

Project Title	Transalloys Manganese Alloy Smelter Energy Efficiency Project
CDM Reference Number	1027
Monitoring Period (dates)	01/04/2008 - 30/06/2009
Report Date	1 December 2009
Client Name	Ecosecurities International Ltd.
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Version Control	Date
Version 1.0	10/09/2009 – Draft report
Version 2.0	01/12/09 –Final Verification Report

Project Title: Transalloys Manganese Alloy Smelter Energy Efficiency Project	
CDM Project reference:	1027
Project Location:	Transalloys, Clewer Road, Witbank, 1035, Mpumalanga
Country:	South Africa
Project Start Date:	01/10/2004 (Registered 19/10/2007)
Project Parties:	South Africa (host) , United Kingdom of Great Britain and Northern Ireland ,Switzerland
Project Participants:	Transalloys Pty Ltd (South Africa) [formerly Highveld Steel and Vanadium Corporation Limited]; Ecosecurities Ltd ; Ecosecurities Group Plc. (UK)
Methodology used:	AM0038, ACM0002
Methodology version number:	V1, V6 (respectively)
Crediting Period:	01/10/04 - 30/09/2014 (fixed)
Monitoring Period:	01/04/2008 - 30/06/2009

Summary:

Number of CERs certified: 112,292 tonnes CO₂ equivalent.

ERM CVS was commissioned by Ecosecurities to verify and certify the emissions reductions reported for the period 01/04/2008 to 30/06/2009 as set out in the monitoring report of the CDM project Transalloys Manganese Alloy Smelter Energy Efficiency Project, Registration Reference 1027.

Based on the work performed, ERM CVS has concluded that the project is implemented as planned and described in the project design document, all equipment / technology that is essential to the generation of emissions reductions is calibrated and maintained appropriately and the monitoring procedures are in place, as per the Revised Monitoring Plan dated 15/06/2009, approved by the UNFCCC Secretariat on 25/10/09. ERM CVS can confirm that the project does generate emission reductions and that the emission reductions set out in the monitoring report are fairly stated. The emissions reductions were found to be appropriately calculated in accordance with AM0038 and the revised monitoring plan,

ERM CVS has certified the emission reductions for the period 01/04/2008 to 30/06/2009 as 112,292 tonnes CO₂ equivalent. This value exceeds the estimated emissions in the PDD by 57% due to a combination of reasons that have been satisfactorily explained by the client and are set out in section 3B.

ERM CVS has determined a few areas where the project can be strengthened in terms of the quality assurance and quality control procedures. These issues have been indicated as Forward Action Requests and should be submitted to the verification team of the next periodic verification.

Client:	Ecosecurities International Ltd.		
Client Representative:	Aude Duquesne		
Report approved by:		Signature 	
Name: Melanie Eddis			
Date: 1 December 2009			

Table of Contents

1. Introduction	4
A. Objectives of verification	4
B. Verification Scope	4
C. Description of Project Activity	4
D. Limitations	5
2. Verification Approach	6
A: Verification Process	6
B: Verification Team	6
C: Quality Assurance / Technical Review	6
3. Verification Findings	7
A: Status of open issues from previous verifications (if applicable)	7
B: Conformance of project implementation with the PDD	7
C: Compliance of the Monitoring Plan with the applied methodology	8
D: Compliance of monitoring with approved Monitoring Plan	8
E: Completeness of data	9
F: Data Management Processes and Controls	9
G: Emission Reduction Calculations	10
H: Deviations	10
I: Other observations	10
4. Parameters Verified	11
5. Corrective Action Requests, Clarification Requests and Forward Action Requests	18
Clarification Requests	18
Clarification Requests continued	19
Corrective Action Requests	20
Corrective Action Requests continued	21
Forward Action Requests	22
6. Conclusions	23
A. Assessment against the provisions of Decision 17/CP.7	23
B. Assessment against Verification Principles	24
C. Overall Conclusion	24
7. ERM CVS Certification Statement	25
Annex 1: Abbreviations	26
Annex 2: Key Reference Documents	26
Annex 3: Persons Interviewed	27

1. Introduction

ERM CVS was commissioned by Ecosecurities Ltd to conduct verification and certification of the emission reductions set out in the Monitoring Report (reference 1027), Version 2 dated 02/10/2009. This report sets out the methodology and conclusions of the verification process and the ERM CVS Certification Statement. ERM CVS will assess and verify that the implementation of the project activity and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board.

A. Objectives of verification

The objective of verification is to establish whether sufficient evidence exists to confirm, to reasonable assurance:

- Whether the emission reductions as set out in the Monitoring Report V2 for the Transalloys Manganese Alloy Smelter Energy Efficiency Project have been reported in accordance with the approved methodology AM0038 and revised monitoring plan (as accepted by the UNFCCC on 25/10/09).
- Whether the reported data meet the key principles of data quality and are complete, reliable, consistent, accurate, valid, transparent and conservative.
- Whether the project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place.
- Whether the monitoring report and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements.
- Whether the data recorded and stored as per the monitoring methodology

B. Verification Scope

The verification addresses the emissions reductions for the period 01/04/2008 to 30/06/2009 reported by Transalloys Manganese Alloy Smelter Energy Efficiency Project in its Monitoring Report dated 06/08/2009. The verification is based on:

- Project Design Document, dated 02/03/2007
- AM0038 V1 - Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of SiMn
- Monitoring Report, dated 06/08/2009 V1
- Monitoring Report, dated 02/10/2009 V2
- Revised Monitoring Plan, dated 15/06/2009
- Revised Monitoring Plan Validation Opinion, dated 03/08/2009

C. Description of Project Activity

The Transalloys Manganese Alloy Smelter Energy Efficiency Project, developed by Transalloys division of Highveld Steel and Vanadium Corporation Ltd, is primarily an industrial energy efficiency project that reduces the electricity consumption in the production of silicomanganese (SiMn) alloy (a key component in steel making) at its Witbank facility in South Africa. It primarily generates certified emission reductions (CERs) due to the retrofitting of current submerged electric arc furnaces with a new design of electric arc furnaces, electrode assemblies, and control and peripheral systems which reduces the specific electricity consumption of alloy production. The project displaces electricity from the South African grid, which is mostly produced from coal (these are known as the "offsite" emissions). Amounts of coal, coke (used as reductants) & paste used is also monitored as their use results in carbon emissions (these are known in the PDD as "onsite" emissions).

Five furnaces are covered by the project. Furnace 7 was retrofitted in late 2004, furnace 5 and furnace 3 in 2005 and furnace 1 and furnace 6 are expected to be retrofitted, although plans have been delayed due to poor market conditions that directly affected the viability of the retrofits.

The approach of the project, for all furnaces, has been to retrofit new technology into the existing furnace infrastructure, which was designed for a different technology.

The central elements that have been changed in the project are the following:

- Furnaces 7 and 5: the PCD (pitch centre diameter), which measures the distance between the three electrodes, is optimized in order to reduce electricity consumption.
- The same principles are applied for furnaces 1, 3, and 6. The units are smaller and so the design is a bit different and the elements that needed to be changed for the project are not all the same. For instance, furnace 3 is converted from a rotating (around its vertical axle) to a stationary furnace and the old pneumatic slipping system (to let the electrode paste down the electrode) is changed. Bateman provide the technology for these furnaces.

The emission reductions reported from the project for the period 01/04/2008 - 30/06/2009 equate to 112,292 tonnes of CO₂ equivalent. This value exceeds the forecast by 57%. Ecosecurities has provided reasons for the difference which are explained in section 3B of this document.

D. Limitations

None

2. Verification Approach

A: Verification Process

The verification process consists of a strategic review phase and an on-site assessment phase to identify any key issues or errors, resolve issues with the Project Participant, and issue a verification statement and report.

Strategic Review

The first phase of verification involves performing a strategic review prior to on-site assessment to confirm consistency of the Monitoring Report with the Monitoring Plan and Methodology. Residual risks are identified in the strategic review phase to take forward for on-site assessment and stakeholder interviews. Key activities include:

- Strategic Review and risk assessment based on the monitoring report and the project activities and processes relative to the Monitoring Plan and Monitoring Methodology.
- Review of the registered PDD, including the monitoring plan and the corresponding validation report, previous verification report, the revised monitoring plan and applied monitoring methodology, and relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board.
- Evaluation of spreadsheets and other calculation tools used to generate GHG data
- Review of documentation provided in advance of the site visit (see Annex 2 for complete listing of documents reviewed).

On-Site Assessment

The second phase of project verification consisted of conducting an on-site assessment and interviewing key stakeholders. For the Transalloys project, the on-site assessment was conducted on 19 and 20 August 2009 at the project site in Witbank, South Africa, to review evidence and interview key personnel. On site review included evaluation of data management processes and controls in place during the reporting period, review of calibration records, physical inspection of installed equipment, and review of supporting evidence for each monitoring point.

Resolution of Issues

The final phase entailed review of the client responses to any Clarification Requests, Corrective Action Requests (CARs), Forward Action Requests (FARs), Requests for Deviation of the Monitoring Plan (if applicable), and/or notification of change to the project design (if applicable). Report preparation, technical review, and submission of the request for issuance are the final steps in the verification process.

B: Verification Team

<i>Verification Team</i>	Role	Verification	CDM Requirements	Sectoral Scope (9)	Technical Sub-scope	Host Country	Attend site visit?
Jon Duncan	Lead Verifier	Yes	yes	Partial	Partial	yes	Yes
Graham Paul	Verifier	Yes	yes	Full	Full	yes	Yes
Brian Hayes	Technical Expert	Yes	yes	Full	Full	yes	Yes

<i>Technical Review</i>	Role	Verification	CDM Requirements	Sectoral Scope	Technical Sub-scope	Host Country	Attend site visit?
Lisa Campbell	Technical Reviewer	yes	yes	Partial	Partial	No	No
Braulio Pikman	Technical Reviewer	yes	yes	Full	Full	No	No

C: Quality Assurance / Technical Review

As part of the quality assurance process, a competent Technical Reviewer (TR) is assigned to each project as an independent reviewer. The role of the TR is to ensure that all requirements are assessed, issues are appropriately identified and resolved, decisions are consistent with EB guidance and rulings, and the quality of the report and other project documentation is consistent with ERM CVS standards. The TR will independently make a judgement on acceptance or rejection of the recommendations of the verification team.

3. Verification Findings

A: Status of open issues from previous verifications (if applicable)

FAR1 – The available procedures need to be amended in order to cover the roles and responsibilities according to the responsibility matrix in the PDD, for access, revision, modification and authority for data collection, storage, archiving and back up.

Procedures have been amended in order to cover the roles and responsibilities according to the responsibility matrix in the PDD, for access, revision, modification and authority for data collection, storage, archiving and back up. The procedures are found in the Monitoring Manual, dated 11/08/2009 V1.

FAR2- A new procedure to define the calibration of the power meters has to be created and enforced covering all elements requested in FAR 1.

A new procedure to define the calibration of the power meters has been created and enforced covering all elements requested in FAR1. The procedure can be found in the Monitoring Manual, dated 11/08/2009 V1.

FAR3 – There is a need to create, communicate and enforce a calibration plan for each monitoring equipment. The calibration plan should be part of the integrated management system SHEQ.

A calibration plan has been set up for monitoring equipment and has been uploaded onto the internal management server system which is accessible across the Transalloys site.

FAR4 – The responsibilities and authorities have to be described in the integrated management system SHEQ as per the responsibility matrix indicated in the PDD.

The responsibilities and authorities (as per the responsibility matrix in the PDD) have been integrated into the Monitoring Manual in tables 1, 3 and 5. The correct information is there but could be more clearly laid out.

B: Conformance of project implementation with the PDD

The Transalloys Manganese Alloy Smelter Energy Efficiency Project, Registration Reference 1027, was registered on 19/10/2007 with the crediting period of 01/10/04 - 30/09/2014 (fixed). The project has been operational since 01/10/2004. This is the second project verification and the monitoring period covered in this verification activity is 01/04/2008 - 30/06/2009, which falls within the crediting period.

The verification team can confirm that the project has been implemented as set out in the PDD in accordance with AM0038 V1. Furnaces 3, 5 and 7 have been retrofitted as described in the PDD whilst furnaces 1 and 6 have not been retrofitted due to economic conditions. Due to the fact that the furnaces were in operation it was not physically possible to verify the PCD optimization but evidence was provided in the form of schematic diagrams. The project started operating on 01/10/2004 with the PCD optimization to furnace 7 taking place by end September 2004, to furnace 5 by end December 2005, and to furnace 3 by end October 2005, along with the conversion of furnace 3 from a rotating furnace to a stationary furnace. According to the PDD, furnace 6 was to be retrofitted in 2008 and furnace 1 in 2009. According to the project manager the plan is still to retrofit furnaces 1 and 6 but will only do so when economic conditions improve. As it stands, during the monitoring period of 15 months, furnace 3 operated for approximately 12.5 months, furnace 5 for 7 months (none in 2009) and furnace 7 for just over 8 months (none in 2009). Transalloys have all the metering and monitoring equipment in place at the 3 retrofitted furnaces in order to monitor the project parameters. Further, the data storage processes and systems have been confirmed to be in accordance with the monitoring plan.

The project participants sought revision to the Monitoring Plan in the current monitoring period. The Revised Monitoring Plan was validated by DNV (26/06/2009) and was approved by the UNFCCC CDM Secretariat on 25/10/09. The Monitoring Report has been uploaded onto the UNFCCC website as part of the verification procedure.

The Verification team can confirm that there have been no changes to the project or to any attributes of the project between the first and second verification periods.

The amount of emissions reductions during the second monitoring period (112,292 tCO₂e) exceeds the estimated emissions in the PDD by 57% due to a combination of factors that have both positively and negatively influenced the estimated emission reductions. An excess was also reported, and issued, during the first monitoring period (01/10/2004 – 31/03/2008).

Factors that have increased the emission reductions above those estimated in the PDD are:

1. On-site emission reductions (due to consumption of coal, coke and paste) are higher than forecast due to the calculated project on-site emission factor of 2.59 tCO₂/tSiMn being lower than the baseline on-site emission factor of 2.93 tCO₂/tSiMn. The primary reason for the reduction in the onsite emission factor during the monitoring period is due to a reduction in the amount of coke required in the smelting process, which is as a result of the project activity. CL1 provides further detail regarding the reduction in the onsite emission factor.
2. Electricity savings (MWh/tSiMn) were higher than forecasted in PDD estimates due to the following two reasons:
 - a. The PDD estimates a reduction in specific electricity consumption per ton of manufactured product of 0.4 MWh/tSiMn. 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. The methodology established a baseline consumption of 5.4 MWh/tSiMn (based on data from 1997-2003). When validation

started in November 2006 it was deemed appropriate to keep 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. Essentially the savings would be 0.4 MWh/tSiMn (on the 2003 baseline of 4.91 MWh/tSiMn) + 0.49 MWh/tSiMn (the 7 year baseline of 5.4 MWh/tSiMn – 4.91 MWh/tSiMn) = 0.89 MWh/tSiMn.

- b. The project has achieved a higher than anticipated electricity saving during the monitoring period. Compared to PDD estimates of 0.4MWh/t electricity savings (2003 baseline), the project has achieved 0.59MWh/t (compared to the 2003 baseline).

CL3 provides further details on this discussion around electricity consumption during the monitoring period.

Factors that have reduced the emission reductions are:

1. Delay of Furnace 6 retrofit. In the PDD Ecosecurities had expected furnace 6 to be retrofitted in early 2008. Due to poor market conditions, the retrofitting works have not started yet. Hence the PDD estimates are adjusted in order to only cover the emission reduction generated by furnaces 3, 5 and 7 (the ones retrofitted to date).
2. Lower SiMn production during the monitoring period. The PDD estimates are based on an annual SiMn production of 96,488 t which corresponds to 120,610tSiMn over a period equal to the length of this monitoring period. However, only 79,635 tSiMn have been produced during this monitoring period due to economic demand.

The above reasoning, along with information provided in the closed out clarifications requests (CL1 & CL3) explains the increased amount of emissions reductions as presented in the Monitoring Report. The verification team can conclude that the project has been implemented as set out in the PDD in accordance with AM0038 V1 and is satisfied that the generation of emission reductions above that estimated in the PDD are achieved as a result of the project activity.

C: Compliance of the Monitoring Plan with the applied methodology

The project participants sought revision to the Monitoring Plan in the current monitoring period. The Revised Monitoring Plan was validated by DNV 26/06/2009) was approved by the UNFCCC CDM Secretariat on 25/10/09.

The revised monitoring plan included the following:

- Revisions to the recording frequency of the quantity of SiMn production in year y during the project, due to the fact that the frequency was not clearly mentioned in the PDD.
- Revisions to the recording frequency of electrode paste used as electrode due to the fact that the frequency was not clearly mentioned in the PDD.
- Revisions to the updating frequency of the emission factor applied to coal consumed as a reductant, due to the fact that the frequency was not clearly mentioned in the PDD.
- Revisions to the source for the emission factor applied for electrode paste due to the fact that this was not mentioned clearly in the PDD.

The Revised Monitoring Plan is verified to be in accordance with the approved methodology AM0038 V1. Conformance of the Revised Monitoring Plan (accepted 25/10/09) with AM0038 V1 was assessed during the verification process through document review, on-site inspection, and interviews with key personnel.

D: Compliance of monitoring with approved Monitoring Plan

The monitoring of project parameters as per the Revised Monitoring Plan and the implementation of management quality assurance and quality control procedures (including the revision and implementation of FARs from the 1st verification) have been properly implemented in accordance with the Revised Monitoring Plan and the Monitoring Report (as detailed in section 4 of this document). Exceptions identified and closed out during the verification are noted below (CL2, CAR1, CAR2, CAR3, and CAR4). This has been confirmed through site inspection and data and supporting record review.

Description of measurement methods and procedures – manufacturer's requirements. The Revised Monitoring Plan provides details on the 'description of measurement methods and procedures to be applied' for each of the project parameters. For QPy; ECy; Qpcoal,y; Qpcoke,y; and Qppaste,y; maintenance and calibration are described to be done in line with "manufacturer's requirements". The Monitoring Report / Monitoring Manual provides the following detail on calibration and maintenance for each of the parameters:

- QPy: The weighing platforms are calibrated daily following the internal procedure SOP:SiMn161.
- ECy: The electricity meters are calibrated every 5 years to ensure optimal accuracy.
- Qpcoal,y: The weigh hoppers are maintained regularly and tested weekly for accuracy according to internal procedure TAOP230.
- Qpcoke,y: The weigh hoppers are maintained regularly and tested weekly for accuracy according to internal procedure TAOP230.
- Qppaste,y: Weighbridges must be calibrated by an accredited supplier in terms of the Trade Metrology Act.

The verification team raised a Clarification Request (CL2) for the PP to provide details as to what these 'manufacturer's requirements' are in terms of maintenance and calibration and whether they differ at all from the maintenance and calibration procedures described above (as stated in the Monitoring Report / Monitoring Manual).

Quality assurance and quality control procedures – QPy; ECy; Qppaste,y. The Revised Monitoring Plan provides details on the 'quality assurance and quality control procedures to be applied' for each of the project parameters. For QPy; ECy; and

Qppaste,y; there are specific checks and balances in order to ensure consistency and accuracy that have according to interviews undertaken, been performed. However, the findings of these quality assurance and quality control procedures have not been reported in the Monitoring Report. The verification team have raised Corrective Action Requests (CAR1, CAR2 and CAR4) for the PP to provide details of these omissions in the Monitoring Report.

Details of equipment used in the process of monitoring – ECy. The Monitoring Report provides details on the equipment used in the process of monitoring QPy; ECy; Qpcoal, y; Qpcoke,y; and Qppaste,y (including serial numbers, calibration dates, location, calibration company, and future calibration date). However, an electricity meter used (serial no. 06470035) in the monitoring of electricity supply to furnace 3 is currently not listed. The verification team has raised a Corrective Action Request (CAR3) for the PP to amend this omission in the Monitoring Report.

E: Completeness of data

A full list of documents that was provided for review is detailed in Annex 2. A complete set of data is available for all project parameters for the entire monitoring period bar the exceptions noted as CL1, CL2, CAR1, CAR2, CAR3, and CAR4. The reasons for these exceptions to the completeness of data revolve around clarity of reasons for increased emissions, clarity of manufacturing requirements, complete reporting on QA/QC processes and inclusions of all meters used.

The data set includes times in which the furnaces were not running during the monitoring period. Samples of data were traced from their origin (references in IPCC documents / origination in the Transalloys lab / supplier documentation / equipment printouts - those still available on site), to their use in logsheets (manual and electronic), their transfer into calculation workbooks as well as a review of all calculations used to produce the final emissions reductions. A Forward Action Request (FAR1) has been raised which, when put in place will improve the completeness of the data for future verifications. Details are described below.

Equipment printouts. The data handling procedure for QPy, monitored; Qpcoke,y; and Qpcoal,y; is for data from equipment printouts generated during both equipment calibration and monitoring of parameters (to be transferred into daily logsheets). Monthly logsheets are then saved and stored and during the monitoring period and used for transferring data into calculation workbooks, which are used to calculate project emissions. The equipment printouts are generally not kept post the transcription of this data into logsheets (there are certain data that have been kept since April 2009). This is not out of line with what is detailed in the approved methodology, the PDD, the Revised Monitoring Plan or the Monitoring Report. The logsheets in the case of this project are classified as 'raw data'. This makes sense for certain data parameters e.g. ECy, where the metered data is entered into the logsheets hourly, and the monthly totals are checked against the invoices generated by Eskom, the utility provider. But in the case of certain internal equipment calibration and monitoring of certain project parameters, the equipment display printouts are not archived and hence confirmation of log sheet data entries is in some cases not possible. The verification team have raised a Forward Action Request (FAR1) for the PP, although not currently out of line with what is detailed in the approved methodology, the PDD, the Revised Monitoring Plan or the Monitoring Report, to archive all equipment printouts for the length of the project crediting period from this point forward.

F: Data Management Processes and Controls

Data quality procedures were documented in the Monitoring Manual (dated 11/08/2009 v1) including parameters monitored, data collection procedures, data flow, and quality assurance and quality control procedures, reporting and recordkeeping. The quality assurance procedures include ensuring data completeness and transparency, daily sense checking of logsheets, data checking for transcription errors (into calculation workbooks), training and recordkeeping, cross-checking data against other redundant records for accuracy, second party review of calculations, internal audits of data and records. Records were readily available on site for review and were well organised.

The implementation of management quality assurance and quality control procedures have been properly implemented in accordance with the Revised Monitoring Plan and the Monitoring Report. Persons involved in the monitoring processes have been trained by Ecosecurities. Through interviewing persons involved in data collection, review, and reporting at the facility, the verification team concludes that the personnel are competent, knowledgeable of their roles and responsibilities, and executing the data management plan to ensure accurate data is being collected and reported.

The verification team confirmed a transparent audit trail and complete records for cross checking data. There are further quality assurance and quality control procedures that can be put in place which will strengthen the quality assurance and quality control procedures (FAR2, FAR3, FAR4, and FAR5). These are noted below.

Quality assurance and quality control procedures - logsheets. In order to strengthen the quality assurance and quality control procedures and to lessen the risk of mistakes occurring during the entering of data into logsheets the verification team has raised Forward Action Requests for the PP to password protect monthly Excel logsheets once they have been stored in order to prevent editing of logsheets once they have been checked and saved (FAR2), for the PP to protect calculation cells in daily Excel logsheets to prevent the entering of raw data into these calculation cells (FAR3), and for the PP to develop a procedure for the quality assurance and quality control of logsheet data and for this procedure to include processes for the changing of data in logsheets and the highlighting thereof (FAR4).

Quality assurance and quality control procedures – load cell (weigh hopper) calibration procedure. Currently the calibration of the load cells in the weigh hoppers is done using mass pieces in line with internal procedures. These mass pieces are also calibrated yearly but this information on the mass piece calibration is not stated in the Monitoring Report. There is a need to

update the current load cell (weigh hopper) calibration procedure to include the process in place to calibrate the mass pieces used for the calibration of the weigh hopper's load cells (FAR5).

The data collection system in place meets the requirements of the monitoring plan, as confirmed by the verification team during the site assessment. Evidence reviewed entailed documentation, interviews with site personnel responsible for data collection and controls, and review of the data for the monitoring period.

G: Emission Reduction Calculations

The data set supplied was complete and the emission reduction calculations transparent. The appropriate formulae and methods of calculations of the baseline emissions and project emissions have been implemented (methodology requires no leakage calculation) as per the Revised Monitoring Plan. The use of emission factors and of default values have been appropriately justified and correctly applied.

The following default data have been appropriately applied in the emission reduction calculations:

- Coal emission factor - 3.1 tCO₂/tcoal - IPCC (2006) - Vol3, Ch4, section 4.3.3.2, table 4.6 page 4.37
- Carbon content of volatiles in coke - 80% - equation 4.19, p4.33 of IPCC (2006)
- Carbon content of volatiles in paste - 80% - same value as for the coke of 80% is used as per equation 4.19, p4.33 of IPCC (2006)
- 3.67 tCO₂/tpaste - conservative value used for paste if monthly analysis from supplier unavailable, as per PDD (i.e. 100% carbon)
- Electricity grid emission factor (EFy, offsite) - 1.221 tCO₂/MWh - established ex ante according to ACM0002

Project specific internal audits are performed periodically by Ecorescurities. Quality assurance procedures are in place and all data information is reviewed for accuracy and correctness by a staff member before submission. The forecasted emission reductions for the monitoring period came to 71,323 tCO₂. However, the emissions reductions that Ecorescurities have calculated for the monitoring period are 112,292 tCO₂. Ecorescurities have provided reasons for this difference in the Monitoring Report and these are described above in section 3B of this document.

The emission reduction calculations have been reviewed and samples of data have been traced from their origin (references in IPCC documents / origination in the Transalloys lab / supplier documentation / equipment printouts - those still available on site), to their use in logsheets (manual and electronic), their transfer into calculation workbooks as well as a review of all calculations used to produce the final emissions reductions. Issues with the reduction calculations are noted below (CAR5 and FAR4).

Transcription errors. During the review of the emission reduction calculations transcription errors from the logsheets (manual and electronic) to the calculation workbooks were found. The verification team assessed approximately 13% of the 822 data points (only days when the furnace ran) and found 13 transcription errors (<2%), the majority of which were the transcription of coal data. The verification team raised a Corrective Action Request (CAR5) for the PP to please correct the transcription errors that were discovered in each of the calculation workbooks. Note that these errors were random and had a negligible impact on the emission reduction calculations.

Quality assurance and quality control procedures – logsheets. During the review of the emission reduction calculations it was found that data had been edited in logsheets, with no reason given for the edit, but transferred correctly into the calculation workbooks (7 cases). In section 3F the verification team details the Forward Action Request (FAR4) for the PP to develop a procedure for the quality assurance and quality control of logsheet data and for this procedure to include processes for the changing of data in logsheets and the highlighting thereof.

H: Deviations

No requests were made to the CDM Executive Board for deviation from the approved methodology. No deviations were made to the monitoring plan from the applied methodology.

I: Other observations

No further observations were noted.

4. Parameters Verified

Data / Parameter	QPy
Data Unit	Tonnes of SiMn/year
Description	Quantity of SiMn production in year y during the project activity
Monitoring Plan Requirements	<ul style="list-style-type: none"> “Data will be monitored at each tapping of the furnace i.e. at each “production run” by weighing metal ladles on a weighing platform and aggregated daily” “The weighing platform will be maintained and calibrated regularly in line with the manufacturer’s requirements” “Measured data will be cross-checked with product sales records”
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment (weighing platform) Observed that the equipment printouts as obtained from the weighing platform are generated (after each production run). Equipment printouts are captured by the control room operators (morning, afternoon and night shift), as these printouts are generated, into the production logsheet. The generation and capturing of such data was assessed at the control room (Furnace 3 & 5). Furnace 7 was not operational during the verification. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to determine accuracy of daily aggregated data (as obtained from morning, afternoon and night shifts) and the transcribing of such data into the calculation workbooks. Reviewed records of calibration activities as well as maintenance and calibration procedures. A SiMn cross check spreadsheet has been developed, which was verified. This spreadsheet covers the Total Production, Internal Consumption (Recovered back to furnace), Sales, Internal company purchase sales and C/S Reworked adjustment.
Findings	<ul style="list-style-type: none"> Production log sheets are kept for the full project period, but equipment printouts (weighing metal ladles / calibration records) have only been kept since April 2009. (FAR1) The Monitoring Report stipulates that the weighing platforms are calibrated following the internal procedure SOP: SiMn161. Such calibration procedure reflects that such should be done daily. It was noted that logsheets provide space for calibration entries to be entered at every shift. Calibration entries are not entered at every shift (as per the production log records), but the requirement of daily calibration has been met. It could not be verified what the “manufacturer’s requirements” are for calibration of the weighing platforms. (CL2) For the monitoring period, it was observed that the sales figures are 91% of total production. The monitoring report indicates that production figures are compared to quantities dispatched off site for consistency. However, no further discussions on the results of such comparison or the reasons for deviation between production and sales figures are contained within the monitoring report. (CAR1)
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.

Data / Parameter	ECy
Data Unit	Electricity consumption (MWh)/year
Description	Annual grid electricity consumption by the submerged electric arc furnace
Monitoring Plan Requirements	<ul style="list-style-type: none"> “Electricity consumption will be metered continuously on individual furnaces by an electricity meter and recorded monthly”. “The meters will be maintained and calibrated regularly in line with the manufacturer’ requirements. “Consumption of each furnace will be cross-checked monthly with total electricity bill”
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Electricity meters (Enermax) for the respective furnaces were identified (each with a unique meter serial number), meter calibration requirements, as per the manufacturer (ENERMAX) have been obtained and sighted during the verification. Recording of the meter readings as done by the control room operator for each furnace (hourly recording) into the production logsheet was observed for Furnace 3 and 5. (Furnace 7 was not operational during the verification) Reviewed records of calibration activities as well as maintenance and calibration procedures.

	<ul style="list-style-type: none"> Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to determine accuracy of calculating electricity consumption from meter reading data (as obtained from morning, afternoon and night shifts) and the transcribing of such data from the production logsheet into the workbook.
Findings	<ul style="list-style-type: none"> An electricity reconciliation sheet has been developed and the data as captured therein reviewed during the verification. This reconciliation sheet covers the meter readings (as undertaken by Transalloys) for Furnaces #1 to #7, respective baghouse filters, Plant auxiliaries, Canon and Brick Plant operations. On a monthly basis, the total of these meter readings are compared against the Eskom electricity bill.) An electricity meter used (serial no. 06470035) in the monitoring of electricity supply to furnace 3 is currently not listed in the Monitoring Report along with all other meters used in the project (CAR3).
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.

Data / Parameter	Qpcoal,y
Data Unit	Tonnes of coal/year
Description	Annual consumption of coal used as reductant in the submerged electric arc furnace
Monitoring Plan Requirements	<ul style="list-style-type: none"> "The amount of coal put in each batch is weighed in hoppers with load cells and recorded daily". "The load cells will be maintained and calibrated regularly in line with the manufacturer's requirements
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment (weigh hoppers and load cells) Observed the equipment printouts from the weigh hopper load cells are generated. Instrument printouts are captured by the control room operators (morning, afternoon and night shift), as these printouts are generated, into the production log sheet. The generation and capturing of such data was assessed at the control room of Furnace 3. Reviewed records of calibration activities as well as maintenance and calibration procedures. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to determine accuracy of daily aggregated data (as obtained from morning, afternoon and night shifts) and the transcribing of such data into the calculation workbooks.
Findings	<ul style="list-style-type: none"> Production logsheets are kept for the full project period, but Instrument printouts (weigh hopper weights) have only been kept since April 2009. (FAR1) Although falling outside the monitoring period, a concern was noted where data was incorrectly captured onto the production log sheets (Nightshift on 17 August 2009, Furnace 3: Raw material data input captured in the "Total" column). Although this was confirmed not to be of regular occurrence (as per the data sampling undertaken), it still raises the need for protection of calculation cells in the electronic production log sheets. (FAR2 and 3) For the data, 13 May 2009 (Furnace 3): Deviations from instrument printout data and production logsheet were noted. No comments were captured on the production log sheet documenting why corrections were undertaken on the final recorded data (as contained in the production log sheet). (FAR4) It could not be verified what the "manufacturer' requirements" are for calibration of the weighhoppers. (CL2) Internal procedure TAOP230 includes the requirement for load cell calibration, with a frequency of once/week. It was found that calibration is undertaken once/week (using standard mass pieces), with the results captured into the production logsheets. Annually, the mass pieces are calibrated, as per records from a SANAS accredited laboratory (ECS). Date of calibration: 2009-01-09, with certificate number ECS/09/80. There is a need to update the current load cell (weigh hopper) calibration procedure to include the process in place to calibrate the mass pieces used for the calibration of the weighhoppers' load cells. (FAR5)
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.

Data / Parameter	Qpcoke,y
Data Unit	Tonnes of coke/year
Description	Annual consumption of coke used as reductant in the submerged electric arc furnace
Monitoring Plan	<ul style="list-style-type: none"> "The amount of coke put in each batch is weighed in hoppers with load cells and

Requirements	<ul style="list-style-type: none"> recorded daily". "The load cells will be maintained and calibrated regularly in line with the manufacturer's requirements"
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment (weigh hoppers and load cells) Observed the equipment printouts from the weigh hopper load cells are generated. Instrument printouts are captured by the control room operators (morning, afternoon and night shift), as these printouts are generated, into the production logsheet. The generation and capturing of such data was assessed at the control room of Furnace 3. Reviewed records of calibration activities as well as maintenance and calibration procedures. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to determine accuracy of daily aggregated data (as obtained from morning, afternoon and night shifts) and the transcribing of such data into the calculation workbooks.
Findings	<ul style="list-style-type: none"> Production logsheets are kept for the full project period, but equipment printouts (weigh hopper weights) have only been kept since April 2009.(FAR1) Although falling outside the monitoring period, a concern was noted where data was incorrectly captured onto the production log sheets (Nightshift on 17 August 2009, Furnace 3: Raw material data input captured in the "Total" column). Although this was confirmed not to be of regular occurrence (as per the data sampling undertaken), it still raises the necessity for protection of calculation cells in the electronic production log sheets. (FAR2 and 3) It could not be verified what the "manufacturer's requirements" are for calibration of the weigh hoppers. (CL2) Internal procedure TAOP230 includes the requirement for load cell calibration, with a frequency of once/week. It was found that calibration is undertaken once/week (using standard mass pieces), with the results captured onto the production log sheets Annually, the mass pieces are calibrated, as per records from a SANAS accredited laboratory (ECS). Date of calibration: 2009-01-09, with certificate number ECS/09/801. There is a need to update the current load cell (weigh hopper) calibration procedure to include the process in place to calibrate the mass pieces used for the calibration of the weighhoppers' load cells. (FAR5)
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.

Data / Parameter	Qppaste,y
Data Unit	Tonnes of electrode paste/year
Description	Annual consumption of electrode paste used as electrode in the submerged electric arc furnace
Monitoring Plan Requirements	<ul style="list-style-type: none"> "The number of paste cylinders put into the electrode is logged each time a new cylinder is used". "The average weight of each cylinder is calculated based on weighing paste trucks (arriving at the facility) on a weighbridge and dividing on a monthly basis the total weight by number of cylinders delivered to the facility". "The annual figure is obtained by summing the daily product of number of cylinders used and monthly average weight". "The weighbridge will be maintained and calibrated regularly in line with the manufacturer's requirements to ensure its accuracy. Average weight of each cylinder will be compared to indications of the supplier."
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment cells, electrodes and weighbridge) Observed the capturing of amount of cylinders as used per shift into the production logsheet. Observed stock spreadsheets verifying the amount of cylinders as used per shift into the production logsheet. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 for the transcribing of such data from the production logsheet into the calculation workbooks. Observed supplier delivery data to confirm delivery weight and no. of cylinders and verify the calculation obtained for these months by summing the daily product of no. of cylinders used and the monthly average weight. Reviewed records of calibration activities as well as maintenance and calibration procedures.

	<ul style="list-style-type: none"> Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 for the transcribing of such data from the production logsheet into the workbook. Observed the weighbridge meter (serial no. 060102100). Observed calibration records for weighbridge during the verification (also cross checking calibration records against the unique serial number).
Findings	<ul style="list-style-type: none"> It could not be verified what the "manufacturer" requirements are for calibration of the weigh bridge (at the main entrance). The monitoring report does not contain discussion on the results from cross-checking the average weight of each cylinder with the indication of the supplier. (CAR1)
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.

Data / Parameter	EF_{coal,y}
Data Unit	tCO ₂ /tcoal
Description	Emission factor applied for the coal consumed as reductant in year y
Monitoring Plan Requirements	<ul style="list-style-type: none"> The 2006 IPCC value of 3.1tCO₂/tcoal will be used in the project. If new IPCC guidelines are released, this value may be updated according to latest relevant EB guidance".
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed default emission factor in the 2006 IPCC guidelines (3.1tCO₂/tcoal). No relevant EB guidance observed relating to updated default coal emission factor. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 for the correct use of the default emission factor in the calculation workbooks.
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.

Data / Parameter	EF_{coke,y}
Data Unit	tCO ₂ /tcoke
Description	Emission factor applied for the coke consumed as reductant in year y
Monitoring Plan Requirements	<ul style="list-style-type: none"> "Coke samples are prepared at Transalloys and sent to the laboratory (at the moment from neighbouring facility at Highveld) for analysis of volatile and fix carbon content". "Monthly averages of carbon contents are used for the calculation of a monthly emission factor". "This emission factor is calculated using equation 4.19, p4.33 of IPCC (2006). The annual emission factor is calculated as the average of monthly emission factors and used for emission calculations". "Lab analyses are done according to applicable national and international standards". "If values are missing or inconsistent for some months, the average of previous and next 3 months will be used".
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm the monthly averages of carbon contents are used for calculation of a monthly emission factor. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm the emission factor is calculated using the equation stated above and that the annual emission factor is calculated as the average of monthly emission factors and used for emission calculations. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm the correct use of carbon content of volatiles default value from IPCC (2006) as per equation 4.19, p4.33 of IPCC (2006). Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to national SABS standards. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that when values are missing or inconsistent for some months, the average of previous and next 3 months will be used.
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.

Data / Parameter	EF_{paste,y}
Data Unit	tCO ₂ /tpaste
Description	Emission factor applied for the electrode paste consumed as electrode in year y
Monitoring Plan Requirements	<ul style="list-style-type: none"> "This emission factor is calculated using equation 4.19, p4.33 of IPCC (2006). Fix carbon and volatiles content analyses are obtained from the supplier. Carbon content in the volatiles (C_v) is not available in these analyses hence in accordance with the monitoring plan the same value as for the coke of 80% is used". "This project-specific value will be compared to EF_{paste,y} and the maximum between the two values will be taken for EF_{paste,y}".
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm the emission factor is calculated using the equation stated above Observed supplier documentation on fix carbon and volatiles content for the months when deliveries took place, as per the calculation workbooks. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm a value of 80% is used for the carbon content in the volatiles. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that for the months when supplier analysis reports are not available, the conservative value of 3.67 tCO₂/t suggested by the methodology AM0038 is used, as stated in the monitoring report. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that the maximum between EF_{paste,y} (3.32tCO₂/t according to monitoring plan) and EF_{paste,y} is used.
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.

Data / Parameter	Quality of coalp
Data Unit	Mass fraction of each component of coal
Description	Quality of coal based on elementary analysis and other relevant properties
Monitoring Plan Requirements	<ul style="list-style-type: none"> "Fixed carbon, volatiles, S and P contents will be monitored at the start of the project activity. This will be done by lab analyses according to applicable national and international standards.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that quality of coal is reported in terms of fixed carbon, volatiles, S and P contents. Observed that the quality of coal is reported monthly as per the monitoring report. Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to the applicable standards set by the South African Bureau of Standards , as is stated in the monitoring report.
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.

Data / Parameter	Quality of cokep
Data Unit	Mass fraction of each component of coke
Description	Quality of coke based on elementary analysis and other relevant properties
Monitoring Plan Requirements	<ul style="list-style-type: none"> "Fixed carbon, volatiles, S and P contents will be monitored at the start of the project activity. This will be done by lab analyses according to applicable standards set by the South African Bureau of Standards.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that quality of coal is reported in terms of fixed carbon, volatiles, S and P contents. Observed that the quality of coal is reported monthly as per the monitoring report. Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to the applicable standards set by the South African Bureau of Standards
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring

	Plan.
Data / Parameter	Quality of electrode pastep
Data Unit	Mass fraction of each component of electrode paste
Description	Quality of electrode paste based on elementary analyses and other relevant properties
Monitoring Plan Requirements	<ul style="list-style-type: none"> “The quality of the paste will be taken from supplier’s data at the time of purchase”
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed supplier documentation on fix carbon and volatiles content for the months when deliveries took place, as per the calculation workbooks
Findings	<ul style="list-style-type: none"> The monitoring report does not contain discussion on the results from cross-checking the quality of paste to the IPCC or other suppliers. (CAR1)
Conclusions	The parameter, besides exceptions noted is consistent with the Monitoring Plan. Exceptions have been closed out prior to verification being finalised.
Data / Parameter	EF_y offsite
Data Unit	Grid emission factor (tCO ₂ /MWh)
Description	Grid emission factor
Monitoring Plan Requirements	<ul style="list-style-type: none"> The Grid electricity emission factor (EF_{y,offsite} in tCO₂e/MWh) for South Africa is established ex ante according to ACM0002”.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the calculations and assumptions of this ex ante calculation within the PDD. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that grid emission factor stated above is used throughout the calculation workbooks
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.
Data / Parameter	Quality of SiMnp
Data Unit	Mass fraction of each component of SiMn
Description	Quality of SiMn
Monitoring Plan Requirements	<ul style="list-style-type: none"> “A sample will be lab analysed daily to ensure that the quality remains between pre-determined specifications for Mn, C, Si, P and S”. “Lab analyses will be undertaken to national or international standards to ensure accuracy” – these are the applicable standards set by the South African Bureau of Standards.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that quality of SiMn is reported daily in terms of Mn, C, Si, P and S. Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to the applicable standards set by the South African Bureau of Standards
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.
Data / Parameter	Quality of ore
Data Unit	Mass fraction of each component of ore
Description	Quality of ore
Monitoring Plan Requirements	<ul style="list-style-type: none"> “A sample will be lab analysed at least monthly to determine the composition of the ore (e.g. contents in Mn, Fe, SiO₂, CaO)”. “Lab analyses will be undertaken to national or international standards to ensure accuracy” – these are the applicable standards set by the South African Bureau of Standards.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that quality of ore is reported monthly in terms of its composition (e.g. contents in Mn, Fe, SiO₂, CaO). Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to national SABS standards. Reviewed Ore % Composition data and analysed findings.

Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed. It was noted that ore composition has fluctuated over the monitoring however this fluctuation is within acceptable limits. The key component in the ore's composition is manganese (%Mn), as this defines the amount of reductant (coke) and energy required. Lower %Mn requires higher coke and energy use. It was observed that the % Mn over the monitoring period is lower than the 2003 baseline and hence confirms the emission reductions are attributable to the project activity. It was noted that %Fe composition of the ore over the monitoring period is higher than the 2003 baseline. ERM CVS confirmed that fluctuations in Fe during this monitoring period have no significance on the conductivity and electrical efficiency of the system and hence the emissions reductions claimed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan requirements.

Data / Parameter	Quality of fluxes
Data Unit	Mass fraction of each component of fluxes
Description	Quality of fluxes
Monitoring Plan Requirements	<ul style="list-style-type: none"> A sample will be lab analysed at least monthly to determine the composition of the ore (e.g. contents in Mn, Fe, SiO₂, CaO)". "Lab analyses will be undertaken to national or international standards to ensure accuracy" – these are the applicable standards set by the South African Bureau of Standards.
Verification Activities / Evidence Reviewed	<ul style="list-style-type: none"> Observed the physical equipment at the lab used for the analysis of samples. Sampling the full monitoring period, data verification was undertaken for Furnace 3, Furnace 5 and Furnace 7 to confirm that quality of fluxes is reported monthly in terms of its composition (e.g. contents in Mn, Fe, SiO₂, CaO). Observed internal procedures as part of SHEQ internal management system confirming that lab analyses are done according to national SABS standards.
Findings	<ul style="list-style-type: none"> No concerns were noted and compliance to the monitoring plan requirements confirmed.
Conclusions	The data are concluded to be accurate and fairly stated in accordance with the Monitoring Plan.

5. Corrective Action Requests, Clarification Requests and Forward Action Requests

Clarification Requests

Finding	Clarification Request	PP response and follow up	Conclusion
CL1 - Onsite Emission Factor	<p>Please clarify the reason/s for the reduction in coke consumption that has contributed to the greater onsite emission reductions that are described in the Monitoring Report.</p> <p>Please clarify whether these changes in any way have impacted the product quality.</p>	<p>During this monitoring period the consumption of coke has decreased compared to the overall furnaces baseline level by 18.4%. This is due to the project having a positive effect that was not expected before being implemented, or more accurately was expected but to a lesser extent. The primary purpose of coke is to increase electric conductivity in the furnace hence decreasing the electric arc current through the mixture. The project's retrofit mainly consisted of reducing the Pitch Centre Diameter of the electrodes, bringing the electrodes closer to the star point (where the electric arcs from the 3 electrodes meet in the furnace) hence reducing electrical resistance for the electric arc. This is compensated by using a lesser proportion of coke in the recipe, resulting in increased resistivity of the furnace charge hence ensuring that the electric arc current does not soar. As a consequence of this, less coke is required by the project furnaces compared to the baseline situation.</p> <p>The SiMn quality, as can be verified by the monitored data after exiting the furnaces, has not been affected by this reduction of coke usage: the Silicon and Manganese content of the alloy is still satisfactory for the industry standards. It is worth mentioning that coke (as well as other reductants) is not supposed to provide any of the SiMn alloy's core components. The alloy content in carbon is typically less than 2% in weight, which corresponds to about 2% of the total carbon provided in the furnace by coal, coke and paste altogether. The remainder exits the furnaces as part of the exhaust gases.</p>	<p>ERM CVS has verified changes as per the PP response and is satisfied that this is adequately explained.</p> <p>CL1 is closed.</p>

Clarification Requests continued

Finding	Clarification Request	PP response and follow up	Conclusion
CL2 - Equipment calibration	Please clarify the "manufacturer's requirements" as described in the revised monitoring plan for the maintenance and calibration of scale platforms (QPy, monitored), electricity meters (ECy), load cells in weigh hoppers (Qpcoal,y and Qpcoke,y) and weighbridge in Qppaste,y).	The requested documents from the platform scales, electricity meters, load cells in weigh hoppers and weighbridge manufacturers have been provided to the verifying DOE. All manufacturers have certified that the site's practice regarding calibration is in line with their requirements.	ERM CVS has reviewed the documents indicating that site's practice is in line with manufacturer requirements which were noted as follows: QPy: Manufacturer finds daily calibration to be in line with good practice (ref: email dated 02/09/09 from JSC Sales team) ECy: Manufacturers standards indicate that "it is not necessary to recalibrate the meters over its lifespan (+/- 10 years)", but is "good practice to recalibrate once every five years" (Ref: strike technologies letter 04/04/08) Qpcoal and Qpcoke: "weekly testing procedure in line with requirements" (ref: email dated 26/08/09 from Loadtech Load Cells). Qppaste: "Minimum verification period for weighbridges that are utilized for a prescribed purpose as per definition of "TRADE" in the Trade Metrology Act, is stipulated to be 2 years" (ref: letter from Sasco Africa 01.10.09) CL 2 is closed.
CL3 - Baseline electricity consumption	Please clarify further the "Methodology effect on baseline electricity consumption" reason for difference between PDD forecasts and reported ER.	A more comprehensive explanation has been included in the Monitoring Report in the section 2.3.	ERM CVS has reviewed changes in Section 2.3 of the Monitoring report and is satisfied that the reasons for the difference between the ER estimated in the PPD and the reported ER is adequately explained. CL3 is closed.

Corrective Action Requests

<i>Finding</i>	<i>Corrective Action Request</i>	<i>PP response and follow up</i>	<i>Conclusion</i>
CAR1 - QA/QC findings – QPy, monitored (Tonnes of SiMn). The monitoring plan requires that as a QA/QC procedure for “QPy, monitored”, “measured data will be cross-checked with product sales records” while the Monitoring Report states that “Production figures are compared to quantities dispatched off site for consistency”. However, the findings of these processes are not reported in the Monitoring Report.	Please report the QA/QC process and findings for QPy, monitored (Tonnes of SiMn) in the Monitoring Report.	This has now been added to the monitoring report in the section 4.2.	ERM CVS has verified changes as per the PP response and is satisfied that the process and findings are reported in the monitoring report. CAR1 is closed
CAR2 - QA/QC findings – ECy (MWh of electricity). The monitoring plan requires that as a QA/QC procedure for “ECy”, “consumption of each furnace will be cross-checked monthly with total electricity bills” while the Monitoring Report states that “values reported are cross-checked with electricity metered monthly by the grid company Eskom”. However, the findings of these processes are not reported in the Monitoring Report.	Please report the QA/QC process and findings for ECy (MWh of electricity) in the Monitoring Report.	This has now been added to the monitoring report in the section 4.2.	ERM CVS has verified changes as per the PP response and is satisfied that the process and findings are reported in the monitoring report. CAR2 is closed
CAR3 - Electricity meters. Section 4.4.1 of the Monitoring Report provides information on the equipment used in the process of monitoring QPy; ECy; Qpcoal, y; Qpcoke,y; Qppaste,y (including serial numbers, calibration dates, location, calibration company, and future calibration date). However, an electricity meter used (serial no. 06470035) in the monitoring of electricity supply to furnace 3 is not listed.	Please correct the information in the Monitoring Report section 4.4.1 to provide information on electricity meter serial no. 06470035 used in the monitoring of electricity supply to furnace 3 that is currently not listed.	This has now been corrected in the Monitoring Report in the section 4.4.1.	ERM CVS has verified changes as per the PP response and is satisfied that correct information has been supplied. CAR3 is closed

Corrective Action Requests continued

Finding	Corrective Action Request	PP response and follow up	Conclusion
<p>CAR4 - QA/QC findings - Qppaste,y (Tonnes of paste/year) and Quality of pastep.</p> <p>The monitoring plan requires that as a QA/QC procedure for "Qppaste,y", "the weigh bridge will be maintained and calibrated regularly in line with the manufacturer's requirements to ensure its accuracy. Average weight of each cylinder will be compared to indications of the supplier" while the Monitoring Report states that "average weight of each cylinder is compared to indications of the supplier". For quality of paste the monitoring plan states that "results will be compared to factors supplied by IPCC or other suppliers"</p> <p>However, the findings of these processes are not reported in the Monitoring Report.</p>	<p>Please report the QA/QC process and findings for Qppaste,y (Tonnes of paste/year) and Quality of paste,p in the Monitoring Report.</p>	<p>This has now been added to the monitoring report in the section 4.2.</p>	<p>ERM CVS has verified changes as per the PP response and is satisfied that the process and findings are reported in the monitoring report.</p> <p>CAR4 is closed</p>
<p>CAR5 - A minor amount of transcription errors from logsheets into calculation workbooks were found. 13% of data points (only days when furnaces operational) for SiMn produced, electricity use, coal use, coke use, and electrode paste use were assessed. The number of transcription errors were 0.92% (of the 13% assessed) for SiMn produced, electricity use, and electrode paste use and 7.34% (of the 13% assessed) for coal use. The resulting percentage error in emissions reductions is an underestimation of less than 1% of total emissions reductions, consisting of "offsite" (electricity use) underestimations of -0.02%, and "onsite" (consumption of coal, coke and paste) underestimations of -0.64%.</p>	<p>Please correct the transcription errors that were discovered in each of the calculation workbooks</p>	<p>This has now been corrected in the ER workbooks and all the subsequent changes reflected in the Monitoring Report.</p>	<p>ERM CVS has verified changes as per the PP response and is satisfied that errors have been corrected.</p> <p>CAR5 is closed</p>

Forward Action Requests

<i>Finding</i>	<i>Forward Action Request</i>	<i>PP response and follow up</i>	<i>Conclusion</i>
FAR1 – equipment printouts for both equipment calibration and for monitoring project parameters are not kept for any particular length of time.	There is a need to archive all equipment printouts for both equipment calibration and for monitoring project parameters for the entire project crediting period.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification
FAR2 – Monthly Excel logsheets are not password protected at the end of each month when they are saved on the server.	There is a need to make all monthly Excel logsheets password protected at the end of the month when they are saved on the server in order to prevent any 'editing' of these logsheets taking place.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification
FAR3 – Daily Excel logsheets do not have all 'calculation cells' protected.	There is a need to protect all 'calculation cells' in the daily Excel logsheets in order to prevent the entering of raw data into these cells.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification
FAR4 – During the QA/QC process of the logsheet data, data may be edited if incorrect. However, there is no information provided as to why the data was edited or in many cases how it has been edited.	There is a need for a procedure for the QA/QC of logsheet data to be developed and for this procedure to include processes for the changing of data in logsheets.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification
FAR5 – Currently the calibration of the load cells in the weigh hoppers is done using mass pieces according to internal procedures. These mass pieces are also calibrated yearly but this information is not stated in the Monitoring Report.	There is a need to update the current load cell (weigh hopper) calibration procedure to include the process in place to calibrate the mass pieces used for the calibration of the weighhoppers' load cells.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification
FAR6 – Currently the documents relaying the manufacturers requirements for the for the maintenance and calibration of scale platforms (QPy, monitored), electricity meters (ECy), load cells in weigh hoppers (Qpcoal,y and Qpcoke,y) and weighbridge in Qppaste,y) are not filed on site.	There is a need to file the documentation (letters and emails) relating to the manufacturers requirements for the for the maintenance and calibration of scale platforms (QPy, monitored), electricity meters (ECy), and load cells in weigh hoppers (Qpcoal,y and Qpcoke,y) on site with the monitoring plan.	This will be addressed during monitoring period No.3 and verifiable at next verification.	DOE is to verify this at next verification

6. Conclusions

A. Assessment against the provisions of Decision 17/CP.7

	Comments
Is the project documentation in accordance with the requirements of the registered PDD and relevant provision of decision 17/CP.7, EB decisions and guidance and the COP/MOP?	Project documentation is compliant with the requirements of the registered PDD and decisions of the COP/MOP.
Have on-site inspections been performed that may comprise, inter alia, a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observations of established practices and testing of the accuracy of monitoring equipment?	On site inspection of equipment, all supporting data including cross-reference with database, and manual plant logs, and review of calculations were performed. Any instances where inconsistencies with the monitoring plan were noted are discussed in Section 5. These have been closed out prior to the verification being finalised.
Has data from additional sources been used? Is yes, please give detail and significance	Default data from IPCC documents and data from supplier documentation has been used in calculations of emissions reductions. No concerns were noted and compliance to the monitoring plan requirements is confirmed.
Have the monitoring results and monitoring methodologies been applied correctly, and is their documentation complete and transparent?	The monitoring methodologies have been applied correctly. Any inconsistencies are discussed in section 5. These have been closed out prior to verification being finalised.
Have any recommendations for changes to the monitoring methodology for future crediting periods been issued to the project participant?	Not applicable.
Determine the reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CDM project activity, based on the data and information using calculation procedures consistent with those contained in the registered project design document and the monitoring plan.	The reduction in anthropogenic emissions was verified to be 112,292 tonnes for the monitoring period 01/04/2008 - 30/06/2009, as stated in the monitoring report (dated 02/10/2009 V2).
Identify and inform the project participants of any concerns related to the conformity of the actual project activity and its operation with the registered project design document.	The project activity conforms to the requirements of the PDD.
Has the monitoring report been posted on the UNFCCC website? Please give address below.	The monitoring report was posted on the UNFCCC website on 14 August 2009 (http://cdm.unfccc.int/Issuance/MonitoringReports)


B. Assessment against Verification Principles

Verification Principles	Comment
Completeness <i>All relevant and significant sources are recorded, disclosed, classified and described for the relevant monitoring period</i>	A complete set of data is available for all project parameters for the entire monitoring period. All project parameters as stated in the Revised Monitoring Plan are sufficiently monitored and the monitoring procedures are being followed in accordance with the monitoring documents.
Reliability <i>The emissions data is recorded, processed, reported and aggregated following the most likely operational characteristics and likely development, with appropriate crediting time following verifiable procedures</i>	Data has been electronically and manually collected, backed up, processed, extracted into calculation workbooks, reviewed, and reported in a reliable manner. The quality of evidence is accurate and credible and able to yield the same results over time.
Consistency and Comparability <i>Changes in methodologies should be clearly identified and documented to allow for consistent year-to-year comparisons.</i>	Methodologies are clearly stated in the monitoring report. Data are collected, reviewed and calculations are determined in a consistent manner. This allows for consistent year-to-year comparisons for future monitoring periods.
Accuracy <i>Data calculation should be exact and provide accurate results, they should include uncertainties of measurements and/or descriptions</i>	The project has sought to minimise bias and uncertainty in the measurement process by performing consistent and accurate calibration of key meters / equipment for which calibration certificates are available. Default data are used appropriately, data collection is consistent and calculations are exact resulting in accurate data for emissions reductions calculations.
Validity <i>Indicators used to calculate baseline and project emissions should be verifiable</i>	Parameters used to calculate baseline emissions and project emissions are valid and are sufficiently monitored in accordance with the Revised Monitoring Plan. As such, the data for all parameters are verifiable.
Transparency <i>The project documents should be transparent and easy to understand, with all assumptions, calculation methodologies and formulas stated along with the rationale for selecting them.</i>	Records are well organised, readily available, and copies of key documents such as calibration certificates are available. All parameters, assumptions, and default data used in baseline and project emissions calculations are stated in a transparent manner.
Conservativeness <i>Assumptions, values and procedures are conservative in accordance with the applicable methodology to ensure that GHG emissions reductions or removal enhancements are not over-estimated</i>	There were no incidents where data were not available for the crediting period. Default data used and assumptions made were in line with the methodology and were conservative in nature. The information can be considered conservative as the GHG emission reductions or removal enhancements of the project activity have not been overestimated.

C. Overall Conclusion

	Conclusion
<i>Compliance of Monitoring Plan with approved methodology</i>	The Monitoring Plan is compliant with the approved methodology, AM0038 Version 1.
<i>Compliance of monitoring with validated Monitoring Plan</i>	The actual monitoring conducted for the Transalloys project for the monitoring period 01/04/2008 - 30/06/2009 is in compliance with the validated Revised Monitoring Plan.
<i>Total tonnes of emission reductions verified as achieved during the monitoring period by the defined project activity</i>	112,292 tonnes of CO ₂ equivalent.

7. *ERM CVS Certification Statement*

Name of Project	Transalloys Manganese Alloy Smelter Energy Efficiency Project
Reference Number	1027
Monitoring Period verified	01/04/2008 to 30/06/2009
Basis of verification	<p>ERM CVS based its verification work on:</p> <ul style="list-style-type: none"> • CDM approved monitoring methodology, AM0038.; • Revised Monitoring Plan, dated 15/06/2009, validated 26/06/2009, and approved on 25/10/2009; • ERM CVS's internal CDM verification methodologies and protocols.
Responsibilities of ERM CVS	ERM CVS is responsible to provide an independent verification conclusion on the reported GHG emission reductions for the project during the relevant time period
Responsibilities of Client	Ecosecurities is responsible for preparing the monitoring report and providing all necessary evidence to support the reported emissions reductions
ERM CVS Conclusion	<p>The GHG emission reductions reported in the monitoring report, dated 02/10/2009, for the period 01/04/2008 to 30/06/2009, have been calculated in accordance with the approved monitoring methodology, reference AM0038 and the Revised Monitoring Plan and formulae set out in the Project Design Document of 02/03/2007 V6.</p> <p>Based on the verification activities undertaken, ERM CVS concludes that the reported emission reductions are fairly stated</p>
Total GHG emission reductions certified	112,292 tonnes of CO ₂ equivalent
Signed on behalf of ERM CVS	 <p>Melanie Eddis Head of Climate Change</p>
Date:	1 December 2009

Annex 1: Abbreviations

CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
DNA	Designated National Authority
CDM EB	CDM Executive Board
GHG	Greenhouse Gas
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
PP	Project Participant

Annex 2: Key Reference Documents

Project related documents		Date/Version/Status
1	AM0038	AM0038 - method for improved electrical energy efficiency of arc furnace in production of SiMn v1
2	ACM 0002	ACM 0002 - methodology for grid connected electricity generation from renewable sources - used for grid emission factor calc
3	PDD	Transalloys Manganese Alloy Smelter Energy Efficiency Project. Version 6, 02 March 2007
4	Revised Monitoring Plan	Revised Monitoring Plan - PDD ID 1027 - 15 06 2009 – Clean
5	Validation Opinion	DNV_RRMP_1027_Validation_Opinion_Rev_Approved20090803_TrackedChnages
6	Verification Monitoring Report V1 2009	1027 Transalloys 2nd Ver CDM Monitoring Report V1 ERM 06 08 2009
7	Verification Monitoring Report V2 2009	1027 Transalloys 2nd Ver CDM Monitoring Report V2 ERM 02 10 2009
8	UNFCCC approval of the revised monitoring plan	Email trail from UNFCCC to DNV to Ecosecurities to ERM CVS
9	Monitoring Manual	Transalloys CDM Monitoring Manual v1 – 11.08.2009x
10	Calibration certificates for meters stated in monitoring report	Transalloys 2nd Ver Calibration Certificates
11	Ecosecurities Site visit summary	Monitoring Visit & Training Summary
12	Line Diagram / process flow chart	Transalloys Line Diagram
13	Verification Monitoring Report V5 2008	Ecosecurities Transalloys monitoring report – V5 2008
14	Verification Report 2008	Verification Report for Ecosecurities Group plc – first verification - 6 October 08
15	Certification Statement	Certification for Ecosecurities plc for first verification of Transalloys - 6 Oct 2008
16	Calibration certificate - 22Kv electricity meter (furnace 3) (06470035)	Electricity meter not stated in monitoring report (CAR3) – 24/11/2006. Next calibration due 23/11/2011.
17	Weights used for weigh hopper calibration (H1-H25) (25 x 20kg mass pieces). Serial no. 381429	Calibration certificate dated 08/01/2008.
18	Weights used for weigh hopper calibration (H1-H25) (25 x 20kg mass pieces). Serial no. ECS/09/801	Calibration certificate dated 09/01/2009
19	Electricity meter - Strike calibration requirements.pdf	Calibration requirements letter dated 04/04/08
20	Platform scales - JCS Scales calibration requirements.pdf	Calibration requirements email dated 02/09/09
21	Weigh hoppers load cells - Loadtech calibration requirements.pdf	Calibration requirements letter dated 26/08/09
22	Weighbridge - Sasco Africa calibration requirements.pdf	Calibration requirements letter dated 01/10/09
23	Transalloys calculation workbooks	Transalloys CER Workbook M2 - All Furnaces - 02.10.2009 Transalloys CER Workbook M2 – Furnace 3 - 02.10.2009 Transalloys CER Workbook M2 - Furnace 5 - 02.10.2009 Transalloys CER Workbook M2 - Furnace 7 - 02.10.2009

Background documents	Date/Version/Status
Clean Development Mechanism Validation and Verification Manual	Version 01

Annex 3: Persons Interviewed

Persons Interviewed	Position
Steve Anzarouth	Ecosecurities
Sean Buchanan	Ecosecurities
Jade Feinberg	Ecosecurities
Johan Gous	Production engineer / CDM QC Manager
Blessing Buthelezi	Transalloys lab
Lou Jacobs	Services manager / CDM Programme Manager
Deon Broodryk	Lab Superintendent / CDM QC Manager
Steve van Niekerk	Project engineer / Instruments Engineer
Petrus and control room staff	Furnace Operator (furnace 3)
Quinton Beck	Stock Manager - paste and casings