VALIDATION REPORT

ONYX LANDFILL GAS RECOVERY PROJECT – TRÉMEMBÉ, BRAZIL

REPORT NO. 2004-1373

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DET NORSKE VERITAS

VALIDATION REPORT

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Approved by: Einar Telnes Technical Director	Organisational unit: DNV Certification, International Climate Change Services
Client: Onyx	Client ref.: Lionel Bondois

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DNV Certification

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:
DNV has performed a validation of the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil" on the basis of UNFCCC and Brazilian criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities.
The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.
In summary, it is DNV's opinion that the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil", as described in the project desing document of October 2004, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0011. Hence, DNV will requests the registration of the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil" as CDM project activity, once the written approval by the DNA of Brazil, including a confirmation that the project assists in achieving sustainable development, has been received.

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Work carried out by: Susanne Haefeli, Filipe Tavares	
Work verified by: Einar Telnes	
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Abbreviations

ABETRE	Brazilian Association of Residue Treatment Facilities
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CETESB	Company of Environmental Sanitation Technology
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill gas
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change

1 INTRODUCTION

Onyx has commissioned DNV Certification (hereafter DNV) to validate the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil" (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for small-scale CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consisted of the following personnel:

Ms Susanne Haefeli	DNV Certification Oslo, Norway	Team Leader, GHG auditor
Mr Filipe Tavares	DNV Certification Sao Paulo	GHG auditor, waste sector expert
Mr Einar Telnes	DNV Certification Oslo, Norway	Internal verifier

1.1 Validation 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 compliance with relevant UNFCCC and host Party 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).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against Kyoto Protocol criteria for the CDM, the CDM rules and modalities as agreed in the Marrakech Accords and relevant decisions by the CDM Executive Board (including the approved methodology used by the project). The validation team has, based on the recommendations in the Validation and Verification Manual /5/ employed a risk-based approach, focusing on the identification of significant risks for project registration, implementation and the generation of CERs.

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

1.3 Description of Proposed CDM Project

The landfill is located in the City of Tremembé – Sao Paulo – Brazil. It is operated by Onyx's Brazilian subsidiary SASA. The landfill is divided in two disposal areas. The existing area (Aterro 1) has a capacity of 850 000 m^3 and is no longer used for waste disposal. A new area (Aterro 3) will have a total capacity of 1 700 000 m^3 and will receive approximately 180 000 tonnes/yr of municipal and commercial waste. The new area will be filled in 4 phases until 2012.

The proposed CDM project consists of the:

- Installation of a landfill gas recovery network over the future disposal areas of the site
- Optimisation of the landfill gas extraction system
- Drilling of additional extraction wells, interconnection of horizontal drains
- Increased flaring capacity of landfill gas (LFG)

- Increased capacity in the leachate evaporation process
- Feasibility study to evaluate a possible project extension to export electricity to the electrical grid.

The recovered LFG will mainly be used onsite for evaporation of wastewater from the landfill (leachate). At a later stage, some electricity may be generated with the LFG, although the generated electricity will be used only for onsite usage. This has not been taken into account for the proposed CDM project activity.

Construction of the project started in December 2000 and included the installation of a piping network to connect the existing vents at Aterro 1. The construction was finished in March 2001 with the commissioning of the evaporator and flare in March 2001.

2 METHODOLOGY

The validation consists of the following three phases:

I a desk review of the project design and the baseline and monitoring methodology
II follow-up interviews with project stakeholders and assessment of operational conditions
III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /5/. The protocol shows in transparent manner 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 three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil" is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective Action Requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;
ii) validation protocol requirements have not been met; or
iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	***Reference***	***Conclusion***	***Cross reference***
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**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*	*Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.*

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***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 seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below).A request for **Clarification (CL)** is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 2***	***Summary of project participants' response***	***Validation conclusion***
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.*	*The responses given by the the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

2.1 Review of Documents

The following project design documentation and additional background documents related to the project design and baseline were reviewed by DNV:

- PDD for the Onyx Landfill Gas Recovery Project – Trémembé, Brazil, Version of August 2004 and October 2004 /1/, including the following annexes:
    - Letters from the environmental regulator CETESB, dated 3 January 2002
    - Letter from the association of residue treatment facilities ABETRE, dated 10 July 2003
    - Extract of "2000 Vivendi Environmental report" and "2001 Onyx Environmental Report"
    - Permit to operate, issued by CETESB
- Leachate treatment cost comparison between on-site and off-site solution /4/
- ISO 14 001 Certificate for the landfill site

2.2 Follow-up Interviews

During May – November 2004, DNV performed interviews with representatives of Onyx and SASA to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Onyx Lionel Bondois and Gary Crawford	➢ Baseline assumptions ➢ Project additionality
SASA Breno Caleiro	➢ Local stakeholder consultation process ➢ Monitoring and project management issues

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified for DNV's conclusion on the validation. The initial concerns raised by DNV were resolved during communications with Onyx and SASA.

Since modifications to the project design were necessary to resolve DNV's concerns, Onyx decided to revise the PDD of August 2004 and resubmitted a revised PDD in October 2004. The revised PDD addresses all concerns raised by DNV.

3 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 revised and resubmitted PDD of October 2004.

3.1 Participation Requirements

The project participants are Onxy of France, SASA of Brazil and SenterNovem acting on behalf of the Government of the Netherlands. The participating Parties are Brazil as the host Party and the Netherlands as Annex I Party. Brazil and the Netherlands meets all relevant participation requirements. The DNA of the Netherlands approved the project on 13 March 2003. The DNA of Brazil approved the project on 19 April 2004.

3.2 Project Design

The project design reflects current good practice. The landfill gas collection system consists of:

- vertical wells, progressive and after disposal of waste is finished
- horizontal drains
- collection piping
- leachate evaporator –("EVAP"), using landfill gas as a fuel/ heat source to evaporate leachate
- landfill gas flare
- controls for the evaporator and the flare
- blower
- Diesel generator

By implementing these technology approaches at the SASA Landfill Site, Onyx has transferred its technological know-how to the SASA team who installed and operates the system. Several training programs have been provided to the local staff to transfer this know-how.

The contribution to Brazil's *sustainable development* consists in the following:

Environmental:

- Reduction of GHGs from the landfill
- On-site treatment of leachate
- Reduction of VOCs and odours from the landfill
- Increase of safety and better risk management for the landfill
- Final cover system including revegetation and reforestation as each disposal area is completed
- In addition, as part of the landfill development plans approximately 150,000 trees will be planted in "green buffer" area around the site.

Social contribution:

- Job creation
- Technology transfer

The DNA of Brazil confirmed that the project assists in achieving sustainable development.

3.3 Project baseline and additionality

The project applies the approved baseline methodology AM0011 "landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario". The baseline methodology was designed specifically for landfill gas recovery projects where the baseline is atmospheric release of LFG, there are no regulations governing flaring and/or combustion of landfill gas and the captured gas is used to evaporate leachate and/or is flared.

The additionally is assessed in 4 steps, including qualitative baseline scenario discussions, an IRR assessment and a barrier test. It has been clearly explained and confirmed by letters from CETESB, the waste regulatory body in Brazil, that waste treatment in Brazil is more concerned with other environmental impacts, such as odour and leachate treatment, and LFG recovery beyond periodical venting of LFG is not common practise.

More specifically, step 1 assesses the legal requirements related to the landfill gas emissions. Onyx clearly presents the case that Brazil does not require any kind of landfill gas flaring or utilization. This has been confirmed by the validation team.

Step 2 assesses alternative economically attractive scenarios. Again, Onyx assesses in a complete and logical way the scenario:

- without recovery,
- the one where leachate is processed at a local waste water treatment facility, and
- the project scenario.

As a consequence of DNV's investigation, it has been confirmed that no other scenarios are realistic, hence the baseline scenario is confirmed to be venting of landfill gas for safety reasons.

Step 3 asks for a barrier and common practice test in case the proposed CDM project activity has a higher IRR than one of the other scenarios. This step does not apply to this project, as it has been confirmed that the project scenario does not have a higher IRR than the identified baseline scenario alternatives. It has been clearly demonstrated that the investment costs for the onsite leachate treatment outweigh the cost savings due to the fact that leachate does not need to be processed off-site.

Step 4 is an extra step on the credibility of the baseline, to be assessed by the DOE. This has been done by DNV's landfill expert in Brazil. It is confirmed that the venting of the landfill gas for safety reasons only is a credible baseline scenario.

In summary, it can be concluded that the project baseline is sound and the project is generating real, additional, measurable emission reductions and therefore has a long-term benefit for climate change mitigation.

3.4 Monitoring Plan

The project applies the approved monitoring methodology AM0011 "Landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario". Although the methodology mentions electric generation, the project doesn't include it yet. The emission reduction can be measured directly through the amount and composition of landfill gas flowing in the leachate evaporator and the flare. The monitoring plan provides 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.

AM0011 – as opposed to AMC0001 – does not require the inclusion in the project emissions of CO_2 emissions resulting from combustion of other fuels used to run the capture equipment. Therefore, DNV has not requested the deduction of these emissions from the generated emission reductions. This is deemed acceptable for at least 2 reasons:

- these amounts are supposedly insignificant compared to the emission reductions, and
- the project does in return not claim emission reductions from the elimination of leachate transportation, as leachate does not need transport to a local wastewater treatment plant for disposal via tanker trucks anymore.

The authority for monitoring and reporting was identified by a flowchart indicating Technician and SASA Site Management. Calibration of monitoring equipment will be according suppliers instructions. Detailed monitoring and project management procedures are contained in the site's operation manual. The landfill site detains an ISO 14 001 Certificate.

3.5 Calculation of GHG Emissions

The project boundaries include the emission reductions due to the evaporator and flare activity. Not included – and in line with AM0011 – are:

- The emission reductions due to non-transport of the leachate to the local water treatment facility: this is conservative
- The emissions from the waste transport to the site: they occur both in the baseline and project scenario
- The emissions from energy consumption to run the capture and utilization equipment: These are assumed to be minimal.

The emissions from the landfill have been calculated using the First Order Decay model. The formulas used are correct and the assumptions made for estimating GHG emission reductions are sound and transparent.

3.6 Environmental Impacts

The environmental impacts of the project have been analysed and are – other than the increased nuisance during the construction phase – only positive. The capture and destruction of LFG does not need a complete Environmental Impact Assessment in Brazil and the Operating Licence issued by CETESB every 6 months (last issued on July 22, 2004) covers the proposed project activity.

3.7 Comments by Local Stakeholders

Paragraph II of Resolution Nr. 1 detailing the Brazilian host country requirements and – more specifically – the stakeholder consultation modalities and procedures details that the project developer needs to invite comments from the following stakeholders:

- City hall and City councils

- State and Municipal Environmental agencies

- Brazilian forum of NGOs

- Community associations

- District attorney

SASA invited the most important local stakeholders for a meeting that was held on 17 August 2002 in Taubaté, state of Sao Paulo. The Kyoto Protocol and SASA's Landfill Gas Recovery Project were discussed. After consulting representatives from the Brazilian DNA, the Brazilian forum of NGOs and the district attorney were contacted in a separate mail in October 2004. No comments were received.

An "Open House" program has been implemented by SASA for several years. It consists of a 2 hour site tour, to show the facility and explain all the activities developed by SASA. Most of the stakeholders invited for the 17 August 2002 meeting have participated in SASA's "Open House" program. No comments were received.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

According to the modalities for the validation of CDM projects, the validator shall make publicly available the project design document and receive, within 30 days, comments on the validation requirements from Parties, stakeholders and UNFCCC accredited Non-governmental Organisations (NGO) and make them publicly available.

The PDD of October 2004 was published on www.dnv.com/certification/ClimateChage, and Parties, stakeholders and NGOs were through the CDM website invited to provide comments on the validation requirement during a period of 30 days from 25 October until 24 November 2004. No comments were received.

5 VALIDATION OPINION

DNV Certification Ltd. (hereafter DNV) has performed a validation of the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil". The validation was performed on the basis of UNFCCC criteria and host country criteria, 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 project participants are Onxy of France, SASA of Brazil and SenterNovem acting on behalf of the Government of the Netherlands. The participating Parties are Brazil as the host Party and the Netherlands as Annex I Party. Brazil and the Netherlands meets all relevant participation requirements. The DNA of the Netherlands approved the project on 13 March 2003. The DNA of Brazil approved the project on 19 April 2004 and confirmed that the project assists in achieving sustainable development.

By burning landfill gas instead of passive venting of it, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

An analysis of possible baseline scenarios according to AM0011 has shown that the proposed project activity 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 starting date and length of the project crediting period and operational lifetime is clearly defined. Monitoring requirement and procedures are clearly outlined in the operations manual of the landfill site.

Landfill emissions are estimated based on the First Order Decay model and the forecasted emission reductions stated in the PDD seem to be realistic and based on conservative assumptions.

The project does not result in any adverse environmental impacts.

Local stakeholders have been invited to comment on the project according to the requirements outlined by resolution Nr. 1 of the Brazilian DNA. International stakeholder comments have been sought from 25 October until 24 November 2004 and no comments have been received.

In summary, it is DNV's opinion that the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil", as described in the project desing document of October 2004, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0011. Hence, DNV requests the registration of the "Onyx Landfill Gas Recovery Project – Trémembé, Brazil" as CDM project activity, once the written approval by the DNA of Brazil, including a confirmation that the project assists in achieving sustainable development, has been received.

6 REFERENCES

Documents provided by the project participants that relate directly to the project:

/1/ Onyx, *CDM-PDD for Onyx Landfill Gas Recovery Project – Trémembé, Brazil*, Version of August and October 2004

/2/ Comissão Interministerial de Mudança Global do Clima, *Letter of Approval*

/3/ Ministry of Housing, Spatial Planning and the Environment, *Declaration of Approval*. 13 March 2003.

/4/ Onyx, *Leachate treatment cost comparison between on-site and off-site solution*, confidential document, 12 October 2004

Background documents related to the design and/or methodologies employed in the design or other reference documents:

/5/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF), *Validation and Verification Manual*, at www.vvmanual.info

/6/ Approved baseline and monitoring methodology AM0011*, Landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario.* Version 01, 13 July 2004.

/7/ CETESB, *Current operating licence for the Tremembé landfill*, 22 July 2004, valid for 6 months.

/8/ Comissão Interministerial de Mudança Global do Clima, *Resolução nº 1*, 2004

/9/ UNFCCC, *Annex 3 - Clarifications on the treatment of national and/or sectoral policies and regulations (paragraph 45 (e) of the CDM Modalities and Procedures) in determining a baseline scenario,* Executive Board 16's meeting report, October 2004

Persons interviewed during the validation, or persons contributed with other information that are not included in the documents listed above:

/10/ Breno Caleiro, Manager SASA, Brazil

/11/ Gary Crawford and Lionel Bondois, Manager Onyx, France

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APPENDIX A

CDM 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	OK	Table 2, Section E.4.1
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	OK	Table 2, Section A.3 The DNA of Brazil confirmed that the project assists in achieving sustainable development.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
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	OK	DNA of Brazil approved the project on 19 April 2004. The DNA of the Netherlands approved the project on 13 March 2003.
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. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Decision 17/CP.7	OK	No public funding is involved.

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	The Brazilian DNA is the Comissão Interministerial de Mudança Global do Clima. The Dutch DNA is the Ministry of Housing, Spatial Planning and the Environment.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Brazil ratified the Kyoto Protocol on 23 August 2002. Netherlands ratified the Kyoto 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	The assigned amount of the Netherlands is 92% of the emissions in 1990.
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	The Netherlands have in place a national registry and reported in 1 April 2004 the latest inventory for the years 1990-2002.
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	OK	Table 2, Section B.1.1 and D.1.1

REQUIREMENT	REFERENCE	CONCLUSION	Cross Reference / Comment
	Procedures §37e		
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 has been published on the UNFCCC CDM website www.dnv.com/certification/ClimateChange, and Parties, stakeholders and NGOs have been invited to provide comments on the validation requirement during a period of 30 days, from 25 October until 24 November 2004. 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 project is located in Tremembé Municipality, in the São Paulo State, Brazil.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The project system boundaries are limited to the geographic area of the SASA Landfill site (Aterro 1 and Aterro 3) which includes a landfill gas capture system, a leachate evaporator and a flare.		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 good practices?	/1/	DR	The project design engineering reflects good practice through the use of top and bottom covers of the landfill, land fill gas recovery with (progressive) vertical wells and horizontal drains, a leachate evaporator and a flare. The latest European waste		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			management standards are applied.		
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	Common practice in Brazil is sanitary landfill without landfill gas treatment or only safety venting. The project thus results in a significant better performance than any common landfill practise in Brazil.		OK
A.2.3. 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 substituted by other more efficient technologies, at least within the ten years crediting period, due to a low incentive level to implement LFG recovery systems.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR	The project will require minimal additional training for project operation and maintenance.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Yes.		OK
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	The project exceeds current Brazilian legislation for landfill		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	Yes		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/, /2/	DR	The project is in line with current sustainable development priorities in Brazil.		OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	Yes, there are other benefits, like adequate leachate treatment, decreased safety hazard		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			risk and odour reduction.		
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/, /6/	DR	The project applies the approved baseline methodology AM0011 "landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario"		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR	The baseline methodology was designed specifically for landfill gas recovery projects where the baseline is atmospheric release of LFG, there are no regulations governing flaring and/or combustion of landfill gas and the captured gas is used to evaporate leachate and/or is flared.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
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, the application of the baseline methodology is transparent with respect to the selected baseline, which is atmospheric release of LFG without any LFG recovery and flaring		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/, /4/	DR	Yes. The investment in LFG recovery and on-site leachate treatment does not generate any significant cost savings.		OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Yes, the baseline is determined taking into account project-specific circumstances.		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, according to the methodology, the additionally test includes the assessment of legal requirements and assessment of economic issues.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Yes		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	Yes. Waste treatment in Brazil is more concerned with other environmental impacts, such as odour and leachate treatment. LFG recovery beyond periodical venting of LFG is not a common practise.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario (e.g. through (a) a flow-chart or series of questions that lead to a narrowing of potential baseline options, (b) a qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely, (c) a qualitative or quantitative assessment of one or more barriers facing the proposed project activity or (d) an indication that the project type is not common practice in the proposed area of implementation, and not required by a Party's legislation/regulations)?	/1/, /11/	DR I	Yes, the methodology establishes a step-wise set of questions, through which it is demonstrated that the project is not a likely baseline scenario. The methodology establishes an extra check on credibility of the baseline that should be assessed by DOE. Considering the political tendency in Brazil with respect to legislation for LFG recovery and the fact that the project does not produce energy, continuous atmospheric release of LFG is a likely baseline scenario.		OK
B.2.8. Have the major risks to the baseline been identified?	/1/, /9/	DR	Based on the CDM-EB's recent decision that: *"… national and/or sectoral policies or regulations that give positive comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs) and* *that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) may not be taken into account in developing a baseline scenario…"*, no risks have been identified.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes.		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/, /7/	DR	Construction of the project started in December 2000 and the project equipment will remain in place until the end of the fixed crediting period.		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	A fixed 10 year crediting period starting 2003-01-01 was selected.		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/, /6/	DR	The project applies the approved monitoring methodology AM0011 "Landfill gas recovery with electricity generation and no		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			capture or destruction of methane in the baseline scenario".		
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes, the methodology was designed specifically for landfill gas recovery projects.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	Yes, The emission reduction can be measured directly through the amount and composition of landfill gas used by the leachate evaporator and the flare.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes.		OK
D.2. Monitoring of Emission Reductions *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	Yes, all data according to the methodology are collected and archived until 2 years after the end of the crediting period.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	Yes, all indicators identified in the monitoring methodology AM0011 are included. The emissions due to operation of the capture and utilization equipment are not included. This is justified as these emissions are considered insignificant compared to the overall emissions from the landfill. Also, the project does not claim the emission		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			reductions due to the decreased need of leachate transport off-site.		
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	Yes, total LFG flow is monitored continuously.		OK
D.2.4. Will the indicators give opportunity for real measurements of achieved emission reductions?	/1/	DR	The methodology establishes the direct measurement of emission reduction trough the amount and composition of landfill gas flared and from leachate evaporation..		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	Yes		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	In accordance with AM0011 no increase in emissions outside the project boundary is expected as a result of the project activity.		OK
D.4. 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.4.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/, /6/, /8/	DR	AM0011 and Resolution 1 do not require the monitoring of social or environmental indicators.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
D.5. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.5.1. Is the authority and responsibility of project management clearly described?	/1/	DR	Authority is identified by a flowchart indicating SASA to be responsible for the overall site management.		OK
D.5.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	*Idem*		OK
D.5.3. Are procedures identified for training of monitoring personnel?	/1/	DR	Yes, detailed procedures are contained in the monitoring and verification manual for the landfill site		OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	*Idem*		OK
D.5.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Yes, the calibration will be according to suppliers instructions		OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	*Idem*		OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	*idem*		OK
D.5.8. 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	*idem*		OK
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and	/1/	DR	Yes, provisions for data review are detailed.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
uncertainties?					
D.5.10. Are procedures identified for review of reported results/data?	/1/	DR	*Idem*		OK
D.5.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	*Idem*		OK
D.5.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR	*idem*		OK
D.5.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	*Idem*		OK
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. 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/, /10/	DR I	Yes, the project considers all LFG produced according "First order decay" model based on waste deposited at SASA landfill. The waste volume received by the landfill has increased with a factor 4.5 between 1996 and 2000. The calculations are deemed to be		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
			correct.		
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes, the emissions and capture were documented through yearly tables.		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	Yes, the LFG capture efficiency is considered being 80 % one year after the area is covered and equipped with an extraction system. For the existing site "Aterro 1" the actual extraction efficiency is evaluated to be 70 %, and will increase to 80 % following the cover placement and extraction equipment installation. For "Aterro 3 - phase 3", the extraction efficiency is evaluated to be 50 % for the last part of the filling period and will increase to 80 % one year after the closure of this area. These assumptions are considered to be conservative		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/, /10/	DR I	The composition of industrial and commercial waste contains enough organic material necessary to produce methane		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	In accordance with AM0011 only methane is considered. Changes in emissions of other gases were considered not significant.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
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	In accordance with AM0011 no increase in emissions outside the project boundary – leakage – is expected as a result of the project activity. The emissions resulting from energy use to operate the equipment was considered not significant.		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	Yes, the baseline emissions are calculated by the "first order decay" model.		OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	The landfill site defines the baseline boundary.		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, see E.1.3 regarding the capture efficiency.		OK
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the	/1/	DR	Yes		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
documentation?					
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, see E.1.3 regarding the capture efficiency.		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 expected to abate 700 625 tCO_{2e} during the crediting period of 10 years.		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	Yes		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	The capture and destruction of LFG does not need an EIA and the Environment Operation Licence of landfill already covers the proposed project activity.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	No, all environmental aspects are positive.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	No impacts are identified.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	See F.1.3		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	Yes.		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/, /8/	DR	The main stakeholders were invited to a meeting that was held on 17th of August 2002 in Taubaté, state of Sao Paulo. The Kyoto Protocol and SASA's Landfill Gas Recovery Project were discussed. No comments were received. The Brazilian forum of NGOs and the district attorney have been invited by separate mail in October 2004.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/, /8/	DR	The stakeholders have been directly invited. An "Open House" program has been implemented by SASA for several years. It consists of a 2 hour site tour, to show the facility and explain all the activities developed by SASA. Most of the stakeholders invited for the 17th August have participated in SASA's "Open House" program. No comments were received.		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/, /8/	DR	Yes. The Brazilian DNA has been consulted as for the correct process to be followed.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl	Final Concl
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	No comments were received.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	No comments were received.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project participants' response	Final conclusion
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No *Corrective Action Requests* or requests for *Clarification* were identified.

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