



VCS VERIFICATION REPORT

METHANE CAPTURE, FLARE AND UTILIZATION AT TYSON WASTE WATER TREATMENT FACILITIES

MONITORING PERIOD:

1 JANUARY 2011 – 30 SEPTEMBER 2011

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Summary:

Det Norske Veritas (U.S.A), Inc (DNV) has performed the verification of the emission reductions reported for the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” (VCS Project ID: 14,15,16,17) for the period 1 January 2011 – 30 September 2011, to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity.

The verification was performed on the basis of VCSA Programme Guidelines & Standard version 3.0 for the VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and site inspection, and the resolution of outstanding issues.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (version 4) of 20 December 2011) are fairly stated. The GHG emission reductions were calculated correctly on the basis of approved methodology ACM0014 (version 1) and the monitoring plan contained in the VCS PD of 29 March 2009.

Hence, Det Norske Veritas (U.S.A), Inc (DNV) is able to certify that the emission reductions from the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” during the period amount to 215 134 tonnes CO₂ equivalent.

DNV does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to DNV and the engagement conditions detailed in this report. DNV cannot be held liable by any party for decisions made or not made based on this report.

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1 INTRODUCTION

Blue Source has commissioned Det Norske Veritas (U.S.A), Inc (DNV) to carry out the verification and certification of emission reductions reported for the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” (the project) in the period 1 January 2011 – 30 September 2011. This report contains the findings from the verification and includes a verification statement for the verified carbon units.

1.1 Objective

Verification is the periodic independent review and ex-post determination by an accredited verification body of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined verification period.

A verification statement is the written assurance by a verification body that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and provide a verification statement of emission reductions reported for the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” for the period 1 January 2011 – 30 September 2011.

1.2 Scope and Criteria

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement.
- To verify that reported GHG emissions data is sufficiently supported by evidence.

The criteria of the verification are:

- VCS Program Guide version 3.0
- VCS Standard version 3.1 and other relevant requirements defined by VCSA.
- The approved methodology ACM0014 (version 1).

The verification shall ensure that reported emission reductions are complete and accurate in order to be verified.

1.3 Level of assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. DNV applied a materiality threshold of 5% with respect to omission or misstatements concerning reported quantities as per VCS standard 5.3.1 4).

1.4 Summary Description of the Project

The Project was developed by Tyson at meat processing facilities within the mid-western United States. There are four such sites located in Joslin, IL, Amarillo, TX, Storm Lake, IA, and Lexington, NE (hereafter sites will be referred to by city name only) with adjoining waste water treatment facilities. All locations contain storage lagoons for the primary treatment of wastewater through the anaerobic decomposition process.

Project implementation at the sites has taken the form of two phases; phase 1 (December, 2000- April, 2001) was the covering of the lagoons and capturing of the biogas for flaring purposes, phase 2 (March, 2004 – October, 2005) was the capturing of the biogas and transporting this to the adjacent Tyson processing facility for use in the boiler, which results in the displacement of pipeline natural gas. Phases 1 and 2 have been implemented at three sites with the lone exception of Storm Lake, where only gas flaring has been implemented./1/

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

The scope of this verification does not include a validation or gap validation of this project. Hence, this section has been left blank.

2.1 Validation Process

2.1.1 Document Review

2.1.2 Interviews

2.1.3 Site Inspections

2.1.4 Resolution of Any Material Discrepancy

2.2 Validation Findings

2.2.1 Gap Validation

2.2.2 Methodology Deviations

2.2.3 New Project Activity Instances

2.3 Validation Conclusion

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the registered VCS PD, the applied methodology, and the VCS Standard version 3.1 and other relevant VCS requirements.

- A desk review of the monitoring report and all support documents.
- Follow-up interviews with project stakeholders and site inspection.
- The resolution of outstanding issues and the issuance of the verification report and statement.

The following sections outline each step in more detail.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records.
- The calibration and maintenance records for the monitoring instruments.
- The management systems to support the project operation and monitoring.

Verification team

Role	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 13.2 competence
Team leader (Verifier)	Bachamanda	Shruthi	USA	✓	✓	✓	✓		
Technical reviewer	Godinez	Gloria	Mexico					✓	✓

Duration of verification

Desk Review: 5 November 2011 – 30 November 2011

Site Visit 7 December 2011 – 12 December 2011

Reporting: 12 December 2011 - 29 December 2011

3.2 Document Review

DNV conducted the desk review during the period of November 5 – 30 November 2011. Blue Source submitted, the monitoring report, emission reduction calculation worksheet, waste water summary data sheets and all supporting documentation including monitored data, calibration records, lab analysis data etc. to DNV prior to the start of the desk review. DNV conducted a quantitative verification of numbers in the data sheets with the numbers used as input values for the calculation; monitored data was checked for missing values; the calibration records for meter at the frequency provided in the monitoring plan; the lab analysis data with input values etc. DNV conducted a qualitative verification of Tyson GHG Management systems, calculation procedures, procedures for transfer of emissions reports prior to the site visit.

In addition to the monitoring documentation provided by the project participants, DNV reviewed:

- (a) The registered VCS-PDD, including the VCS-monitoring plan and the corresponding validation report/1//3//4/;
- (b) Previous verification reports/6//7//8//9/;
- (c) The applied monitoring methodology/11/;
- (d) Relevant decisions, clarifications and guidance from the VCSA/17/;and
- (e) Relevant tools from CDM relevant to this project verification activity /10//11//12//13//14//15//16/.

3.3 Interviews

DNV conducted interviews for the verification as part of the site visit process. The following personnel from Tyson and Blue Source were interviewed for the monitoring period of 1 January 2011 to 30 September 2011.

Name of person	Title/Role	Name of Organisation	Location
Kevin Judge	WWTP Superintendent	Tyson Fresh Meats, Inc	Joslin Illinois 61257
Chris Knotts	WWTP Superintendent	Tyson Fresh Meats, Inc	Amarillo, Texas
Neil Vanzweden	WWTP Superintendent	Tyson Fresh Meats, Inc	Storm lake, IW
Kevin Townsend	Chief Commercial Officer	Blue Source	Amarillo, Texas

3.4 Site Inspections

Site visits were conducted on December 7 - 9, 2011 at Joslin, IL, Storm Lake, IA and Amarillo, TX. The verification of the emission reductions assessed all factors and issues that constitute the basis for emission reductions from the project. The people interviewed as part of the site visit have been listed above in section 3.3. The on-site assessment involved:

- (i) Assessment of the implementation and operation of the VCS project activity as per the registered VCS-PD;

- (ii) Review of information flows for generating, aggregating and reporting the monitoring parameters;
- (iii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS-PD;
- (iv) A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- (v) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology;
- (vi) Review of calculations and assumptions made in determining the GHG data and emission reductions;
- (vii) Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.
- (viii) A walk around survey to verify the location of the meter the data sampling points. Review of the meter model and date of installation.

3.5 Resolution of Any Material Discrepancy

A corrective action request (CAR) was issued, where:

- (i) Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- (ii) Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- (iii) Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

The list of CARs and CLs issued by DNV and the response provided by the PP has been provided in Appendix A of this report.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in registered VCS PD of 29 March 2009, and that the monitoring has been carried out in accordance with the monitoring plan contained in the registered VCS PD of 29 March 2009.

Table 1: Project Implementation Dates by Site

Location	Stage 1 - Flaring Effective Date	Stage 2 - Biogas Utilization Effective Date
Joslin, IL	06/2001	03/2004
Lexington, NE	05/2001	12/2004
Amarillo, TX	04/2001	10/2005
Storm Lake, IA	12/2000	N/A

The FARs in the fourth verification was issued in the verification report dated December 27, 2010. The monitoring period (November 1, 2010 to December 31, 2010) occurred prior to the issuance of the fourth verification report (December 27, 2010). Hence, the FARs issued in the fourth verification period were not addressed in the fifth verification report and carried over to the sixth verification. The FAR identified in the fourth verification is listed below:

Forward Action Requests:

FAR 1: DNV identified that the influent wastewater flow is consistently lower than the effluent wastewater flow in all four facilities. The PD needs to review the monitoring of influent and effluent flow to identify the reason for this disparity.

The PP identified that in all facilities except Storm Lake, the effluent waste water flow is higher than the influent waste water flow. The reason for this was that some waste water streams including sump water, tannery water were entering the anaerobic effluent waste water stream prior to the monitoring point of the effluent waste water flow meter. However, DNV has confirmed that higher anaerobic effluent flow results in a higher effluent BOD, resulting in lower emission reduction values. This is conservative and FAR 1 is closed.

4.2 Completeness of Monitoring

The monitoring plan in the VCS PD “Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities”/1/ was correctly applied. The parameters monitored during the period of January 1, 2011 to September 30, 2011 are listed below:

Table 2: Amarillo Monitoring

Parameter	Method of estimation	Sampling Frequency and Technique	Reporting Unit	Calibration Frequency
Wastewater influent flow into anaerobic lagoon (East Beam House, West Beam House,	flow meter	Daily	Mgal/d	Annual /31//27/

Raw lift flow) /25//26//27//28/				
BOD concentration at inlet to the anaerobic lagoon /29//25/	BOD ₅ test	15 minute grab. composited for 24 hours ;7 day/week	mg/l	Lab Certification/30/
Wastewater effluent flow out of anaerobic lagoon /25//32/	flow meter	continuous	Mgal/d	Annual /31/
BOD concentration at outlet of anaerobic lagoon /29//25/	BOD ₅ test	2/week grab sample	mg/l	Lab Certification/30/
Biogas CH ₄ content /25/	Daniel BTU Chromatograph	continuous	volumetric fraction	Auto Calibration (Tyson voluntarily calibrated biannually /36/
Biogas flow rate to flare /33/	flow rate	daily	ft ³ /min	Quarterly/34/ - Refer FAR 2
Biogas flow rate to boiler /33/	flow rate	daily	ft ³ /min	Quarterly/35/ - Refer FAR 2
Propane consumption /37/	Receipts	Monthly	Gallons	NA

Table 3: Joslin Monitoring

Parameter	Method of estimation	Sampling Frequency and Technique	Reporting Unit	Calibration Frequency
Wastewater influent flow into anaerobic lagoon /38/	flow meter	continuous	Mgal/d	Annual /40//41/
BOD concentration at inlet to the anaerobic lagoon /39/	BOD ₅ test	3/week composite	mg/l	Lab Certification /45/
Wastewater effluent flow out of anaerobic lagoon /38/	flow meter	continuous	Mgal/d	Annual /40/
BOD concentration at outlet of anaerobic lagoon /31//39/	BOD ₅ test	2/week grab.	mg/l	Lab Certification /45/
Biogas CH ₄ content /44/	third party analysis	quarterly	volumetric fraction	Lab Certification /45/
Biogas flow rate to flare /43/	flow meter	continuous	ft ³ /min	Quarterly
Biogas flow rate to boiler /43/	flow meter	continuous	ft ³ /min	Quarterly
Propane /46/	Receipts	Monthly	Gallons	NA

Table 4: Storm Lake Monitoring

Parameter	Method of estimation	Sampling Frequency and Technique	Reporting Unit	Calibration Frequency
Wastewater influent flow into anaerobic lagoon /49/	flow meter	continuous	Mgal/d	Annual/48/

BOD concentration at inlet to the anaerobic lagoon /49/	BOD ₅ test	15 minute grab . composited for 24 hours ;7 day/week	mg/l	Lab Certification /50/
Wastewater effluent flow out of anaerobic lagoon /47/	flow meter	continuous	Mgal/d	Annual/51/
BOD concentration at outlet of anaerobic lagoon /49/	BOD ₅ test	3/week grab	mg/l	Lab Certification
Biogas CH ₄ content /52/	third party analysis	quarterly	volumetric fraction	Lab Certification
Biogas flow rate to flare /54/	flow meter	continuous	ft ³ /min	Quarterly /53/

Table 5: Lexington Monitoring

Parameter	Method of estimation	Sampling Frequency and Technique	Reporting Unit	Calibration Frequency
Wastewater influent flow into anaerobic lagoon /56/	flow meter	continuous	Mgal/d	Annual /59/
BOD concentration at inlet to the anaerobic lagoon /49/	BOD ₅ test	15 minute grab. composited for 24 hours ; during production days	mg/l	Lab Certification
Wastewater effluent flow out of anaerobic lagoon /56/	flow meter	continuous	Mgal/d	Annual /59/
BOD concentration at outlet of anaerobic lagoon /49/	BOD ₅ test	2-3 day/week grab	mg/l	Lab Certification
Biogas CH ₄ content /57/	third party analysis	quarterly	volumetric fraction	Lab Certification

Biogas flow rate to flare /58/	flow meter	continuous	ft ³ /min	Quarterly
Biogas flow rate to boiler/58/	flow meter	continuous	ft ³ /min	Quarterly

Monitoring Plan Deviation

Amarillo - Calibration

Methodology deviation applied to the calibration frequency of the flow meter monitoring the biogas to boiler and the flare.

The flow meter monitoring the biogas to boiler and the flare is required to be calibrated quarterly as stated in the monitoring report. However, both these meters have been calibrated annually. The results of the delayed calibration do not show any errors in the measuring equipment. Hence, the PP has applied the maximum permissible error of the instrument (2% - flow meter monitoring biogas to boiler) and $\pm[1\% \text{ of Reading} + (.5\% + .02\%/^{\circ}\text{C of Full Scale})]$ - flow meter monitoring biogas to flare) to the measured value for the monitoring period of January 1, 2011 to September 30, 2011. This results in a deduction of 166 tCO₂e VERs.

DNV considers this to be conservative and in lines with the CDM Annex 60 "Guidelines for assessing compliance with the calibration frequency requirements".

Joslin - Calibration

The monitoring report states that the biogas to flare flow meter and biogas to boiler flow meter is calibrated quarterly. However, only an annual calibration has been conducted.

Calibration accuracy check records show the boiler flow meter to be within the specified accuracy range, so the maximum error according to the equipment specifications has been applied in a conservative manner. The specified accuracy of the boiler flow meter (GE DigitalFlow XGM868 unit) is: $\pm 2\%$ of reading. The lower end of the accuracy range is chosen because this decreases baseline emissions more than it increases project emissions. DNV considers this to be conservative and in lines with the CDM Annex 60 "Guidelines for assessing compliance with the calibration frequency requirements".

4.3 Accuracy of GHG Emission Reduction or Removal Calculations

The project uses the approved CDM methodologies and tools for emission reduction calculations,

- "Avoided methane emissions from wastewater treatment" ACM0014 (Version 1) /11/,
- "Tool to determine project emissions from flaring gases containing methane" (Version 1)/12/,
- "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (Version 01)/13/,
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) /14/and

- “Tool to calculate the emission factor for an electricity system”(Version 1)/15/.

Appropriate IPCC default values were used for the global warming potential and density of methane. Project monitoring data for biogas collected and destroyed by the project, flare efficiency and methane fraction, and parameters of measuring BOD concentrations are used to calculate the amount of methane destroyed by the project activity.

Electricity data and the carbon emission factor from ACM0014 /11/ were used to determine the project emissions from the amount of electricity consumed for the project activity. Estimation for total electricity consumption is based upon the maximum load usage by model type for gas handling equipment as well as a 7.2% transmission and distribution loss associated with the US electricity grid /1/.

For a complete list of default and constant values used for emission reduction estimates, see table 6 below.

Table 6:Default and Constant Values for Emission Reduction Estimates

Parmeter	Value	Source
EF _{GRID}	1.3 tCO ₂ /MWh	Tool to calculate the emission factor for an electricity system /16/
Transmission and Distribution Loss	7.20%	U.S. Climate Change Technology Program /24/
B _O	0.21 lbsCH ₄ /lbsCOD	ACM0014 Version 01
f _{COD,aer}	92.7 mtCOD/ha month	ACM0014, Version 1
EF _{CO2FF,Boiler}	0.05278 mtCO ₂ /MMBtu	IPCC /23/
NCV _{CH4}	922.45 Btu/ft ³	IPCC /23/
η _{Boiler}	100%	Value developed by project developer
COD/BOD	2.4 lbs COD/ lbs BOD	IPCC /23/
W _S	231 mg/L	On-Site measurements
R _S	1.3333 lbs COD /lbs Sulfate	Engineering design factors for sulfide to sulfate conversion
nL	5	PDD /1/
EF _{Propane}	0.00574 mtCO ₂ e/gallon	U.S. EPA /22/

WC _{Propane}	17.20 kg C/ MMBtu	U.S. EPA /22/
EC _{Propane}	3.824 MMBtu/ barrel	U.S. EPA /22/
fvCH ₄	%	
Amarillo, TX	69.86%	Continuous Monitoring /25/
Joslin, IL	76.30%	Quarterly samples by third party for gas chromatographic analysis /43/
Lexington, NE	81.38%	Quarterly samples by third party for gas chromatographic analysis /57/
Storm Lake, IA	77.10%	Quarterly samples by third party for gas chromatographic analysis /52/
nFlare	%	
Amarillo, TX	98.0%	State air permit
Joslin, IL	96.3%	State air permit
Lexington, NE	98.0%	State air permit
Storm Lake, IA	98.0%	State air permit

4.4 Quality of Evidence to Determine GHG Emission Reductions or Removals

All necessary documentation is collected, referenced and aggregated and is easily accessible in hard-copy or electronic format. A sample set of data for the months of February, April and September 2011 were verified for all four sites Amarillo, TX, Joslin, IL, Lexington, NE and Storm Lake, IA. DNV conducted a desk review and site visit to verify the following documents to confirm the emission reduction during the period of January 1, 2011 to September 30, 2011.

Calibration Records for all flow meter for all sites were verified. Lab Certificates were verified to establish accuracy of the BOD concentration at influent and effluent.

Table 7: Quality of Evidence

Parameter	Evidence Supplied
BOD Concentration of Influent	Weekly Reports and Lab result print outs
BOD Concentration of Effluent	Weekly Reports and Lab result print outs

Biogas flow rate	Daily reports with average scf/hour
Monitoring equipment maintenance	Third Party Calibration Certificates
Effluent rate at inlet and outlet	Flow meter readings - central data system.
CH ₄ content in Biogas	Record of third party analysis for all sites except Amarillo. Amarillo - Daniel Gas Chromatography data sheet

4.5 Management and Operational System

For all sites in the project, the general reporting procedures involve the collection of data on site, where it is then transferred once a month to a central Tyson location for archiving. The Project Developer Blue Source is supplied with weekly totals/averages for all data.

BOD Sampling:

BOD sampling responsibilities are delegated to state certified licensed wastewater operators at all sites. Once samples have been collected they are then transported to State certified labs where professionally trained chemists tests for BOD concentrations and several other water quality measurements found in the anaerobic influent and effluent. From this process, computer print outs are produced with BOD concentrations that are ultimately used for emission reduction estimates.

Water Flow:

Continuous flow meters are used to monitor anaerobic influent/effluent, with slight variations in positioning and monitoring at each site. The water flow in all sites are monitored electronically with daily totals being produced on a print out which is then migrated by hand by staff to a central excel file.

Gas Production:

All facilities have continuous gas monitoring equipment that produces hourly totals in daily standard cubic feet. From this output, the staff then migrate by hand, the data to an Excel spreadsheet where daily totals are produced. Monitoring of gas that flows to the flares and boilers is also done from the same system and accounted for in the data migration.

Calibration:

All facilities have third party quarterly calibration of the flow meters monitoring the flow of gas to the flare and boiler. The flow meters monitoring the waste water flow at influent and effluent of the anaerobic digester is calibrated at a minimum frequency of once a year. Certified in-house or external labs conduct the BOD₅ analysis. This documentation is provided to Blue Source for record keeping.

5 VERIFICATION CONCLUSION

Det Norske Veritas (U.S.A), Inc (DNV) has performed the verification of the emission reductions that have been reported for the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” (VCS Registration No. 14,15,16,17) project for the period 1 January 2011 – 30 September 2011.

The project participants are responsible for the collection of data in accordance with the 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 approved methodology ACM0014 (version 1), the monitoring plan contained in the registered VCS PD of 29 March 2009 and the monitoring report (version 4) dated 20 December 2011. The verification included i) checking whether the provisions of the monitoring methodology 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 “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” (VCS Project ID No. 14,15,16,17) project for the period 1 January 2011 – 30 September 2011 are fairly stated in the monitoring report (version 4) dated 20 December 2011.

The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0014 (version 1) and the monitoring plan contained in the registered VCS PD of 29 March 2009.

Det Norske Veritas (U.S.A), Inc is able to certify that the emission reductions from the “Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities” during the period 1 January 2011 – 30 September 2011 amount to 215 134 tonnes of CO₂ equivalent, detailed as below.

Reporting period: 1 January 2011 – 30 September 2011

Verified GHG emission reductions or removals in the above reporting period:

Amarillo - Emission reduction for the period 1 January 2011 – 30 September 2001:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	102 565
Project Emissions	2 364
Net GHG emission reductions or removals	100 201

Joslin - Emission reduction for the period 1 January 2011 – 30 September 2011:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	28 528
Project Emissions	1 601
Net GHG emission reductions or removals	26 927

Lexington - Emission reduction for the period 1 January 2011 – 30 September 2011:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	57 853
Project Emissions	2 051
Net GHG emission reductions or removals	55 802

Storm Lake - Emission reduction for the period 1 January 2011 – 30 September 2011:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	33 619
Project Emissions	1 416
Net GHG emission reductions or removals	32 204

Summary of Emission Reductions for the period of 1 January 2011 – 30 September 2011 for all four Tyson facilities:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	222 565
Project Emissions	7 432
Net GHG emission reductions or removals	215 134

DNV does not assume any responsibility towards the issuance and utilization of the VCU's hereby verified and certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to DNV and the engagement conditions detailed in this report. DNV cannot be held liable by any party for decisions made or not made based on this report.

6 REFERENCES

- /1/ Blue Source: "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities" (VCS PD), March 2009
- /2/ Blue Source: Monitoring Report for the "Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities" project for the period October 1, 2009 – December 31, 2009, Version 1, February 9, 2010
- /3/ Blue Source: Monitoring Report for the "Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities" project for the period January 1, 2011- September 30, 2011, Version 4, November 4, 2011
- /4/ DNV: VCS Validation Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities," March 2009
- /5/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - January 1, 2004 to December 31, 2008," March 2009
- /6/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - January 1, 2009 to September 30, 2009," December 2009
- /7/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - October 1, 2009 to December 31, 2009," February 2010
- /8/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - January 1, 2010 to October 31, 2010," December 2010
- /9/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - January 1, 2010 to October 31, 2010," 27 December 2010
- /9.5/ DNV: VCS Verification Report for "Emission Reduction Protocol for Methane Capture, Flare and Utilization at Tyson Wastewater Treatment Facilities - November 1, 2010 to December 31", 2011". March 3, 2011

- /10/ CDM Executive Board, EB 48, Annex 68, *Guidelines on completeness check of requests for issuance*, 17 July 2009
- /11/ CDM Executive Board: Approved Baseline and Monitoring Methodology ACM0014: "Avoided methane emissions from wastewater treatment systems". Version 01, 30 November 2007
- /12/ CDM Executive Board: "Tool to determine project emissions from flaring gases containing methane", version 1, 15 December 2006
- /13/ CDM Executive Board: "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 01)
- /14/ CDM Executive Board: "Tool to determine emissions from flaring gases containing methane." Version 1
- /15/ CDM Executive Board: "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)
- /16/ CDM Executive Board: "Tool to calculate the emission factor for an electricity system" (Version 1)
- /17/ Verified Carbon Standard, Version 3.1, date 15 July 2011

- /18/ Verified Carbon Standard Program Guide, Version 3.1, dated 19 October 2011

- /19/ ISO 14064-3 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions and employed a risk-based approach.

[http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=38700](http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=38700&tscope=PROGRAMME)
[tscope=PROGRAMME](http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=38700&tscope=PROGRAMME)

- /20/ ISEA3000 (Revised) Assurance Engagements other than Audits or Reviews of Historical Financial Information.

<http://www.ifac.org/IAASB/ProjectHistory.php?ProjID=0008>

- /21/ Blue Source: "Spreadsheets for the calculation of the emission reductions for the Tyson Wastewater Treatment Facilities", version 3, December 5, 2011

- /22/ U.S. EPA's eGRID2006 Version 2.1 (April 30, 2007),
<http://www.epa.gov/cleanenergy/egrid/index.htm>
- /23/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5 – Waste, Chapter 6 – Wastewater Treatment and Discharge, Page 6.12

<http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>
- /24/ United States Climate Change Technology Program, Technology Options for the Near and Long Term, Page 34
- /25/ Tyson Foods, Inc: Amarillo anaerobic lagoon flow and loading 2011, 1 January 2011 – 30 September 2011
- /26/ Tyson Foods, Inc: Beam House Daily Flow, 1 January 2011 – 30 September 2011
- /27/ Tyson Foods, Inc: Clarifier Flow, 1 January 2011 – 30 September 2011
- /28/ Tyson Foods, Inc: Lift Station Daily Flow, 1 January 2011 – 30 September 2011
- /29/ Tyson Foods, Inc: Amarillo Wastewater Report – Weekly report for waste water flow, BOD and biogas flow, Last week of February, May and September
- /30/ ERA: Tyson Fresh Meats, Inc - Amarillo BOD Historical Data – Data Analysis, 21 November 2011
- /31/ Flow Control, Inc: Calibration service report for east beam house, west beam house, raw lift flow, anaerobic effluent recycle flow and anaerobic effluent flow meter, 10 October 2011
- /32/ Tyson Foods, Inc: Anaerobic Effluent Flow, 1 January 2011 – 30 September 2011
- /33/ Tyson Food, Inc: Biogas to flare, Biogas to boiler, SWEWEEKINDING_BS, Last week of February, May and September 2011.
- /34/ GE: biogas to boiler meter calibration “flare gas flow meter periodic field verification, commissioning and acceptance report, 2 August 2011
- /35/ EPI, product quality certificate of conformance, 24 May 2011
- /36/ Tyson Food, Inc: Analysis of Raw data, 10 August 2011
- /37/ Tyson Fresh Meats Inc: Amarillo Propane Consumption excel, 6 January 2010 to
26 October 2011
- /38/ Tyson Foods, Inc: Joslin waste water data– daily reading, 20 – 27 February 2011, 27 February – 6 March 2011, 22 May – 5 June 2011,

- /39/ Tyson Foods, Inc: Joslin Wastewater Report – Daily reading BOD influent and effluent concentration, Last week of February, May and September
- /40/ Flow Control: Calibration of the waste water influent meter, anaerobic influent (anoxic influent flow meter), 1 December 2011
- /41/ Instrument Direct, Inc.: Certificate of Completion for Richard Watkins from Flow Control, 20 September 2011
- /42/ Tyson Joslin Lab: BOD lab Analysis, quarterly 2011.
- /43/ Tyson Fresh Meats, Inc.: “Joslin Biogas Scrubbing Worksheet”, Daily biogas to flare and biogas to boiler reading, February, May and September 2011
- /44/ Platt environmental services, Inc: Flue Gas Volumetric Flow Audit and cylinder gas audit test report, methane concentration in biogas, 31 January 2011, 4 April 2011 and 5 July 2011
- /45/ The American Association for Laboratory Accreditation: Tyson Foods, Inc – Accreditation for technical competence in the field of chemical testing, Valid to June 2012
- /46/ Tyson Fresh Meats Inc: Joslin Propane Consumption excel, 1 January 2010 to 30 September 2011
- /47/ Tyson Foods, Inc: Tyson storm lake waste water log sheet (daily monitoring), February, May and September 2011
- /48/ Hutcheson Engineering Products: Hutcheson Engineerring products field report, 19 May 2011
- /49/ Tyson foods, Inc laboratory, Tyson waste water analysis report, February and May 2011
- /50/ State of Iowa, Department of natural resources: Certification and Parameter List, 2 February 2011
- /51/ Endress+Hauser: Flow meter verification certificate Transmitter, 20 May 2011.
- /52/ Platt Environmental Services/GTI: major Component Gas Analysis by Gas chromatography (ASTM D1945/D1946), 16 feb 2011, 2 May 2011, 19 July 2011
- /53/ Platt Environmental: Flue Gas volumetric flow audit report, Calibration Report , January 2011, July 2011 and April 2011
- /54/ Tyson Storm Lake: Storm lake compliance report, 2 January 2, 2011 – 30 November 2011
- /55/ American Association for Laboratory Accreditation: GTI Testing Laboratories, 31 January 2010
- /56/ Tyson Foods, Inc: Wastewater Report – Weekly report for waste water flow (influent and effluent), November, December 2010

/57/ Gti: "Major Component Gas Analysis by Gas Chromatography", September 2011

/58/ Tyson Foods, Inc: Biogas daily meter reading – January – September 2011

/59/ Tyson Fresh Meat Laboratory: F/S Instruments calibration, 3 May 2011

APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	Amarillo The monitoring plan states that the meters monitoring the biogas flow rate to boiler and biogas flow rate to flare will be calibrated quarterly. The PP has calibrated the flow meters annually. This is not according to the monitoring plan of the project design document. In lines with Annex 60 "Guidelines for assessing compliance with the calibration frequency requirements" for calibrations that have been delayed and calibrations has been implemented after the monitoring period, the PP shall follow either of the two options in calculating the emission reductions: a) Applying the maximum permissible error of the instrument to the measured values, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.	Calibration accuracy check records show both the boiler and flare flow meters to be within the specified accuracy range, so the maximum error according to the equipment specifications has been applied in a conservative manner. The specified accuracy of the flare flow meter (Eldridge Series 8200MPNH) is: $\pm[1\% \text{ of Reading} + (.5\% + .02\%/^{\circ}\text{C of Full Scale})]$. The meter's full scale reading is 2,000 scfm. 30 °C is a conservatively high temperature. Therefore, maximum accuracy deviation is: $\pm(1\% \text{ of reading} + 14,419 \text{ scfd})$. The full scale scfd factor is converted into a monthly value based on number of days in each month to allow for direct integration into the emission reductions calculations spreadsheet. The specified accuracy of the boiler flow meter (GE DigitalFlow XGM868 unit) is: $\pm 2\%$ of reading. For the flare meter, the upper end of the accuracy range chosen since this serves only to increase project emissions (conservative). For the boiler meter, the lower end of the accuracy range is chosen because this decreases baseline emissions more than it increases project emissions (conservative). Emission reduction calculations have been updated accordingly.	The flow meter monitoring the biogas to boiler and the flare is required to be calibrated quarterly as stated in the monitoring report. However, both these meters have been calibrated annually. The results of the delayed calibration do not show any errors in the measuring equipment. Hence, the PP has applied the maximum permissible error of the instrument (2% - flow meter monitoring biogas to boiler) and $\pm[1\% \text{ of Reading} + (.5\% + .02\%/^{\circ}\text{C of Full Scale})]$ - flow meter monitoring biogas to flare) to the measured value for the monitoring period of January 1, 2011 to September 30, 2011. This results in a deduction of 166 tCO₂e VERs. CAR 1 is closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 2	Joslin The monitoring report states that the waste water influent meter is calibrated annually. The waste water influent meter was calibrated on 1 December 2011. The PP needs to provide documentation to show when this meter was last calibrated.	Evidence of start date of meter (1st flow recording) provided. Meter was operational from January 6, 2011.	A new meter was installed on January 3, 2011. Hence, the first annual calibration was conducted on 1 Dec 2011. CAR 2 is closed
CAR 3	Joslin The effluent waste water BOD sample is collected from the influent anoxic waste water. The water from the tannery, sump and Mwater enters the anaerobic waste water effluent stream prior to entering the anoxic treatment. The BOD can be higher or lower due to the mixing of other waste water streams. The methodology ACM00014 requires the quantity of COD treated in the anaerobic digester to be measured. By measuring the BOD of the influent anoxic waste water, the PP is not obtaining the accurate measurement of the COD treated in the anaerobic digester.	The BOD effluent sample point typically only contains the actual effluent from the anaerobic lagoons. Water from the "Mwater" stream does flow in upstream of the sample point, but this is a once-per-day event amounting to only 10-12,000 gallons per day of low-strength wastewater. While it is unlikely that the sample would be taken while the Mwater stream was present at that moment, such a situation would result in a conservative reading since it would increase the overall pounds of BOD present in the effluent and therefore reduce baseline emissions.	For sector expert input MWater – they try recovering chrome from the waste water. The MWater does have BOD loading, but low. The MWater joins the effluent anaerobic waste water once a day. The additional BOD in the Mwater will most likely increase the BOD load in the anaerobic effluent waste water, thus resulting in a conservative effluent BOD value. CAR 3 closed.

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 4	Joslin The monitoring report states that the biogas to flare flow meter and biogas to boiler flow meter is calibrated quarterly. The PP shall submit the quarterly calibration reports for the biogas to flare and biogas flow meter for the monitoring period 1 January 2011 to 30 September 2011.	The same Annex 60 approach is taken to discount the flows recorded by the boiler flow meter since it was calibrated annually rather than quarterly. This approach is not necessary to apply to the flare meter because it was verified quarterly in accordance with the monitoring plan. Calibration accuracy check records show the boiler flow meter to be within the specified accuracy range, so the maximum error according to the equipment specifications has been applied in a conservative manner. The specified accuracy of the boiler flow meter (GE DigitalFlow XGM868 unit) is: $\pm 2\%$ of reading. The lower end of the accuracy range is chosen because this decreases baseline emissions more than it increases project emissions (conservative).	The results of the delayed calibration do not show any errors in the measuring equipment. Hence, the PP has applied the maximum permissible error of the instrument (2% - flow meter monitoring biogas to boiler) to the measured value for the monitoring period of January 1, 2011 to September 30, 2011. CAR 4 closed.

Clarification requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Amarillo The PP needs to demonstrate that the BOD analysis is conducted by a certified laboratory. The lab certificate for the Tyson Lab, Amarillo needs to be submitted to DNV.	Lab Certificate submitted	The PP has submitted the ERA – Lab evaluation of Tyson Fresh Meats, Inc – Amarillo BOD Historical data. – 21/11/2011. This demonstrates that the Tyson Fresh Meats, Inc is a certified lab. CL 1 is closed.
CL 2	Joslin The PP needs to demonstrate that the BOD analysis is conducted by a certified lab. The lab certificate for the Tyson Lab, Joslin needs to be submitted to DNV.	Up-to-date lab certificate provided.	The PP has submitted the Tyson Food, Inc accreditation certificate – valid to June 30, 2012. Genesco, IL. CL 2 closed

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	DNV identified that the influent wastewater flow is consistently lower than the effluent wastewater flow in all four facilities. The PD needs to review the monitoring of influent and effluent flow to identify the reason for this disparity.	The PP identified that in all facilities except Storm Lake, the effluent waste water flow is higher than the influent waste water flow. The reason for this was that some waste water streams including sump water, tannery water were entering the anaerobic effluent waste water stream prior to the monitoring point of the effluent waste water flow meter. Higher effluent waste water flow results in higher effluent BOD, resulting in lower emission reduction.	DNV has confirmed that higher anaerobic effluent flow results in a higher effluent BOD, resulting in lower emission reduction values. This is conservative and FAR 1 is closed. FAR 1 is closed

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV's assessment of response by Project Participants