VALIDATION REPORT

ADVANCED SWINE MANURE TREATMENT FOR THE HUASCO VALLEY AGROINDUSTRY IN CHILE

REPORT NO. 2007-0885

REVISION NO. 03

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2007-06-04	ConCert Project No.: PRJC-111367-2008-CCS-BRA
Approved by: Michael Lehmann	Organisational unit: DNV Climate Change and Environmental Services
Client: Agrocomercial AS Limitada	Client ref.: Carlos Andrés Vives

DNV CLIMATE CHANGE SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994 774 352 MVA

Summary:

Project Name: Advanced Swine Manure Treatment for the Huasco Valley Agroindustry
Country: Chile
Methodology: ACM0010 **Version:** 05
GHG reducing Measure/Technology: Methane recovery in animal-manure management systems
ER estimate: 811 629 tCO_2e per year (average)
Size
☒ Large Scale ☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested ☐ Clarifications Requested
☒ Full Approval and submission for registration ☐ Rejected

In summary, it is DNV's opinion that the project activity "Advanced Swine Manure Treatment for the Huasco Valley Agroindustry" in Chile, as described in the PDD, version 04 of 15 February 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0010, version 05. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2007-0885	Subject Group: Environment
Report title: Advanced Swine Manure Treatment for the Huasco Valley Agroindustry in Chile	
Work carried out by: Felipe Lacerda Antunes, Luis Filipe Tavares	
Work verified by: Hendrik Brinks (draft), Andrea Leiroz (final)	

Date of this revision:	Rev. No.:	Number of pages:
2012-02-15	03	19

Indexing terms

Key words
Climate Change
Kyoto Protocol
Validation
Clean Development Mechanism

☒ No distribution without permission from the client or responsible organisational unit
☐ free distribution within DNV after 3 years
☐ Strictly confidential
☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

B_0	Maximum methane potential
BOD	Biochemical Oxygen Demand
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CONAMA	National Commission for the Environment of Chile
DAF	Dissolved Air Flotation
DNV	Det Norske Veritas
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
MCF	Methane conversion factor
MP	Monitoring Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
NPV	Net Present Value
ODA	Official Development Assistance
PDD	Project Design Document
R_{VS}	Relative reduction of volatile solids
UNFCCC	United Nations Framework Convention on Climate Change
tCO_2e	Tonnes of CO_2 equivalents
VS	Volatile solids excretion rate [kg/day]
VVM	Validation and Verification Manual

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity "Advanced Swine Manure Treatment for the Huasco Valley Agroindustry" in Chile. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Chile. No participating Annex I Party is yet identified. Chile fulfils the participation criteria and has approved the project and authorized the project participant Agrocomercial AS Limitada. The DNA from Chile confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0010, version 05 "Consolidated baseline methodology for GHG emission reductions from manure management systems".

The project involves the implementation of aerobic digestion in activated sludge treatment systems at Agrosuper's swine farm Hacienda Tortora. Following this treatment stage, the sludge runs into an aerobic and controlled storage lagoon for irrigation purposes and for composting. As a result, the project results in reductions of CH_4 and N_2O emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 811 629 tCO_2e per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the project activity "Advanced Swine Manure Treatment for the Huasco Valley Agroindustry" in Chile, as described in the PDD, version 04 dated 15 February 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0010, version 05. Hence, DNV requests the registration of the project as a CDM project activity.

Rio de Janeiro and Oslo, 2012-02-15

Felipe Lacerda Antunes	Michael Lehmann
CDM Validator	*Director of Services and Technologies*
DNV Rio de Janeiro, Brazil	DNV Climate Change Services AS

2 INTRODUCTION

Agrocomercial AS Limitada has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the Advanced Swine Manure Treatment for the Huasco Valley Agroindustry project in Chile (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0010 (version 05). The validation was based on the recommendations in the Validation and Verification Manual /12/.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

/1/ Cantor CO2e: *CDM-PDD for project activity "Advanced Swine* Manure Treatment for the Huasco Valley Agroindustry*" in Chile*, Version 01 dated 23 February 2007, version 02 dated 12 May 2010, version 03 dated 21 November 2011 and version 04 dated 15 February 2012.

/2/ Agrocomercial AS Limitada and ICAFAL constructor: contract to start the construction of the facilities, dated 19 May 2006.

/3/ Agrocomercial AS Limitada: Spreadsheets with emission reduction calculation – "Huasco ER calculation sheets", dated 19 January 2011.

/4/ Agrocomercial AS Limitada: Spreadsheets with NPV calculation – "NPV comparison", dated 19 January 2011.

/5/ Agricola Super Ltd.: letter to CONAMA of 10 August 2000 which mentions that one of the objectives of its projects is to mitigate climate change.

/6/ Environmental Regional Commission: Environmental License issued on 6 January 2006.

/7/ Agrocomercial AS Limitada: Baseline lagoon design (document not dated).

/8/ Agrocomercial AS Limitada: Hog operational data with swine population and weight, and project electricity consumption.

/9/ Agrocomercial AS Limitada: Authorization for investing UDS 16 million in the installation of the activated sludge treatment equipment, dated 27 November 2006.

/10/ Agrosuper AS: Authorization for investing in monitoring equipment for Corneche, Pocillas and La Estrella project.

3.1.2 Letters of approval

/11/ CONAMA (DNA of Chile): *Letter of approval* dated 22 September 2011 Confirmed by the e-mail message from CONAMA dated 1 December 2011

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

/12/ CDM Executive Board: *Validation and Verification Manual*, version 1.2.

/13/ CDM Executive Board: *Baseline and monitoring methodology ACM0010* – "Consolidated baseline methodology for GHG emission reductions from manure

management systems", version 05.

/14/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, version 05.2.

/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 02.

/17/ CDM Executive Board: *Guidelines on the assessment of investment analysis*, version 05.

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

/18/ Ricardo Leiva y Cia Ltda.: E-mail message with a quote for an anaerobic lagoon dated 10 November 2010.

/19/ ASPROCER: Clean Developed Agreement issued in 30 September 2005.

/20/ Chilean Agricultural Ministry: "Technical recommendations for environmental management on swine manure management" dated December 2005.

/21/ Chilean Agro Climatic Map (Santibáñez and Uribe, 1993).

/22/ IPCC: Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. http://www.ipcc.ch/.

/23/ CONAMA: Law 19 300 dated 9 March 1994 (Environmental General Bases Law).

/24/ PIC (Pig Improvement Company Canada Ltd.): invoices of animals issued in 2008.

/25/ ASPROCER: News about project paralysation dated 10 October 2007.

/26/ Nijhuis Water Technology B.V.: Equipment quote dated 24 February 2006.

/27/ Evidences for installation costs:

- Icafal (ground movement) invoice 68 dated 7 June 2006;
- Tecsa (construction) invoices 34978 dated 4 August 2006, 35345 dated 6 October 2006, 35395 dated 23 October 2006, 35538 dated 17 November 2006, 35674 dated 11 December 2006, and 35939 dated 23 February 2007;
- Patricia Soto (civil works) invoices 4042 dated 10 January 2007 and 4406 dated 15 May 2007; and
- Alcaino (civil works) invoice 2000 dated 12 March 2007.

/28/ Evidences for maintenance costs:

- Astormaq (mechanical preventive maintenance) invoice 276 dated 20 July 2009;
- Mechanic Seals invoices 430 dated 2 July 2009 and 6655 dated 21 July 2009;
- MG Mantencion (electrical preventive maintenance) invoice 1067 dated 17 July 2009;
- EMIN invoice 53730 dated 1 July 2009; and
- Alfa Laval invoice 55772 dated 13 July 2009.

/29/ Evidences for additional costs:

- Aguasin, Hidrolab and Emelectric: all invoices for water analysis and electrical consumption for 2009 for La Estrella Plant (UNFCCC ref. number 0033).

/30/ Economy Ministry: Chilean Law of Income Tax dated 1 January 2004

/31/ CDEC-SIC Operation Statistics 1998 – 2007.

3.2 Follow-up interviews with project stakeholders

On 11 July 2007 Felipe Lacerda Antunes from DNV visited the project site at Hacienda Totora and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/32/	2007-07-11	Carlos Andres Vives	Agrocomercial AS Limitada	➢ Management System ➢ Environmental Licenses ➢ Consultation of local stakeholders ➢ Additionality of the project ➢ Baseline emission calculations ➢ Emission factor calculation
/33/	2007-07-11	Juan Manuel San Martin	Agrocomercial AS Limitada	
/34/	2007-07-11	Wolfgang Peralta	Agrocomercial AS Limitada	
/35/	2007-07-11	Sergio Vives	Cantor CO_2e	
/36/	2007-07-11	Alfonso Guijón Buschmann	Poch Ambiental	
/37/	2007-07-11	Maria Luz Farah	Poch Ambiental	

Main changes between the version published for the 30 days stakeholder commenting period and the final version submitted for registration:

- As per the CARs and CLs raised in the draft validation report.

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Advanced Swine Manure Treatment for the Huasco Valley Agroindustry" in Chile is enclosed in Appendix A to this report.

Table 2 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

A corrective action request (CAR) is raised if one of the following occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

(b) The CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

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

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

The validation protocol in Appendix A is based on the project design as documented and described in the PDD, version 02 dated 12 May 2010, and Table 3 of this validation protocol describes any changes made to this version of the PDD as a result of CARs and CLs raised by DNV.

The findings of the validation of the project design as documented and described in earlier version(s) of the PDD are described in the initial validation protocol included in Appendix B to this report.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A c**orrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 are repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1: Validation protocol tables

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement					
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 13.2/15.2 competence
Team leader (Validator)	Antunes	Felipe	Brazil	✓	✓	✓	✓		✓
Validator	Tavares	Luis Filipe	Brazil	✓		✓			✓
Technical reviewer (draft validation report)	Brinks	Hendrik	Oslo					✓	
Technical reviewer (final validation report)	Leiroz	Andrea	Brazil					✓	✓

The qualification of each individual validation team member is detailed in Appendix C to this report.

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD, version 04 dated 15 February 2012.

4.1 Participation requirements

The project participant is Agrocomercial AS Limitada of host Party of Chile. No participating Annex I Party is yet identified. The host Party (Chile) meets all relevant participation requirements.

A letter of approval (LoA) /11/ was issued by DNA of Chile on 22 September 2011, authorizing Agrocomercial AS Limitada of host Party as project participant and confirming that the project assists in achieving sustainable development.

The letter of approval was received from the project participant. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /12/. CONAMA (the Chilean DNA) confirmed by an e-mail message dated 1 December 2011 /11/ that the letter of approval was authentic.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Chile.

4.2 Project design

The Advanced Swine Manure Treatment for the Huasco Valley Agroindustry in Chile project will be implemented in new facilities that are part of the expansion goals from Agrosuper in order to satisfy the international demand for pork meat. The expansion will take place in the northern part of Chile in one big site, in a semi- desertic and unpopulated area.

The project is based on aerobic digestion in an activated sludge treatment system (dissolved air flotation solid-separation units with aerobic treatment). Following this treatment stage, the sludge runs into an aerobic and controlled storage lagoon for irrigation purposes and for composting. The activated-sludge process is an aerobic treatment system with a continuous flow that uses complex populations of aerobic micro-organisms to break down organic matter in wastewater.

The project design and engineering reflects good practice and is significantly better than the common practice of swine management in Chile, since it is demonstrated that the implementation of the project exceeds current Chilean regulations for swine waste treatment and that the proposed manure treatment process is a highly advanced technology system, as confirmed in the Clean Development Agreement II /19/. The raw effluent is pumped into a balance tank and then through a primary solids separation unit where an initial volume of manure is removed. The remaining effluent is transported to a dissolved air flotation unit (DAF) and then into the anoxic tank of the aerobic system, where it is mixed with an active mass of micro-organisms (referred to as activated sludge) capable of aerobically degrading organic material. Diffused aeration maintains the aerobic environment in the basin and keeps reactor contents (referred to as mixed liquor) completely mixed. After a specific treatment

time, water is pumped to the biological solids separation stage, where the sludge and a clarified effluent are obtained. The process recycles a portion of settled sludge back to the aeration basin to maintain the required sludge concentration (within the aerobic basin). The process also intentionally wastes a portion of the separated sludge to maintain the required solid retention time for effective organic (BOD) removal. DNV could confirm the project design by carrying out a physical inspection during the site visit.

A 7 years renewable crediting period is selected (with the potential of being renewed twice), starting on 1 January 2012. The starting date of the project activity is 19 May 2006, correspondent to the date the contract between Agrocomercial and ICAFAL was signed in order to start the construction of the facilities /2/. The expected operational lifetime of the project is 50 years, based on the equipment depreciation /30/.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project applies the approved baseline methodology ACM0010 – "Consolidated baseline methodology for GHG emission reductions from manure management systems", version 05 /13/. This methodology is applicable to the project activity since:

i) the project is implemented at new swine farm facilities operating in a competitive market,

ii) the project and the baseline scenario comply with all the environmental regulations of Chile,

iii) the swine population is managed under confined conditions,

iv) there is no discharge of wastewater streams to rivers and/or estuaries in the project or the baseline scenario,

v) the anaerobic lagoon considered in the baseline scenario has a depth of 4.5 meters /7/,

vi) the annual average temperature at the site is 17.9 ºC /21/ which is above the required temperature of 5^{o}C,

vii) the retention time of the manure in the anaerobic lagoon is 91 days /7/, therefore greater than 1 month and

viii) all the lagoons have a non-permeable layer on the bottom.

The compliance of those applicability conditions was confirmed during the site visit carried out on 11 July 2007.

The assessment of the project's compliance with the applicability criteria of ACM0010 (version 05) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

According to ACM0010, the project boundary is restricted to the aerobic activate sludge treatment system. The system boundaries are as follow:

	GHGs involved	*Description*
Baseline emissions	*CH_4 and N_2O*	*Emissions from the baseline anaerobic*

		lagoon
Project emissions	*CO_2, CH_4 and N_2O*	*Direct emissions from the activated sludge system and emissions from onsite electricity consumption*
Leakage	*CH_4 and N_2O*	*Emissions from storage and land application of treated manure*

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0010 (version 05).

4.5 Baseline identification

In line with ACM0010, the following step-wise method was applied for baseline identification:

- Step 1: Define alternative scenarios to the proposed CDM project activity:

The following possible baseline scenarios were considered are as per IPCC 2006 Guidelines /22/:

i) aerobic treatment; (i.e. the project activity without CDM),
ii) solid storage,
iii) liquid slurry,
iv) uncovered anaerobic lagoon,
v) pit storage,
vi) anaerobic digester,
vii) composting,
viii) Deep bedding.

All scenarios are in compliance with all applicable legal and regulatory requirements. Apart from existing legislation in Chile that establishes water quality parameters that do not allow manure to be discharged into watercourses, there is no legislation in place that requires specific swine manure treatment in the country. The main legislation applicable to the environment is the Environmental General Bases Law 19 300 from 1994 /23/.

The dry lot system has been excluded as it is not applicable to swine barns. The solid storage, pit storage and composting system may also be excluded due to the swine manure effluent low solids content. Deep bedding was also eliminated because it is not a good system for a large swine population.

The majority of the Chilean pork production industry use open lagoons for their swine manure treatment, which was confirmed by the Clean Development Agreement established by the swine producers /19/. The rest of the companies have land application as a prevailing waste management practice, considering in some cases an inefficient previous solids separation. Additionally, all projects, that have undergone environmental impact assessment in the past,

were approved with anaerobic lagoon systems. This is reinforced with the signature of the second version of the Clean Development Agreement which requires swine producers to appply lagoons and stop any discharge into open fresh water bodies /19/.

In this sense, the following baseline alternatives will be considered:

i) aerobic treatment; (i.e. the project activity without CDM),

ii) uncovered anaerobic lagoon;

- Step 2: Barrier analysis:

DNV could confirm that the project faces technology barriers due to the maintenance requirements involved with this technology. The independent study from the Chilean Agricultural Ministry /20/ clearly confirms that an activated sludge plant requires much more maintenance and monitoring than the usual scenario of anaerobic lagoon.

Moreover, it is demonstrated that the implementation of the project exceeds current Chilean regulations for swine waste treatment and that the proposed manure treatment process is a highly advanced technology system, as confirmed in the Clean Development Agreement II /19/.

- Step 3: Investment analysis:

Choice of approach

As neither the project activity scenario nor the uncovered anaerobic lagoon scenario generates revenues apart from CDM, simple cost analysis was selected, which is considered to be adequate. Costs of both scenarios are compared applying the NPV as financial indicator.

Discount rate selection

The discount rate of 10% applied is used internally for Agrosuper in order to make investment decisions, as confirmed in other project activity from Agrosuper /10/.

Input parameters

DNV verified the input parameters used for the investment analysis. The analysis was conducted on a ten-year period, which is the typical period used by Agrosuper to develop its investment analysis and is in line with the "Guidance on the assessment of investment analysis" (CDM-EB) /17/. DNV acknowledges that the option of a 10- year analysis is a conservative approach compared to the maximum period of 20 years suggested as appropriate by the Guidance, because the project and baseline scenario have both only cash outflows during the complete period, which are greater in the project scenario compared to the baseline scenario. Therefore, a greater assessment period in this case would only increase the difference of the NPV values between the baseline and the project scenario.

In order to demonstrate the appropriateness of the input parameters provided, the project proponent conducted an investment analysis considering the real costs of the project, and recent proposals for the baseline scenario.

The following input values were assessed by DNV:

Baseline scenario:

- Installation costs: US$ 2 405 211. Source: Proposal from Ricardo Leiva for a 432 000 m^3 lagoon dated 10 November 2010 (*) /18/;
- Additional costs: US$ 966 400. Source: Proposal from Ricardo Leiva for a 432 000 m^3 lagoon dated 10 November 2010 (*) /18/.

(*) The baseline installation costs are calculated based on the quote value for ground movements of the anaerobic lagoon. The unitary investment costs are the following:

-Excavation costs is 3.01 US$/$m^3$.

-Construction costs is 2.55 US$/$m^3$.

The volume of the anaerobic lagoon is 432 000 m^3 /7/ and investment cost is obtained multiplying the anaerobic lagoon volume by the unitary costs, obtaining a baseline investment cost of US$ 2 405 211.

The baseline additional costs are calculated based on the quote value for cleaning of the anaerobic lagoon. The unitary costs are the following:

-Removal costs is 3.43 US$/$m^3$.

-Dried sludge cost is 3.38 US$/$m^3$

-Field disposition cost is 3.55 US$/$m^3$

The sludge volume of the anaerobic lagoon is 120 060 m^3 and additional costs are obtained multiplying the sludge volume by the unitary costs, obtaining a baseline additional cost of US$ 966 400.

Activated sludge plant:

- Equipment costs: US$ 1 829 268. Source: Supplier equipment quote /26/;
- Fair value: US$ 182 927. Source: 10% of investment costs, which DNV considers reasonable;
- Installation costs: US$ 6 153 917. Source: Icafal (ground movement) invoice 68, Tecsa (construction) invoices 34978, 35345, 35395, 35538, 35674, and 35939, Patricia Soto (civil works) invoices 4042 and 4406, and Alcaino (civil works) invoice 2000 /27/;
- Maintenance costs: US$ 128 049. Source: Estimated based on maintenance costs for La Estrella plant, that is a similar plant registered under CDM (UNFCCC ref. number 0033) /28/;
- Additional costs (operation, consultancy, engineering, irrigation costs, drying solids, sludge removal and land application): US$ 805 065. Source: Estimated based on costs for La Estrella plant, that is a similar plant registered under CDM /29/.

All related invoices and contracts were provided and confirmed by DNV.

Calculation and conclusion

The investment analysis for 10 years was provided in a spreadsheet /4/. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project NPV (-USD 13 646 239) is much more negative than the baseline NPV (-USD 3 337 859), which is reasonable considering that the investments required to install an anaerobic lagoon are much lower that the investments required to implement a project consisting of a digester and an activated sludge treatment.

- Step 4: Baseline revision at renewal of crediting period:

The project participant, at the renewal of each crediting period, will take into account changes in the relevant national and/or sectoral regulations between two crediting periods as well as any increase in the animal stock above the pre-project animal stock.

The baseline determination is transparent and deemed reasonable.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

According to ACM0010, the baseline scenario and additionality are determined in four steps, as described in the previous section 4.5.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

The starting date of the project activity is 19 May 2006, correspondent to the date the contract between Agrocomercial and ICAFAL was signed in order to start the construction of the facilities /2/. This is the earliest project commitment on expenditures, since the activated sludge plant installation was committed on November 2006 /9/.

CDM benefits were considered since the conception of the project in December 2000. Agrosuper initiated a voluntary process to implement advanced waste management systems in order to reduce GHG emissions into the atmosphere. During the following years, especially between 2005 and 2006, Agrosuper successfully registered several of these projects under the Clean Development Mechanism. A letter to CONAMA (Chilean Environmental Agency) of 10 August 2000 mentions that one of the objectives of its project is to mitigate climate change /5/.

Actions to secure CDM status were taken in parallel to the project implementation. On 2 June 2007 the first version of the PDD was published for global stakeholder's consultation, and the validation process started. However, on 10 October 2007 the project implementation was put on hold, as confirmed in the press releases available /25/, and this led to the cancellation of the first validation contract with DNV. No action regarding project implementation was done in 2008 and 2009, and finally on 15 May 2010 the validation process started again.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

As described under section 4.5 above.

4.6.3 Investment analysis

As described under section 4.5 above.

4.6.4 Barrier analysis

As described under section 4.5 above.

In conclusion, all arguments presented above are deemed sufficient to demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.

4.7 Monitoring

The project applies the approved monitoring methodology ACM0010 – "Consolidated baseline methodology for GHG emission reductions from manure management systems", version 05 /13/.

The monitoring plan reflects good monitoring and reporting practices and it is in compliance with the monitoring methodology ACM0010 (version 05).

It is DNV's opinion, that the project participant is able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

- R_{VS}: Volatile solids degradation factor, assumed to be 75% for anaerobic lagoon, 90% for aerobic treatment and 20% for storage lagoon;
- $EF_{N2O,D,j}$: Direct N_2O emission factor, equal to zero for anaerobic lagoon and storage lagoon and 0.005 kg N_2O-N/kg N for aerobic treatment with forced aeration as per IPCC 2006 Guidelines /22/;
- $EF_{N2O,ID,j}$: Indirect N_2O emission factor, equal to 0.01 kg N_2O-N/kg NH_3-N and NO_x-N as per IPCC 2006 Guidelines /22/;
- F_{gasm}: fraction of N lost due to volatilization, equal to 0.2 as per IPCC 2006 Guidelines /22/;
- EF_1: N_2O emission factor from soil, equal to 0.01 kg N_2O-N/kg N as per IPCC 2006 Guidelines /22/;
- EF_4: N_2O emission factor from volatilization, equal to 0.01 kg N_2O-N/kg NH_3-N and NO_x-N as per IPCC 2006 Guidelines /22/;
- EF_5: N_2O emission factor from runoff water, equal to 0.0075 kg N_2O-N/kg N as per IPCC 2006 Guidelines /22/;
- F_{leach}: fraction of N leached, equal to 0.3 as per IPCC 2006 Guidelines /22/;
- n_{dy}: Number of days treatment plants were operational in year y, equal to 365 since Agrocomercial's site operates during the whole year;
- $MS\%_{Bl,j}$: fraction of manure handled in system j in the baseline, equal to 1;
- GWP_{CH4} and GWP_{N2O}: Global warming potential for CH_4 and N_2O, equal to 21 and 310, respectively, as per IPCC 2006 Guidelines /22/;
- D_{CH4}: density of methane, equal to 0.00067 t/m^3 as per ACM0010 version 5 /13/;
- MCF_d: methane conversion factor for leakage calculation, equal to 1 as per ACM0010 version 5 /13/;
- $CF_{N2O-N,N}$: conversion factor, equal to 44/28 as per ACM0010 version 5 /13/;
- $VS_{default}$: default value for the volatile solid excretion per day on a dry-matter basis, equal to 0.27 kg-dm/animal/day for market swine and 0.5 kg-dm/animal/day for breeding swine as per IPCC 2006 Guidelines /22/;

- $W_{default}$: default average animal weight, equal to 46 kg for market swine and 198 kg for breeding swine as per IPCC 2006 Guidelines /22/.

In the calculation of baseline emissions, CO_2 emissions from electricity and heat consumed within the project boundary are not considered, thus the parameters $CEF_{Bl,therm,y}$, $EG_{Bl,y}$ and $HG_{BL,y}$ are not included in section B.6.2 of the PDD.

4.7.2 Parameters monitored ex-post

The monitoring plan allows for collection and archiving of the following key parameters related to the determination of emission reductions resulting from the project activity:

- MCF: Methane correction fraction (for anaerobic lagoon, storage lagoon and for treatment of sludge);
- $B_{0,LT}$: Maximum methane production;
- $VS_{LT,y}$: Volatile solid excretion per animal per day;
- N_{RATE}: Annual average nitrogen excretion per 1000 kg of defined livestock population;
- $R_{N,n}$: Nitrogen degradation factor;
- T: Annual average temperature at project site;
- W_{site}: Average animal weight at the project site;
- N_{LT}: Average livestock population;
- $nd_{sludge,y}$: Number of days of sludge managed in composting system;
- F_{Aer}: Fraction of volatile solids directed to aerobic treatment;
- $EL_{pr,y}$: Electricity used in the project;
- MS%: Fraction of manure handled in the system;
- Type of barn and AWMS;
- Existence and enforcement of relevant regulations;
- $NEX_{LT,y}$: Annual average nitrogen excretion per kg of livestock population;
- $TDL_{i,y}$: Average technical transmission and distribution losses for providing electricity;
- CEF_{grid}: Emission factor for the Chilean power grid.

Details of data to be collected, frequency of data recording and data recording format are described in the PDD.

All data will be kept for two years after the end of the last crediting period.

4.7.3 Management system and quality assurance

Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports and calibration, have been developed and were assured by a certified ISO 9001 (Quality Management System) and ISO 14001 (Environment Management System).

4.8 Algorithms and/or formulae used to determine emission reductions

All aspects related to direct and indirect GHG emissions are captured in the PDD.

Baseline emissions:

The baseline emissions are primarily the CH_4 and N_2O emissions from anaerobic lagoons, while for the project emissions, apart from the CH_4 and N_2O emissions of the activated sludge treatment system and the storage lagoon, leakage has also been considered. Because of the nitrification-denitrification process, there are no indirect N_2O project emissions.

The selection of IPCC default values for VS, B_o and MCF for the different treatment stages is appropriate. During the site visit, DNV confirmed that IPCC default values for breeding swine from North America are representative for Agrosuper farms due to the following reasons:

a) The genetic source of the production operations livestock originate from Canadian genetic roots for high production standards /24/.

b) The project specific average swine weights are more similar to developed country IPCC default values /22/.

c) Diets in the project are similar to diets in developed countries. Farm use formulated feed rations (FFR) are optimized to maximize production and minimize costs for the various animal(s), stage of growth, category, weight gain/productivity and/or genetics, using a special software named PRILL, massively recognized in the swine production industry. DNV was able to check the software and confirm the information about FFR during the site visit /37/.

The average temperature of 17.9 ºC for Huasco site was confirmed from the Chilean Agroclimatic Map /21/.

Baseline emissions are expected to be on the average 888 658 tCO_2e per year.

Leakage:

Project CH_4 and N_2O leakage emissions are the emissions released during project activity from the storage lagoon and the land application of the treated manure. Baseline CH_4 and N_2O leakage emissions are the emissions released during the baseline scenario land application of the treated manure. CH_4 and N_2O leakage emissions are estimated as the net of those released under project activity and those released in the baseline scenario.

The estimated annual amount of leakage is on the average –193 093 tCO_2e per year thus, leakage was not considered in the calculation of the emission reductions.

Project emissions:

Project emissions from electricity consumption are estimated following the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” /15/. The electricity consumption will be measured. The applied value for the technical transmission and distribution losses (TDL) is 20% as per the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” /15/.

Carbon emission factor for the SIC (“Sistema Interconectado Central”) grid will be calculated *ex-post* with a combined margin approach as per the “Tool to calculate the emission factor for an electricity system” /16/. For estimating purposes, the operating margin was calculated using method (b) described in the Tool. The simple adjusted operating margin was calculated for the most recent year for which data were available: 2007. The build margin was calculated taking into account the 20% of the total generation in 2007, since this generation (9 936 124

MWh) was higher than the generation of the five more recent plants (155 000 MWh) /31/. The data correspond to the Central Interconnected System of the Republic of Chile (SIC), where the project activity is located. The estimated operating margin is 0.749 tCO_2/MWh and the build margin is 0.490 tCO_2/MWh. Then, assuming the default weights values 0.5 for the build margin and 0.5 for the operating margin established in the tool, it is possible to calculate the combined margin emission factor as 0.619 tCO_2/MWh.

Project emissions are expected to be on the average 77 030 tCO_2e per year.

Spreadsheets for the calculation of the emission reductions were provided and checked to confirm the estimated emission reductions /3/.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 811 629 tCO_{2e} per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

Agrocomercial A.S. Limitada submitted an Environmental Impact Assessment study to the National Commission for the Environment (CONAMA) that approved and authorized a complete agro industrial project scheme that include the construction of barns with advanced waste treatment systems, reducing potential impacts to the environment /6/. The project activity minimizes the release of odours related to swine manure management, because organic matter is stabilized by forced aeration.

4.10 Comments by local stakeholders

Local stakeholders were primarily consulted through the process of the environmental impact assessments /6/. In addition, the project was presented on Agrosuper's website (www.agrosuper.cl) and discussions about the project were carried out in seminars and workshops in Chile. In order to show their facilities and the technological improvements done in the last years, Agrosuper has a program in which invites the neighbouring community of the Project areas to visit their plants.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 02 dated 23 February 2007, applying ACM0010 version 05 was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website (http://cdm.unfccc.int/Projects/Validation/DB/DHJ9ZGCTGOKHVN393XF63GWJBK052V/view.html) invited to provide comments during a 30 days period from 15 May 2010 to 13 June 2010. No comments were received.

Before this, the PDD version 01 of 23 February 2007 applying ACM0010 version 02 was made publicly available on DNV's climate change website (http://cdm.unfccc.int/Projects/Validation/DB/3P37R0OVKQ1FN28Q24SOVFDQGIA2IM/view.html) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 2 June 2007 to 1 July 2007. No comments were received.

- o0o -

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	~~CAR 2~~ OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	~~CAR 2~~ OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity						
A.1	**Title of the project activity (VVM para 55-57)**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes *If no, list where the PDD is not in accordance:*		OK
A.2	**Description of the project activity (VVM para 58-64)**					
A.2.1	How was the design of the project assessed?	/1/	DR	*What type is the project?* ☐ Project in existing facility or utilizing existing equipment(s) ☐ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15 000 tCO_2e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis. ☐ The project is an individual small scale		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				project activity with emission reductions not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☒ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☐ Reviewing available designs and feasibility studies		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	When the validation commenced the project was at the final stage of construction.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR	Not applicable.		OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	Yes. The project is based on aerobic digestion in a activate sludge treatment system (dissolved air flotation solid-separation units with aerobic treatment). Following this treatment stage, the sludge runs into an aerobic and controlled storage lagoon for irrigation purposes and for composting. The activated-sludge process is an aerobic treatment system with a continuous flow that uses complex populations of aerobic micro-organisms to break down organic matter in wastewater. The raw effluent is pumped into a balance tank and then through a primary solids separation unit where an initial volume of manure is removed. The remaining effluent is transported to a		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				dissolved air flotation unit (DAF) and then into the anoxic tank of the aerobic system, where it is mixed with an active mass of micro-organisms (referred to as activated sludge) capable of aerobically degrading organic. Diffused aeration maintains the aerobic environment in the basin and keeps reactor contents (referred to as mixed liquor) completely mixed. After a specific treatment time, water is pumped to the biological solids separation stage, where the sludge and a clarified effluent are obtained. The process recycles a portion of settled sludge back to the aeration basin to maintain the required sludge concentration (within the aerobic basin). The process also intentionally wastes a portion of the separated sludge to maintain the required solid retention time for effective organic (BOD) removal. DNV could confirm the project design by carrying on a physical inspection during the site visit.		
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	No, the project activity is a Greenfield power plant.		OK
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR	Yes. The project design and engineering reflects good practice and is significantly better than the common practice of swine management in Chile.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/	DR	Yes, the technology is significantly better than the common practice of swine management in Chile.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3 Participation requirements (VVM para 51-54, 125-127)					
A.3.1 Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			OK
	Chile (host)		Spain		
a) Party has ratified the Kyoto Protocol	☒ Yes ☐ No		☒ Yes ☐ No		
b) Party has designated a Designated National Authority	☒ Yes ☐ No		☒ Yes ☐ No		
c) The assigned amount has been determined	☐ Yes ☐ No		☒ Yes ☐ No		
A.3.2 Do the letters of approval meet the following requirements?	/1/ /11/	DR	The Letters of Approval from Chile and Spain have not been provided.	~~CAR 2~~	OK
	Chile (host)		Spain		
a) LoA confirms that Party has ratified the Kyoto Protocol	☒ Yes ☐ No		☐ Yes ☐ No		
b) LoA confirms that participation is voluntary	☒ Yes ☐ No		☐ Yes ☐ No		
c) The LoA confirms that the project contributes to the sustainable development of the host country?	☒ Yes ☐ No		NA		
d) The LoA refers to the precise project activity title in the PDD	☒ Yes ☐ No		☐ Yes ☐ No		
e) The LoA is unconditional with respect to (a) to (d) above	☒ Yes ☐ No		☐ Yes ☐ No		
f) The LoA is issued by the respective Party's DNA	☒ Yes ☐ No		☐ Yes ☐ No		
g) The LoA was received directly by the DNA or the PP	☐ DNA ☒ PP		☐ DNA ☐ PP		
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic	DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM.				
A.3.3 Have all private/public project participants been authorized	/1/	DR	The Letters of Approval from Chile and Spain	~~CAR 2~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	by an involved Party?			have not been provided.		
A.4 Technical description of the project activity (VVM para 58-64)						
A.4.1	Is the project's location clearly defined?	/1/	DR	Yes. The project will be implemented in Chile's III Region, province of Huasco.		OK
A.5 Public funding of the project activity						
A.5.1	In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Chile.		OK
B Application of a baseline and monitoring methodology						
B.1 Methodology applied (VVM para 65-76)						
B.1.1	Does the project apply an approved methodology and the correct and valid version thereof?	/1/ /13/	DR	The project applies the approved baseline methodology ACM0010 – "Consolidated baseline methodology for GHG emission reductions from manure management systems", version 05.		OK
B.1.2	If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/ /15/ /16/	DR	Yes. The "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*", Version 01 and the "*Tool to calculate the emission factor for an electricity system*" version 02 are applied.		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76)						
B.2.1	How was it validated that project complies with the following applicability criteria: Farms where livestock populations, comprising of cattle, buffalo, swine, sheep,	/1/	DR	As confirmed during the site visit, the swine population is managed under confined conditions.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	goats, and/or poultry, is managed under confined conditions?					
B.2.2	How was it validated that project complies with the following applicability criteria: Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries)?	/1/ /6/	DR	As confirmed during the site visit and by the environmental license, there is no discharge of wastewater streams to rivers and/or estuaries in the project or the baseline scenario.		OK
B.2.3	How was it validated that project complies with the following applicability criteria: In case of anaerobic lagoons treatments systems, the depth of the lagoons used for manure management under the baseline scenario should be at least 1m?	/1/	DR	DNV requests a justification about the baseline applicability evidencing clearly the depth of the anaerobic lagoon of 4.5 meters, the Huasco valley annual average temperature and the retention time.	~~CL 1~~	OK
B.2.4	How was it validated that project complies with the following applicability criteria: The annual average temperature in the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C?	/1/	DR	DNV requests a justification about the baseline applicability evidencing clearly the depth of the anaerobic lagoon of 4.5 meters, the Huasco valley annual average temperature and the retention time.	~~CL 1~~	OK
B.2.5	How was it validated that project complies with the following applicability criteria: In the baseline case, the minimum retention time of manure waste in the anaerobic treatment system is greater than 1 month?	/1/	DR	DNV requests a justification about the baseline applicability evidencing clearly the depth of the anaerobic lagoon of 4.5 meters, the Huasco valley annual average temperature and the retention time.	~~CL 1~~	OK
B.2.6	How was it validated that project complies with the following applicability criteria: The AWMS/process in the project case should ensure that no leakage of manure waste into ground water takes place, e.g., the lagoon should have a non-permeable layer at the lagoon bottom?	/1/ /6/	DR	As confirmed during the site visit and by the environmental license, all the lagoons have a non-permeable layer on the bottom.		OK
B.2.7	Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	Yes. The baseline scenario is one of the options from IPCC 2006.		OK
B.3	**Project boundary (VVM para 78-80)**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined	/1/	DR	Yes. According to ACM0010, the project boundary is restricted to the aerobic activate		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	and in accordance with the methodology?			sludge treatment system.		
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	Baseline: CH_4 and N_2O emissions from the baseline anaerobic lagoon. Project: CO_2, CH_4 and N_2O emissions from the activated sludge system and emissions from onsite electricity consumption. Leakage: CH_4 and N_2O emissions from storage and land application of treated manure. The GHG sources identified cover all possible sources, as per ACM0010 and as confirmed during the site visit.		OK
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/	DR	The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0010 (version 05).		OK
B.4	**Baseline scenario determination (VVM para 81-88, 105-107)**					
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /22/	DR	The following possible baseline scenarios were considered are as per IPCC 2006 Guidelines: i) aerobic treatment; (i.e. the project activity without CDM), ii) solid storage, iii) Liquid slurry. iv) uncovered anaerobic lagoon; v) pit storage, vi) anaerobic digester,		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				vii) composting, viii) Deep bedding. The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios.		
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /19/	DR	The dry lot system has been excluded as it is not applicable to swine barns. The solid storage, pit storage and composting system may also be excluded due to the swine manure effluent low solids content. Deep bedding was also eliminated because it is not a good system for large volumes of water. The majority of the Chilean pork production industry use open lagoons for their swine manure treatment, which was confirmed by the Clean Production Agreement established by the swine producers. The rest of the companies have land application as a prevailing waste management practice, considering in some cases an inefficient previous solids separation.		OK
B.4.3	What is the baseline scenario?	/1/	DR	The baseline scenario is the uncovered anaerobic lagoon.		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	Yes. The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes.		OK
B.4.6	Does the baseline scenario sufficiently take into account	/1/	DR	Yes. Relevant national and/or sectoral policies		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	relevant national and/or sectoral policies, macro-economic trends and political aspirations?			and circumstances are considered and listed in the PDD.		
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/	DR	The baseline determination is transparent and deemed reasonable. The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity. All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.		OK
B.5	**Additionality determination (VVM para 94-121)**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/	DR	The project proponent applied ACM0010 to demonstrate the baseline scenario and additionality.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/ /23/	DR	Yes, regulatory requirements were considered.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes, as described in the following sections.		OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	The project additionality is based in both investment and barrier analysis.		OK
	Prior consideration of CDM (VVM para 98-103)					
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /5/	DR	CDM benefits were considered since the conception of the project: in December 2000, Agrosuper initiated a voluntary process to implement advanced waste management systems in order to reduce GHG emissions into the atmosphere. During the following years, especially between 2004 and 2005, Agrosuper successfully consummate several of these projects under the Clean Development Mechanism. A letter to CONAMA (Chilean Environmental Agency) of 10 August 2000 mentions that one of the objectives of its project is to mitigate climate change.		OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/	DR	Not applicable		OK
	Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7	What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/	DR	The PDD should present a timeline with the main actions related to project implementation, CDM previous consideration and actions to secure CDM status in parallel to the project implementation. Correspondent evidence should be provided.	~~CL 2~~	OK
B.5.8	When did the construction of the project activity start?	/1/	DR	See B.5.7	~~CL 2~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.9	When was the project commissioned?	/1/	DR	See B.5.7	~~CL 2~~	OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	See B.5.7	~~CL 2~~	OK
Investment analysis (VVM para 108-114)						
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	No project alternatives generate revenues apart from CDM.		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	Yes, as described in the PDD.		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Yes, simple cost analysis is applied.		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	A 10% discount rate is applied.		OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR	The project applies simple cost analysis, and compares NPV.		OK
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	Not applicable.		OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/	DR	Not applicable.		OK
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/	DR	Yes. The investment analysis is done for 10 years, and fair value is returned in the last year.		OK
B.5.19	When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between	/1/	DR	Not applicable.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	finalization of the FSR and the investment decision adequate?					
B.5.20	How was the amount of output (e.g. sales of electricity) assessed?	/1/	DR	☐ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☐ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☐ Other approach. DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	~~CL 3~~	OK
B.5.21	How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision?	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the output price was validated:* DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	~~CL 3~~	OK
B.5.22	How were the investment costs assessed? Were the data available and valid at the time of decision?	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants *Provide details on how the investment costs were validated:*	~~CL 3~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.		
B.5.23	How were the O&M costs assessed? Were the data available and valid at the time of decision?	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	~~CL 3~~	OK
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision?	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how other input parameters were validated:* DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	~~CL 3~~	OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	~~CL 3~~	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR	Not applicable		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	Not applicable		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	Not applicable		OK
Barrier analysis (VVM para 115-118)						
B.5.29	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	Barriers identified are complementary to the investment analysis.		OK
B.5.30	How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	The investment barrier presented in the PDD is not related to lack of access to capital as per ACM0010 requirements. Therefore, DNV requires this barrier to be removed. DNV requests independent sources of data as evidences that substantiate the technology barrier and legal constrains.	~~CAR 1~~	OK
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	See B.5.30	~~CAR 1~~	OK
B.5.32	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.30	~~CAR 1~~	OK
B.5.33	How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	See B.5.30	~~CAR 1~~	OK
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	See B.5.30	~~CAR 1~~	OK
B.5.35	Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.30	~~CAR 1~~	OK
B.5.36	How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	See B.5.42		OK
B.5.37	How does CDM alleviate the barriers due to prevailing	/1/	DR	See B.5.42		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	practise?					
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.42		OK
B.5.39	How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	The investment barrier presented in the PDD is not related to lack of access to capital as per ACM0010 requirements. Therefore, DNV requires this barrier to be removed. DNV requests independent sources of data as evidences that substantiate the technology barrier and legal constrains.	~~CAR 1~~	OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	See B.5.39	~~CAR 1~~	OK
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	See B.5.39	~~CAR 1~~	OK
	Common practice analysis (VVM para 119-121)					
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /19/	DR	The majority of the Chilean pork production industry use open lagoons for their swine manure treatment, which was confirmed by the Clean Development Agreement established by the swine producers. The rest of the companies have land application as a prevailing waste management practice, considering in some cases an inefficient previous solids separation. Additionally, all projects, that have undergone environmental impact assessment in the past, were approved with anaerobic lagoon systems. This is reinforced with the signature of the second version of the Clean Development Agreement which requires swine producers to count with lagoons and stop any discharge into		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				open fresh water bodies.		
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/	DR	Swine manure management in Chile was considered.		OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /19/	DR	The Clean Development Agreement is used.		OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/ /19/	DR	No similar non-CDM project was identified.		OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	Not applicable.		OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	The project activity without CDM does not constitute a common practice in Chile.		OK
	Conclusion					
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	In conclusion, all arguments presented above are deemed sufficient to demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.		OK
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 199-203)					
B.6.1	How was the $R_{VS,n}$, D_{CH4}, MCF_d and $CF_{N2O-N,N}$ verified?	/1/ /13/	DR	Values taken from ACM0010 were applied.		OK
B.6.2	How was the $EF_{N2O,D,j}$, $EF_{N2O,ID,j}$, F_{gasm}, EF_1, EF_4, EF_5, F_{leach}, GWP_{CH4} and GWP_{N2O} verified?	/1/ /22/	DR	Values were taken from IPCC 2006 Guidelines.		OK
B.6.3	How was the nd_y and $MS\%_{Bl,j}$ verified?	/1/	DR	These values were established by the project participant and found to be reasonable during the site visit.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Baseline emissions (VVM para 89-93)					
B.6.4	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	DNV requests a spreadsheet with the calculation of the grid emission factor and emission reduction calculation, as well as evidence of the input values used, like electricity consumption, number of animals, animal weight, and VS degradation factor and N degradation factor for aerobic treatment and storage lagoon.	~~CL 4~~	OK
B.6.5	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	See B.6.5	~~CL 4~~	OK
B.6.6	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	See B.6.5	~~CL 4~~	OK
	Project emissions (VVM para 89-93)					
B.6.7	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	DNV requests a spreadsheet with the calculation of the grid emission factor and emission reduction calculation, as well as evidence of the input values used, like electricity consumption, number of animals, animal weight, and VS degradation factor and N degradation factor for aerobic treatment and storage lagoon. The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and the "Tool to calculate the emission factor for an electricity system" should be referenced in PDD section B.1. The project proponent is required to explain in the PDD how the electricity grid emission factor was estimated. According to the Tool to calculate baseline, project and leakage emissions from electricity consumption, a 20% of technical and distribution losses should be considered for electricity	~~CL 4~~ ~~CL 6~~ ~~CL 8~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				consumption calculation.		
B.6.8	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	See B.6.7	~~CL 4~~ ~~CL 6~~ ~~CL 8~~	OK
B.6.9	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	See B.6.7	~~CL 4~~ ~~CL 6~~ ~~CL 8~~	OK
Leakage (VVM para 89-93)						
B.6.10	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	DNV requests a spreadsheet with the calculation of the grid emission factor and emission reduction calculation, as well as evidence of the input values used, like electricity consumption, number of animals, animal weight, and VS degradation factor and N degradation factor for aerobic treatment and storage lagoon.	~~CL 4~~	OK
B.6.11	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	See B.6.10	~~CL 4~~	OK
B.6.12	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	See B.6.10	~~CL 4~~	OK
Emission Reductions (VVM para 89-93)						
B.6.13	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the	/1/	DR	DNV requests a spreadsheet with the calculation of the grid emission factor and emission reduction calculation, as well as evidence of the input values used, like electricity consumption, number of animals, animal weight, and VS degradation factor and N degradation factor for aerobic treatment and storage lagoon.	~~CL 4~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	data provided in the PDD and supporting files to be submitted for registration.					
B.7	**Monitoring plan (VVM para 122-124)**					
	Data and parameters monitored					
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	Yes. The monitoring plan is in compliance with the monitoring methodology ACM0010 (version 05).		OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	According to ACM0010, the following data should be monitored and described in section B.7.1: existence and enforcement of relevant regulation, type of barns, NEX and TDL. If the parameter CEFd will be monitored ex-post, it should be presented in section B.7.1, not in B.6.2. ACM0010 requires the PDD to describe the system of random sampling taking into account stratification of each livestock population into a minimum of 3 weight categories.	~~CL 5~~ ~~CL 7~~	OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	See B.7.2	~~CL 5~~	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	See B.7.2	~~CL 5~~	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	See B.7.2	~~CL 5~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.2	~~CL 5~~	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.2	~~CL 5~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Ability of project participants to implement monitoring plan					
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	During the site visit, and considering the project proponent experience with similar registered CDM project activities, the project participant is able to implement the monitoring plan.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/	DR	Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports and calibration, have been developed and were assured by a certified ISO 9001 (Quality Management System) and ISO 14001 (Environment Management System).		OK
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Yes. See B.7.9.		OK
B.7.11	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Yes. All data will be kept for two years after the end of the last crediting period.		OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	The DNA of Chile and ACM0010 do not require monitoring of sustainable development indicators.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	See B.7.12		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	See B.7.12		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
C Duration of the project activity / crediting period						
C.1.1	**Start date of project activity (VVM para 99-100, 104)**					
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/ /2/	DR	The starting date of the project activity is 19 May 2006, correspondent to the date it was sign the contract between Agrocomercial and ICAFAL in order to start the construction of the facilities.		OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	Yes. The expected operational lifetime of the project is 50 years.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	A 7 years renewable crediting period is selected, starting on 1 January 2012.		OK
D Environmental Impacts (VVM para 131-13))						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /6/	DR	Yes. Agrocomercial submitted an Environmental Impact Assessment study to the National Commission for the Environment (CONAMA) that approved and authorized a complete agro industrial project scheme that include the construction of barns with advanced waste treatment systems, reducing potential impacts to the environment.		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /6/	DR	Yes. See D.1.1		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /6/	DR	The project activity minimizes the release of odours related to swine manure management, because organic matter is stabilized by forced aeration.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Yes, analysis is sufficiently described in the PDD.		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?	/1/ /6/	DR	No transboundary environmental impacts are foreseen.		OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /6/	DR	Yes. Local stakeholders were primarily consulted through the process of the environmental impact assessments. In addition, the project was presented on Agrosuper's website and discussions about the project were carried out in seminars and workshops in Chile. In order to show their facilities and the technological improvements done in the last years, Agrosuper has a program in which invites the neighbouring community of the Project areas to visit their plants.		OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /6/	DR	Yes. See E.1.1		OK
E.1.3	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/ /6/	DR	Yes. See E.1.1		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /6/	DR	Yes. No negative comments were received.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /6/	DR	Yes. No negative comments were received.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 1 The investment barrier presented in the PDD is not related to lack of access to capital as per ACM0010 requirements. Therefore, DNV requires this barrier to be removed. DNV requests independent sources of data as evidences that substantiate the technology barrier and legal constrains.	B.5.30 – B.5.35 B.5.39 – B.5.41	**Technological barriers:** To operate an activated sludge plant, a minimal amount of manure is required to have a continuous flow of manure to the system. An effective Activated Sludge system needs a constant nutrient concentration on the mixed biological liquor, with minimal variations on the F/M ratio (nutrients/bacteria population). A batch type manure supply will affect the bacteria meaning poor performance of the activated sludge. The flow must be as constant as possible, on both volume and nutrient concentration for a good performance and control of the main biological process of the activated sludge. The same requirement is valid to maintain the performance of the physical/chemical solid separation units, both primary and secondary. Therefore, a large quantity of animals is required to achieve a constant manure flow on both quantity and quality to the system. A system based on low stocks is not possible for an advanced activated sludge due to high variations on flow and quality that will affect the optimal conditions required by the bacteria to effectively consume the BOD and Nitrogen contained on the manure. An advanced activated sludge system needs	Investment barriers were removed from the revised PDD. DNV could confirm that the project faces technology barriers due to the maintenance requirements involved with this technology. The independent study from the Chilean Agricultural Ministry /20/ clearly confirms that an activated sludge plant requires much more maintenance and monitoring than the usual scenario of anaerobic lagoon. Moreover, it is demonstrated that the implementation of the project exceeds current Chilean regulations for swine waste treatment and that the proposed manure treatment process is a highly advanced technology system, as confirmed in the Clean Production Agreement II /19/. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		a complex and detailed monitoring 24/7/365 to operate effectively. A lack of control will also affect the performance of both biological and physical/chemical systems. Please find attached some of the daily records required to operate effectively an activated sludge system. Please note that some of the records are based on supervision periods of 1 hour, reflecting the complexity of this type of systems. The maintenance is also a technological barrier to consider for this project. The maintenance level required by the project highly exceeds the maintenance required by the baseline, making the baseline the most attractive course of action. A detailed maintenance plan is required for a proper performance of both biological and physical/chemical systems. Biological systems required a permanent and complete mixing on the biological reactors, and a constant specific oxygen concentration for the aerobic bacteria, therefore the aeration, mixing and recirculation systems need a permanent supervision and maintenance to maintain the required performance levels. Lack of it will affect the biological performance of the system, meaning that the removal of BOD and Nitrogen will not be achieved. This is also valid for the physical/chemical separation systems, needing a higher maintenance level to perform efficiently in relation to solids	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		removal and polymer consumption, the main cost involved on an advanced activated sludge system. Poor performance on this parameter will raise the cost of operation of the system affecting the economical evaluation and making more negative the ROI of the project, making of the baseline again the most attractive course of action. Please find attached the maintenance plan and operational records on CAR 1 evidence. Please find attached the external document on CAR 1 evidence. Please to see on page 10 the following paragraph. *" No obstante, el manejo de purines no se basa sólo en la implementación y posterior operación de un sistema de tratamiento, sino que además requiere como un segundo pilar fundamental, de un sistema de gestión de purines a nivel predial, que gestione un seguimiento a través de procedimientos técnicos escritos de monitoreo de aguas superficiales y subterráneas, planes de emergencia, planes y registros de estado de operación, reparación y mantención de equipos o unidades, planes de control y acciones correctivas, informes de auto-evaluación y planes de capacitación, entre otros."* **Legal constrains:** The Chilean legislation don't has any specific requirements for the	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		pork production industry regarding manure management, beside establishing maximums on specific parameters for contaminants in water to be discharged into watercourses. The baseline considers the irrigation of the effluent of Anaerobic Lagoons, and therefore the legislation makes this the most attractive course of action. The last sectorial regulation named Clean Production Agreement II (Acuerdo de Producción Limpia II) is a voluntary agreement submitted by Agrosuper, that requires the implementation of Anaerobic Lagoons as the standard, and therefore the baseline is again the most attractive course of action, being also recognized as a step forward on manure management for Chilean swine production industry. The project greatly exceeds the legal and sectorial regulations. Please find attached the Clean Production Agreement II on CAR 1 Legal constrains (APL II).	
CAR 2 The Letters of Approval from Chile and Spain have not been provided.	A.3.2 A.3.3	Please find attached the Letter of Approval from Chile. Alimentos Euroagro A.S was eliminated like Project Participant. Therefore is not necessary the LoA from Spain.	A letter of approval (LoA) /11/ was issued by DNA of Chile on 22 September 2011, authorizing Agrocomercial AS Limitada of host Party as project participant and confirming that the project assists in achieving sustainable development. Alimentos Euroagro AS from Spain was removed as a project participant. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 1 DNV requests a justification about the baseline applicability evidencing clearly the depth of the anaerobic lagoon of 4.5 meters, the Huasco valley annual average temperature and the retention time.	B.2.3 – B.2.5	**Baseline applicability justification:** Irrigation costs of the manure highly depend on Nitrogen content. Please find attached an economical evaluation on CL 1 [Hydraulic retention time] showing two plausible alternatives for the baseline scenario: **Direct Irrigation:** Direct irrigation is a plausible scenario if enough land is available to irrigate the manure with specific nitrogen content. The Nitrogen dose to be applied to the soil is to be agreed with the national authority and current projects have an average of 2.464 Nitrogen Kg/Ha of eucalyptus per year. On this case, the total plantation costs will be of $ 4 575 726 USD. **Anaerobic Lagoon:** The implementation of Anaerobic lagoons is also a plausible scenario for manure management. In order to achieve Nitrogen and BOD removal, an anaerobic lagoon must have at least 30 days of HRT and be deeper than 1 meter. Construction costs for lagoons are lower with a depth of 6-7 meters (existing lagoons on other projects demonstrates that this is the most economic construction option for lagoons). Following the same costs analysis made for direct irrigation, the Nitrogen removal achieved by the Anaerobic Lagoon lowers the eucalyptus plantation costs to $ 3 757 286, including lagoon construction	DNV could confirm by the baseline lagoon design /7/ that the baseline lagoon would have a 4.5 m depth and a retention time of 91 days. The temperature of 17.9 ºC for Huasco was confirmed from the Chilean Agroclimatic Map /21/, which are higher than the required methodological temperature of 5 ^{o}C. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		costs. Therefore, the most attractive way of action for the baseline will be an Anaerobic lagoon with a Nitrogen removal as high as possible, ensuring a depth of at least 1 meter, and preferably higher, since the total lagoon area required for depths lower than 4.5 meters will raise the lagoon construction costs. This also ensures the HRT of at least 1 month, since the Nitrogen removal is a requirement for the most attractive economic way of action. Please find attached the anaerobic lagoon depth on CL 1 evidence. **HRT** The exact value calculated for HRT is 91 days; this is calculated through the quotient between the useful volume of the lagoon and the estimated daily flow for the project activity. The lagoon design volume is attached on spreadsheet "anaerobic lagoon depth". The daily flow is obtained from the maximum working capacity designed for an Activated Sludge Plant, based on technical specifications mentioned by the supplier. Please find attached the Hydraulic retention time on CL 1 evidence. **Annual average temperature**: Please find attached the requested evidence on CL 1 Average temperature at Huasco site.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The source of official information to determine Huasco's annual average temperature can be found in The Chilean Agroclimatic Map realizaded by INIA (Instituto de Investigación Agropecuria), which is based on actual data sources and specific information for each location.	
CL 2 The PDD should present a timeline with the main actions related to project implementation, CDM previous consideration and actions to secure CDM status in parallel to the project implementation. Correspondent evidence should be provided.	B.5.7 – B.5.10	Please find Letter Gantt with requested timeline on section B.5 PDD. Please find attached DNV contract, meeting with authority, external consultants and project paralysation on CL 2 evidence.	The timeline was included in the PDD as required. CDM benefits were considered since the conception of the project: in December 2000, Agrosuper initiated a voluntary process to implement advanced waste management systems in order to reduce GHG emissions into the atmosphere. During the following years, especially between 2005 and 2006, Agrosuper successfully consummate several of these projects under the Clean Development Mechanism. A letter to CONAMA (Chilean Environmental Agency) of 10 August 2000 mentions that one of the objectives of its project is to mitigate climate change /5/. Actions to secure CDM status were taken in parallel to the project implementation. On 2 June 2007 the first version of the PDD was published for global stakeholder's consultation, and the validation process started. However, on 10 October 2007 the project implementation was paralyzed, as confirmed in the press releases available /25/, and this led to the cancellation of the first validation contract with DNV. No

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			action regarding project implementation was done in 2008 and 2009, and finally on 15 May 2010 the validation process started again. Therefore this CL is closed.
CL 3 DNV requests the spreadsheet with NPV calculation, as well as evidences of the input values used.	B.5.20 – B.5.25	Please find attached spreadsheet with economic evaluation on CL 3 evidence (NPV calculation). **Activated sludge plant:** **Installation costs:** Please find attached the estimated investment for installation costs on CL-3 evidence. The items are the following: electrical assembly, equipment assembly and piping, treatment system, topography, treatment system engineering, technical inspection and land removal; inter alia. The invoices are attached on "installation costs invoices". Installation costs: US$ 6 153 917. Source: Cost Center Huasco activated sludge plant (contracted values). **Equipment costs:** Please find attached the equipment costs on CL-3 evidence (Equipment quotes). Equipment costs: US$ 1 829 268 Source: Equipment quotes (Nijhuis Water Technology B.V.) **Maintenance and additional costs:** Please find attached the evidences of the input values used for additional costs,	In order to demonstrate the appropriateness of the input parameters provided, the project proponent conducted an investment analysis considering the real costs of the project. <u>Baseline scenario:</u> – Installation costs: US$ 2 405 211. Source: Proposal from Ricardo Leiva dated 10 November 2010 /18/; – Additional costs: US$ 966 400. Source: Proposal from Ricardo Leiva dated 10 November 2010 /18/. <u>Activated sludge plant:</u> – Equipment costs: US$ 1 829 268. Source: Suppier equipment quote /26/; – Fair value: US$ 182 927. Source: 10% of investment costs, which DNV considers reasonable; – Installation costs: US$ 6 153 917. Source: Icafal (ground movement) invoice 68, Tecsa (construction) invoices 34978, 35345, 35395,

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		maintenance costs on CL-3 evidence for "La Estrella" plant 2009 to date, currently operating under similar conditions. The invoices are attached on "Maintenance costs invoices" and "Additional costs invoices". Maintenance costs: US$ 27 794 monthly average (July) Source: Cost Center La Estrella activated sludge plant. Additional costs: US$ 2 514 886. Source: electric, analysis and polymer bills. **Baseline scenario:** **Installation costs:** US$ 2 405 211. Source: Quote value (Ricardo Leiva y Cia Ltda). (*) **Additional costs:** US$ 966 400. Source: Quote value (Ricardo Leiva y Cia Ltda (**) (*) The baseline installation costs are calculated based on the quote value for ground movements of the anaerobic lagoon. The unitary investment costs are the following: -Excavation costs is 3.01 US$/$m^3$. -Construction costs is 2.55 US$/$m^3$. The volume of the anaerobic lagoon is 432 000 m^3 and investment cost is obtained multiplying the anaerobic lagoon volume by the unitary costs, obtaining a baseline investment cost of US$ 2 405 211. The ground movement quote value is	35538, 35674, and 35939, Patricia Soto (civil works) invoices 4042 and 4406, and Alcaino (civil works) invoice 2000 /27/; – Maintenance costs: US$ 128,049. Source: Estimated based on maintenance costs for La Estrella plant, that is a similar plant registered under CDM /28/; – Additional costs: US$ 805 065. Source: Estimated based on maintenance costs for La Estrella plant, that is a similar plant registered under CDM /29/. All related invoices and contracts were provided and confirmed by DNV. The investment analysis for 10 years was provided in a spreadsheet /4/. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project NPV (-USD 13 646 239) is much more negative than the baseline NPV (-USD 3 337 859), which is quite reasonable considering that the investments required to install an anaerobic lagoon are much lower that the investments required to implement a project consisting of a digester and an activated sludge treatment. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		attached "Ground movement quote" (**)The baseline additional costs are calculated based on the quote value for cleaning of the anaerobic lagoon. The unitary costs are the following: -Removal costs is 3.43 US$/$m^3$. -Dried sludge cost is 3.38 US$/$m^3$ -Field disposition cost is 3.55 US$/$m^3$ The sludge volume of the anaerobic lagoon is 120 060 m^3 and additional costs are obtained multiplying the sludge volume by the unitary costs, obtaining a baseline additional cost of US$ 966 400. Please find attached spreadsheet on CL-3 NPV Calculation (baseline scenario). The cleaning anaerobic lagoon quote value is attached "Cleaning quote" There are no potential revenues involved in any of these scenarios. The assumptions and parameters considered in the analysis were chosen to be conservative.	
CL 4 DNV requests a spreadsheet with the calculation of the grid emission factor and emission reduction calculation, as well as evidence of the input values used, like electricity consumption, number of animals, animal weight, and VS degradation factor and N degradation factor for aerobic treatment and storage lagoon.	B.6.4 – B.6.13	Please find attached the emission reduction calculation spreadsheet and grid emission factor calculation spreadsheet. **Electricity consumption**: Please find attached the electricity consumption calculation spreadsheet on CL- 4 evidence for "La Estrella" plant 2009 to date, currently operating under similar conditions.	The spreadsheet with the calculation of the grid emission factor was provided. Carbon emission factor for the SIC ("Sistema Interconectado Central") grid will be calculated *ex-post* with a combined margin approach as per the "Tool to calculate the emission factor for an electricity system" /16/. For estimating purposes, the operating margin was calculated using method (b) described in the Tool. The simple adjusted

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The estimated electricity consumption for Huasco site will depend of pumped water to the compressors of biological lagoons, this is because to average temperature is higher by two degrees Celsius compared to the plant La Estrella, and therefore the consumption of water to oxygenate must be greater to air the lagoons. Therefore the electricity consumption calculation is conservative. **Animal stock:** Huasco is a large scale project that considers an important investment and an important number of swine heads. Considering the size of the Huasco project breeding and market swine barns will be built and loaded gradually. The investment plan considers 150 000 breeding swine and all their progeny (1 488 902 market swine) for the complete project. The progeny is calculated considering the average amount of piglets per sow a year. According to the investment plan, the *(Advanced swine manure treatment)* wastewater treatment systems will be implemented according to the amount of breeding and market swine population in the barns. The *(Activated sludge plants)* wastewater treatment plants will startup with a fraction of the total design flow, which will increase regularly to achieve total treatment design capacity. This procedure is based on load to be in accordance with design and design yields	operating margin was calculated for the most recent year for which data were available: 2007. The build margin was calculated taking into account the 20% of the total generation in 2007, since this generation (9 936 124 MWh) was higher than the generation of the five more recent plants (155 000 MWh). The data correspond to the Central Interconnected System of the Republic of Chile (SIC), where the project activity is located. The estimated operating margin is 0.749 tCO_2/MWh and the build margin is 0.490 tCO_2/MWh. Then, assuming the default weights values 0.5 for the build margin and 0.5 for the operating margin established in the tool, it is possible to calculate the combined margin emission factor as 0.619 tCO_2/MWh. A spreadsheet for the calculation of the emission reductions was provided and checked to confirm the estimated emission reductions /3/. Hog operational data from La Estrella plant, a similar plant from Agrosuper that is in operational stage, was provided to confirm the estimated values. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		will be accomplished. The number of heads during the crediting period has been estimated taking into account an accelerated grow rate, in order to reach the maximum production at the fourth year. Therefore, it has been established a load program, that considers 30 000 breeding swine heads and all their progeny (297 780 market swine) for the first year. In the same way, for the second, third and fourth year the load program considers 80 000, 120 000 and 150 000 breeding swine heads respectively and their own progeny. Then, in the fourth year is reached the maximum number of heads for breeding and market swine during the crediting period. For the next years of the crediting period it is considered the maximum number of heads for breeding and market swine. For ex-post calculations, the grow rate of swine heads will be flexible, therefore, the ex-post number of heads for each year of the crediting year could be different from the values presented in the PDD. **Animal Weight:** Please find attached the spreadsheet with average weight of breeding and wean to finish. This information is managed for Agrosupers's swine production system. **VS and N degradation factor for aerobic treatment:** The VS and N degradation	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		factor on this system will be similar to similar systems already in operation. Please find attached the VS and N removal calculation for "La Manga" plant 2010 to date, currently operating under similar conditions. The solids are not usually measured on storage lagoon, as the only parameter needed for normal operation is nitrogen. On manure the nitrogen is linked to the solids contents. As seen on the aerobic treatment performance evidence, the solids removal is higher to the nitrogen removal. The same happens on storage lagoon due to the decantation of the solids, and therefore is possible to ensure that the removal is higher than the 25% of removal for nitrogen.	
CL 5 According to ACM0010, the following data should be monitored and described in section B.7.1: existence and enforcement of relevant regulation, type of barns, NEX and TDL. If the parameter CEFd will be monitored ex-post, it should be presented in section B.7.1, not in B.6.2.	B.7.2 – B.7.7	The NEX, TDL, existence and enforcement of relevant regulation and type of barns are included on section B 7.1. The CEFd parameter was referenced in section B.7.1. Please find attached corrected PDD.	The revised PDD presents all required parameters in the monitoring plan. Therefore this CL is closed.
CL 6 The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and the "Tool to calculate the emission factor for an electricity system" should be referenced in	B.6.7 – B.6.9	The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and the "Tool to calculate the emission factor for an electricity system" were referenced in section B.1.	The revised PDD clearly refers the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and the "Tool to calculate the emission factor for an electricity system".

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
PDD section B.1. The project proponent is required to explain in the PDD how the electricity grid emission factor was estimated.		Please find attached corrected PDD.	Therefore this CL is closed.
CL 7 ACM0010 requires the PDD to describe the system of random sampling taking into account stratification of each livestock population into a minimum of 3 weight categories.	B.7.2	The description of system of random sampling was referenced in section B.7.1. [Data / parameters] Wsite. Please find attached corrected PDD.	The revised PDD describes the system of random sampling applied for the livestock population weight monitoring. Therefore this CL is closed.
CL 8 According to the "Tool to calculate baseline, project and leakage emissions from electricity consumption", a 20% of technical and distribution losses should be considered for electricity consumption calculation.	B.6.7 – B.6.9	The Average Technical and Distribution Losses are included on the emission reduction calculations for project electricity consumption. Please check the emission reduction spreadsheets on CL 4 attached evidence.	DNV reviewed the emission reduction calculation spreadsheet /3/ and confirms that a 20% of technical and distribution losses were correctly considered for electricity consumption calculation. Therefore this CL is closed

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
No forward action request was identified.		

- o0o -

APPENDIX B

INITIAL VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	~~CAR 5~~	OK
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	~~CAR 5~~	OK
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	~~CAR 5~~	OK
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	~~CAR 5~~	OK
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Chile.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	CONAMA is the DNA of Chile and the Ministry of the Environment is the DNA of the Spain.

Requirement	Reference	Conclusion	Cross Reference / Comment
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Chile has ratified the Kyoto protocol on 26 August 2002. Spain ratified the Protocol on 31 May 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	Spain's assigned amount is 92% of the 1990 emissions level.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	CDM Modalities and Procedures §37f	OK	Table 2, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD of 23 February 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide

Requirement	Reference	Conclusion	Cross Reference / Comment
			comments during a 30 days period from 1 June 2007 to 2 July 2007. No comments were received.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The Huasco advanced waste management systems are located in the communities of Vallenar, Freirina and Huasco in the province of Huasco.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	Yes, the project system boundaries are restricted to the aerobic digestion in a activate sludge treatment system. The PDD considers two sources of leakage: the storage lagoon and land application of the treated manure. However, according to ACM0010, leakage covers only the emissions from land application of treated manure. In this case, the storage lagoon should be part of the project boundary, and its emissions should be considered as project emissions.	~~CAR 4~~	OK
A.2. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.2.1. Does the project design engineering reflect current	/1/	DR	Yes. The project design and engineering reflects		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
good practices?			good practice through the use of aerobic digestion in a activate sludge treatment system. Subsequent to aerobic treatment the residual liquid manure runs into a storage lagoon for irrigation purposes and composting. The activated-sludge process is an aerobic secondary treatment system with continuous flow that uses complex populations of aerobic micro-organisms to break down organic matter in wastewater.		
A.2.2. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	The project is unlikely to be replaced by other more efficient technologies, at least within the first seven year crediting period.		OK
A.2.3. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR	The authority and responsibility of project management and of monitoring procedures have not been identified. Procedures for training of monitoring personnel have not been identified. Procedures for emergency preparedness for cases where emergencies can cause unintended emissions have not been identified. Procedures for internal audits of GHG project compliance with operational requirements as applicable have not been identified. Procedures for project performance reviews have not been identified. Procedures for corrective actions have not been identified.	~~CL 20~~	OK
A.2.4. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	See A.2.3	~~CL 20~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	Agrocomercial submitted an Environmental Impact Assessment study to the National Commission for the Environment (CONAMA) that approved and authorized a complete agro industrial project scheme that include the construction of barns with advanced waste treatment systems, reducing potential impacts to the environment. No evidences of the Environment Impact Assessment and environmental licenses were provided.	~~CL 21~~	OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Chile and the DNA of Spain, including the confirmation that the project assists in achieving sustainable development	~~CAR 5~~	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	See A.3.2		
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is expected to bring improvement on sustainable development through improving the water quality as a resource for crops irrigation, reducing the odour, pathogen and vector control, and generating job opportunities for local residents.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved baseline methodology ACM0010 – "Consolidated baseline methodology for GHG emission reductions from manure management systems", Version 2 of 15 December 2006.		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR	This methodology is applicable to the project activity since the project is implemented at a swine farm operating in a competitive market, the project and the baseline scenario comply with all the environmental regulations of Chile, there is no discharge of wastewater streams to rivers and/or estuaries in the project or the baseline scenario, the anaerobic lagoon considered in the baseline scenario has a depth of 4.5 meters, the annual average temperature in the site is 17.96 ºC, the retention time of the manure in the anaerobic lagoon is greater than 1 month and finally, all the lagoons will have a non-permeable layer on the bottom. DNV requests a justification about the baseline applicability evidencing clearly how the depth of the anaerobic lagoon of 4.5 meters was determined and how the minimum retention time	~~CL 24~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			of the manure waste in the anaerobic treatment system more than 1 month was established.		
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	Yes.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	Yes. Based on an assessment of legal constrains, historical practice of manure management, investment and technology barriers, it has been established that treatment of swine manure in anaerobic lagoons is the most attractive course of action and the prevailing practice and therefore the baseline scenario.		OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Project specific financial data and circumstances for manure treatment have been considered.		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Yes. Compatible as per available data and based on IPCC default values.		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	Yes. See B.2.2		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/	DR	According to ACM0010, the baseline scenario and additionality shall be determined in four steps.	~~CL 9~~ ~~CL 10~~ ~~CL 11~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			(1) The following possible baseline scenarios have been discussed: Aerobic treatment, solid storage, liquid/slurry, uncovered anaerobic lagoon, pit storage and anaerobic digister. The dry lot system, deep bedding and composting have been excluded as it is not applicable to swine barns. Based on an assessment of legal constrains, historical practice of manure management and investment and technology barriers, it has been established that treatment of swine manure in anaerobic lagoons is the most attractive course of action and the prevailing practice and therefore the baseline scenario. The majority of the Chilean pork production industry use open lagoons for their swine manure treatment. While as per ACM0010, all possible baseline scenarios listed in the IPCC guidelines must be discussed and taken into account, it is seen that the scenarios "pasture/range/paddock", "daily spread" and "burning for fuel" have not been considered and discussed. DNV requests evidence that anaerobic lagoon is the common practice scenario in Chilean swine barns. (2) It has been demonstrated that the project faces investment barriers due to high investment costs and technology barriers due to the maintenance requirements involved with this technology. Moreover, it is demonstrated that the implementation of the project exceeds current Chilean regulations for swine waste	~~CL 29~~	

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			treatment and that the proposed manure treatment process is a highly advanced technology system. DNV requests more information about what kind of investment barriers occurred in Huasco project (3) Due to the non existence of positive cash flows, an economic analysis is carried on comparing the net present value (NPV) parameters, between project and baseline scenarios. The NPV of the project is far less attractive than the NPV of the baseline scenario. Please provide data that support the NPV comparison. (4) The project participant, at the renewal of each credit period, will take into account changes in the relevant national and/or sectoral regulations between two crediting periods as well as any increase in the animal stock above the pre-project animal stock. In conclusion, all arguments presented above are deemed sufficient to demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional. CDM benefits were considered since the conception of the project: in December 2000, Agrosuper initiated a voluntary process to implement advanced waste management systems in order to reduce GHG emissions into the atmosphere. During the following years, especially between 2004 and 2005, Agrosuper		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			successfully consummate several of these projects under the Clean Development Mechanism.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	No major risks are foreseen.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	IPCC guidelines and US-EPA are the sources.		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR	Yes, the starting date of the project is 19 May 2006, correspondent to the date it was sign the contract between Agrocomercial and ICAFAL in order to start the construction of the facilities, and it has a lifetime of 50 years.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	Yes, the project adopts a renewable crediting period of 7 years starting from 1 January 2012.		OK
D. Monitoring Plan *The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved monitoring methodology ACM0010 – "Consolidated baseline methodology for GHG emission		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			reductions from manure management systems", Version 2 of 15 December 2006.		
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	This methodology is applicable to the project activity since the project is implemented at a swine farm operating in a competitive market, the project and the baseline scenario comply with all the environmental regulations of Chile, there is no discharge of wastewater streams to rivers and/or estuaries in the project or the baseline scenario, the anaerobic lagoon considered in the baseline scenario has a depth of 4.5 meters, the annual average temperature in the site is 17.96 ºC, the retention time of the manure in the anaerobic lagoon is greater than 1 month and finally, all the lagoons will have a non-permeable layer on the bottom.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	Yes. The reduction of the volatile solids and nitrogen during a treatment stage is estimated based on reference data for different treatment types, is applied to determine the reduction of volatile solids and nitrogen during the first treatment stage (activated sludge treatment). Appropriate default values published by the IPCC will be applied for parameters such as the volatile solid excretion rate and nitrogen excretion per animal, which will be adjusted for actual animal weight, and the maximum methane potential, the methane conversion factor and the N_2O emission factor for each treatment stage.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	The monitoring plan comprises the monitoring of livestock population, the average weight and	~~CL 27~~ ~~CL 28~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			the electricity consumption. Electricity meters and the weighting systems will be calibrated periodically. QA/QC procedures have been established and seem reasonable. According to the PDD, the emission factor for project activity consumption (CEFd) will be monitored annually. It must be defined how this factor will be updated, once it was used the value of the latest Chilean PDD registered. It must be confirmed if the Chilean agroclimatic map is the official source to determine the average temperature at project site. ACM0010 states that the monitoring plan should include on-site inspections for each individual farm included in the project boundary. However, the PDD does not make any reference to this.	~~CL 19~~	
D.2. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	The formulae given in the approved methodology to determine emissions for every treatment stage in the baseline and project scenario are correctly applied. Details of the data to be collected, the frequency of data recording, its certainty and format, storage location and the responsibility for data collection and processing are clearly described.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	See D.2.1.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	See D.2.1.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	See D.2.1.		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	See D.2.1.		OK
D.3. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	Yes. Project CH_4 and N_2O leakage emissions are the emissions released during project activity from the land application of the treated manure. Baseline CH_4 and N_2O leakage emissions are the emissions released during the baseline scenario land application of the treated manure. CH_4 and N_2O leakage emissions are estimated as the net of those released under project activity and those released in the baseline scenario. The PDD considers two sources of leakage: the storage lagoon and land application of the treated manure. However, according to ACM0010, leakage covers only the emissions from land application of treated manure. In this case, the storage lagoon should be part of the project boundary, and its emissions should be considered as project emissions.	~~CAR 4~~	OK
D.3.2. Are the choices of leakage indicators reasonable?	/1/	DR	See D.3.1.		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	See D.3.1.		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	See D.3.1.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	The formulae given in the approved methodology to determine emissions for every treatment stage in the baseline and project scenario are correctly applied. Details of the data to be collected, the frequency of data recording, its certainty and format, storage location and the responsibility for data collection and processing are clearly described.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	See D.4.1		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	See D.4.1		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/	DR	See D.4.1		OK
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	The DNA of Chile and ACM0010 do not require monitoring of sustainable development indicators.		OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/	DR	See D.5.1		OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/	DR	See D.5.1		OK
D.5.4. Are the sustainable development indicators in line	/1/	DR	See D.5.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
with stated national priorities in the Host Country?					
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	The authority and responsibility of project management and of monitoring procedures have not been identified. Procedures for training of monitoring personnel have not been identified. Procedures for emergency preparedness for cases where emergencies can cause unintended emissions have not been identified. Procedures for internal audits of GHG project compliance with operational requirements as applicable have not been identified. Procedures for project performance reviews have not been identified. Procedures for corrective actions have not been identified.	~~CL 20~~	OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Yes. Electricity meters and the weighting systems will be calibrated periodically.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR	See D.6.1	~~CL 20~~	OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	See D.6.1	~~CL 20~~	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E. Calculation of GHG Emissions by Source *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.*					
E.1. Predicted Project GHG Emissions *The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	Yes CH4 and N2O emissions from the aerobic treatment system are considered. The PDD states that methane project emissions from sludge produced in the aerobic treatment are calculated only if the management of the sludge is anaerobic (sludge ponds). If the sludge is managed aerobically, PESL,y is considered to be zero. However, according to IPCC 2006, table 10.17, chapter 10, volume 4, Methane Conversion Factor (MCF) should be considered for composting systems, with values from 0.5% to 1.5% according to the temperature and the kind of composting system. Please demonstrate in equation 11 that there are no indirect N2O project emissions.	~~CAR 3 CL 15~~	OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	All calculations are transparently documented. DNV requests a spreadsheet with the calculation of emission reductions. Equation 7 is not identifying correctly the variable “project emissions from use of heat and/or electricity (PEelec/heat)”.	~~CL 12 CL 14~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	The selection of IPCC default values for VS, Bo and MCF for the different treatment stages is appropriate. It must be confirmed if the conditionings presented in ACM0010 for using developed countries VSLT,y values regarding genetics source of the livestock and the use of formulated feed rations are attended. It must be confirmed if project proponent data for estimating VS degradation factor and N degradation factor for aerobic treatment and storage lagoon are reasonable. Carbon emission factor for the SIC ("Sistema Interconectado Central") grid is obtained from the PDD "Nueva Aldea Biomass Power Plant Phase 2 (Nueva Aldea Power Plant Phase 2)" registered on June 2th, 2006 (methodology ACM0006). The grid emission factor used for calculation of leakages from energy consumption (0.469 tCO2eq/MWh), was calculated accordingly to ACM0002, as it is required in ACM0010. According to the PDD, the grid emission factor was taken from the latest Chilean PDD registered. It should be described how this emission factor was calculated, the version of ACM0002 used, as well as the values of the operating margin, the build margin and the lambda, if applicable. Please provide data about the equipment used in project activity that will consume 73 444 MWh/year.	~~CL 25~~ ~~CL 26~~ ~~CL 16~~ ~~CL 17~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	See E.1.1.		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	See E.1.1.		OK
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	Project CH_4 and N_2O leakage emissions are the emissions released during project activity from the land application of the treated manure. Baseline CH_4 and N_2O leakage emissions are the emissions released during the baseline scenario land application of the treated manure. CH_4 and N_2O leakage emissions are estimated as the net of those released under project activity and those released in the baseline scenario. The PDD considers two sources of leakage: the storage lagoon and land application of the treated manure. However, according to ACM0010, leakage covers only the emissions from land application of treated manure. In this case, the storage lagoon should be part of the project boundary, and its emissions should be considered as project emissions.	~~CAR 4~~	OK
E.2.2. Have these leakage effects been properly accounted for in calculations?	/1/	DR	See E.1.1		OK
E.2.3. Does the methodology for calculating leakage comply with existing good practice?	/1/	DR	See E.1.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.2.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	See E.1.1		OK
E.2.5. Have conservative assumptions been used when calculating leakage?	/1/	DR	See E.1.1		OK
E.2.6. Are uncertainties in the leakage estimates properly addressed?	/1/	DR	See E.1.1		OK
E.3. Baseline Emissions *The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	The baseline emissions are primarily the CH_4 and N_2O emissions from anaerobic lagoons, while for the project emissions, apart from the CH_4 and N_2O emissions of the activated sludge treatment system and the storage lagoon, leakage has also been considered. DNV requests an explanation about how the number of heads during the crediting period was estimated. The calculations presented in equation 24 are not correct, once that the relative reduction of nitrogen in the baseline is 60%, and not 20%.	~~CL 13~~ ~~CL 18~~	OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	Yes, and are restricted to on-site emissions only.		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes.		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	Yes. The boundary includes only the emission reductions from manure management techniques dealing with swine manure from a cluster of production units discharging manure to handling		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			systems.		
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	Yes.		OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	Yes.		OK
E.4. Emission Reductions Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	The project is forecasted to reduce CO_2 emissions to the extent of 5 817 463 tCO_2e (831 066 tCO_2e / year average) over the defined first renewable 7 years crediting period. The PDD should present the result of baseline emissions, project emissions, leakage emissions and emissions reductions for each individual AWMS.	~~CL 23~~	OK
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Agrocomercial submitted an Environmental Impact Assessment study to the National Commission for the Environment (CONAMA) that approved and authorized a complete agro industrial project scheme that include the construction of barns with advanced waste	~~CL 21~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			treatment systems, reducing potential impacts to the environment. No evidences of the Environment Impact Assessment and environmental licenses were provided.		
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	See F.1.1	~~CL 21~~	OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	None foreseen; the project activity minimizes the release of odours related to swine manure management, because organic matter is stabilized by forced aeration.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	None foreseen.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	No adverse impacts are foreseen from this project.		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	See F.1.2	~~CL 21~~	OK
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	Local stakeholders were primarily consulted through the process of the environmental impact assessments. In addition, the project was presented on Agrosuper's website and discussions about the project were carried out in seminars and workshops in Chile. In order to show their facilities and the technological improvements done in the last years, Agrosuper has a program in which invites the neighbouring		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			community of the Project areas to visit their plants. Given the limited social impacts of the project, the consultation of local stakeholders is deemed sufficient.		
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	See G.1.1		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	See G.1.1		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	No. DNV requests evidence of the stakeholders' invitation for comments, the comments received and the answers provided by the project proponent.	~~CL 22~~	OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	See G.1.4	~~CL 22~~	OK

Table 3 Resolution of Corrective Action and Clarification Requests

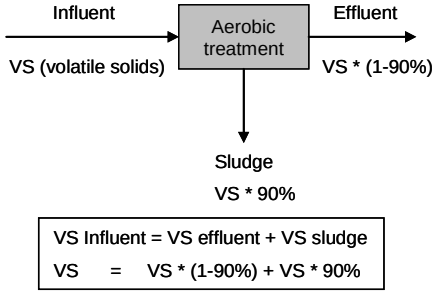
Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 3 The PDD states that methane project emissions from sludge produced in the aerobic treatment are calculated only if the management of the sludge is anaerobic (sludge ponds). If the sludge is managed aerobically, $PE_{SL,y}$ is considered to be zero. However, according to IPCC 2006, table 10.17, chapter 10, volume 4, Methane Conversion Factor (MCF) should be considered for composting systems, with values from 0.5% to 1.5% according to the temperature and the kind of composting system.	E.1.1	The methane project emissions from sludge disposed in a composting system will be accounted considering a MCF equal to 1%, according to IPCC 2006, table 10.17, chapter 10, volume 4, for Composting – passive windrow and a temperature of 17.96 ºC (conditions for Huasco project). The annual methane emissions from composting installations, ad up to 12 953 tCO_2/year at full project capacity and will be added to the leakage emissions in the CERs calculation sheets.	The revised PDD considers the methane project emissions from the sludge submitted to composting. Therefore this CAR is closed.
CAR 4 The PDD considers two sources of leakage: the storage lagoon and land application of the treated manure. However, according to ACM0010, leakage covers only the emissions from land application of treated manure. In this case, the storage lagoon should be part of the project boundary, and its emissions should be considered as project emissions.	A.1.2 D.3.1 E.2.1	As in ACM0010, the project boundary is to be defined by the project proponent and "The project proponents will provide a clear diagrammatic representation of the project scenario with all the treatment steps adopted in treating the manure waste as its final disposal in the CDM-PDD". Since the project activity considers a new treatment system for manure, storage lagoons remain as a part of the irrigation management system outside the project boundary. From the authorities point of view, storage is part of the "manure application plan" (Plan de aplicación de purine, PAP), which considers the criteria to establish and calculate the needs for storage and land application surface. This application plan, must also be approved by the "Agricultural and Animal Production Service" (Servicio	Project CH_4 and N_2O leakage emissions are the emissions released during project activity from the storage lagoon and the land application of the treated manure. Baseline CH_4 and N_2O leakage emissions are the emissions released during the baseline scenario land application of the treated manure. CH_4 and N_2O leakage emissions are estimated as the net of those released under project activity and those released in the baseline scenario. Therefore this CAR is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Agrícola y Ganadero, SAG). Therefore the storage lagoons are to be considered outside the project boundary and its emissions also considered, but as leakages, as established in ACM0010.	
CAR 5 The Letters of Approval from Chile and Spain have not been provided.	A.3.2	----	CAR closed and re-opened as "CAR 2" in the new validation protocol.
CL 9 While as per ACM0010, all possible baseline scenarios listed in the IPCC guidelines must be discussed and taken into account, it is seen that the scenarios "pasture/range/paddock", "daily spread" and "burning for fuel" have not been considered and discussed.	B.2.7	Pasture/Range/Paddock: This kind of system is not applicable because Agrosuper`s swine production is large and managed under confined conditions, to achieve the high productivity standards and production levels, intensive and confined animal production is aimed to. There is few extensive swine production in Chile but certainly it is not possible to reach such big productivity with pasture systems. Finally, surface density would require a huge surface of land to allow the same amount of swine to be raised. The environmental assessments have been presented and approved under confined and intensive production standards. Daily spread: This kind of system is not applicable because swine population is large and managed under confined conditions. Therefore, large quantity of manure is produced in the barns and cannot be daily spread to land, but must be treated and stored.	DNV acknowledges that the scenarios "pasture/range/paddock", "daily spread" and "burned for fuel" are not applicable for this kind of swine production. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		In addition, since the manure management system is based on daily washing systems with water, storage lagoons are required for as part of the land application management. Burned for fuel: This kind of system is not applicable, since the washing systems in the barns use water to flush the swine manure, which is pumped into pits and to the wastewater treatment systems. The liquid manure is mainly water, therefore the calorific value is low compared to other fuels. Therefore, it is not preferable to use the liquid manure as fuel for energetic purposes. Finally, "burned for fuel systems" may mainly be used for cattle and dairy stock in paddocks, where manure dries exposed to wind and sun in dry climate areas.	
CL 10 DNV requests evidence that anaerobic lagoon is the common practice scenario in Chilean swine barns.	B.2.7	In Chile, 90% of the swine production is subscribed to the Clean Development Agreement, which is represented by 40 companies out of 50. The PDD establishes that approximately 50% of the companies in Chile have introduced the open lagoon system, in the context of the Clean Development Agreement. The rest of the companies have land application as a prevailing waste management practice, considering in some cases an inefficient previous solids separation. There are no official records to quantify accurately the distribution of waste management	The Clean Development Agreement clearly establishes the requirements of AWMS. It was also evidenced in CONAMA's website that the projects that have undergone environmental impact assessment in the past were approved with anaerobic lagoon systems. Therefore this CL is closed.

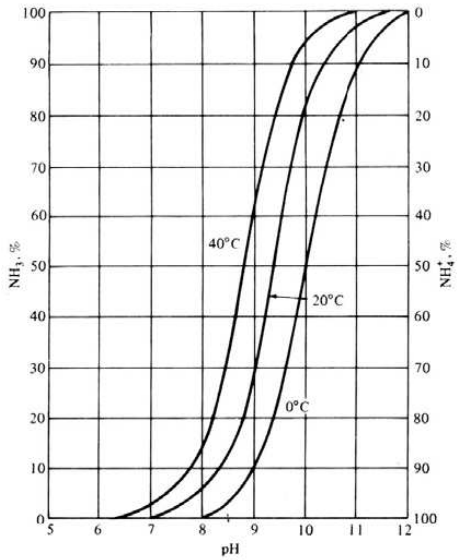
Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		practices, but Agrocomercial AS Ltda. could arrange an interview with the general manager of the Swine producing association (ASPROCER) to confirm this statement. Additionally, all projects, that have undergone environmental impact assessment in the past, were approved with anaerobic lagoon systems. This is reinforced with the signature of the second version of the Clean Development Agreement which requires swine producers to count with lagoons and stop any discharge into open fresh water bodies (enforcement of the DS90 Regulation, that establish the discharge standards for existing sources into any surface water bodies).	
CL 11 Please provide data that support the NPV comparison.	B.2.7	Attached is the Economic Evaluation Excel sheet which supports the NPV comparison. DNV is requested to maintain strict confidentiality regarding this information, since confidentiality agreements and design know how is related to this information.	The investment analysis for 10 years was provided in a spreadsheet /4/. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project NPV (-USD 13 646 239) is much more negative than the baseline NPV (-USD 3 337 859), which is quite reasonable considering that the investments required to install an anaerobic lagoon are much lower that the investments required to implement a project consisting of a digester and an activated sludge treatment. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 12 DNV requests a spreadsheet with the calculation of emission reductions.	E.1.2	Attached is the Emission Reduction Excel sheet. The project proponent considers that using 90% in the calculation of project CH4 leakage emissions from composted sludge is correct. In the calculations it is considered a 90% of volatile solids removal for the aerobic treatment. Aerobic treatment considers that volatile solids are transformed into treated water and biomass. This is different than anaerobic treatment where volatile solids are transformed into biogas, thus annex 1 from ACM0010 must be applied. The effluent has a volatile solids content equal to (1-90%) of the influent volatile solids. Therefore, the volatile solids content of the sludge is 90% of the influent volatile solids. The following figure shows a mass balance for the aerobic treatment stage that illustrates the explanation given.	The following mistake was identified in the calculations: 1) Both in the PDD and the spreadsheet, the calculation of project CH_4 leakage emissions from composted sludge utilizes a factor of 90% instead of (1-90%). Therefore this CL remains opened. OK, the calculation of project CH_4 leakage emissions from composted sludge was clarified. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		 Then, VS*90% represents the sludge composted.	
CL 13 DNV requests an explanation about how the number of heads during the crediting period was estimated.	E.3.1	Huasco is a large scale project that considers an important investment and an important number of swine heads. Considering the size of the Huasco project breeding and market swine barns will be built and loaded gradually. The investment plan considers 150 000 breeding swine and all their progeny (1 488 902 market swine) for the complete project. The progeny is calculated considering the average amount of piglets per sow a year. According to the investment plan, the wastewater treatment systems will be implemented according to the amount of breeding and market swine population in the barns. The wastewater treatment plants will startup with a fraction of the total design flow, which will increase regularly to achieve total treatment design capacity. This procedure is based on load to be in	It was clarified that the number of heads was estimated based in the investment plan and an accelerated grow rate. DNV considers this approach reasonable. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		accordance with design and design yields will be accomplished. The number of heads during the crediting period has been estimated taking into account an accelerated grow rate, in order to reach the maximum production at the fourth year. Therefore, it has been established a load program, that considers 30 000 breeding swine heads and all their progeny (297 780 market swine) for the first year. In the same way, for the second, third and fourth year the load program considers 80 000, 120 000 and 150 000 breeding swine heads respectively and their own progeny. Then, in the fourth year is reached the maximum number of heads for breeding and market swine during the crediting period. For the next years of the crediting period it is considered the maximum number of heads for breeding and market swine. For ex-post calculations, the grow rate of swine heads will be flexible, therefore, the ex-post number of heads for each year of the crediting year could be different from the values presented in the PDD.	
CL 14 Equation 7 is not identifying correctly the variable "project emissions from use of heat and/or electricity ($PE_{elec/heat}$)".	E.1.2	In the equation 7, there is a typing error. In the equation it is typed "BEelec/heat" instead of "PEelec/heat".	The revised PDD corrected the equation. Therefore this CL is closed.
CL 15 Please demonstrate in equation 11 that there are no indirect N_2O project emissions.	E.1.1	The mechanism of nitrogen removal in the activated sludge is a biological process named nitrification- denitrification.	The 2006 IPCC guidelines describe direct and indirect N_2O emissions as follows: Direct N_2O emissions occur via combined

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		For wastewater, the nitrogen is usually measured as the Total Kjehldahl Nitrogen (TKN). This includes organic and ammoniac nitrogen and excludes nitrite and nitrate. For the raw manure, TKN represents almost all the nitrogen content, because there aren't nitrites and nitrates, as the result of the non presence of oxygen in the manure. The ammoniac nitrogen oxidizes through the nitrification to nitrites and then to nitrates. The main product of the reactions is the nitrate. The equations for this process are: $NH_4^+ + \frac{3}{2}O_2 \rightarrow NO_2 + 2H^+ + H_2O$ Nitritation $NO_2^- + \frac{1}{2}O_2 \rightarrow NO_3$ Nitratation The nitrates generated can be converted to nitrogen gas, through the denitrification reaction of the nitrates by the biomass at the anoxic zone. In case of recirculation of manure between the aerobic and the anoxic zone, the denitrification is almost complete. The main reaction for the denitrification process is: $6NO_3^- + 5CH_3OH \rightarrow 5CO_2 + 3N_2 + 7H_2$ Denitrification	nitrification and denitrification of nitrogen contained in the manure. Indirect emissions result from volatile nitrogen losses that occur primarily in the forms of ammonia and NO_x. Direct and indirect N_2O emissions have to be determined for both the project and the baseline using the equations presented in ACM0010. It is necessary to justify that either $EF_{N20,ID,j}$ or F_{gasm} is zero. Therefore this CL remains open.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		The level of dissolved oxygen and the quantity of organic matter in the aeration lagoon guarantee these reactions occur in the system. In the nitrification process the main part of the NH_4^+ is transformed to NO_2^- and then to NO_3^-. The non reacted NH_4^+ remains in equilibrium with NH_3 according to the temperature and pH. The following figure shows the equilibrium isotherms for NH_4^- /NH_3.  Reference: Peavy, H.S., Rowe, D.R., Tchobanoglous G. (1986)	

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Environmental Engineering. Mcgraw-Hill The expected pH for Huasco activated sludge system is approximately 7, similar condition found in other activated sludge systems of Agrosuper as Ramirana and Peralillo. The annual average temperature for Huasco site is greater than Ramirana and Peralillo, then the expected activated sludge temperature for Huasco is greater than Ramirana (18.7 ºC) and Peralillo (19.2 ºC). Then for the expected conditions of Huasco, the equilibrium is displaces totally to the NH_4^+, therefore there is not volatilization of NH_3 in the activated sludge stage. The species NO_2^- (nitrite) and NO_3^- (nitrate) generated in the process are ionic compounds, therefore are totally soluble in water and they are only present in aqueous phase. In the anoxic stage, were there is no presence or injection of oxygen, microorganisms consume the oxygen from the NO_2^- and NO_3^- generating only N_2 (gaseous nitrogen). The ionic nitrites and nitrates have an oxidation state **different** than the NO_x gaseous compounds (nitrogen oxides). The generation of gaseous nitrogen oxides from ionic nitrites and nitrates is not possible. NO_x gaseous	

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		compounds are generated in combustion processes, where N_2 reacts with oxygen at high temperature conditions (Reference: Castells, X.E. *Tratamiento y valorización energética de los residuos* (2005) Ediciones Díaz de Santos, page 233). Then there is no generation of NO_x gaseous compounds in the activated sludge process. Because of the nitrification-denitrification process, there isn't volatilization of NH3 and NOx, therefore, there aren't indirect N2O emissions from the atmospheric deposition of nitrogen on soils and surfaces.	The justification giver for Fgasm to be zero is reasonable. Therefore this CL is closed.
CL 16 According to the PDD, the grid emission factor was taken from the latest Chilean PDD registered. It should be described how this emission factor was calculated, the version of ACM0002 used, as well as the values of the operating margin, the build margin and the lambda, if applicable.	E.1.3	The emission factor was calculated using ACM0002 version 5. Within the SIC system, over 60% of the energy produced corresponds to hydro-generated energy. To account for this large portion of low-cost / must run resources, the Project Developer chose to determine the CO2 emission factor by calculating the Operating and Build Margin coefficients of the SIC grid and estimate the Combined Margin emission factor. The Operating Margin was calculated using method (b) described in ACM0002. The Build Margin was calculated taking	ACM0010 states that "Use the latest approved version of ACM0002 to calculate the grid emission factor". The latest approved version of ACM0002 is version 6, and the emission factor was calculated using ACM0002 version 5. Therefore this CL remains open.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		into account the 20% of the total generation in 2006. The Generation was obtained directly from the CDEC-SIC. The Plant emission factors for the operating units in the SIC was calculated using information obtained directly from the CDEC-SIC and the Power Plants themselves (the power plant owner's web page). In the few cases that the information was not available, the calculation used the default IPCC values from the IPCC 1996 Revised Guidelines and the IPCC Good Practice Guidance. The calculation was done using data for year 2006. The estimated operating margin is 0.689 tCO2/MWh and the build margin is 0.249 tCO2/MWh. Then, assuming the default values (0.5) for the weights established in ACM0002, it is possible to calculate the Combined Margin emission factor: $EF = 0.5 \cdot 0.689 + 0.5 \cdot 0.249 = 0.469 tCO_2$ The lambda used in the Operating Margin calculation was obtained from the load curve for the SIC for the year 2006. The lambda obtained is 0.001. A comment is put into the PDD, regarding that according to ACM0002 an ex ante value is used and therefore annual monitoring is not applicable.	Last version of ACM0002 is used to

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		The grid emission factor has been updated using ACM0002 version 6. The Project Developer chose to determine the CO_2 emission factor by calculating the Operating and Build Margin coefficients of the SIC (Central Interconnected System of the Republic of Chile) grid and estimate the Combined Margin emission factor. The Operating Margin was calculated using method (b) described in ACM0002. The Build Margin was calculated taking into account the 20% of the total generation in 2005. The Generation was obtained directly from the CDEC-SIC. The data correspond to the Central Interconnected System of the Republic of Chile (SIC), where the project activity is located. The simple adjusted operating margin was calculated for the most recent three years for which data were available: 2003, 2004, and 2005. The build margin was calculated using data for 2005. The emission factor is determined ex-ante and kept fixed for the first crediting period, as allowed by ACM0002. The estimated operating margin is 0.608 tCO_2/MWh and the build margin is 0.207 tCO_2/MWh. Then, assuming the default	calculate the grid emission factor. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		values (0.5) for the weights established in ACM0002, it is possible to calculate the Combined Margin emission factor: $EF = 0.5 \cdot 0.608 + 0.5 \cdot 0.207 = 0.408 tCO_2$ The lambda used in the Operating Margin calculation was obtained from the load curve for the SIC for the years 2003, 2004 and 2005. The lambdas obtained are 0.0014, 0.0008 and 0.0024 for the years 2003, 2004 and 2005 respectively.	
CL 17 Please provide data about the equipment used in project activity that will consume 73 444 MWh/year..	E.1.3	Attached is a detailed list of the equipment and the installed power for breeding and market AWMS.	During the site visit DNV reviewed the list of equipment and considers the installed power estimate reasonable. Therefore this CL is closed.
CL 18 The calculations presented in equation 24 are not correct, once that the relative reduction of nitrogen in the baseline is 60%, and not 20%.	E.3.1	In the calculation presented in equation 24 there is a typing error. The leakage calculated is correct, it was estimated using a relative reduction of nitrogen of 60%, although the calculation presented shows a reduction of 20%.	The equation was corrected in the revised PDD. Therefore this CL is closed.
CL 19 ACM0010 states that the monitoring plan should include on-site inspections for each individual farm included in the project boundary. However, the PDD does not make any reference to this.	D.1.4	The following paragraph will be included in the PDD. The monitoring plan includes on sites inspections for each individual farm included in the project boundary.	The revised PDD considers on site inspections for each individual farm. Therefore this CL is closed.
CL 20 The authority and responsibility of project management and of monitoring procedures have not been identified.	A.2.3 A.2.4 D.6.1 to D.6.13	Agrocomercial is working in the implementation of an integrated management system to be certified under ISO 9001:2000 and ISO 14001:2004, in the	It was confirmed that Agrocomercial is certified under ISO 9001:2000 and ISO 14001:2004. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
Procedures for training of monitoring personnel have not been identified. Procedures for emergency preparedness for cases where emergencies can cause unintended emissions have not been identified. Procedures for internal audits of GHG project compliance with operational requirements as applicable have not been identified. Procedures for project performance reviews have not been identified. Procedures for corrective actions have not been identified.		same way, the projects in the central zone of Chile are certified. Therefore the indicated procedures will be part of the environmental management system.	
CL 21 No evidences of the Environment Impact Assessment and environmental licenses were provided.	A.3.1 F.1.1 F.1.2 F.1.6	Please find attached several EIA documents. The project was approved by the following resolution: resolution Nº03/2006 of the Regional Commission for the Environment (III Region).	Agrocomercial submitted an Environmental Impact Assessment study to the National Commission for the Environment (CONAMA) that approved and authorized a complete agro industrial project scheme that include the construction of barns with advanced waste treatment systems, reducing potential impacts to the environment /6/. Therefore this CL is closed.
CL 22 DNV requests evidence of the stakeholders' invitation for comments, the comments received and the answers provided by the project proponent.	G.1.4 G.1.5	In Chile, the stakeholders invitation for comments is mandatory for an Environmental Impact Assessment Study. For the Huasco project, during this process it was stated that the project was being developed within the Clean Development Mechanism framework and the Kyoto Protocol. As result of this process, no stakeholder comment regarding Climate Change or GHG emissions were received.	All stakeholders' consultation process is clearly described in the EIA. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Several stakeholder presentations were held during the environmental impact assessment and are stated in the attached Resolution Nº03/2006.	
CL 23 The PDD should present the result of baseline emissions, project emissions, leakage emissions and emissions reductions for each individual AWMS.	E.4.1	The baseline emissions, project emissions leakage emissions and emission reduction for each individual AWMS will be incorporated in the PDD.	The revised PDD presents all emissions information for each individual AWMS. Therefore this CL is closed.
CL 24 DNV requests a justification about the baseline applicability evidencing clearly how the depth of the anaerobic lagoon of 4.5 meters was determined and how the minimum retention time of the manure waste in the anaerobic treatment system more than 1 month was established.	B.1.2	The anaerobic lagoons were designed in order to represent the baseline of the project and were designed with the purpose of receiving all manure from the barns that feed a single manure management system. Traditionally, all lagoons were designed with a 5 meter total depth, where 4.5 meters useful depth is considered. As shown during the audit, lagoon volumes result in retention times for each project of over 5 months.	The baseline lagoon design /7/ clearly confirms the 4.5 m depth of the anaerobic lagoon. Therefore this CL is closed.
CL 25 It must be confirmed if the conditionings presented in ACM0010 for using developed countries $VS_{LT,y}$ values regarding genetics source of the livestock and the use of formulated feed rations are attended.	E.1.3	The following justification will be included in the PDD. There are no site-specific measured data or regional or national data for representing volatile solids values. It is also costly to measure volatile solids because there are several inlets to the wastewater treatment processes. The IPCC default values of volatile solids content in raw manure for developed countries are representative for Agrosuper farms due to the following reasons: a) The genetic source of the production operations livestock originate from	The proposed justification was included in the revised PDD. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Canadian genetic roots for high production standards. b) The project specific average swine weights are more similar to developed country IPCC default values. c) Diets in the project are similar to diets in developed countries. Farm use formulated feed rations (FFR) are optimized to maximize production and minimize costs for the various animal(s), stage of growth, category, weight gain/productivity and/or genetics, using a special software named PRILL, massively recognized in the swine production industry.	
CL 26 It must be confirmed if project proponent data for estimating VS degradation factor and N degradation factor for aerobic treatment and storage lagoon are reasonable.	E.1.3	The activated sludge plants of Huasco project are designed to reach a VS removal level and N removal level over 95%, according to the mass balances. These removal rates are guaranteed by a contract between Agrocomerical AS and the technology supplier. Therefore, the VS degradation factor and N degradation factor applied for the aerobic treatment are reasonable. For the storage lagoon, the VS degradation factor and N degradation factor chosen are lower than a typical open pond according US-EPA 2001, table 8-10, chapter 8, in order to take into account that the influent of the storage lagoon has low content of volatile solids and nitrogen.	During the validation process DNV could confirm that the VS and N degradation factor on this system will be similar to similar systems already in operation in Agrosuper, like La Estrella plant (UNFCCC ref number 0033).. Therefore this CL is closed.
CL 27	D.1.4	According to ACM0002 an ex ante value	The revised PDD establishes an *ex ante*

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
According to the PDD, the emission factor for project activity consumption (CEF_d) will be monitored annually. It must be defined how this factor will be updated, once it was used the value of the latest Chilean PDD registered.		can be used and will be considered as shown in the clarifications before. It will be included in point B.6.2 of the PDD.	value for CEF_d. Therefore this CL is closed.
CL 28 It must be confirmed if the Chilean agroclimatic map is the official source to determine the average temperature at project site.	D.1.4	The Chilean agroclimatic map is one official source to determine the average temperature at project site. It was developed by the INIA (Instituto de Investigaciones Agropecuarias) and it has an extended climate classification and specific information for each location.	It was confirmed the appropriate use of the Chilean agroclimatic map. Therefore this CL is closed.
CL 29 DNV requests more information about what kind of investment barriers occurred in Huasco project	B.2.7	The investment barriers identified in Huasco project are the economic/financial barriers from the Investment analysis. The aerobic manure treatment process is one of the most advanced technology systems in the world and the investment costs involved are higher compared to other available systems. The net present value (NPV) of the aerobic treatment investment is much more negative than the NPV of an anaerobic lagoon investment (baseline), and then the most economically attractive course of action for Agrocomercial is the baseline. There are no more investment barriers than the economic/financial barriers.	Once all investment was done with Agrocomercial's own resources, investments barriers are no longer claimed in PDD version 2. Therefore this CL is closed.

o0o -

APPENDIX C

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Felipe Lacerda Antunes *holds a Master's Degree in Production Engineering (Quality) and a Post Graduate Diploma in Environmental Management and Industrial Waste Management and Treatment. Possesses an International experience of more than 10 years in the field of quality and environmental auditing, working two years as the responsible of the QMS of Rede Metrológica RS and since 1999 as a QMS and EMS auditor in DNV.*
He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both in South America & abroad. He has also been actively involved in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 10 years in DNV.
His qualification and experience in CDM demonstrate him sufficient sectoral competence in energy generation from renewable energy sources, waste handling and disposal, and animal waste management.

Luis Filipe Tavares *holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering. Having an overall experience of thirty tree years.*
Prior to joining DNV having around twenty tree years experience in integrated steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping) and production (coke oven, sinter and blast funaces laboratories).
His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control.
He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.
He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.
His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Andrea Leiroz *holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering having an overall experience of around thirteen years.*
She has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in Brazil & abroad.
Her qualification, experience in CDM demonstrates her sufficient sectoral competence in Energy Generation from renewable energy sources, Waste handling and disposal and Animal waste management.

Hendrik Brinks *holds a Master Degree in Inorganic Chemistry & Material Science and a Dr. Scient Degree in Inorganic Chemistry & Material Science. He has an overall experience of around 16 years. Prior to joining DNV, he has 7 years of working experience at a research*

institute by scientific research on future energy systems with hydrogen as an energy carrier and project management for monitoring system design. He has published >50 papers in international journals with peer reviews. His experience also covers teaching and research at University of Oslo, Norway.

He has 4 years extensive experience in validation and verification of >400 CDM projects worldwide and also experience from other 3rd party validation/verification schemes. Quality Manager Hendrik W. Brinks is the service line responsible for CDM in DNV and is qualified for approval of CDM projects. He has previously worked as Technical Director for CDM.

His qualification and experience in CDM demonstrate his sufficient sectoral competence in "Waste Handling and Disposal" and quality control (technical review) competence for projects within renewable energy, biomass power, waste heat recovery, energy efficiency, waste handling, wastewater, coal mine methane, transport, charcoal and flare reduction.