

**MONITORING REPORT FORM (CDM-MR) ***
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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

**MONITORING REPORT**

Version 4 – 26/03/2012

Transalloys Manganese Alloy Smelter Energy Efficiency Project

Reference number 1027

Monitoring period number 4 - 01/03/2010 - 30/04/2011

SECTION A. General description of the project activity**A.1. Brief description of the project activity: >>**

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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:

The Transalloys Manganese Alloy Smelter Energy Efficiency Project is an industrial energy efficiency project that reduces the electricity consumption in the production of silicomanganese (subsequently “SiMn”) alloy (a key component in steel making) at its Witbank facility in South Africa.

The project displaces electricity from the South African grid, which is predominantly coal based. Usage of coal and coke (employed as reductants), and paste (predominantly carbon, employed as electrode) in the submerged electric arc furnaces are also included in the emission reduction calculation.

2. Brief description of the installed technology and equipment:

The Transalloys facility currently employs 5 submerged electric arc furnaces for SiMn alloy production. Furnaces 1, 3, and 5 (subsequently “F1”, “F3”, and “F5”) are of “Elkem” design, while Furnace 6 (subsequently “F6”) is a self built furnace based on that design. Furnace 7 (subsequently “F7”) is of “Demag” design. The electric capacities of the furnaces are 48MVA (F5 and F7), 22MVA (F6) and 21MVA (F1 and F3).

The approach of the project, for the 5 furnaces producing SiMn at the facility, is to retrofit new technology into the existing furnace infrastructure.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods etc.):

The project is a prompt start project claiming carbon credits as of October 2004 for the retrofit of the five furnaces. The retrofit schedule is as per Table 1 (below):

F7	Retrofit completed 09/2004
F3	Retrofit completed 10/2005
F5	Retrofit completed 12/2005
F6	Originally planned to be retrofitted in 2008, but delayed due to poor market conditions. To date, it remains without retrofit.
F1	Originally planned to be retrofitted in 2009, but delayed due to poor market conditions. To date, it remains without retrofit.

Table 1: Project furnace(s) retrofit schedule



4. Total emission reductions achieved in this monitoring period:

230,307 tCO₂e

A.2. Project Participants

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Host party:

Republic of South Africa, indirectly involved; Authorised Participant(s): Transalloys (Pty) Ltd. (formerly Highveld Steel and Vanadium Corporation Ltd.).

Other parties involved:

- United Kingdom of Great Britain and Northern Ireland, indirectly involved; Authorised Participant(s): EcoSecurities Group plc;
- Switzerland, indirectly involved; Authorised Participant(s): EcoSecurities Group plc.

A.3. Location of the project activity:

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Clewer Road, Witbank 1035, Mpumalanga, Republic of South Africa.

A.4. Technical description of the project

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The retrofit of the furnaces consists of the following:

- F5 and F7: the Pitch Centre Diameter (subsequently “PCD”) which measures the distance between the three electrodes (please refer to Figure 3 of the registered PDD), was optimised in order to reduce electricity consumption. If the PCD is too large, then the furnace requires a higher current density; whereas if the PCD is too small, the outside of the furnace(s) cool(s) excessively, resulting in operational difficulties. The decision to change the PCD was based on assumptions and mathematical models that *still require* actual confirmation in practice, since such innovative changes imply an element of uncertainty. Changing the PCD means that all 3 electrode column assemblies and the material inlets have to be changed, in addition to adaptation of the existing roofing structure (to the new dimensions). For F5, the investment cost was relatively high since the off-take systems (i.e. stacks) *also* had to be changed, and new lining and foundations installed for the furnace. “Pyromet” provided the technology for these furnaces, and it was the first time such technology was employed for a Brownfield project.
- The same principles apply to F1, F3, and F6, however, these units being smaller, the design was slightly different. For instance, F3 was converted from a rotating (around its vertical axle) to a static furnace, and the old pneumatic slipping system (allowing the electrode paste down the electrode) was changed – both elements make the scope of this retrofitting unique and challenging. “Bateman” provided the technology for these furnaces.

Diagram 1 (below) is a schematic of one furnace, representing inputs and outputs of products and energy:

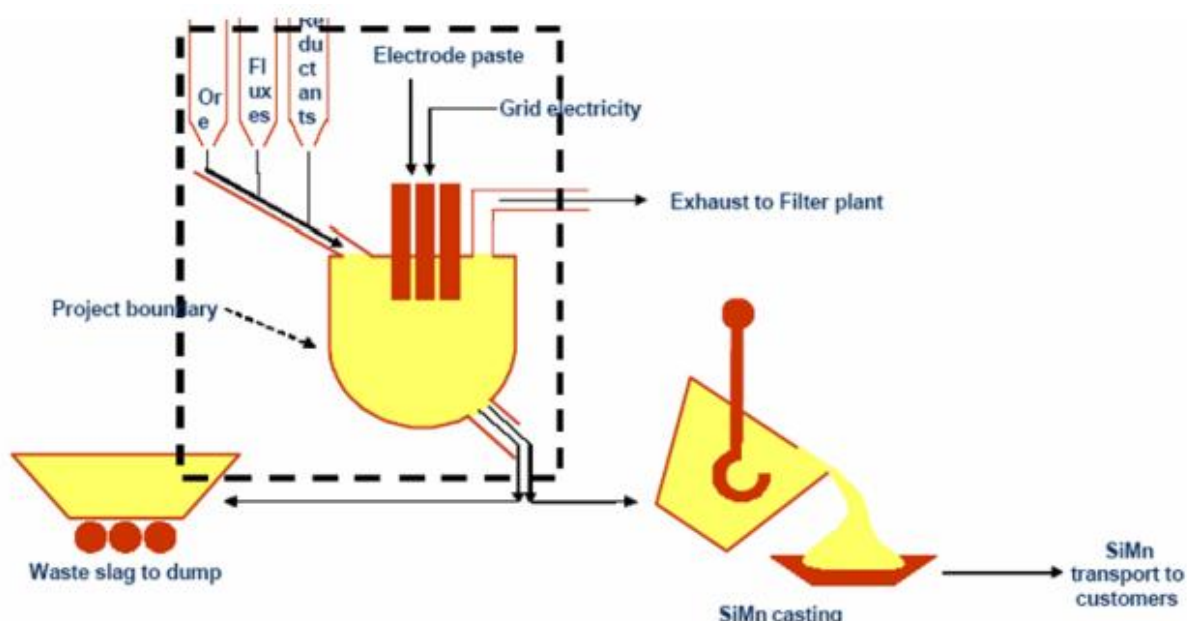


Diagram 1: Schematic of furnace (representing input(s)/output(s) of product(s)/energy)

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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- AM0038 version 1 - Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of SiMn;
- ACM0002 version 6 - Consolidated methodology for grid-connected electricity generation from renewable sources.

A.6. Registration date of the project activity:

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19/10/2007. The project was “prompt start” with crediting period commencing 01/10/2004.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Fixed crediting period: 01/10/2004 – 30/09/2014.

There was no post-registration change to the start date of the crediting period.

A.8. Name of responsible person(s)/entity(ies):

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The Monitoring Report is compiled by EcoSecurities International Ltd.

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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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1. Commencement date of operation of the project activity:

The project employs phased implementation since it covers 5 furnaces at the project site. The project commenced operations on 01/10/2004, and the retrofit schedule is as per Table 2 below:

F7	Retrofit completed 09/2004. Operation commencement 01/10/2004.
F3	Retrofit completed 10/2005. Operation commencement 30/11/2005.
F5	Retrofit completed 12/2005. Operation commencement 04/12/2005.
F6	Originally planned to be retrofitted in 2008, but delayed due to poor market conditions. To date, no retrofit.
F1	Originally planned to be retrofitted in 2009, but delayed due to poor market conditions. To date, no retrofit.

Table 2: Retrofit schedule for furnaces

2. Information regarding the actual operation of the project activity during this monitoring period:

F3, F5, and F7 operated throughout this monitoring period.

3. Events or situations affecting the applicability of the methodology:

No events occurred that affected the applicability of the methodology.

B.2. Revision of the monitoring plan

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The Monitoring Plan was revised, and approved on 25/10/2009. No other revision is pending.

B.3. Request for deviation applied to this monitoring period

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No request for deviation was applied during this monitoring period.

B.4. Notification or request of approval of changes

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No notification or request of approval of changes has been made.

SECTION C. Description of the monitoring system

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Data collection procedures

The monitored data is collected at different stages of the process, in different parts of the plant, as explained below:

- Amount of SiMn produced, electricity, paste, coke, and coal used at the project furnaces are collected from meters via a Distributed Control System (subsequently “DCS”) and directly displayed on an interface in the control room directly. The values are entered in the respective furnace log-sheets by the furnace operator. After being checked by the Production Engineer, the daily totals are then summed and entered in the CDM workbook. Paste cylinders are tallied as they are placed into their casings. To obtain the monthly average weight of the paste cylinders (used to calculate the amount of paste as per Monitoring Plan), the readings from the weighbridge (at the facility entrance) are recorded in a spreadsheet by the weighbridge personnel for each paste delivery. The monthly total weight and number of cylinders weighed is then entered in the CDM workbook, where the monthly average weight of the paste cylinders is calculated.
- Quality of coal, coke (used to calculate emission factor for coke in the CDM workbook), SiMn, ore, and fluxes are obtained via composition analysis performed at the plant laboratory. The results are then entered in the CDM workbook.
- Paste quality details are obtained from the supplier.
- Values for grid emission factor and coal emission factor are taken directly from the PDD and entered in the CDM workbook, as per the Monitoring Plan.

Please refer to sections D.2 and E for detail of emission reduction calculation.

The monitored parameter data is taken from the CDM workbook and reported in the CDM Monitoring Report prior to verification.

Organisational structure, roles, and responsibilities

An on-site CDM Manager is responsible for organising the monitoring team and ascertaining that the monitoring system is as per the Monitoring Plan. Furnace operators who collect monitored data report to the Production Engineer who checks the production data (including CDM monitored data). Laboratory staff performing the analyses are organised under a Laboratory Manager. Maintenance teams are in place at the plant to ascertain that monitoring equipment is maintained and calibrated as per the Monitoring Plan. Roles and responsibilities are clearly defined in the site procedures that are part of the ISO9001 certified quality management system.

Emergency procedures for the monitoring system

Since all measurements and analyses employed for project CDM monitoring are also used for internal reporting, emergency procedures are in place on-site for possible equipment failures.

The metering system is represented in Diagram 2 (below):

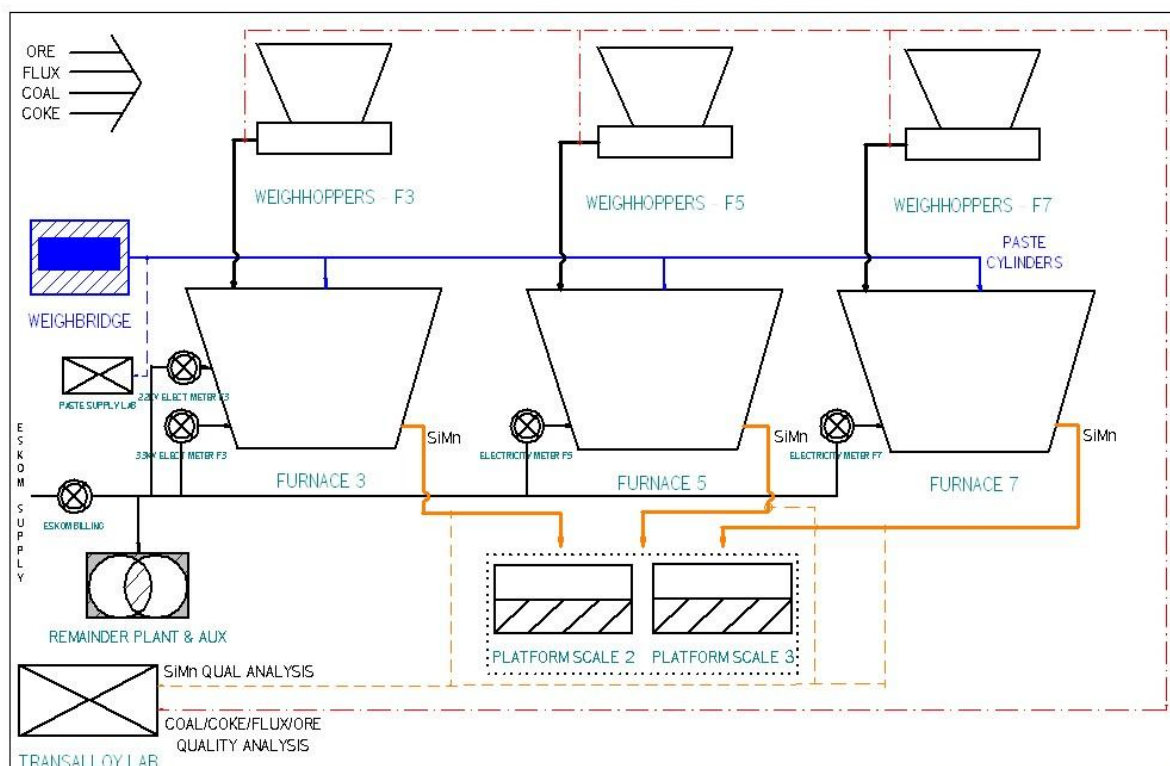


Diagram 2: Transalloys metering system

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	QP _i																																																												
Data unit:	Tonnes of SiMn/year																																																												
Description:	Annual SiMn production for 7 years preceding the project activity																																																												
Source of data used:	Project proponent																																																												
Value(s):	<table><tr><th colspan="6">QP_i (tSiMn/y)</th></tr><tr><th>Furnace</th><th>1</th><th>3</th><th>5</th><th>6</th><th>7</th></tr><tr><td>1997</td><td>21,685</td><td>21,930</td><td>38,847</td><td>22,571</td><td>40,685</td></tr><tr><td>1998</td><td>7,506</td><td>9,518</td><td>42,005</td><td>24,188</td><td>42,399</td></tr><tr><td>1999</td><td>21,779</td><td>17,680</td><td>35,788</td><td>8,238</td><td>44,477</td></tr><tr><td>2000</td><td>18,641</td><td>19,731</td><td>35,877</td><td>21,269</td><td>34,862</td></tr><tr><td>2001</td><td>21,809</td><td>22,660</td><td>34,843</td><td>21,846</td><td>31,933</td></tr><tr><td>2002</td><td>23,349</td><td>22,159</td><td>41,898</td><td>22,618</td><td>43,700</td></tr><tr><td>2003</td><td>21,321</td><td>21,601</td><td>35,108</td><td>21,632</td><td>37,717</td></tr><tr><td>Total 97-03</td><td>136,090</td><td>135,279</td><td>264,366</td><td>142,362</td><td>275,773</td></tr></table>	QP _i (tSiMn/y)						Furnace	1	3	5	6	7	1997	21,685	21,930	38,847	22,571	40,685	1998	7,506	9,518	42,005	24,188	42,399	1999	21,779	17,680	35,788	8,238	44,477	2000	18,641	19,731	35,877	21,269	34,862	2001	21,809	22,660	34,843	21,846	31,933	2002	23,349	22,159	41,898	22,618	43,700	2003	21,321	21,601	35,108	21,632	37,717	Total 97-03	136,090	135,279	264,366	142,362	275,773
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Indicate what the data are used for (Baseline/ Project/ Leakage emission	Baseline emission calculations																																																												



calculations)	
Additional comment:	Measurement methods are the same as the ones used for $Q_{p,y,monitored}$ (see section D.2)

Data / Parameter:	EC _i																																																												
Data unit:	MWh/year																																																												
Description:	Annual grid electricity consumption by the submerged electric arc furnace(s) for 7 years preceding the project activity																																																												
Source of data used:	Project proponent																																																												
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Additional comment:	Measurement methods are the same as the ones used for EC _y (see section D.2)																																																												

Data / Parameter:	$Q_{bcoal,i}$																																																												
Data unit:	Tonnes of coal/year																																																												
Description:	Annual consumption of coal used as reductant in the submerged electric arc furnace(s) for 7 years preceding the project activity																																																												
Source of data used:	Project proponent																																																												
Value(s) :	<table><tr><th colspan="6">Q_{bcoal,i} (tcoal/y)</th></tr><tr><th>Furnace</th><th>1</th><th>3</th><th>5</th><th>6</th><th>7</th></tr><tr><td>1997</td><td>14,538</td><td>15,064</td><td>28,939</td><td>17,345</td><td>31,098</td></tr><tr><td>1998</td><td>4,494</td><td>5,862</td><td>33,313</td><td>16,586</td><td>31,741</td></tr><tr><td>1999</td><td>13,005</td><td>11,529</td><td>31,738</td><td>5,764</td><td>37,165</td></tr><tr><td>2000</td><td>13,426</td><td>13,055</td><td>33,574</td><td>17,146</td><td>31,216</td></tr><tr><td>2001</td><td>16,304</td><td>17,863</td><td>31,619</td><td>19,936</td><td>26,698</td></tr><tr><td>2002</td><td>16,704</td><td>16,871</td><td>35,932</td><td>20,993</td><td>37,788</td></tr><tr><td>2003</td><td>18,501</td><td>19,475</td><td>32,739</td><td>20,195</td><td>33,883</td></tr><tr><td>Total 97-03</td><td>96,972</td><td>99,719</td><td>227,854</td><td>117,965</td><td>229,589</td></tr></table>	Q _{bcoal,i} (tcoal/y)						Furnace	1	3	5	6	7	1997	14,538	15,064	28,939	17,345	31,098	1998	4,494	5,862	33,313	16,586	31,741	1999	13,005	11,529	31,738	5,764	37,165	2000	13,426	13,055	33,574	17,146	31,216	2001	16,304	17,863	31,619	19,936	26,698	2002	16,704	16,871	35,932	20,993	37,788	2003	18,501	19,475	32,739	20,195	33,883	Total 97-03	96,972	99,719	227,854	117,965	229,589
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	section D.2)
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Data / Parameter:	Q _{bcoke, i}																																																																	
Data unit:	Tonnes of coke/year																																																																	
Description:	Annual consumption of coke used as reductant in the submerged electric arc furnace for 7 years preceding the project activity																																																																	
Source of data used:	Project proponent																																																																	
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Data / Parameter:	Q _{bpaste, i}																																																																	
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Description:	Annual consumption of electrode paste used as electrode in the submerged electric arc furnace(s) for 7 years preceding the project activity																																																																	
Source of data used:	Project proponent																																																																	
Value(s):	<table><tr><th colspan="6">Q_{bpaste,i} (tpaste/y)</th></tr><tr><th>Furnace</th><th>1</th><th>3</th><th>5</th><th>6</th><th>7</th></tr><tr><td>1997</td><td>1,127</td><td>1,136</td><td>2,123</td><td>1,175</td><td>2,023</td></tr><tr><td>1998</td><td>350</td><td>487</td><td>2,344</td><td>1,275</td><td>2,045</td></tr><tr><td>1999</td><td>1,086</td><td>946</td><td>1,763</td><td>417</td><td>2,123</td></tr><tr><td>2000</td><td>1,032</td><td>104</td><td>2,045</td><td>1,143</td><td>2,009</td></tr><tr><td>2001</td><td>1,141</td><td>1,147</td><td>2,031</td><td>958</td><td>1,543</td></tr><tr><td>2002</td><td>1,029</td><td>1,025</td><td>1,968</td><td>975</td><td>1,739</td></tr><tr><td>2003</td><td>1,097</td><td>956</td><td>1,690</td><td>1,028</td><td>1,721</td></tr><tr><td>Total 97-03</td><td>6,862</td><td>5,801</td><td>13,964</td><td>6,971</td><td>13,203</td></tr></table>						Q _{bpaste,i} (tpaste/y)						Furnace	1	3	5	6	7	1997	1,127	1,136	2,123	1,175	2,023	1998	350	487	2,344	1,275	2,045	1999	1,086	946	1,763	417	2,123	2000	1,032	104	2,045	1,143	2,009	2001	1,141	1,147	2,031	958	1,543	2002	1,029	1,025	1,968	975	1,739	2003	1,097	956	1,690	1,028	1,721	Total 97-03	6,862	5,801	13,964	6,971	13,203
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Additional comment:	Measurement methods are the same as the ones used for Q _{p paste,i} (see section D.2)																																																																	



Data / Parameter:	EF_{bcoal, i}						
Data unit:	tCO ₂ /tcoal						
Description:	Emission factor applied for the coal consumed as reductant based on carbon content						
Source of data used:	IPCC (2006) – Vol. 3, Ch. 4, section 4.3.3.2, table 4.6, p. 4.37						
Value(s):	<table border="1"> <tr> <th colspan="2">EF_{bcoal, i} (tCO₂/tcoal)</th></tr> <tr> <td>3.1</td><td>tCO₂/tcoal</td></tr> <tr> <td colspan="2">Source: IPCC (2006) Vol3, Ch4, p4.37, Table 4.6</td></tr> </table>	EF _{bcoal, i} (tCO ₂ /tcoal)		3.1	tCO ₂ /tcoal	Source: IPCC (2006) Vol3, Ch4, p4.37, Table 4.6	
EF _{bcoal, i} (tCO ₂ /tcoal)							
3.1	tCO ₂ /tcoal						
Source: IPCC (2006) Vol3, Ch4, p4.37, Table 4.6							
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations						
Additional comment:	Project specific values cannot be used because previous coal carbon contents monitoring precluded a calculation of EF _{b coal} (several coal types have been used and no weighted average can be done).						

Data / Parameter:	EF_{bcoke, i}																				
Data unit:	tCO ₂ /tcoke																				
Description:	Emission factor applied for the coke consumed as reductant based on carbon content																				
Source of data used:	Project proponent																				
Value(s):	<table border="1"> <tr> <th colspan="2">EF_{bcoke, i} (tCO₂/tcoke)</th></tr> <tr> <th>Year</th><th>EF</th></tr> <tr> <td>1997</td><td>3.09</td></tr> <tr> <td>1998</td><td>3.13</td></tr> <tr> <td>1999</td><td>3.10</td></tr> <tr> <td>2000</td><td>3.12</td></tr> <tr> <td>2001</td><td>3.15</td></tr> <tr> <td>2002</td><td>3.17</td></tr> <tr> <td>2003</td><td>3.19</td></tr> <tr> <td>Average 97-03</td><td>3.13</td></tr> </table>	EF _{bcoke, i} (tCO ₂ /tcoke)		Year	EF	1997	3.09	1998	3.13	1999	3.10	2000	3.12	2001	3.15	2002	3.17	2003	3.19	Average 97-03	3.13
EF _{bcoke, i} (tCO ₂ /tcoke)																					
Year	EF																				
1997	3.09																				
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2002	3.17																				
2003	3.19																				
Average 97-03	3.13																				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations																				
Additional comment:	Measurement methods are the same as those that will be used for EF _{p coke, y} (see section D.2)																				

Data / Parameter:	EF_{bpaste, i}
Data unit:	tCO ₂ /tcarbon paste
Description:	Emission factor applied for the electrode paste consumed as electrode based on carbon content



Source of data used:	Paste supplier																
Value(s) :	3.32																
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations																
Additional comment:	<p>The paste supplier supplied the following information on the composition of the paste:</p> <table><tr><th>PROPERTY</th><th>UNIT</th><th>STANDARD</th><th>TYPICAL</th></tr><tr><td>Ash Content</td><td>%</td><td><6 - 7</td><td>6.4</td></tr><tr><td>Volatile Matter</td><td>%</td><td>13 - 15</td><td>13.6</td></tr><tr><td>Fixed Carbon Content</td><td>%</td><td>> 79</td><td>79.8</td></tr></table> <p>The emission factor is then calculated using equation 4.19, p. 4.33 of IPCC (2006):</p> <div><p style="text-align: center;">EQUATION 4.19 CARBON CONTENT OF FERROALLOY REDUCING AGENTS Total C-content in reducing agent i = Fix C in i + Content of volatiles in i • Cv</p></div> <p>Where:</p> <p style="padding-left: 40px;">Cv = Carbon content in volatiles. Unless other information is available, Cv = 0.65 is used for coal and 0.80 for coke.</p> <p>Cv value employed is the same as for coke (0.80), since both have similar characteristics:</p> <ul style="list-style-type: none">- 78.5% of the paste is anthracite, which is a form of coal with high calorific value and carbon content (like coke)- 21.5% of the paste is the binder, which itself is composed of a minimum of 45% of coking-value. <p>Therefore the %m/m of carbon in the paste is 79.8 + (13.6 * 0.80) = 90.68% and EF_{b paste} = 3.32tCO₂/t paste (which is <i>still</i> lower than the IPCC value of 3.4).</p>	PROPERTY	UNIT	STANDARD	TYPICAL	Ash Content	%	<6 - 7	6.4	Volatile Matter	%	13 - 15	13.6	Fixed Carbon Content	%	> 79	79.8
PROPERTY	UNIT	STANDARD	TYPICAL														
Ash Content	%	<6 - 7	6.4														
Volatile Matter	%	13 - 15	13.6														
Fixed Carbon Content	%	> 79	79.8														

D.2. Data and parameters monitored

Data / Parameter:	QP_{v, monitored}
Data unit:	Tonnes of SiMn
Description:	Quantity of SiMn production
Measured /Calculated /Default:	Measured
Source of data:	Weighing platforms 2 and 3
Value(s) of monitored parameter:	F3 = 28,054 F5 = 54,543 F7 = 57,721
Indicate what the data are used for (Baseline/ Project/	Baseline and Project emission calculations



Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>Weighing platforms 2 and 3 are calibrated weekly following internal procedure SOP: SiMn161, as per manufacturer requirements. The accuracy of the weighing platforms is 2.5%.</p> <p>There were 3 calendar weeks in the monitoring period where there was no calibration recorded/available, and these were: 24-30/01/2011; 28/02-06/03/2011; and 04-10/04/2011. Per EB52 Annex 60, when there is no calibration record (i.e. in these 3 instances), the maximum error is employed for conservativeness, this being the higher between the error found at subsequent calibration and the maximum permissible error. This “correction” manifests itself in the quantity of SiMn produced (in F3, F5, and F7), and the relevant cells have been highlighted in the emission reduction workbook.</p>
Measuring/ Reading/ Recording frequency:	The data is recorded at every tapping of the furnaces. Daily total is recorded daily.
Calculation method (if applicable):	Daily total is obtained by summing data from all tappings that occurred on that day.
QA/QC procedures applied:	<p>Saleable product has been cross-checked against sales and stock difference for the monitoring period, demonstrating agreement (i.e. sales + stock difference = 177,828t, which is 7.55% less than total production (192,347t) for the monitoring period.</p> <p>Saleable product (177,828t) is the sum of three components: Declared furnace production (167,123t); sold fines (6,042t)¹; and recovered materials (4,663t). When a comparison between declared furnace production and total furnace production is made, the former is 86.89% of the latter, and this 86.89% constitutes an improvement compared to the previous (i.e. third) verification period’s value of 83.85%². This is to be expected, considering that the production process is being constantly fine-tuned.</p>

Data / Parameter:	EC_v
Data unit:	MWh
Description:	Grid electricity consumption by the submerged electric arc furnace(s)
Measured /Calculated /Default:	Measured
Source of data:	Electricity meter
Value(s) of monitored parameter:	F3 = 106,148 F5 = 228,805 F7 = 230,584
Indicate what the data are used for (Baseline/ Project/ Leakage emission	Project emission calculations

¹ ‘Fines’ have no declared value *unless* they are sold.

² For M3:

[declared furnace production (i.e. 72,126.25t)/total furnace production (i.e. 86,017.13t)] x 100% = 83.85%



calculations)					
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The electricity meters are calibrated every 5 years to ensure optimal accuracy, in line with manufacturer requirements and national standards.				
	Furnace	Serial number	Accuracy class	Calibration date	Valid until
	F3 – 22kV	06470035	0.5	24/11/2006	23/11/2011
	F3 – 33kV	00061498	1	25/04/2008	24/04/2013
	F3* – 22kV	95679335	0.5	02/06/2009	01/06/2014
	F5	06460054	0.5	22/11/2006	21/11/2011
	F7	06390018	0.5	28/09/2006	27/09/2011
	F7**	96505392	0.5	11/03/2010	10/03/2015
	* meter started 23/10/2010 ** meter started 19/09/2010				
Measuring/ Reading/ Recording frequency:	An electricity meter per project furnace continuously measures electricity consumed. The value is recorded daily.				
Calculation method (if applicable):					
QA/QC procedures applied:	Values reported are cross-checked against electricity metered monthly by the grid company ESKOM. The two values correlate satisfactorily during this Monitoring Period, with a 99.7% correlation coefficient. The total difference over the period was 143MWh, or 0.02%.				

Data / Parameter:	$Q_{pcoal, v}$
Data unit:	Tonnes of coal
Description:	Consumption of coal used as reductant in the submerged electric arc furnace(s)
Measured /Calculated /Default:	Measured
Source of data:	Load cells based weigh hoppers
Value(s) of monitored parameter:	F3 = 19,900 F5 = 42,822 F7 = 42,187
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The load cell based weigh hoppers are maintained regularly and tested weekly for accuracy, according to internal procedure TAOP230 (with the maximum permissible error of 2.5%), which is in line with manufacturer requirements.</p> <p>There were numerous periods in the monitoring period where calibrations took place less than the requisite once per week for Furnace 7, and these were: 12-24/03/2010; 03-16/06/2010;</p>



	<p>18-30/06/2010; 02-14/07/2010; 30/07/2010 – 11/08/2010; 28/08/2010 – 05/09/2010; 17-29/09/2010; 22/10/2010 – 03/11/2010; 05-17/11/2010; 19/11/2010 – 01/12/2010; 10/12/2010 – 06/01/2011; 28/01/2011 – 09/02/2011; 11-30/03/2011; & 08-27/04/2011.</p> <p>Note: 17/06/2010, 01/07/2010, 04/11/2010, & 18/11/2010 represent dates <i>between</i> the aforementioned periods where there was a weekly calibration available. For conservativeness, only these dates have been deemed with calibration – i.e. the week surrounding these respective dates has had the conservative EB52 Annex 60 correction applied.</p> <p>Per EB52 Annex 60, when there is no weekly record (i.e. in these instances), the maximum error is employed for conservativeness, this being the higher between the error found at subsequent calibration and the maximum permissible error. This “correction” manifests itself in the quantity of Coal consumed in F7, and the relevant cells have been highlighted in the emission reduction workbook.</p>
Measuring/ Reading/ Recording frequency:	The amount of coal used in the project furnaces is metered by weigh hoppers, and is automatically summed and recorded daily per furnace.
Calculation method (if applicable):	
QA/QC procedures applied:	In addition, Procedure SiMn300 is applied to all log-sheets which stipulates the procedure for Supervisors to ensure that data has been captured correctly.

Data / Parameter:	$Q_{\text{pcoke}, v}$
Data unit:	Tonnes of coke
Description:	Consumption of coke used as reductant in the submerged electric arc furnace
Measured /Calculated /Default:	Measured
Source of data:	Load cells based weigh hoppers
Value(s) of monitored parameter:	F3 = 435 F5 = 1,946 F7 = 1,537
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial	The load cell based weigh hoppers are maintained regularly, and tested weekly for accuracy according to internal procedure TAOP230 (with



number, calibration frequency, date of last calibration, validity)	<p>maximum permissible error of 2.5%), which is in line with manufacturer requirements.</p> <p>There were numerous periods in the monitoring period where calibrations took place less than the requisite once per week for Furnace 7, and these were:</p> <p>12-24/03/2010; 03-16/06/2010; 18-30/06/2010; 02-14/07/2010; 30/07/2010 – 11/08/2010; 28/08/2010 – 05/09/2010; 17-29/09/2010; 22/10/2010 – 03/11/2010; 05-17/11/2010; 19/11/2010 – 01/12/2010; 10/12/2010 – 06/01/2011; 28/01/2011 – 09/02/2011; 11-30/03/2011; & 08-27/04/2011.</p> <p>Note: 17/06/2010, 01/07/2010, 04/11/2010, & 18/11/2010 represent dates <i>between</i> the aforementioned periods where there was a weekly calibration available. For conservativeness, only these dates have been deemed with calibration – i.e. the week surrounding these respective dates has had the conservative EB52 Annex 60 correction applied.</p> <p>Per EB52 Annex 60, when there is no weekly record (i.e. in these instances), the maximum error is employed for conservativeness, this being the higher between the error found at subsequent calibration and the maximum permissible error. This “correction” manifests itself in the quantity of Coke consumed in F7, and the relevant cells have been highlighted in the emission reduction workbook.</p>
Measuring/ Reading/ Recording frequency:	The amount of coke used in the project furnaces is metered by weigh hoppers, and is automatically summed and recorded daily per furnace.
Calculation method (if applicable):	
QA/QC procedures applied:	In addition, Procedure SiMn300 is applied to all log-sheets which stipulate the procedure for Supervisors to ensure that data has been captured correctly.

Data / Parameter:	$Q_{\text{dpaste, v}}$
Data unit:	Tonnes of paste
Description:	Consumption of electrode paste used as electrode in the submerged electric arc furnace
Measured /Calculated /Default:	Measured and calculated
Source of data:	Weighbridge (for the weight of the cylinders) and production log (for the number of cylinders)



Value(s) of monitored parameter:	F3 = 720 F5 = 1,706 F7 = 1,712			
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations			
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The weighbridge is calibrated in line with manufacturer requirements, as detailed in the table below:			
	Serial number	Accuracy [%]	Calibration date	Valid until
	991019*	0.2	28/01/2010	27/01/2012
	TA19072010**	0.2	30/07/2010	29/07/2012
			12/01/2011	11/01/2013
* ended use 30/07/2010 **began use 30/07/2010				
Measuring/ Reading/ Recording frequency:	The number of paste cylinders inserted into the electrode is logged each time a new cylinder is added. The weight of the cylinders is obtained by weighing paste delivery trucks (arriving at the facility) on a weighbridge and dividing (on a monthly basis) the total weight by the number of cylinders delivered to the facility. The annual paste figure is obtained by summing the daily product of number of cylinders used and monthly average weight for the year.			
Calculation method (if applicable):	The annual figure is obtained by summing the daily product of number of cylinders used and monthly average weight.			
QA/QC procedures applied:	Average weight of each cylinder is compared to supplier values. The figures are within 0.05% of supplier values for the 700mm cylinders (used in F5 and F7), and within 0.24% for the 500mm cylinders (used in F3). The result of this cross-check is satisfactory, since measurements are made by two different weighbridges once the paste has been loaded onto the delivery truck(s).			

Data / Parameter:	EF_{pcoal, y}
Data unit:	tCO ₂ /t coal
Description:	Emission factor applied for the coal consumed as reductant in year y
Measured /Calculated /Default:	Default
Source of data:	IPCC (2006) – Vol. 3, Ch. 4, section 4.3.3.2, table 4.6, p. 4.37
Value(s) of monitored parameter:	3.1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type,	N/A



accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	The 2006 IPCC value of 3.1tCO ₂ /t coal is employed in the project. If new IPCC guidelines are released, this value may be updated according to latest relevant EB guidance.
Calculation method (if applicable):	
QA/QC procedures applied:	IPCC data is used to ensure consistency with the emission factor employed in the baseline.

Data / Parameter:	EF_{pcoke, y}				
Data unit:	tCO ₂ /t coke				
Description:	Emission factor applied for the coke consumed as reductant in year y				
Measured /Calculated /Default:	Calculated				
Source of data:	Calculated based on: <ul style="list-style-type: none"> - Carbon content and volatiles proportion sourced from laboratory analyses. - Carbon content of volatiles from IPCC (2006). 				
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th>2010</th><th>2011</th></tr> </thead> <tbody> <tr> <td>3.03</td><td>3.06</td></tr> </tbody> </table>	2010	2011	3.03	3.06
2010	2011				
3.03	3.06				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A				
Measuring/ Reading/ Recording frequency:	Monthly				
Calculation method (if applicable):	<p>Coke samples are prepared at Transalloys and sent to the laboratory for analysis of volatile and fixed carbon content. Monthly averages of carbon contents are employed for the calculation of a monthly emission factor.</p> <p>This emission factor is calculated using equation 4.19, p. 4.33 of IPCC (2006):</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">EQUATION 4.19 CARBON CONTENT OF FERROALLOY REDUCING AGENTS Total C-content in reducing agent i = Fix C in i + Content of volatiles in i • Cv</p> </div> <p>Where:</p> <p>Cv = Carbon content in volatiles. Unless other information is available, Cv = 0.65 is used for coal and 0.80 for coke.</p>				



	The annual emission factor is calculated as the average of monthly emission factors and employed for emission calculations.
QA/QC procedures applied:	Lab analyses are undertaken according to national SABS standards. When values are missing or inconsistent for some months, the average of the previous 3 and next 3 months are used.

Data / Parameter:	EF_{ppaste, y}				
Data unit:	tCO ₂ /t of carbon paste				
Description:	Emission factor applied for the electrode paste consumed as electrode in year y				
Measured /Calculated /Default:	Calculated				
Source of data:	Calculated from supplier analyses and/or IPCC.				
Value(s) of monitored parameter:	<table border="1"> <tr> <th>2010</th><th>2011</th></tr> <tr> <td>3.67</td><td>3.67</td></tr> </table>	2010	2011	3.67	3.67
2010	2011				
3.67	3.67				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A				
Measuring/ Reading/ Recording frequency:	Monthly				
Calculation method (if applicable):	<p>This emission factor is calculated using equation 4.19, p. 4.33 of IPCC (2006):</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">EQUATION 4.19 CARBON CONTENT OF FERROALLOY REDUCING AGENTS Total C-content in reducing agent i = Fix C in i + Content of volatiles in i • Cv</p> </div> <p>Where: Cv = Carbon content in volatiles. Unless other information is available, Cv = 0.65 is used for coal and 0.80 for coke.</p> <p>For the months when supplier analysis reports are not available, a conservative value of 3.67 tCO₂/t (as suggested by the methodology AM0038 v1) is employed.</p>				
QA/QC procedures applied:	<p>The annual emission factor obtained is compared to EF_{bpaste, y} (3.32 tCO₂/t), and the maximum between the two values is employed for EF_{ppaste, y}.</p> <p>In the event a monthly analysis is not available, a conservative value of 3.67 tCO₂/t is employed for that month.</p>				

Data / Parameter:	Quality of coal_p
Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of coal based on elementary analysis and other relevant



	properties
Measured /Calculated /Default:	Calculated
Source of data:	Analysis report from internal laboratory
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Laboratory analyses are undertaken at least monthly, and fixed carbon, volatiles, S, and P contents are reported.
QA/QC procedures applied:	Lab analyses are undertaken according to national SABS standards.

Data / Parameter:	Quality of coke_p
Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of coke based on elementary analysis and other relevant properties
Measured /Calculated /Default:	Calculated
Source of data:	Analysis report from internal laboratory
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Laboratory analyses are performed at least monthly, and fixed carbon, volatiles, S, and P contents are reported.
QA/QC procedures applied:	Lab analyses are performed according to national SABS standards.

Data / Parameter:	Quality of electrode paste_p
Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of electrode paste based on elementary analyses and other



	relevant properties
Measured /Calculated /Default:	Calculated
Source of data:	Supplier
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	N/A
Calculation method (if applicable):	This is based on supplier laboratory analyses reports.
QA/QC procedures applied:	The IPCC 2006 Volume 3, p. 4.38, Table 4.6 “CO ₂ Emission Factors for Ferroalloy Production” gives a typical emission factor of 3.4tCO ₂ /t _{paste} . When new paste analyses are received it is checked that the characteristics measured correspond reasonably with this value.

Data / Parameter:	EF_{y, offsite}
Data unit:	tCO ₂ /MWh
Description:	Grid emission factor
Measured /Calculated /Default:	Calculated
Source of data:	Registered PDD
Value(s) of monitored parameter:	The factor of 1.221tCO ₂ /MWh is used during the whole crediting period.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Once for the crediting period
Calculation method (if applicable):	The Grid electricity emission factor (EF _{y, offsite} in tCO ₂ e/MWh) for South Africa is established ex-ante, according to ACM0002 v6.
QA/QC procedures applied:	

Data / Parameter:	Quality of SiMn_p
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Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of SiMn produced during the project activity
Measured /Calculated /Default:	Calculated
Source of data:	Analysis report from internal laboratory
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	A sample is lab-analysed daily to ensure that the quality remains between pre-determined specifications for Mn, C, Si, P, and S.
QA/QC procedures applied:	Lab analyses are undertaken to national SABS standards to ensure accuracy. Results are reviewed, and anomalous results investigated.

Data / Parameter:	Quality of ore
Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of ore
Measured /Calculated /Default:	Calculated
Source of data:	Analysis report from internal laboratory
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	A sample is lab analysed monthly to determine the composition of the ore (e.g. contents in Mn, Fe, SiO ₂ , and CaO).
QA/QC procedures applied:	Lab analyses are undertaken to national SABS standards to ensure accuracy. Results are reviewed, and anomalous results investigated.

Data / Parameter:	Quality of fluxes
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Data unit:	Mass fraction of each component (%m/m)
Description:	Quality of fluxes
Measured /Calculated /Default:	Calculated
Source of data:	Analysis report from internal laboratory
Value(s) of monitored parameter:	N/A
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	N/A
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	A sample of each type of flux is lab-analysed at least monthly when new batches are used. During this monitoring period only pellets are considered as flux, slag not being re-introduced into the furnace any more during this monitoring period.
QA/QC procedures applied:	Lab analyses are undertaken to national SABS standards to ensure accuracy. Results are reviewed, and anomalous results investigated.

SECTION E. Emission reductions calculation**E.1. Baseline emissions calculation**

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The calculation of baseline emissions applying actual values and including formulae used is included in Section E.4 (below).

E.2. Project emissions calculation

>>

The calculation of project emissions applying actual values and including formulae used is included in Section E.4 (below).

E.3. Leakage calculation

>>

There are no Leakage emissions for the Project as can be seen in Section E.4 (below).

E.4. Emission reductions calculation / table

>>



Project Summary					Formulas involved
Overall Emission Reductions (all furnaces)					
Monitoring Period 4	UNIT	2010	2011	TOTAL	
Furnace 3					
Baseline emissions	tCO ₂ e	140,643	56,257	196,900	1
Project emissions	tCO ₂ e	114,412	42,974	157,386	2
Leakage	tCO ₂ e	0	0	0	3
Emission reductions	tCO ₂ e	26,231	13,283	39,514	4
Onsite emission reductions (for uncertainty)	tCO ₂ e	3,940	2,317	6,257	5
Furnace 5					
Baseline emissions	tCO ₂ e	304,526	121,810	426,336	1
Project emissions	tCO ₂ e	248,606	94,710	343,317	2
Leakage	tCO ₂ e	0	0	0	3
Emission reductions	tCO ₂ e	55,919	27,100	83,019	4
Onsite emission reductions (for uncertainty)	tCO ₂ e	11,774	5,660	17,434	5
Furnace 7					
Baseline emissions	tCO ₂ e	320,707	128,283	448,990	1
Project emissions	tCO ₂ e	239,966	97,049	337,015	2
Leakage	tCO ₂ e	0	0	0	3
Emission reductions	tCO ₂ e	80,741	31,234	111,975	4
Onsite emission reductions (for uncertainty)	tCO ₂ e	16226	6759	22,985	5
TOTAL					
Baseline Emissions	tCO ₂	765,875	306,350	1,072,226	6
Project Emissions	tCO ₂	602,984	234,734	837,718	7
Leakage	tCO ₂	0	0	0	8
Emission Reductions	tCO ₂	162,891	71,617	234,508	9
Onsite emission reductions (for uncertainty) ER _{onsite,y}	tCO ₂	31,941	14,736	46,677	10
Emissions to be deducted for uncertainty if ER _{onsite,y} >0	tCO ₂	2,875	1,326	4,201	11
Emission Reductions (adjusted for uncertainty)	tCO ₂	160,017	70,290	230,307	12

Formulas involved:	
1.	$BE_y = BE_{y, \text{offsite}} + BE_{y, \text{onsite}}$ for each furnace $BE_{y, \text{offsite}} = QPy_{\text{max}} \times \text{secb} \times EF_{y, \text{offsite}}$ $BE_{y, \text{onsite}} = QPy_{\text{max}} \times EF_{b, \text{onsite}}$ $EF_{b, \text{onsite}} = (Q_{b, \text{coal}} \times EF_{b, \text{coal}} + Q_{b, \text{coke}} \times EF_{b, \text{coke}} + Q_{b, \text{paste}} \times EF_{b, \text{paste}}) / QP$ $QPy_{\text{max}} = \text{minimum}(QPy_{\text{monitored}}, QPhistoric)$
2.	$PE_y = PE_{y, \text{offsite}} + PE_{y, \text{onsite}}$ for each furnace $PE_{y, \text{offsite}} = QPy_{\text{max}} \times \text{secp} \times EF_{y, \text{offsite}}$ $PE_{y, \text{onsite}} = QPy_{\text{max}} \times EF_{p, y, \text{onsite}}$ $EF_{p, y, \text{onsite}} = (Q_{p, \text{coal}} \times EF_{p, \text{coal}} + Q_{p, \text{coke}} \times EF_{p, \text{coke}} + Q_{p, \text{paste}} \times EF_{p, \text{paste}}) / QP$ $QPy_{\text{max}} = \text{minimum}(QPy_{\text{monitored}}, QPhistoric)$
3.	$Ly = 0$
4.	$ER_y = BE_y - PE_y - Ly$ for each furnace
5.	$ER_{y, \text{onsite}} = BE_{y, \text{onsite}} - PE_{y, \text{onsite}}$
6.	$BE_y = BE_{y, F3} + BE_{y, F5} + BE_{y, F7}$
7.	$PE_y = PE_{y, F3} + PE_{y, F5} + PE_{y, F7}$
8.	$L = L_{F3} + L_{F5} + L_{F7} = 0$
9.	$ER_{y, \text{not adjusted}} = BE_y - PE_y - Ly$
10.	$ER_{\text{onsite}, y} = ER_{\text{onsite}, y, F3} + ER_{\text{onsite}, y, F5} + ER_{\text{onsite}, y, F7}$
11.	Uncertainty adjustment component = $0.91 \times ER_{\text{onsite}, y}$ if $ER_{\text{onsite}, y} > 0$ Uncertainty adjustment component = 0 if $ER_{\text{onsite}, y} \leq 0$
12.	$ER_y = ER_{y, \text{not adjusted}} - \text{Uncertainty adjustment component}$

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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This section includes a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions [tCO ₂ e]	66,553 ³	230,307 ⁴

E.6. Remarks on difference from estimated value in the PDD

>>

The forecasted emission reduction in the PDD for the period 2010 - 2011 is 66,553 tCO₂e/year. When this is pro-rated to the 14 month long monitoring period, the forecast becomes 77,645 tCO₂e. During

³ Per annum

⁴ For the 14 months covering the monitoring period

this monitoring period the emission reductions amount to 230,307 tCO₂e, which exceeds the forecast by 197%. The reasons for this difference are detailed below:

1. **On-site emission reductions.** On-site emission reductions (due to consumption of coal, coke, and paste) are 42,476 tCO₂⁵, due to a specific emission factor of 2.51 tCO₂/tSiMn in the project (which is *lower* than the 2.93 tCO₂/SiMn factor in the baseline). The methodology requires the inclusion of on-site emissions in the project boundary, although it was assumed in the PDD that they would not be affected. This methodology requirement reduces the difference from 197% to 142% as indicated in Table 3 (below).
2. **Higher electricity savings during the monitoring period than 0.4 MWh/tSiMn originally forecast in the PDD.**
 - a. **Methodology effect on baseline electricity consumption.** PDD estimates of reductions in specific electricity consumption assumed a value of 0.4 MWh/tSiMn. The methodology established a baseline consumption of 5.4 MWh/tSiMn (based on 1997-2003 data), however when the electricity saving of 0.4 MWh/tSiMn was estimated by the project developer at the time of decision making (2003), the specific consumption was 4.91 MWh/tSiMn. When validation commenced in 11/2006, it was appropriate to retain the 0.4 MWh/tSiMn savings compared to the 7 years baseline level of 5.4 MWh/tSiMn in view of the monitoring data available at the time. If the estimated saving of 0.4 MWh/tSiMn had been increased by the difference between the specific consumption level of 2003 alone (4.91 MWh/tSiMn) and the one obtained by the methodology required longer baseline of 7 years (5.4 MWh/tSiMn), the saving would have been estimated at $0.40 + 0.49 = 0.89$ MWh/tSiMn. Seen from the other side, if the baseline employed for this monitoring period was based on the 2003 specific electricity consumption of 4.91 MWh/tSiMn instead of the 7 years baseline, the difference between emission reductions claimed and PDD estimates would change from 142% to 57% as shown in Table 3 (below).
 - b. **Higher electricity savings during the monitoring period.** Compared to the PDD estimate of 0.40MWh/t electricity savings, the project achieved 0.88MWh/t (compared to the 2003 baseline). This effect changes the difference from 57% to -29% as shown in Table 3 (below).

As per the registered PDD, the plan *was* to realise 0.5 MWh reduction (per tonne of product), with a target of 1 MWh reduction following gradual fine-tuning to optimal conditions.⁶

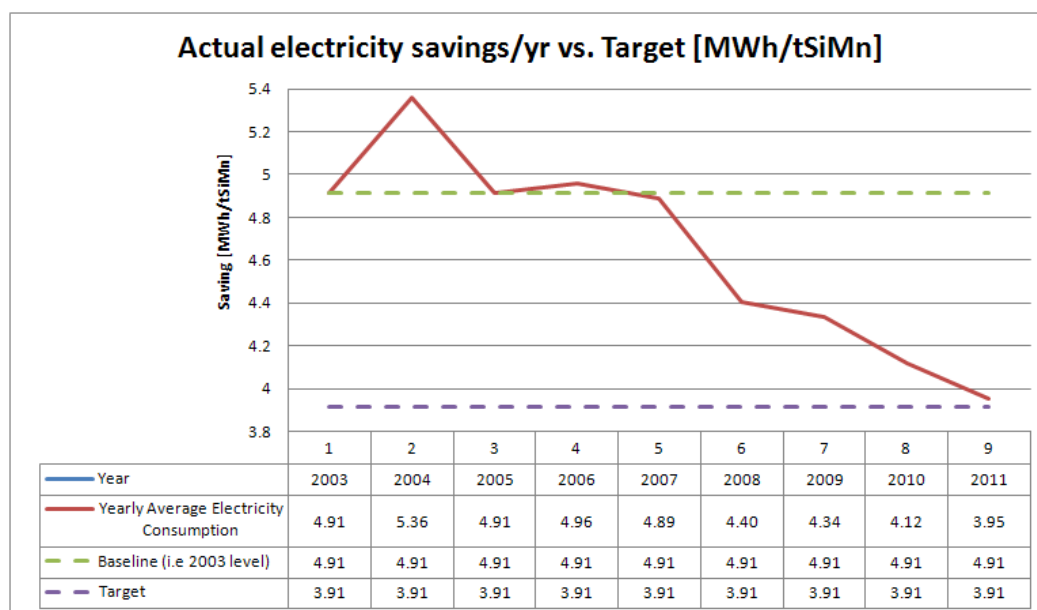
The Validation Report states that the aim *was* to achieve 4.5 MWh/tSiMn, with a target of 4 MWh/tSiMn.⁷

⁵ 46,677 tCO₂ less 9% for uncertainty.

⁶ Please refer to PDD p. 2.

Therefore, based on the above (i.e. the PDD *and* the Validation Report), it is clear that the target was to achieve 1 MWh of electricity savings (as per the PDD) *or* 4 MWh/tSiMn (as per the Validation Report).

A *major* modification such as the PCD change (i.e. the project scenario) will not elicit results overnight. It is an *inexact* science in uncharted territory, and the fact that each furnace has its own distinct ‘personality’ precludes the possibility of reaching a clear target quickly. Indeed, attaining the goal is an open-ended fine tuning process across *numerous* parameters under *changing* atmospheric conditions whose impact on the process *cannot* always be accurately assessed. Such a convoluted process is the *only* way to potentially (and *gradually*) achieve the set target of 1 MWh/tSiMn, and indeed, this is *exactly* what transpired. This uncertainty is further demonstrated by the fact that, immediately following the PCD change, electricity consumption actually *increased* from 4.91 MWh/tSiMn (2003 value) to 5.36 MWh/tSiMn (2004 value). However, following continuous fine-tuning of the process, electricity consumption decrease began its *gradual* approach toward the set target. Please refer to Graph 1 (below):



Graph 1: Actual vs. Target electricity savings

For the sake of simplicity in estimating emission reductions in the PDD, the *initial* assumption *was* to use 0.6 MWh/tSiMn as the savings across the whole crediting period. Validation commenced in 11/2006, and at that time, there was actually an *increase* in electricity consumption per tonne of product (see Graph 1 above).

⁷ Please refer to Section 1.3, p. 5 of Validation Report.

Consequently the DoE (in their Validation Checklist⁸) raised CAR 1: “The estimated GHG emissions reduction is not achieved during an implementation time of up to 2 years. A written explanation and updated estimations of GHG emission reduction is to be provided. The PDD is to be updated accordingly.”⁹

To close CAR 1, the PDD assumption (i.e. using 0.6 MWh/tSiMn) was *reduced*, and 0.4 MWh/tSiMn was used instead.

If the 0.6 MWh/tSiMn were used as a target, and actual electricity consumption and production data used and averaged across the years since the CDM project’s implementation (i.e. 2004 through the end of this monitoring period), the results demonstrate that the target has yet to be attained. Please refer to Graph 2 (below):



Graph 2: Actual cumulative vs. Target cumulative electricity savings per year¹⁰

In summary, there are 3 possible targets for electricity savings:

- i. 1 MWh/tSiMn savings, as per PDD p. 2 – i.e. a target of 3.91 MWh/tSiMn;
- ii. 0.6 MWh/tSiMn savings using electricity consumption and production data and averaged across the years since the CDM project’s implementation (i.e. 2004 through the end of this monitoring period)¹¹; and
- iii. A target of 4 MWh/tSiMn as per Validation Report.

⁸ See Validation Report, p. 37: “Have conservative assumptions been used to calculate project GHG emissions?”

⁹ Please refer to p. 44 of Validation Report.

¹⁰ Based on $QP_{y, \text{monitored}}$

¹¹ Using $QP_{y, \text{monitored}}$ for production data calculation.

For this monitoring period neither “i”, “ii”, or “iii” has been attained. “ii” is not reached, as is clear from Graph 2, where through M4 (i.e. 04/2011), 0.383 MWh/tSiMn savings (based on $QP_{y, \text{monitored}}$) *remain a long way off the 0.6 MWh/tSiMn target*. If $QP_{y, \text{max}}$ (i.e. what the emissions reductions calculations are based on), instead of $QP_{y, \text{monitored}}$, is employed, the conclusion becomes *even more robust*, with cumulative electricity savings (through end-M4) of 0.347 MWh/tSiMn.

Neither “i”, nor “iii” have been achieved, as is clear from the 4.03 MWh/tSiMn as per Table 3 (below):

	2010 (10 months)	2011 (4 months)	M4
$QP_{y, \text{monitored}}$ (t)	96,566	43,752	140,318
EC _y (MWh)	392,780	172,757	565,537
secp, y [MWh/tSiMn]			4.03

Table 3: Specific electricity consumption per product for M4

3. **Delay of F1 & F6 retrofit.** In the PDD, F6 was expected to be retrofitted in early 2008, and F1 in 2009. However, due to poor market conditions, the retrofitting works have not yet commenced. Hence the PDD estimates are adjusted in order to *only* cover the emission reduction generated by F3, F5, and F7 (the furnaces retrofitted to date). This narrows the gap between the estimated and reported emission reductions from -29% to 0% as illustrated in Table 3 (below).

All furnaces				
	PDD forecast	Monitoring report value	Difference	%
Start assumptions	77,645	230,307	152,662	197%
1 After adjustment for on-site emissions	77,645	187,831	110,187	142%
2a After adjustment for baseline electricity consumption factor	77,645	121,843	44,198	57%
2b After adjustment for project electrical efficiency	77,645	54,979	- 22,666	-29%
3 After adjustment for furnace 1 & 6 retrofit being delayed	54,979	54,979	0	0%

Table 3: Summary of monitoring period performance compared to PDD estimate.



History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		