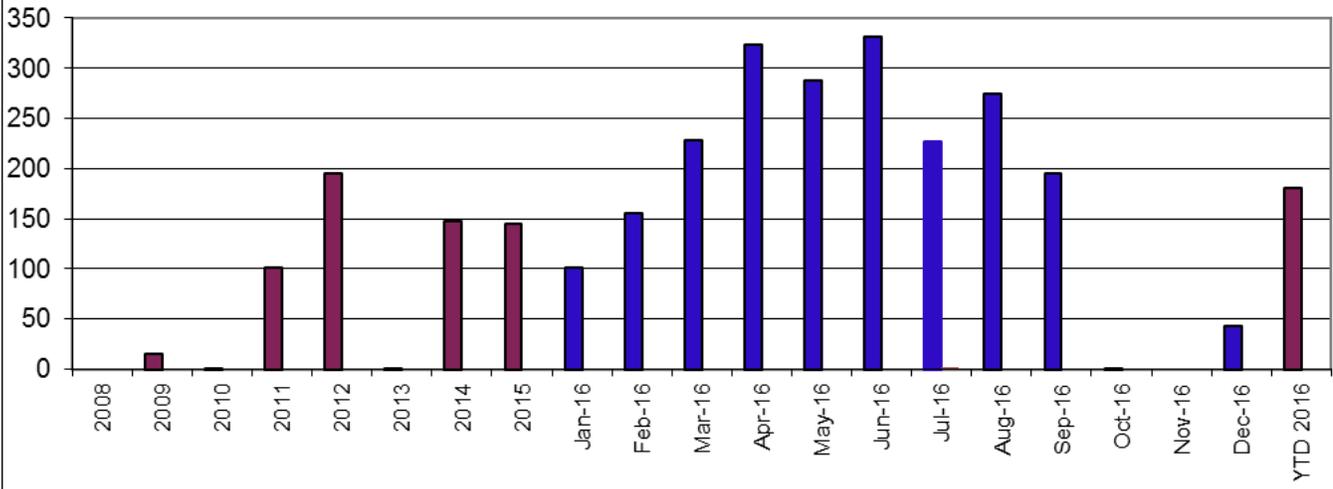


APPENDIX F: *COKE PLANT WATER BALANCE*



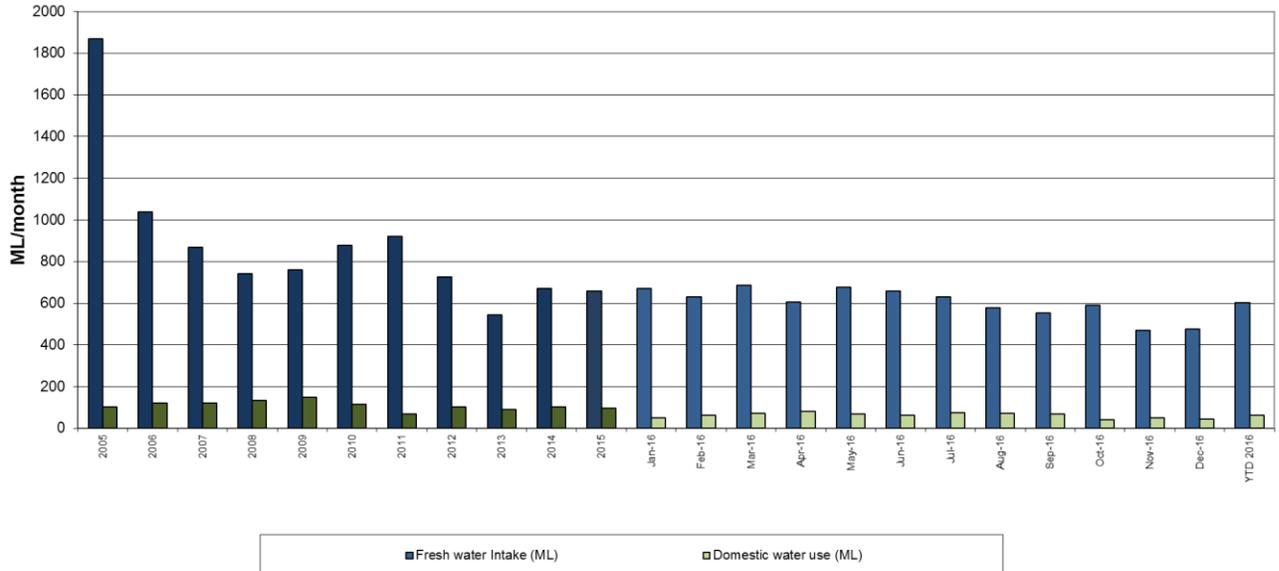
APPENDIX G: *EFFLUEANT DISCHARGED*

Discharge Rietspruit ML/month



APPENDIX H: *WATER ABSTRACTION*

**ArcelorMittal Vanderbijlpark Works
Fresh Water Abstraction
ML/month**



APPENDIX I: *COKE AND OVER GAS AIR QUALITY MONITORING*

Project done on behalf of
ArcelorMittal South Africa
Vanderbijlpark Works

AIR QUALITY MONITORING PLAN FOR THE
ARCELOR MITTAL VANDERBIJLPARK
COKE OVENS

Report No.: APP/10/AMSA-01 Rev1.1

JANUARY 2011

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REPORT DETAILS

Reference	APP/10/AMSA-01
Status	Revision 1.1
Report Title	Air Quality Monitoring Plan for the ArcelorMittal Vanderbijlpark Coke Ovens
Date Submitted	January 2011
Client	ArcelorMittal South Africa(Pty) Ltd
Prepared by	Gerrit Kornelius Pr Eng BEng (Hons) MBA PhD (Chemical Engineering) (University of Pretoria)
Notice	Airshed Planning Professionals (Pty) Ltd is a consulting company located in Midrand, South Africa, specialising in all aspects of air quality, ranging from nearby neighborhood concerns to regional air pollution impacts. The company originated in 1990 as Environmental Management Services, which amalgamated with its sister company, Matrix Environmental Consultants, in 2003.
Declaration	Airshed is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of specialised services as stipulated in the terms of reference.
Copyright Warning	Unless otherwise noted the copyright in all text and other matter (including the manner of presentation) is the exclusive property of Airshed Planning Professionals (Pty) Ltd. It is a criminal offence to reproduce and/or use, without written consent, any matter, technical procedure and/or technique contained in this document
Acknowledgements	Mr Terence Wilson rendered valuable assistance in gathering and providing data.

REVISION HISTORY

Revision no	Date	Detail
Rev 0	25 October 2010	Original
Rev 1	15 December 2010	Client comments processed
Rev 1.1	3 January 2011	Editorial corrections

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1. BACKGROUND

ArcelorMittal South Africa Vanderbijlpark Works has undertaken a project for the cleaning of coke oven gas and water at their Vanderbijlpark works. From an air quality point of view, the project entailed:

- Improvement of naphthalene recovery by improved gas cooling.
- The improvement of ammonia recovery by upgrading of scrubbers, the conversion of benzene scrubbers to ammonia scrubbers and the provision of a closed loop circulation system.
- The installation of two new distillation columns for the treatment of ammonia scrubbing water and one stripping/de-acidification column for the generation of scrubbing medium for hydrogen sulphide removal.
- Modification of existing ammonia scrubbers and the installation of a new hydrogen sulphide stripper.
- The conversion of hydrogen sulphide to elemental sulphur and the decommissioning of the ammonium sulphate plant.

A record of decision (RoD) was received from the Gauteng Department of Agriculture, Conservation and Environment (GDACE, now the Gauteng Department of Agriculture and Rural Development GDARD) on 21 March 2004.

Airshed Planning Professionals (Pty) Ltd ("APP") was commissioned by ArcelorMittal South Africa Vanderbijlpark Works to develop an air quality monitoring plan to meet the requirements set by GDACE/GDARD in the RoD.

1.1 Study Approach and Methods

A summary of the values obtained by ArcelorMittal South Africa Vanderbijlpark Works as a result of the measurement programme to meet RoD requirements is presented. These are compared to legal requirements for ambient air quality and stack emissions.

Based on the comparison, recommendations are made regarding a future monitoring programme/protocol for the coke ovens and associated gas cleaning plant.

2. LEGAL REQUIREMENTS, STANDARDS AND GUIDELINES

Prior to assessing the requirements for monitoring of the gas plant upgrade at the Vanderbijlpark site, reference needs to be made to the environmental regulations and guidelines governing the emissions and impact of such operations.

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality guideline values indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging periods. These averaging periods refer to the time-span over which the air concentration of the pollutant was monitored at a location. Generally, five averaging periods are applicable, namely an instantaneous peak, 1-hour average, 24-hour average, 1-month average, and annual average. The application of these standards varies, with some countries allowing a certain number of exceedances of each of the standards per year.

2.1 Legal requirements according to the Air Quality Act No.39 of 2004

Under the (now defunct) Atmospheric Pollution Prevention Act (Act No 45 of 1965) (APPA) the focus was mainly on source based control with Registration Certificates issued for Scheduled Processes. Scheduled processes, referred to in the Act, are processes which emit more than a defined quantity of pollutants per year, including combustion sources and smelting. Best Practicable Means (BPM), on which the Registration Certificate requirements are based, represents an attempt to restrict emissions while having regard to local conditions, the prevailing extent of technical knowledge, the available control options, and the cost of abatement. The Department of Environmental Affairs and Tourism (DEAT) was responsible for the administration of this Act with the implementation thereof charged to the Chief Air Pollution Control Officer (CAPCO).

Although emission limits and ambient concentration guidelines were published by DEAT, no provision was made under the APPA to publish formal ambient air quality standards or emission standards. The decision as to what constitutes the best practicable means for each individual case was reached following discussions with the industry. A registration certificate, containing maximum emission limits specific to the industry, was then issued.

The APPA was outdated and not in line with international best practice. It also proved inadequate to facilitate the implementation of the principles underpinning the National Environmental Management Act (NEMA) and the Integrated Pollution and Waste Management (IP&WM) white paper. In this light, the National Environmental Management: Air Quality Act (Act no. 39 of 2004) was drafted, shifting the approach from source based control to decentralised air quality management through an effects-based approach.

The new National Environmental Management: Air Quality Act has shifted the approach of air quality management from source-based control only to the reduction of impact on the receiving environment. The Act has also placed the responsibility of air quality management on the local authorities (district and metropolitan municipalities) who will be tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities, and emissions reduction strategies. The main objective of the act is to ensure the protection of the environment and human

health through reasonable measures of air pollution control within the sustainable (economic, social and ecological) development framework.

2.1.1 Ambient air quality standards

The Air Quality Act (AQA) makes provision for the setting of ambient air quality standards and emission limits at national level, which provides the objective for air quality management. More stringent ambient standards may be implemented by provincial and metropolitan authorities. National ambient standards were published on 24 Dec 2009 (GG 32816) as per table 2-1 below.

Table 2-1: National Ambient Air Quality Standards

Averaging Period	Concentration	Allowed Frequency of	Compliance Date
Sulphur Dioxide (SO₂)			
10 minutes	500µg/m ³ (191ppb)	526	Immediate
1 hour	350µg/m ³ (134ppb)	88	Immediate
24 hours	125µg/m ³ (48ppb)	4	Immediate
1 year	50µg/m ³ (19ppb)	0	Immediate
Nitrogen Dioxide (NO₂)			
1 hour	200µg/m ³ (106ppb)	88	Immediate
1 year	40µg/m ³ (21ppb)	0	Immediate
Particulate Matter (PM₁₀)			
24 hours	120µg/m ³	4	Immediate- End 2014
24 hours	75µg/m ³	4	1 January 2015
1 year	50µg/m ³	0	Immediate-End 2014
1 year	40µg/m ³	0	1 January 2015
Ozone (O₃)			
8 hours (running)	120µg/m ³ (61ppb)	11	Immediate
Benzene (C₆H₆)			
1 year	10µg/m ³ (3.2ppb)	0	Immediate-end 2014
1 year	5µg/m ³ (1.6ppb)	0	1 January 2015
Lead (Pb)			
1 year	0.5µg/m ³	0	Immediate
Carbon Monoxide (CO)			
1 hour	30mg/m ³ (26ppm)	88	Immediate
8 hour (calculated from 1	10 mg/m ³ (8.7ppm)	11	Immediate

2.1.2 Workplace standards

Some workplace measurements were carried out by ArcelorMittal South Africa (Pty) Ltd during June 2010. For the organic compounds measured, the relevant SA workplace standards (Government notice R 1179 of 25 August 1995) are as follows:

Table 2-2: Occupational exposure concentrations (mg/m³)

Benzene	16
Naphthalene	50
Phenols	19
Cresols	22
Coal tar pitch volatiles (not measured)	0.14
Hydrogen sulphide	14

2.1.3 Emission standards

Listed activities were identified by the Minister and include all activities regarded to have a significant detrimental effect on the environment, including health. Emission limits are established at national level for each of these activities (GG 33064 of 31 March 2010) and an atmospheric emission licence will be required in order to operate. With the decentralisation of power to provincial and local authority level, district and metropolitan municipalities will be responsible for the issuing of licences for listed activities. An air quality officer appointed by local authorities and responsible for the issuing of atmospheric emission licences may require a company or person to submit atmospheric impact reports in order to determine the impact of the proposed emissions on ambient air quality.

Emissions from the coke ovens and by-products recovery units are covered by subcategories 3.1 (Combustion installations not used primarily for steam raising or electricity generation) and subcategory 3.2 (Coke production and coal gasification) of the abovementioned regulations as per tables 2.3 and 2.4 below. For plants operating at the date of the notice, these requirements become applicable on 1 April 2015.

Table 2.3: Subcategory 3.1: Combustion installations

Description:	Combustion installations not used primarily for steam raising or electricity generation.		
Application:	All combustion installations (except test or experimental).		
Substance or mixture of substances		Plant status	mg/Nm ³ under standard conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa.
Common Name	Chemical Symbol		
Particulate matter	Not applicable	New	50
		Existing	100
Oxides of nitrogen	NO _x expressed as NO ₂	New	700
		Existing	2000
Total volatile organic	Not applicable	New	40

compounds (from non-coke oven operations)		Existing	90
---	--	----------	----

(a) The following special arrangements shall apply

(i) Sulphur-containing compounds to be recovered from gases to be used for combustion with a recovery efficiency of not less than 90% or remaining content of sulphur-containing compounds to be less than 100 mg/Nm³ measured as hydrogen sulphide, whichever is strictest.

Table 2.4: Subcategory 3.2: Coke production and coal gasification

Description:	Coke production, coal gasification and by-product recovery from these operations.		
Application:	All installations.		
Substance or mixture of substances		Plant status	mg/Nm ³ under standard conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa.
Common Name	Chemical Symbol		
Hydrogen sulphide	H ₂ S	New	7 ⁽ⁱ⁾
		Existing	10 ⁽ⁱ⁾

(a) The following special arrangements shall apply

(i) Charging must be carried out “on the main” with additional draught in the ascension or riser pipes produced by high-pressure water jets in the goosenecks. Even coal feeding must be ensured using screw feeders or rotary valve feeders. Telescopic seals are to be used around the charging holes. Visible emissions are limited to 12 sec per charge

(ii) For pushing, evacuation from the coke guide and the quench car using stationary ducting and gas cleaning or any other technology yielding the equivalent or better results is required.

(iii) For quenching, the quench tower must have suitable baffles; quench water must have less than 50 mg/liter suspended solids and no floating oil.

(iv) A battery and door frame maintenance system approved by the licensing authority must be operated. No more than 4% of doors may show visible leaks; no more than 2.5% of gas off-take pipes may show visible leaks.

(v) Measurement/ inspection procedures for visible leaks from doors, standpipes and from charging shall be carried out weekly for each battery using method EPA 303 from table 1 and records submitted to the licensing authority on a quarterly basis.

(b) The licensing authority may set alternative standards and/or control measures for the reduction of hydrogen sulphide emissions.

2.1.4 Specific monitoring requirements

In addition, the RoD sets certain air quality-related monitoring and reporting requirements that are specific to this project (section 3.2 (g) of the RoD). The introductory paragraph implies that, where stack sampling from the battery combustion stacks is required, representative measurement on a single stack will be accepted provided a motivation is included indicating why that stack should be regarded as representative. The specific requirements are:

- Bi-annual measurements of the composition of cleaned coke oven gas before and after combustion in batteries. This is taken to mean the composition of the coke oven gas after cleaning and the composition of the combustion off-gas.

- Dioxin and furan content of the coke oven stack gas; this is required once only within six months of the decommissioning of the benzole plant.
- Proof must be provided, in the form of personal monitor results and other representative measurements that the door maintenance plan and fugitive emission reduction plan is yielding results.
- Assumptions on the impact of the emissions on ambient air quality made in the specialist air quality report produced during the EIA (Liebenberg-Enslin *et al* 2003) must be confirmed by ambient measurements. The specialist report recommended the installation of additional monitors for particulate matter less than 10 µm diameter (PM₁₀), hydrogen sulphide (H₂S), sulphur dioxide (SO₂) and the combined oxides of nitrogen (NO_x) to the south of the ArcelorMittal site. Results of the measurement must be included in the bi-annual audit report.
- Once-off measurements for the concentration of the following must be included in the first bi-annual report, with remediation proposals should the values prove to be excessive:
 - Ammonia and hydrogen sulphide from the tar decanters, liquid sumps and storage tanks.
 - Benzene at the flushing liquor storage tanks
 - Sampling of cooling tower air/vapour and a prediction of the impact of emissions to atmosphere due to its composition to be included in the first bi-annual audit report together with mitigation measures if the impact is found/estimated to be excessive.
 - Composition of flared coke oven gas and the temperature of the flare to be reported
 - Based on the correspondence between the results predicted in the specialist report and those actually measured (emission and ambient monitoring), consultants are to be appointed to propose a future emission monitoring protocol. The present report is the result of this requirement.
- An independent Environmental Control Officer is to be appointed during construction and commissioning to monitor and report on compliance with the conditions set in the RoD.

3 CONFORMANCE WITH ROD CONDITIONS.

3.1 Composition of cleaned coke oven gas and flue gas (after combustion)

Sampling was done on no 3 and 6 gas plants during June 2010. Results are given in table 3-1 below.

Table 3-1: Results of gas plant performance measurement. (3 samples, average \pm standard deviation)

	No 3 plant	No 6 plant
H ₂ S inlet concentration	6173 \pm 1996 mg/Nm ³	2474 \pm 384 mg/Nm ³
H ₂ S outlet concentration	960 \pm 1211 mg/Nm ³	226 \pm 158 mg/Nm ³
Efficiency based on averages	84.4%	90.8%

Tests for the pollutant content of the flue gas were carried out on 23 June 2010 on two batteries. Results are given in table 3-2 below.

Table 3-2: Results of flue gas concentration measurements. (3 samples, average \pm standard deviation)

	H ₂ S (mg/Nm ³)		NH ₃ (mg/Nm ³)		
No 4 stack	26.1 \pm 12.4		Less than detection limit of 1.2		
No 9 stack	14.1 \pm 9.2		Less than detection limit of 1.2		
Overall average	20.1 \pm 11.8		Less than detection limit of 1.2		
	CO (ppm)	NO as NO ₂ (ppm)	NO ₂ (ppm)	NOx as NO ₂ (ppm)	SO ₂ (ppm)
No 4 stack	5404 \pm 541	50 \pm 4	20 \pm 4	76 \pm 8	0
No 9 stack	1072 \pm 168	112 \pm 6	15 \pm 5	127 \pm 7	0

3.2 Ambient measurements

3.2.1 "Fenceline" background measurements

ArcelorMittal South Africa Vanderbilpark Works operates a number of real-time ambient monitoring stations located close to the fence line of the factory. The location of these monitoring stations is

Air quality monitoring plan for the ArcelorMittal Vanderbilpark coke ovens	
Report no APP/10/AMSA-01 rev 1	p10

given in figure 3-2 overleaf. In view of the prevailing wind directions in the area (see figure 3-1 below), the “south” and “east” stations are most likely to be affected by coke oven emissions. These will also be the stations at which impacts on the adjoining residential areas (Vanderbijlpark to the South and Boipatong to the East) are best reflected.

The results obtained at these stations for SO₂, NO_x and PM₁₀ are given in Table 3-3 overleaf. The “07/08” values are for the period 1 Jan 2007 to 31 Dec 2008, whereas the “09/10” values are for 1 Jan 09 to 30 Apr 2010. It should be noted that the Northern station was only installed during 2009.

Figure 3-1: Wind direction frequency Vereeniging 1997-2001

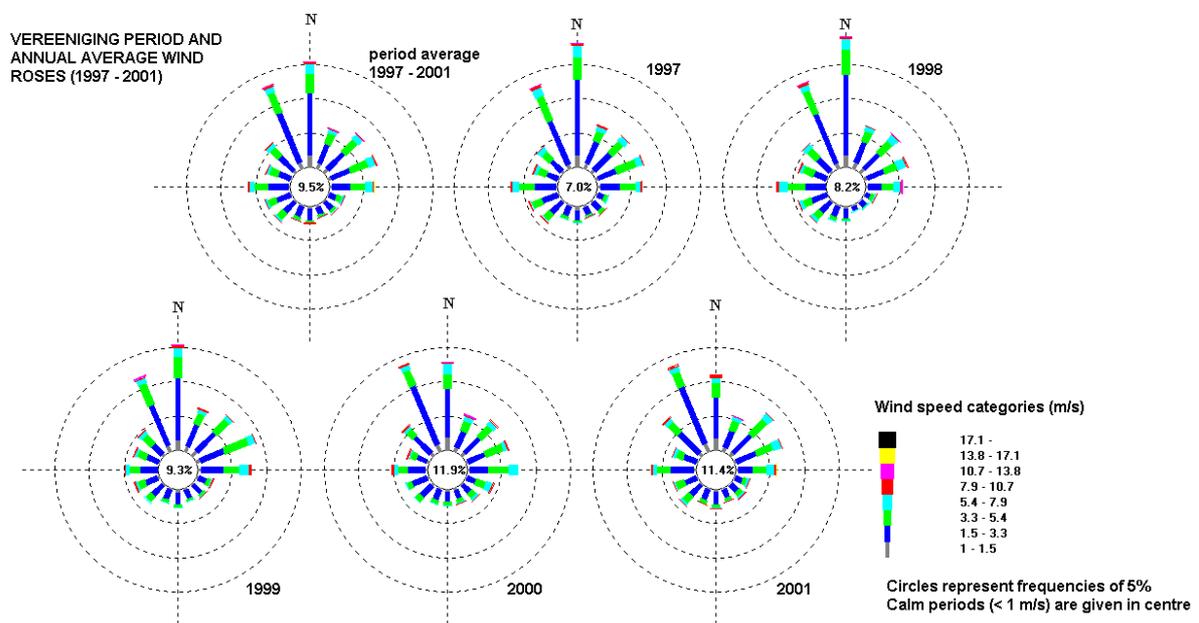


Figure 3-2: Ambient monitoring locations. (Image ArcelorMittal South Africa Vanderbijlpark Works)

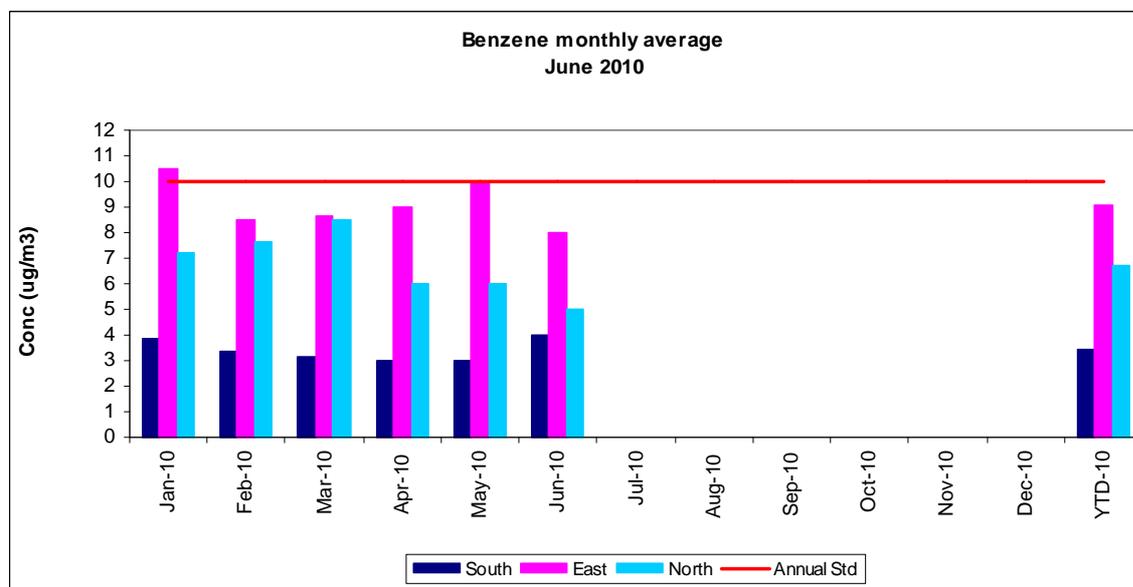


Table 3-3: “Fence line” ambient monitoring results

Component	Location and period	Concentration $\mu\text{g}/\text{m}^3$	Data availability %
NO _x	E 09/10	20.7	84.8
	S 09/10	29.9	80.5
	W 09/10	8.0	29.4
	N 09/10	18.8	63.3
SO ₂	E 07/08	34.3	93.7
	E 09/10	22.5	88.1
	S 07/08	24.8	89.1
	S 09/10	45.2	87.2
	W 07/08	9.1	71.1
	W 09/10	8.8	46.2
	N 07/08	ND	
	N 09/10	21.4	61.9
PM ₁₀	E 07/08	82.3	86.9
	E 09/10	90.3	82.1
	S 07/08	75.4	85.9
	S 09/10	71.4	47.4
	W 07/08	45.1	61.4
	W 09/10	24.7	29.3
	N 07/08	ND	
	N 09/10	55.4	59

In addition, monthly average benzene values were measured at the above stations. The results for 2010 are given in figure 3-3 below.

Figure 3-3: Monthly fence line benzene values.



3.2.2 In-plant measurements

In addition to the fence line measurements for which the results are given above, ArcelorMittal South Africa Vanderbijlpark Works carried out a number of measurements in the plant area during June 2010. The results are provided in table 3-4 below.

Table 3-4. Measurements carried out in the coke plant area. ($\mu\text{g}/\text{m}^3$, value \pm standard deviation)

(ND = not determined, BDL = below detection limit)

Location	Ammonia (NH_3)	Benzene (C_6H_6)	Hydrogen sulphide (H_2S)
Gas plant 3, 2 samples each			
Background	322 \pm 52	918 \pm 353	392 \pm 144
Tar decanter	809 \pm 394	5976 \pm 7341	755 \pm 460
Environmental sump	487 \pm 561	2373 \pm 2929	181 \pm 78
Sump	695 \pm 118	382 \pm 252	513 \pm 250
Gas plant 6, single samples			
Control	202	292	553

	Ammonia (NH ₃)	Benzene (C ₆ H ₆)	Hydrogen sulphide (H ₂ S)
Tar decanter	87	47	102
Environmental sump	807	950	689
Tar separator	1359	ND	199

Gas plant 3, single samples except as noted	Naphthalene	Acenaphtylene	Phenols	Cresols
Background	209.9 ave of 3	BDL	20.5 ave of 3	BDL
Cooling tower	BDL	BDL	9.6 ave of 3	BDL
Environmental tank	482.2	7.8	48.7	22.2
Submerged tank	255.1	1.1	90.1	24.0
Sump	94.0	BDL	7.7	1.0
Environmental sump	79.9	BDL	1.8	BDL
Tar decanter	1718.8	50.6	79.6	58.1
Gas plant 6, single samples				
Control	94.2	BDL	34.3	6.2
Cooling tower	BDL	BDL	BDL	BDL
Tar decanter	37.6	BDL	5.9	BDL
Gas plant 6, single samples				
Environmental sump	671.1	BDL	30.9	2.3
Tar separator	433.4	BDL	21.0	8.9

3.3 Conclusions from monitoring programme

3.3.1 Gas plant performance.

The gas plants meet the RoD requirements in the sense that the clean gas concentration values are below 1.5 g/Nm^3 . Based on the averages of the inlet and outlet compositions, only plant 6 meets the requirements set in the regulation on Minimum Emission Standards (90% removal efficiency or less than $1000 \text{ mg/Nm}^3 \text{ H}_2\text{S}$ in the outlet, whichever is strictest), but these requirements only become mandatory 5 years after publication of the regulation, i.e 1 April 2015.

3.3.2 Flue gas composition.

Measurements meet the requirement for NO_x concentrations comfortably. Hydrogen sulphide concentrations exceed the future Minimum Emission Standards, but again these need to be met only from 1 April 2015. Attention is drawn to the large standard deviations from the small number of measurements.

3.3.3 "Fence line" ambient monitoring results

- NO_x

None of the values measured in 2009/10 exceed the annual average SA ambient standard.

The annual average measured values for 2009/10 correspond remarkably well with the corresponding values for "Coke ovens and other Iscor sources" in the 2003 report. The exception is the "North" station, where the predicted value is slightly less than $10 \text{ }\mu\text{g/m}^3$ against the measured value of $18.8 \text{ }\mu\text{g/m}^3$. This may be due to the impact of domestic fuel use in the residential areas to the north of the plant area, which due to the low level of emission sources and the prevailing wind direction may impact directly on the "North" station.

- SO₂

None of the values measured in 2007/8 or 2009/10 exceed the annual average SA ambient standard. There is no clear trend over time, as the "East" values have declined from 2007/8 to 2009/10 while the "North" values increased considerably over the same period. Values are generally slightly higher than those predicted due to "Coke plant and other Iscor sources" in 2003, with considerably higher values than the predicted ones for the "North" station ($21.4 \text{ }\mu\text{g/m}^3$ measured against less than $10 \text{ }\mu\text{g/m}^3$ predicted). This is probably not due to under-prediction of the impact of the Iscor sources, but to the impact of low-level sources to the north of the plant as described above.

- PM₁₀

Values for the “East” and “South” stations exceed or approach the SA annual average standard valid until the end of 2014, and considerably exceed the standard valid from 2015 onwards. There is no clear temporal trend, except for the “West” values declining by 55% between the two periods – data availability in the second period is however only 29%.

Values for the “North”, “East” and “West” stations are considerably higher than those predicted in 2003, with the “South” values being only slightly higher. This again indicates the impact of sources to the north and west of the plant, which for PM₁₀ may include, in addition to the domestic fuel sources mentioned earlier, vehicle movement on unpaved roads both on the site and in the residential areas to the north, burning of waste in the residential areas and farming activities.

- Benzene

Fence line values are marginally within the present South African annual average standard, but values to the east and north exceed the future SA annual average standard. An anomaly seems to exist in that “North” value is higher than the “South” values in spite of the prevailing winds being from the north to the south.

Values also exceed the predicted values by a considerable margin.

The above leads to the conclusion that a hitherto unidentified source of benzene, or a prevalent high background concentration, is present in the area. Alternatively or additionally, fugitive sources of benzene may be present which were not identified in the 2003 study, where only the batteries themselves were taken into account as benzene sources.

3.3.4 “In-plant” measurements

None of the measured values exceed the legal requirements under the OSH Act. It should however be taken into account that considerably more stringent standards have been adopted internationally, especially for benzene as a known human carcinogen.

4 RECOMMENDATIONS

4.1 “Fence line” ambient monitoring.

- ArcelorMittal South Africa Vanderbijlpark Works is to be commended for the useful data obtained from the fence line monitors in terms of community impact and it is recommended that the programme (including determination of benzene levels) be continued.
- It is however clear from even a rudimentary analysis of the data that this programme alone cannot provide confirmation of the success or otherwise of door maintenance and/or other fugitive dust management programmes in the coke oven area.

4.2 In-plant atmospheric monitoring

- It is therefore recommended that visible leaks from doors, standpipes and charging operations be monitored. Method EPA 303, which is the prescribed method in terms of the Minimum Emission Standards regulation, provides guidance on the protocol (including observation frequency), and in-house training has been carried out by ArcelorMittal South Africa Vanderbijlpark Works. Method 303 prescribes EPA-conducted training, which is obviously not applicable to the local situation. The Department of Environmental Affairs has informally indicated that an accreditation scheme for emission monitoring is being investigated. It is proposed that ArcelorMittal South Africa Vanderbijlpark Works communicate with DEA in this regard, and considers accreditation of the in-house training when these accreditation requirements have been finalised. The results of the method 303 observations will be supported by a trend analysis of the personal monitoring in the coke battery and gas plant area in terms of the OHS Act.
- The required once-off measurements for the concentrations of benzene, ammonia and hydrogen sulphide have shown conformance to legal (in-plant or occupational exposure) limits and it is submitted that repeating these measurements is not necessary.
- Continued regular measurements of these compounds (and coal tar pitch volatiles (CTPV)) for purposes of employee exposure need to be continued as part of the industrial hygiene monitoring programme required by the OSH Act and incidentally, by the analysis of temporal trends, to monitor the management of the fugitive emissions programme.

4.3 Process monitoring

- In view of the wide margin by which the present measurements meet the requirements of the Minimum Emission Standards regulation for these pollutants, annual measurement of the

Air quality monitoring plan for the ArcelorMittal Vanderbijlpark coke ovens	
Report no APP/10/AMSA-01 rev 1	p18

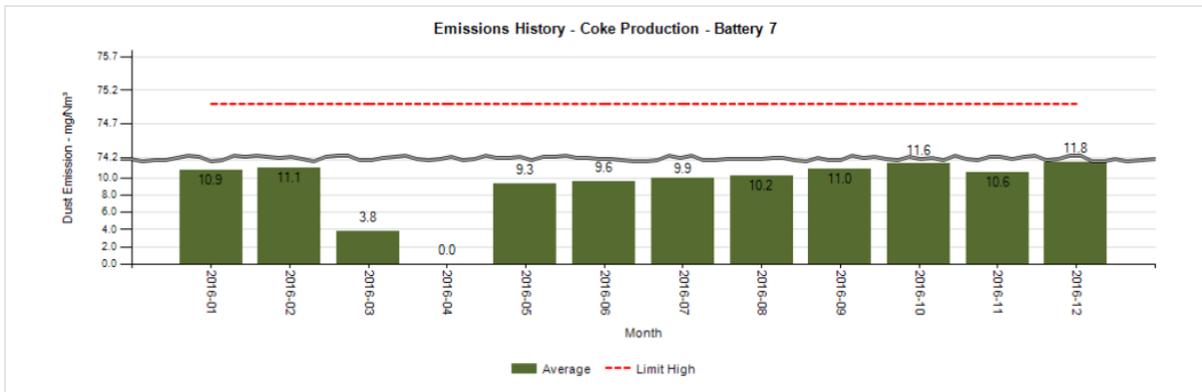
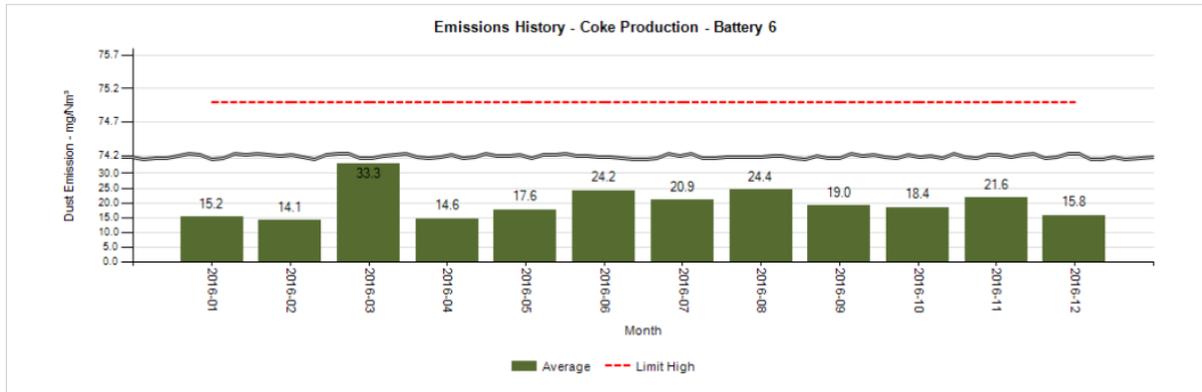
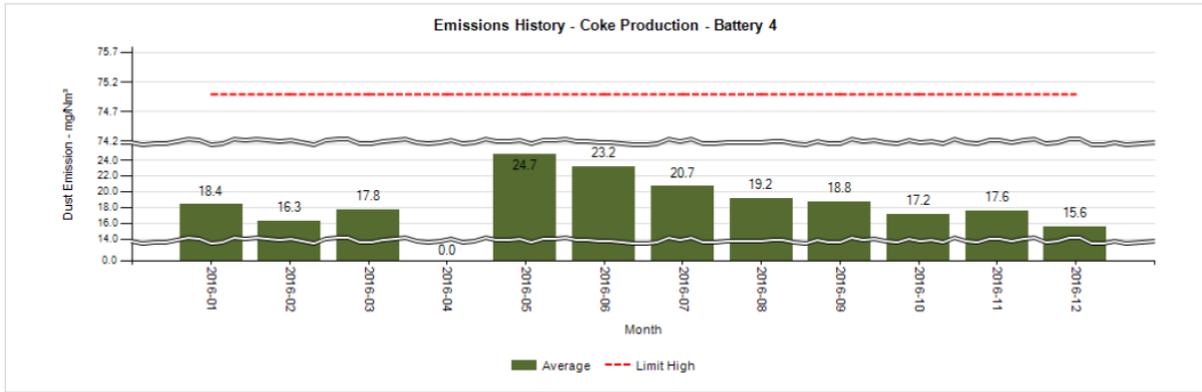
PM₁₀, NO_x and SO₂ emissions from a representative stack per battery stacks under representative operating conditions should be sufficient.

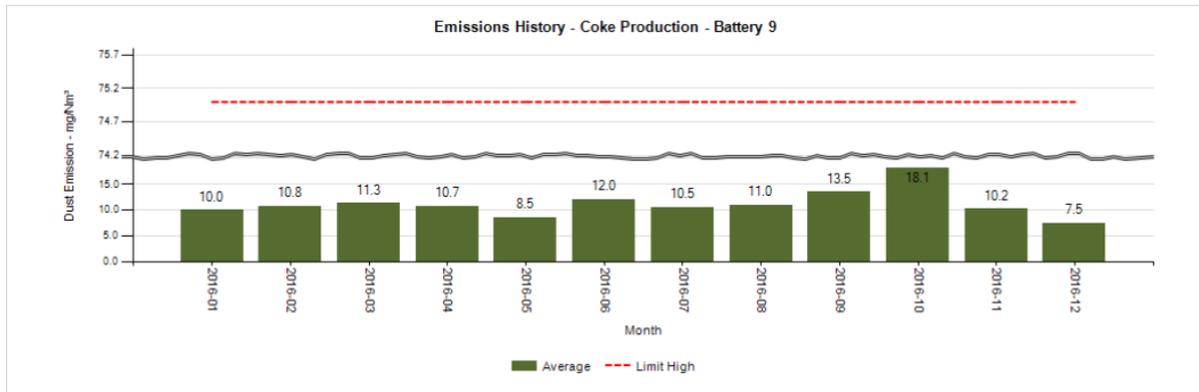
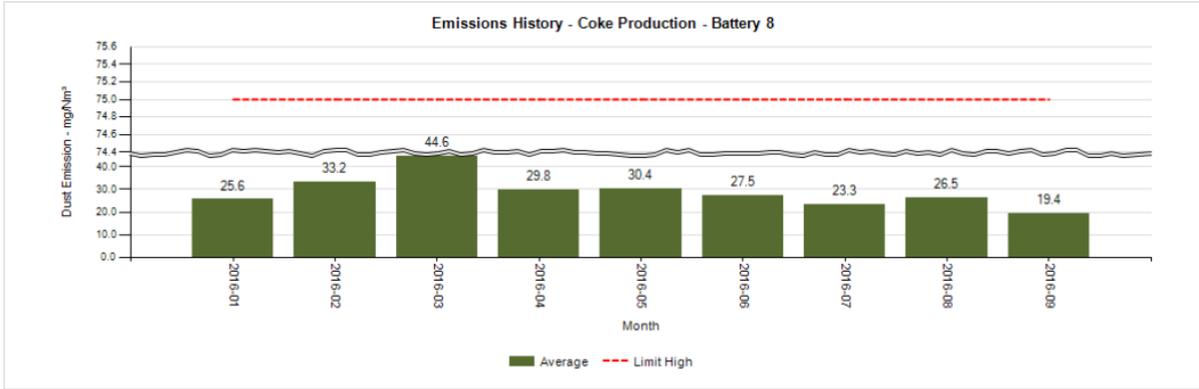
- It will however be noted from the standard deviation that large variations occurred during the measurements of hydrogen sulphide at the gas plant inlet and outlet and with the small number of analyses no final conclusion can be made. It is clear from the high standard deviations of the measurements that either the composition or the measurement method has a high variability. In view of the fact that the plant does potentially not meet the legal requirements applicable from April 2015, these measurements initially need to be repeated at a higher frequency than that specified in the RoD (bi-annually) until the issues of both the measurement variability and the plant performance have been satisfactorily settled and a valid statistical analysis is possible. It is proposed that this be done on a project basis as soon as resources can be made available. Either EPA method 11 (sampling/iodometric).or method 15 (sampling/gas chromatography) could be used.
- Once-off measurement of dioxin and furan in a representative battery stack were done in 2005. Results are low compared to emission standards for other incineration plants and no further action seems to be indicated. .
- Monitoring of quench water quality (and comparison to the requirements of the Minimum Emission Standards regulation) as most probably intended by the RoD requirements should be carried out on a regular basis. As the analytical requirements are not stringent and can probably be met with present in-house facilities, weekly analysis is recommended.
- With regards to the requirement to measure the composition of flared treated gas and the temperature of the flare, it is recommended that an argument be submitted to the authorities that this is a superfluous requirement based on the following:
 - The composition of the flared treated gas is the same as measured under the first bullet in this sub-section, and resolution of the measurement requirements as proposed there will also resolve the question of the composition of the flared gas.
 - Although the fare temperature could be measured thermographically, the information would not add value as oxidation of hydrogen sulphide to sulphur dioxide occurs at quite low temperatures. For purpose of dispersion modelling, a sufficiently accurate estimate of flare temperature to determine its buoyancy can be made without measurement.

5.REFERENCES.

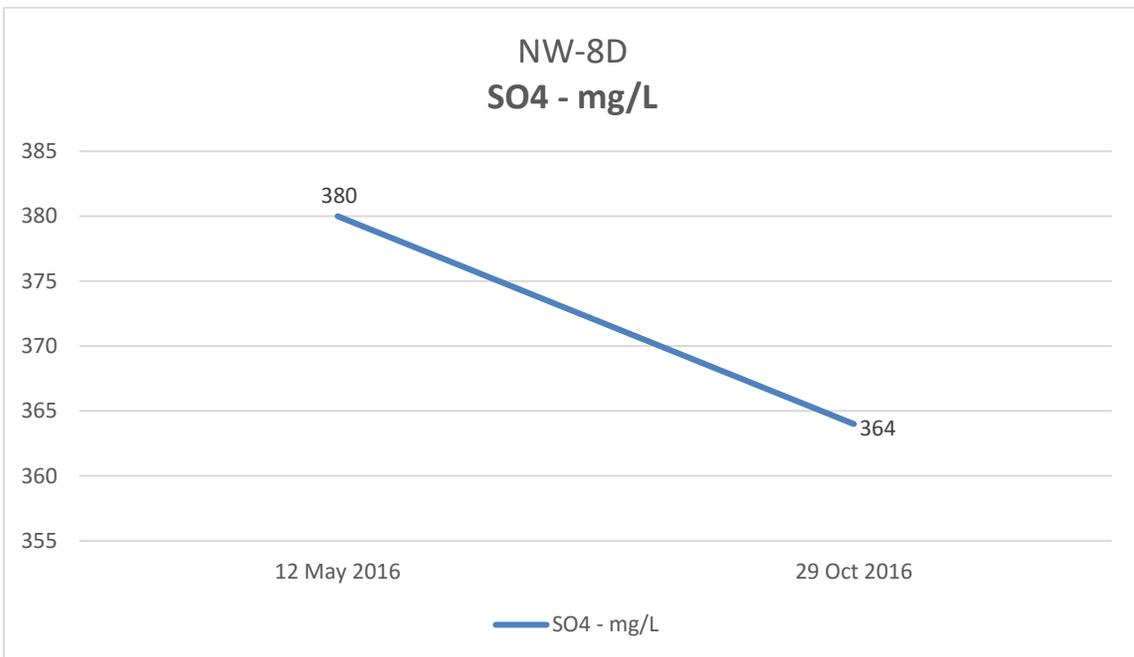
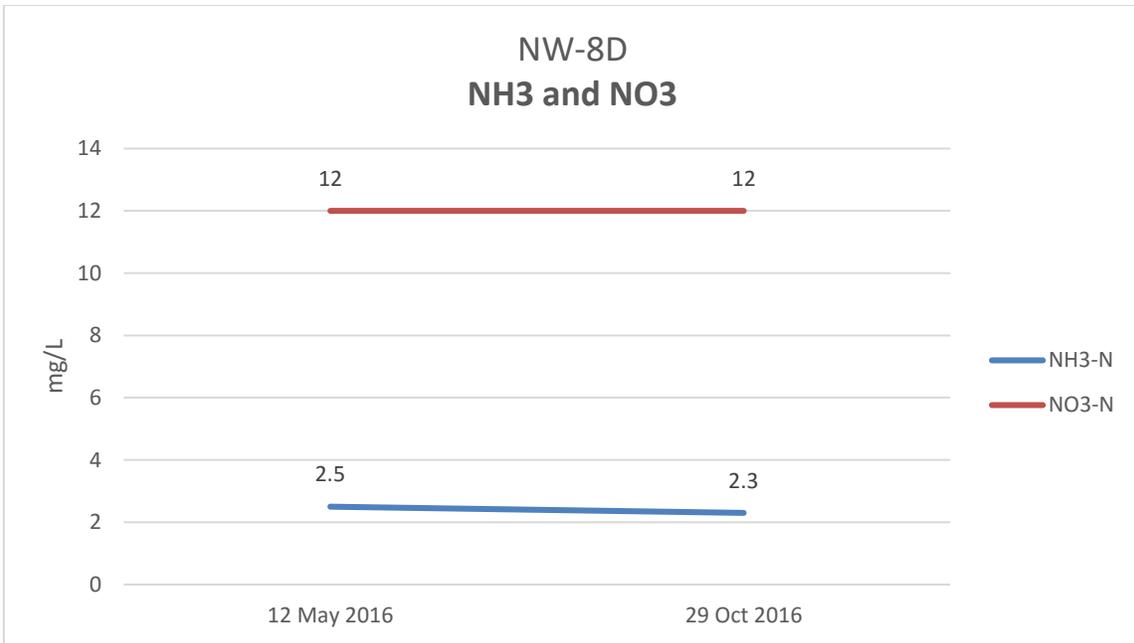
Liebenberg-Enslin, H *et al.* (2003): *Air quality assessment of the Iscor coke oven gas and water cleaning plant upgrade in Vanderbijlpark, with addendum dd 2 July 2003.* Airshed Planning Professionals (Pty) Ltd report number APP/03/SEF-01 Rev 3. Halfway House

APPENDIX J: *COKE BATTERY STACK DUST EMISSIONS*

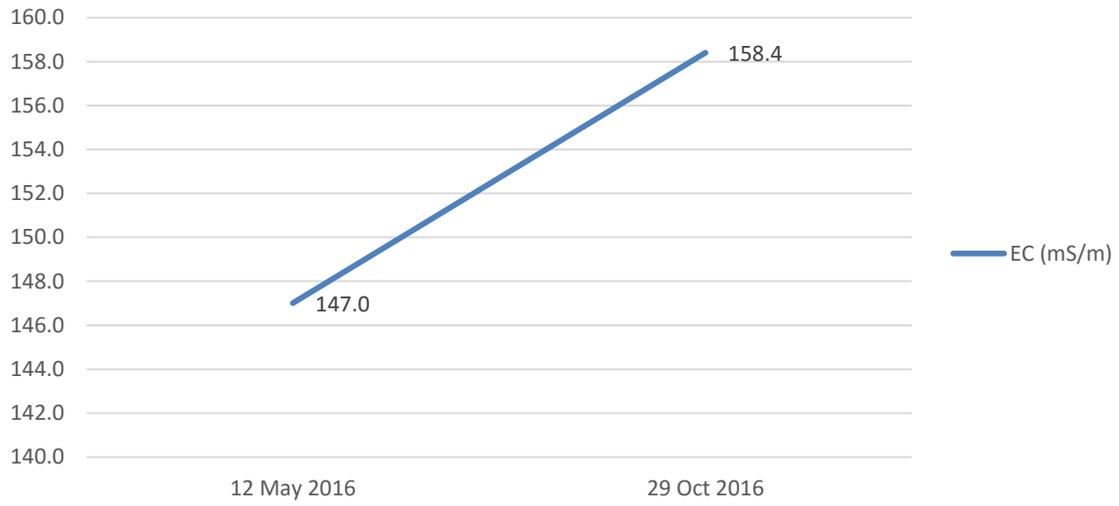


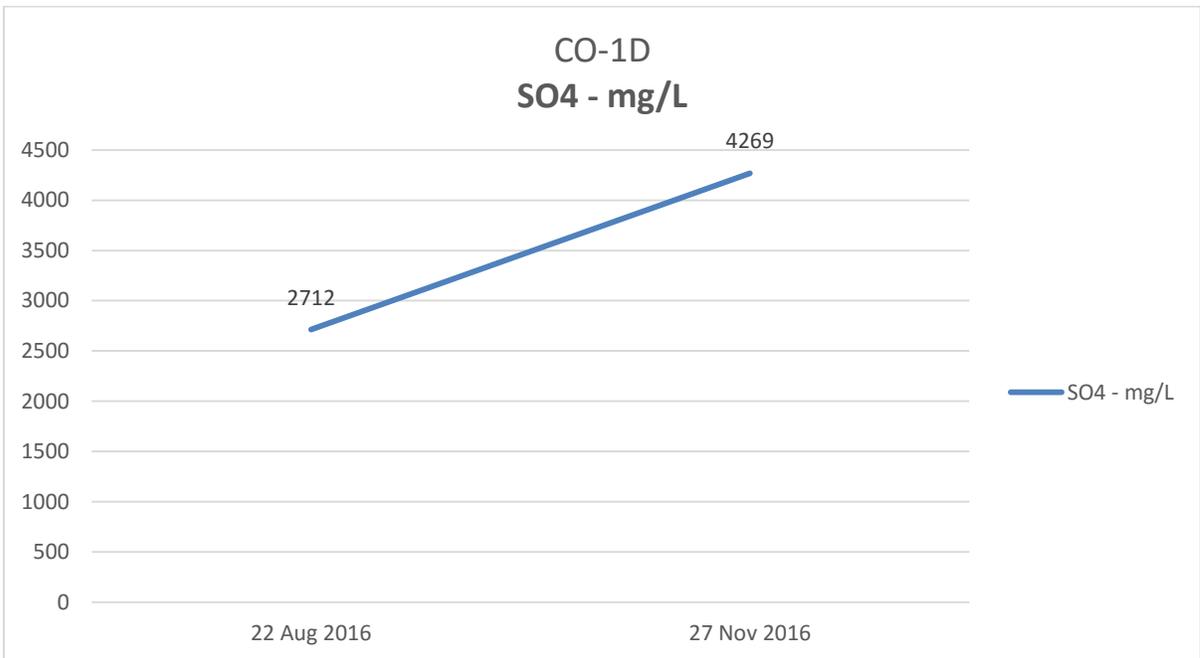
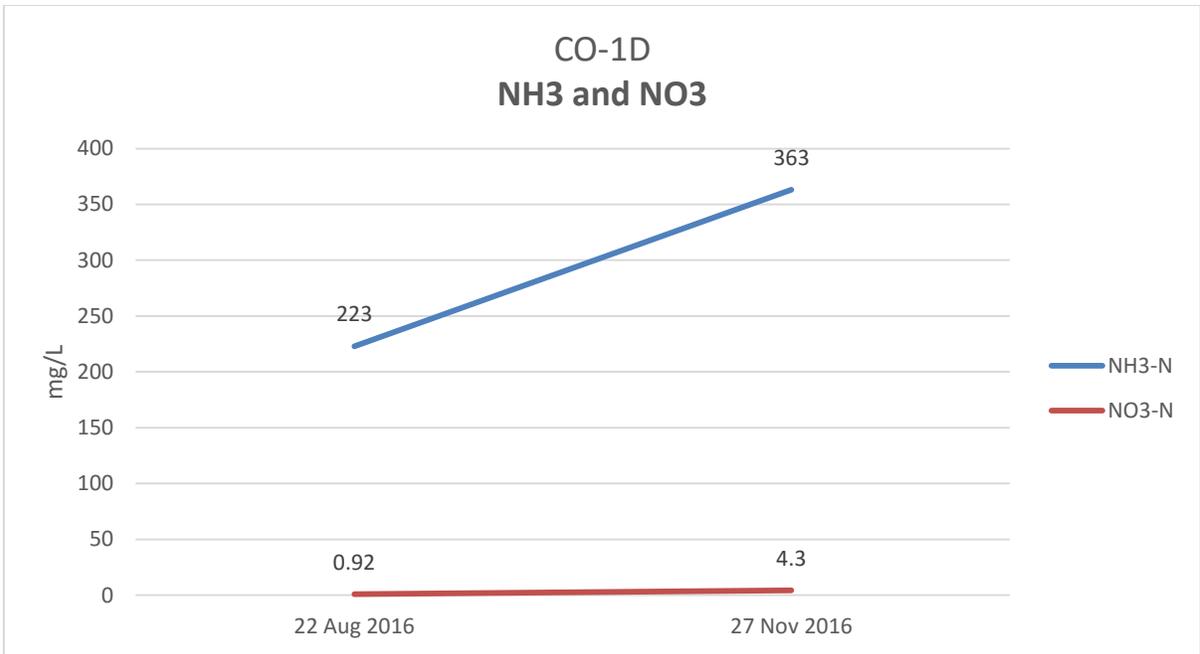


APPENDIX K: *GROUNDWATER MONITORING RESULTS*

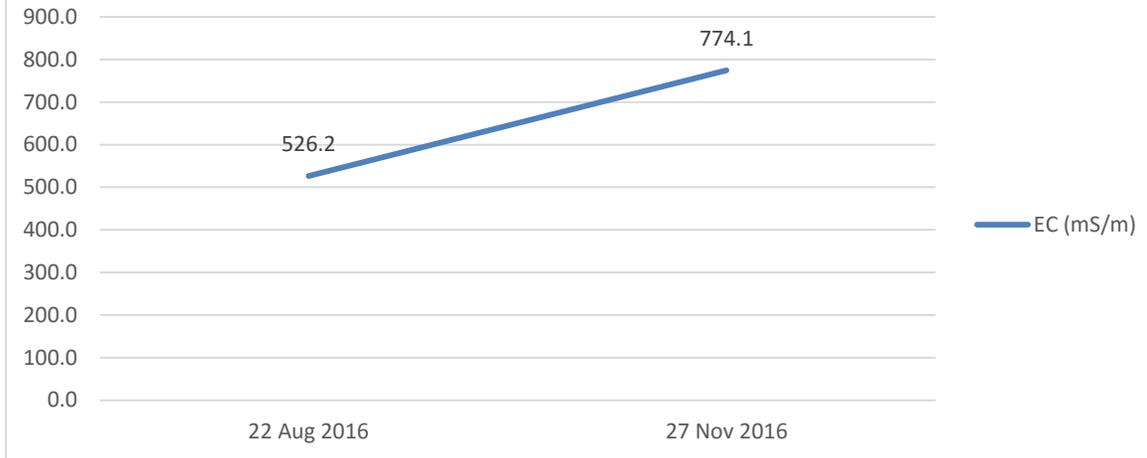


NW-8D
EC (mS/m)

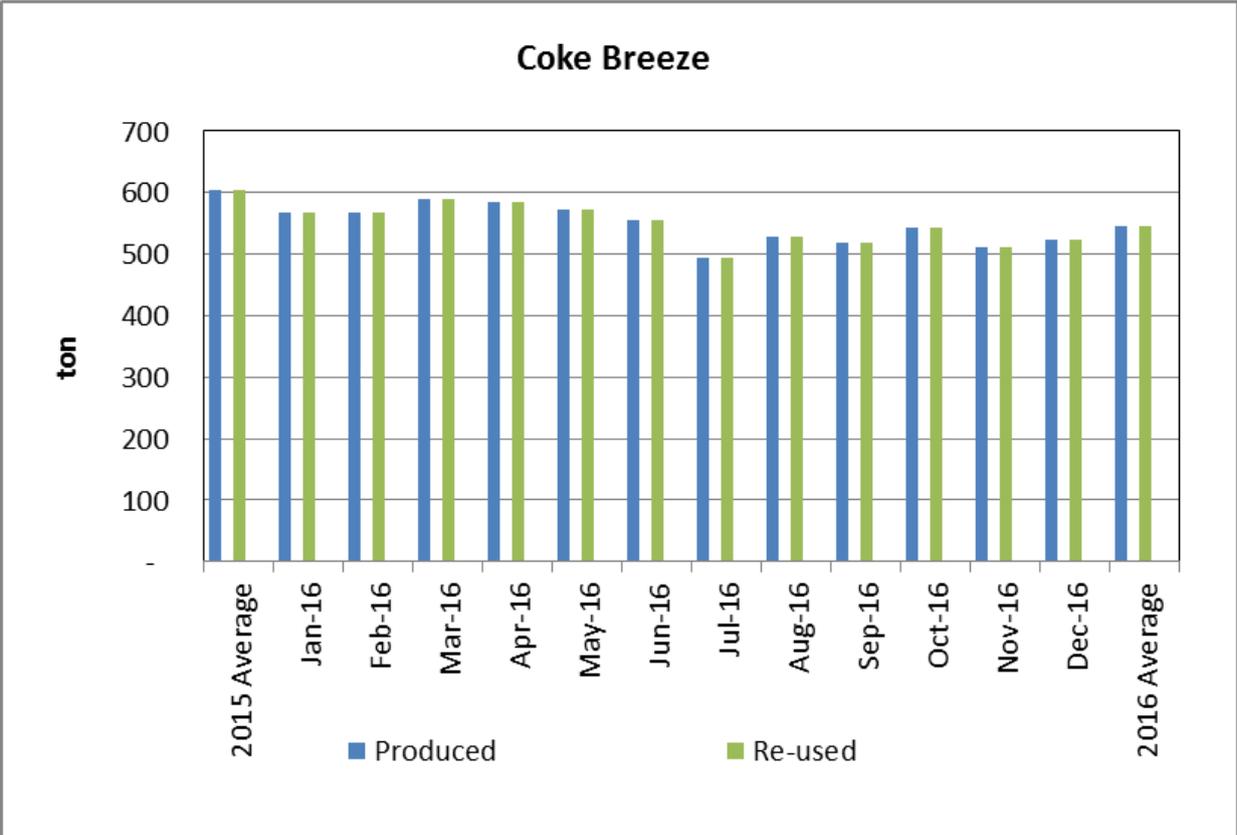
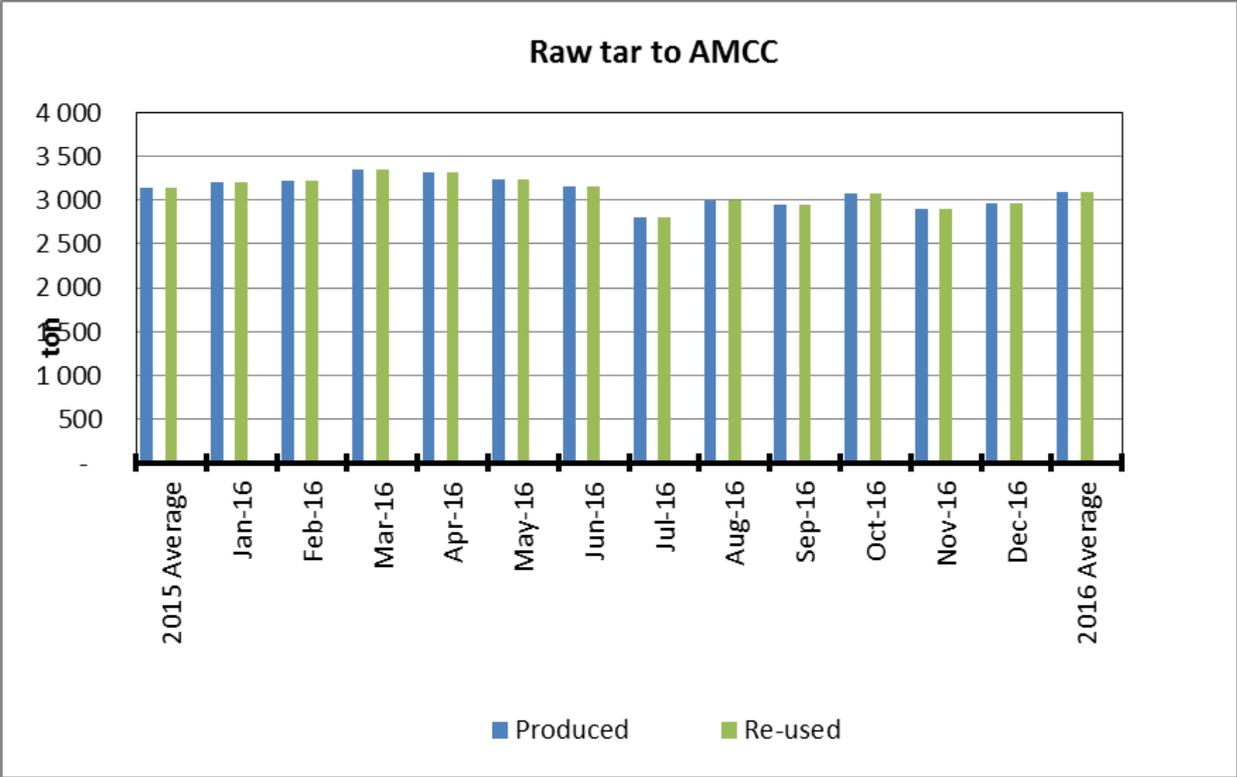




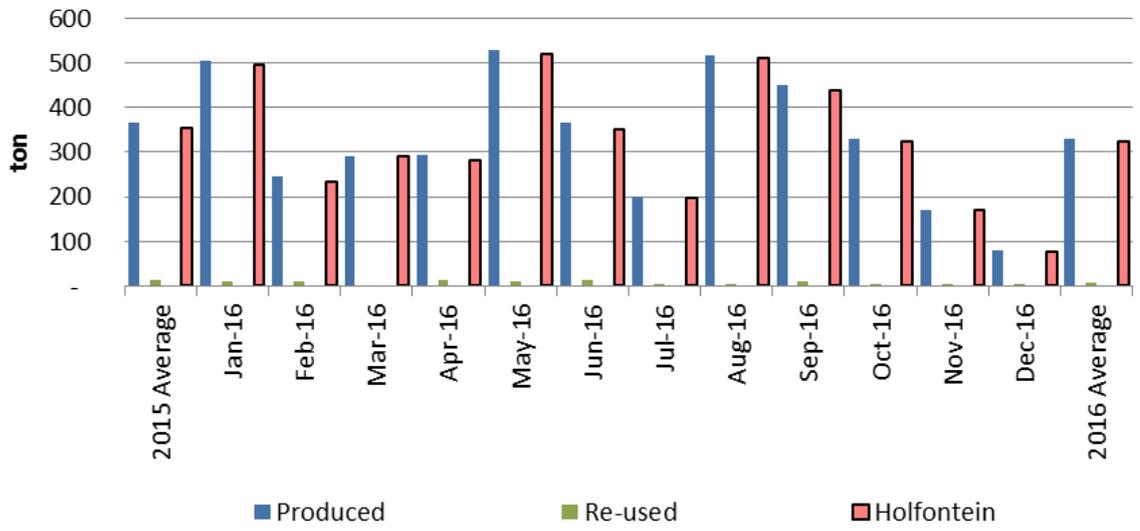
CO-1D
EC (mS/m)



APPENDIX L: *WASTE STREAM QUANTITIES*



Coal tar and ash



APPENDIX M: *EXAMPLE OF A RECENT JOB CARD*

Planning Plant: *SF01*
Vanderbijlpark Works



ArcelorMittal

BEFORE STARTING THE JOB, ASK YOURSELF THE FOLLOWING QUESTIONS

- I Is the equipment isolated ? (Mechanical, Electrical, Area)
- W Am I wearing the correct P.P.E. , What else should I use ?
- O What other party must know we are working here ?
- R Are the right tools available and safe for use ?
- K Have I discussed the known hazards with the team ?
- S What in the area could endanger our safety ?
- A Are specific procedures or instructions applicable ?
- F What can go wrong or fail during the job ?
- E Have I communicated effectively with the team ?

Does this job have an Environmental impact? (Y/N)
 If "Y" describe impact
 What precautions will be put in place to prevent/limit the impact?

Maint Plant: *SFKN Coke Oven By-products* Date Printed: 2017.01.09

Plant Maintenance Work Order Header

Printed By: 3967580

Copy: 1

M/Plan Nr: 59391
 Order Nr: 926153664

Notification Nr:

W/O Type: PM02

Funct Loc:

03-S	IFS South Works
ABC IND: C	LOW IMPACT
03-S-FKN	Coke Oven By-products
ABC IND: C	LOW IMPACT
03-S-FKN-853	GAS PLANT 3
ABC IND: C	LOW IMPACT
03-S-FKN-853-03	GP3 ELECTRO DETARRER SYSTEM
ABC IND: A	HIGH IMPACT

Equip:

Description: (Short) *Inspect all Detarrer insulators*

Planning Related Information

PM Planner grp: MCA	Byproducts A-block
Main work centre: ICNS1 SF01	Superintendent Execution team 2
System Condition: 5	Standing
Priority: 2	Sched - Future Med
Status:	REL CSER NMAT PRC SETC
Activity Type: INS	Inspection
Basic Start Date: 2016.12.07	Basic End Date: 2016.12.07
Basic Start Time: 07:00:00	Basic End Time: 07:00:00

Equipment Installed/Dismantled:

Equipment Number Dismantled:
 Equipment Number Installed:

Operations Detail

Operation number: 0010 Inspect all Detarrer insulators
 Status: REL
 Work Centre: ICNS2 SF01 Superintendent By-Products B-BLOCK
 Personnel Nr: 00000000
 Number Capacities: 1 Planned Duration: 0.0 HR
 Earliest Start: 2016.12.07 Latest Finish: 2016.12.07
 Control Key: PMIN PMINPlant Maintenance Internal
 System Condition: 5 Standing
 Frequency (Package): 01 1 Weekly

Material # Description	Reservation #	Purchase Order #	Quantity
---------------------------	---------------	------------------	----------

PRT Number:	Description:	Quantity Required:
COKE OVENS MINI HIRA	Hazard Identification and Risk	1.000

Confirmation number: 0048300009

Operations Long Text

R=Right
W=Wrong
C=Corrected

Inspect all Detarrer insulators

Detarrer: 3A I 3B I 4A
 Insulator temp. 66,9°C 116,9°C 112,4°C Deg.C
 Doors closed. ... R . I . C . I . R .
 Is temp. visable ... R . I . C . I . R .
 4A Insulator teperatures: 1: 112,4°C 2: 94,6°C 3: 116,9°C

ARTISAN TO COMPLETE

Confirmation Sheet:

St.Date/Time	End Date/Time	Act. Dur	Emp. Nr	Sign	Descrip	Rem. Work
17/01/10	02/11/30	14h55	1001779			

Waiting on cranes	<input type="checkbox"/>	Plant, Unit, Machine Unavailable	<input type="checkbox"/>
Waiting on tools/special tools	<input type="checkbox"/>	Waiting on spares/material	<input type="checkbox"/>
Waiting on transport	<input type="checkbox"/>	Job obstructed clean or remove	<input type="checkbox"/>
Additional unforeseen work	<input type="checkbox"/>	Working conditions difficult	<input type="checkbox"/>
Waiting on service sections	<input type="checkbox"/>	Roll and shear blade services	<input type="checkbox"/>
Roll and shear blade services	<input type="checkbox"/>	Task will not be done	<input type="checkbox"/>
Fin. Confirm	<input type="checkbox"/>		

Dir Plessis

Sign-Off

10 JAN 2017

Supt Sign:

3738057
Tel:29582

Emp.Nr:

Date:

Planning Feedback

Inspection Done
Equipment Still in Good Condition



ArcelorMittal

Hazard Identification and Risk Assessment

Department/Section:		Task executor:	
Date:	Signature:	Employee No	
Task:			

Mini HIRA

No	A1. ARE YOU AT RISK?	No	Yes
1	Have you read the SWP for this task?	1	
2	Will there be supervision whilst this task is performed?	2	
3	Do you have all the necessary PPE as indicated in the SWP?	3	
4	Have you received the required training for this task? (IDP)	4	
5	Have you done this task in the last three months?	5	
6	Are you acquainted with the environment?	6	
7	Is the item / process / machine / equipment – isolated?	7	
8	Have you reported to the person in control of the area.	8	
9	Do you have an evacuation plan	9	
10	Is your equipment and/or tools safe?	10	
11	Will you be exposed to gasses, fumes, dust, heat, noise or HCS?		11
12	Have you currently been working for longer than 9 hours?		12
13	Will you be under pressure due to time limitations?		13
14	Can you spill or create any pollution during this task?		14
15	Are you going to work higher than 1.8 m or on any elevated position without protection rails?		15
16	Will you be entering a confined space?		16
17	Are you working in close proximity of moving machinery?		17
18	Can something fall on you or can you drop something on someone?		18
19	Have you taken any medication in the last 12 hours?		19
20	Is there any change in the process, design or procedure?		20
21	Can you be caught in or between anything?		21

If your answer reflects in the red box (table A1) – indicate the controls you will take to manage those risks on page 2 (Table A2) Controls to manage the risk

A3. TAKE COGNISANCE OF					
	At risk	Not at risk		At risk	Not at risk
Falling/Flying objects			Unsteady/wobbly		
Slippery Surface/trip hazards			Pressure discharge		
Grab hold of			Fellow workers		
Moving open parts			Ingestion/absorption/inhalation		
Falling over/down			Missunderstanding		
Oxygen limitations			Open wires/nip points		
In the path of			Working with new employees		
Static electricity			Traffic (Road and Rail)		
Mixing hazards			Illumination		
Open /close wrongly			Rigging plan		
Limited visibility			Bad weather conditions		
Fire hazard			Other		



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Nr	A2. CONTROLS TO MANAGE THE RISK.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
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15	
16	
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18	
19	
20	
21	

If you cannot manage the risk - continue with the full HAZARD IDENTIFICATION AND RISK ASSESSMENT

COMMENTS