



VERIFICATION / CERTIFICATION REPORT



VOLUNTARY CARBON STANDARD 2007.1

CONVERSION OF SF₆ TO AN ALTERNATIVE
COVER GAS IN MAGNESIUM PRODUCTION
IN EATON RAPIDS, MI AND STRATHROY,
ON

MONITORING AND REPORTING PERIOD:
1 January 2007 to 31 December 2008

PROJECT No: 70001721B
REVISION 01

DET NORSKE VERITAS

VERIFICATION / CERTIFICATION REPORT

Name of Verification company:	Date of the issue:
Det Norske Veritas Certification AS (DNV)	04.06.2009
Report Title:	Approved by:
VCS 2007.1 Verification Report for "Conversion of SF ₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON"	Michael Lehmann
Client:	Project Title:
Climate Change Capital	Conversion of SF ₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON
Summary:	
Det Norske Veritas Certification AS (DNV) has performed verification of the GHG emission reductions reported for the period of 1 January 2007 and 31 December 2008 for the project "Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON" at two locations, namely Eaton Rapids, Michigan, United States of America, and Strathroy, Ontario, Canada, . In our opinion, the GHG emission reductions reported for the project in the monitoring report of 8 February 2009 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AM0065 (version 1) and the Project Design Document of 9 March 2009. Det Norske Veritas Certification AS is able to certify that the emission reductions from the "Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON" during the period 1 January 2007 to 31 December 2008 equate to 72587 tCO₂e (2007 offsets from Ontario, Canada), 50782 tCO₂e (2008 offsets from Ontario, Canada) and 23548 tCO₂e (2008 offsets from MI, US).	
Work carried out by:	Number of pages:
Barbara Toole O'Neil Shruthi Poonacha John Warmerdam (Technical reviewer) Weidong Yang (Technical reviewer)	15



Table of Contents

TABLE OF CONTENTS.....	I
ABBREVIATIONS	II
1. INTRODUCTION	1
1.1 OBJECTIVE	1
1.2 SCOPE AND CRITERIA	1
1.3 VCS PROJECT DESCRIPTION	2
1.4 LEVEL OF ASSURANCE.....	2
2. METHODOLOGY	2
3. VERIFICATION FINDINGS.....	3
3.1 CORRECTIVE ACTIONS AND CLARIFICATIONS	3
3.2 PROJECT IMPLEMENTATION	6
3.3 COMPLETENESS OF MONITORING	6
3.4 ACCURACY OF EMISSION REDUCTION CALCULATIONS	9
3.5 QUALITY OF EVIDENCE TO DETERMINE EMISSION REDUCTIONS.....	10
3.6 MANAGEMENT AND OPERATIONAL SYSTEM.....	11
4. CERTIFICATION STATEMENT	13
REFERENCES	14



Abbreviations

CAR	Corrective Action Request
CCC	Climate Change Capital
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
Mg	Magnesium
NGO	Non-governmental Organization
SO ₂	Sulfur Dioxide
SF ₆	Sulfur Hexafluoride
VCS	Voluntary Carbon Standard
VCS PD	VCS Project Description
VCU	Voluntary Carbon Unit



1. INTRODUCTION

Climate Change Capital (CCC) has retained Det Norske Veritas Certification AS (DNV) to verify the emission reductions reported for the “Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON” project (the project) for the period from 1 January 2007 to 31 December 2008. This report contains the findings from the verification and a certification statement for the certified emission reductions.

The verification team consisted of the following personnel:

<i>Role/Qualification</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>
Team Lead	Toole O’Neil	Barbara	USA
GHG Auditor	Poonacha	Shruthi	USA
Technical Review	Warmerdam	John	USA
Senior Review	Yang	Weidong	USA

1.1 Objective

Det Norske Veritas Certification AS has been commissioned by Climate Change Capital to verify and certify the greenhouse gas (GHG) emission reductions reported for the “Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON” for the period 1 January 2007 and 31 December 2008, equating to 72587 tCO₂e (2007 offsets from Ontario, Canada), 50782 tCO₂e (2008 offsets from Ontario, Canada) and 23548 tCO₂e (2008 offsets from MI, US).

Verification is the periodic, independent review and *ex-post* determination by a Verifier of the monitored GHG emission reductions that have occurred as a result of a project activity during a defined verification period. Certification is the written assurance by a Verifier that, during a specific period in time, a project activity achieved the emission reductions, as verified.

1.2 Scope and Criteria

The verification scope includes:

- Verifying that the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan,
- Verifying that the reported GHG emission data is sufficiently supported by evidence, i.e. monitoring records,
- Evaluating the GHG emission reduction data and write a verification opinion with a reasonable level of assurance regarding the quality of the reported GHG emission reduction data.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified. The verification team has employed a risk-based approach, focusing on the identification of significant reporting risks.



1.3 VCS project Description

Meridian Magnesium Products primary business is the production and casting of magnesium alloys into automotive parts using an injection molding process. This process requires a protection system to prevent the ignition of molten magnesium in the presence of air. The protection system historically used in Meridian Magnesium Products is sulfur hexafluoride (SF₆) gas in Eaton Rapids, US and Strathroy, Canada. The density and low reactivity of the gas make it ideal for use in the casting of reactive metals. Some of the SF₆ used as cover gas escapes to the atmosphere during the casting process. The SF₆ gas has a high global warming potential (GWP) once it has been released to the atmosphere.

In this project, Meridian Magnesium Products has replaced SF₆ with a new cover gas called Novec-612™ (C₂F₅COC₃F₇), a recently patented gas manufactured by 3M that has never been used in the US or Canada for this purpose. It is expected Novec-612™, in combination with SO₂, will eliminate the use of SF₆ as a cover gas at both project sites.

1.4 Level of Assurance

DNV provides reasonable assurance that the project meets VCS criteria. To ensure complete transparency, DNV included the list of clarifications and corrective actions raised during verification in Table 1, Section 3.1. The changes implemented, along with the responses from the project developer, have been included in this table.

2. METHODOLOGY

All factors and issues that constitute the basis for emission reductions from the project were assessed during verification. A site visit was conducted in Eaton Rapids, Michigan on the 1 May 2008 and the facility located in Strathroy, Ontario, Canada on 20 February 2009. DNV has identified key reporting risks and used this assessment to determine to what extent the project operator's control systems were adequate for mitigation of these key reporting risks. In addition, other areas that can have an impact on reported emission reductions have been reviewed in detail during verification.



3. VERIFICATION FINDINGS

3.1 Corrective Actions and Clarifications

Corrective actions required/Clarification	Response	Comment
CAR 1 The calculation worksheet for the emission reduction for the entire monitoring period (in one single worksheet) for both locations should be submitted to DNV.	This has been done	One single worksheet has been submitted for the emission reduction calculation for the monitoring period 1/1/2007 to 12/31/2009 CAR 1 is closed
CAR 2 The monitoring parameters are to be listed in the monitoring report along with metering device model type, location of the monitoring device, unit, monitoring frequency and calibration frequency.	This has been asked of Meridian	This information has been provided in a separate document "Calibration Matrix". This has been accepted. CAR 2 is closed
CAR 3 SF ₆ is to be included as one the parameters to be monitored in the VCS PD and the Monitoring report.	This as been done	SF ₆ has been included among the parameters to be monitored. CAR 3 is closed
CL 1 The monitoring period provided in the monitoring report is 1/1/2008 to 12/31/2008. Please revise the monitoring period in the monitoring report if different.	Monitoring Period is from 1/1/2007 to 12/31/2008	The monitoring report, dated February 8, 2009 has been revised accordingly. CL 1 is closed.



CL 2 The emission reductions achieved for the period 1/1/2008 to 12/31/2008 is significantly lower compared to the emission reductions forecasted for the year 2008 in the VCS PD. Provide an explanation for the same.	The two key factors that played an equal role in the lower-than-forecasted GHG reduction volume were 1.) lower than anticipated magnesium production, and 2.) greater than anticipated use of SF₆ as cover gas. Lower than Anticipated Magnesium Production The Clean Development Mechanism methodology (AM0065) which MA DEP approved for use in its conditional approval of the project determines baseline emissions based on the amount of magnesium produced during the year. In the case of Meridian, this means the amount of metal melted for die casting and recycling. As is now common knowledge, the auto industry is facing its worst situation in generations. The result is that orders to Meridian for their die-cast parts are down significantly; the three big automakers are Meridian's primary customers. Greater than Anticipated SF₆ Use The objective of the project is to eliminate SF₆ use as a cover gas by switching to Novec-612™ in the die casting portion of the	Due to a decrease in orders for die cast parts from automakers this year, there has been a decrease in magnesium production in both Meridian Magnesium facilities (Canada and US). Additionally, due to an SO₂ leakage problem in the melt furnace, Meridian Magnesium had to switch to using SF₆ until the problem was resolved. This resulted in a decrease in <i>ex-post</i> emission reductions compared to forecasted <i>ex-ante</i> estimation. CL 2 is closed
---	--	--



	process, and advanced “dilute SO₂” melt protection technology in the recycling portion of process. However, there were technical issues which prevented the complete elimination of SF₆ use in 2008. Of the two segments at the Meridian facility, die casting and recycling, recycling is the more “SF₆ intensive”. The recycling plant has four points that used SF₆: the melt furnace, the refining furnace, the ingot casting machine and ingot cooling. The melt furnace is by far the largest source of emissions, using about half of total SF₆ in the recycling plant. Meridian had a number of technical difficulties with their seals on the melt furnace, which caused SO₂, the alternative cover gas, to leak out – potentially causing health risks. Consequently, for several months of the year, Meridian used more SF₆ in the melt furnace than was anticipated. This is a problem that Meridian has told us they have largely solved, and the SF₆ consumption has been reduced significantly in the first two months of 2009.	
--	---	--



3.2 Project Implementation

The project implementation has taken place in phases at different locations. The project implementation schedule is below:

US Die Casting	February 1, 2008
US Recycling	April 1, 2008
Canada Die Casting	May 1, 2008
Canada Recycling	January 1, 2007

3.3 Completeness of Monitoring

The monitoring methodology AM0065 is correctly applied. The data monitored during the period of 1 January 2007 to 31 December 2008 have been listed below:

**Table 2: List of Monitored parameters**

	<i>Metal produced</i>		<i>Novec-612™ consumed</i>		<i>SO₂ consumed</i>		<i>SF₆ consumed</i>	
	USA	Canada	USA	Canada	USA	Canada	USA	Canada
Metering Device Model Type	Sterling weight scale (810)	Pennsylvania Weight Scale (7600)	Novec High Flow Mass Flow Meter (M5850)	Novec High Flow Mass Flow Meter (M5850)	SO ₂ Mass Flow meter (M5850)	SO ₂ Mass Flow meter (M5850)	SF ₆ flow meter (J11A101J854)	SF ₆ flow meter (J11A101J854)
Location of the meter	Recycling	Recycling	Remelt Cover gas cabinet	Main Die Cast Cover gas cabinet	Remelt Cover gas cabinet	Recycling Cover gas cabinet	Each cell	Each cell
Units Measured	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs
Calibration Frequency	Annually	Annually	Annually	Annually	Annually	Annually	NA	NA
Calibration Records	Calibrated by Sterling Scale Co., Inc. Calibration Certificate submitted for 7/10/2008 and 1/10/2009	Calibrated by Sterling Scale Co., Inc. Calibration Certificate submitted for 7/10/2008 and 1/10/2009	New instrument installed and hence no record for Calibration	New instrument installed and hence no record for Calibration	Calibrated by Les Technologies Polycontrols Inc. Calibration Certificate submitted for 12/5/2008 and 17/2 2009	Calibrated by Argus-Hazco, Calibration Certificate submitted for 20/2/2008 and 20/2/2008	NA	NA



	<i>Metal produced</i>		<i>Novec-612™ consumed</i>		<i>SO₂ consumed</i>		<i>SF₆ consumed</i>	
	USA	Canada	USA	Canada	USA	Canada	USA	Canada
<i>Data Migration</i>	Take reading from scale and manually enter into central excel file.	Take reading from scale and manually enter into central excel file.	Take flow totalizer reading and manually transfer data to excel file	Take flow totalizer reading and manually transfer data to excel file	Take flow totalizer reading and manually transfer data to excel file	Take flow totalizer reading and manually transfer data to excel file	Take flow totalizer reading and manually transfer data to excel file	Take flow totalizer reading and manually transfer data to excel file
<i>Data Reporting Frequency</i>	Daily	Daily	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly



The monitoring of the project is complete and in accordance with the approved monitoring methodology. The monitoring methodology and sustaining records are sufficient to enable verification of emission reductions. The corrective actions and clarifications actions raised during the verification process have to be addressed in order to improve the completeness of the project monitoring.

3.4 Accuracy of Emission Reduction Calculations

Magnesium Meridian Products has been involved in the design, installation, and maintenance of the control and monitoring system for the project.

The project applies the approved CDM methodology AM0065, version 1 “Replacement of SF₆ with alternate cover gas in the magnesium industry”. The approved default values determined during the validation phase has been used to estimate the emission reductions from the implementation of this project activity.

Table 3: List of Default Values

ID	Variable	Unit	Value	Remark
1	SF ₆ GWP	TCO ₂ eq/TSF ₆	22,800	
2	Novec CF (conservative factor)	TCO ₂ eq/TNovec used	2,830	According to AM0065
3	DF	Fraction	0.5	According to AM0065
4	DI (DI _{SF6,CON,BL})	Fraction	0.95	According to AM0065
5	DI (DI _{SF6,CON,PJ,k,j,y})	Fraction	1.05	According to AM0065
6	Lowest baseline emissions factor for US Die Casting	tSF ₆ /tMg	0.0000914	From baseline assessment
7	Lowest baseline emissions factor for US Recycling	tSF ₆ /tMg	0.000385	From baseline assessment
8	Lowest baseline emissions factor for Canada Die Casting	tSF ₆ /tMg	0.0000549	From baseline assessment
9	Lowest baseline emissions factor for Canada Recycling	tSF ₆ /tMg	0.000684	From baseline assessment



The *ex-post* estimation of the emission reduction for the monitoring period is determined using the equation:

Baseline Emissions = Magnesium produced (Die Casting/ Recycling) * Baseline emission factors

The Baseline emission factors are:

	Die Casting	Recycling
USA facility (EF_{SF6,Mg})	0.0000914	0.000385
Canadian facility (EF_{SF6,Mg})	0.0000549	0.000684

Project Emissions = Emissions from use of Novec-612™ + Emissions from use of SF₆

Emissions from use of Novec-612™ = Amount of Novec-612™ used * Novec-612™ GWP

Emissions from use of SF₆ = Amount of SF₆ used * SF₆ GWP

	GWP
Novec-612™	2,830
SF₆	22,800

Emission Reduction = Baseline Emissions – Project Emissions

3.5 *Quality of Evidence to Determine Emission Reductions*

All necessary documentation was collected, referenced and aggregated and was accessible in hard-copy or electronic format. The following data and documents were verified to confirm the emission reduction during the period of 1 January 2007 through 31 December 2008.

Parameter	Documentation Verified
Amount of Magnesium Produced	Weight entered in report monthly /2/ /3/
Amount of Novec-612™ used	Monthly update on excel sheet by Facility Engineer from flow meter totalizer /2/ /3/
Amount of SO ₂ used	Monthly update on excel sheet by Facility Engineer from flow meter totalizer /2/ /3/
Amount of SF ₆ used	Update of SF ₆ usage record when the empty bottle is replaced./11/

The use of SO₂ as a cover gas requires special monitoring and safety precautions, both from local safety regulations and methodology AM0065. DNV has been able to verify that these requirements have been met. The table below provides the list of requirements and how they have been verified:

**Requirement**

Well controlled SO₂ concentration and flow rates with concentration typically 1% or less.

An associated SO₂ exhausting and abatement system to ensure SO₂ emissions are in compliance with the local environmental regulations. Emissions from the facility to the ambient air should comply with the local standards of the country.

If no local standards exist, the following value should be taken into account as a emission limit for SO₂ concentration in the exhaust system 1470 mg/m³ (dry basis, 273 K, 101,325 kPa at an oxygen concentration of 6 %(v/v)).

Precise gas mixing and delivery system using mass flow controllers (MFC) or similarly accurate device and heated gas lines to SO₂

Gas cabinet or cylinder storage area with leak monitors and emergency ventilation system.

Redundant / back-up melt protection technology in case SO₂ leak requires system shut-down and repair

Emergency response plan, training, and personal safety equipment;

Back-up power / generator for gas mixing system and necessary controls, compressors, etc.

Method of Verification

SO₂ concentration charts were verified to confirm that the SO₂ concentration was below 1% /17.

The Meridian facility emits a very small amount of SO₂ and is not regulated. This was verified against the environment and compliance history online (ECHO)/16/.

The Canadian facility has submitted Amended Certificate of approval from the Ministry of Environment, Ontario/6/.

The SO₂ concentration in the exhaust system was further verified by the Strathroy emissions report.

Verified during visit to US and Canadian plant

Verified Gas Cabinet with leak monitors at both facilities

SF₆ system is in place and can be used in the event of emergency. Both facilities also have premixed bank of gas ready for use. Monitors in place shut system down if they detect concentration of 1 PPM SO₂ and auto switch to SF₆ system.

The training manual and presentation for emergency response, training and safety was reviewed during the site visit./5/

12KW backup generator is in place and has an auto start facility in the event of power outage.

3.6 Management and Operational System

Meridian Magnesium Products is responsible for monitoring, measurement and reporting activities. They maintain a collection system with proper equipment calibration and training of site employees, and submit monitoring reports to CCC.

The facility engineer from Meridian Magnesium Products, Mr. Chuck Woodburn, is responsible for data collection, entering data into the spreadsheet, making monthly and annual reports and archiving data. The calibration is conducted by Sterling Scale Co., Inc., Les



Technologies Polycontrols Inc., and Argus-Hazco Canada for the US and Canadian facility. The facility engineer also has the responsibility of ensuring calibration is carried out periodically. The data are then supplied to the project manager from Climate Change Capital for developing the monitoring reports.

The procedure for monitoring system, internal audit and management review has been established and followed. The staff employed for the maintenance, operation and monitoring are competent and procedures for training have also been established.



4. CERTIFICATION STATEMENT

Introduction

Det Norske Veritas Certification AS (DNV) has performed the verification of the emission reductions that have been reported for the “*Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON*” for the period 1 January 2007 to 31 December 2008.

Meridian Magnesium is responsible for the collection of data in accordance with the validated monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV’s responsibility to express an independent verification statement on the reported GHG emission reductions from the project.

DNV conducted the verification on the basis of the monitoring methodology AM0065 (version 01), the VCS PD of the project and the monitoring report dated 8 February 2009. The verification included i) checking whether the provisions of the monitoring methodology AM0065 and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV’s verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the “*Emission Reduction Protocol for Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON*”, for the period 1 January 2007 to 31 December 2008 are fairly stated in the monitoring report dated 8 February 2009.

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AM0065 (version 01) and the validated VCS PD of 9 March 2009.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the “*Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON*” project during the period 1 January 2007 to 31 December 2008 equate to 72587 tCO₂e (2007 offsets from Ontario, Canada), 50782 tCO₂e (2008 offsets from Ontario, Canada) and 23548 tCO₂e (2008 offsets from MI, US).



REFERENCES

Documents provided that relate directly to the project:

- /1/ Climate Change Capital, Monitoring Report of Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON, 8th February 2008.
- /2/ Climate Change Capital, Meridian Magnesium Eaton Rapids emission reduction calculation worksheet, 26 February 2008
- /3/ Climate Change Capital, Meridian Magnesium Strathroy emission reduction calculation worksheet, 26 February 2008
- /4/ Meridian Magnesium, Project Management, 30 April 2008
- /5/ Meridian Magnesium, Presentation on emergency response plan, training, and personal safety equipment 30 April 2008
- /6/ Ministry of the Environment, Application for approval (Air and Noise), Ontario, 14 May 2002.
- /7/ Ministry of Environment, Amended Certificate of Approval (Air), 5 May 2008, Ontario
- /8/ 3M Canada Company, Material Safety Data Sheet, 17 June 2008, London, Ontario
- /9/ Argus-Hazco Canada, Calibration Certificate, 12 February 2009, Ontario, Canada.
- /10/ Hazco Canada, Calibration Certificate, 20 March 2008, Ontario, Canada.
- /11/ Meridian Magnesium Product, Environmental Management System, SF₆ usage record, 31 December 2008
- /12/ Sterling Scale Co., Inc., Calibration Certificate, 10 July 2008, Eaton Rapids, MI, US
- /13/ Sterling Scale Co., Inc., Calibration Certificate, 30 January 2009, Eaton Rapids, MI, US
- /14/ Les Technologies Polycontrols Inc., Calibration Certificate, 5 December 2008, Québec, Canada.
- /15/ 3M Canada, Invoice, 25 November 2008, Canada
- /16/ US EPA, Enforcement and Compliance History Online (ECHO), <http://www.epa-echo.gov/echo/index.html>
- /17/ Meridian Magnesium, SO₂ concentration charts, 2008
- /18/ Meridian Magnesium, Strathroy Emissions Report, December 2008, Ontario, Canada
- /19/ Climate Change Capital, VCS PD of Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON, 9 March 2008.
- /20/ DNV, VCS 2007.1 Validation Report for "Conversion of SF₆ to an Alternative Cover Gas in Magnesium Production in Eaton Rapids, MI and Strathroy, ON" project, 1 April 2009, USA

Background documents used in the verification:

- /21/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*.



<http://www.vvmanual.info>

- /22/ CDM Executive Board: Approved Baseline and Monitoring Methodology AM0065: “Replacement of SF6 with alternate cover gas in the magnesium industry”. Version 01
- /23/ Voluntary Carbon Standard, Voluntary Carbon Standard 2007.1, 18 November 2008
- /24/ CDM Executive Board: “*Combined tool to identify the baseline scenario and demonstrate additionality*”, Version 02.