

## Verification Checklist

### Section 1: General information

<b>Project title:</b> N <sub>2</sub> O emissions reduction project at the new nitric acid plant of Nitrogénművek Zrt.	<b>Project No:</b> JI Ver0038
<b>Date of site visit:</b> 12-13 May 2009	
<b>Monitoring period:</b> Monitoring report for the period between 01/01/2008 to 31/12/2008.	
<b>Please describe any key changes to the project structure since the last verification (e.g. acquisitions, disposals, product changes, process changes)</b> A new system of data collected has been implemented in the company, and was installed in the nitric acid plant in October 2008. Aside from that, no changes to the project structure compared to the preliminary verification.	

### Section 2: Compliance with the JI requirements

Requirement	Ref. ID	Comments	Issues (incl NIRs/CARs)
<b>1. Compliance with the validated PDD</b>			
1.1. Is the start date of the monitoring period mentioned in the monitoring report consistent with the validated project (PDD)	2, 4, 23	The first monitoring period for this project is from 01/01/2008 to 31/12/2008 which is the first year of the commitment period of the Kyoto Protocol.	No

Requirement	Ref. ID	Comments	Issues (incl NIRs/CARs)
<p>1.2. Are the parameters and the monitoring approach discussed in the monitoring report consistent with the validated PDD</p>	<p>2, 4, 23</p>	<p>Parameters in the monitoring report differ slightly from the Monitoring Plan in the validated PDD. This was reported in the AU4i and AU4 for the voluntary monitoring period of 01/09/2007 to 31/12/2007. A revision of the MP has been requested.</p>	<p>FAR1 was raised to request a revision of the MP in the validated PDD.</p>

Requirement	Ref. ID	Comments	Issues (incl NIRs/CARs)
1.1. Are the QA/QC procedures consistent with the validated PDD	2, 4, 6, 9, 10, 23	Yes. Relevant QA/QC procedures have been issued, e.g. ME 7.5.-S-K1 Procedure for Nitric Acid Plant. The company is ISO9001 and ISO14001 certified (both certificates valid until mid 2009) and this certification cover further requirements for this first periodic verification.	No
<b>2. Conformance with monitoring methodology</b>			
2.1. Is the monitoring report consistent with the version of the methodology the projects was validated against	2, 4, 23	<p>During preliminary verification it was observed that the monitoring plan of the Monitoring Report is different from the monitoring plan from the validated PDD. These differences have been described in detail in the verification report for 2007. None of these changes are structural and do not influence the collection or accuracy of data.</p> <p>The monitoring plan as described in the Monitoring Report was accepted as best practice and therefore accepted.</p>	FAR1 was raised to request revision of the MP

Requirement	Ref. ID	Comments	Issues (incl NIRs/CARs)
2.2. Are there any differences between the methodology and the monitoring plan in the validated PDD	2, 4, 23, 24	<p>Several changes against validated PDD-MP during monitoring period.</p> <p>During preliminary verification it was observed that the monitoring plan of the Monitoring Report is different from the monitoring plan from the validated PDD. These differences have been described in detail in the verification report for 2007. None of these changes are structural and do not influence the collection or accuracy of data.</p> <p>The monitoring plan as described in the Monitoring Report was accepted as best practice and therefore accepted.</p>	FAR1 was raised to request revision of the MP
<b>3. Outstanding issues from previous verification</b>			
3.1. Are there any issues from the previous verification	2, 4, 23 SV	Except for FAR1, no outstanding issues since the previous verification (01/09/2007 to 31/12/2007)	No
<b>4. Project boundaries</b>			
4.1. Is the project boundary consistent with the validated PDD	2, 4, 23, SV	The project boundary is consistent with the validated PDD and Monitoring Plan. This was confirmed during the site visit on 12-13 <sup>th</sup> May 2008.	No

Requirement	Ref. ID	Comments	Issues (incl NIRs/CARs)
<b>5. Additional sources</b>			
5.1. Are there any additional sources which are attributable to the project	2, 4, 5, 23, SV	<p>Natural gas is added to the combined reactor. This natural gas input was originally not intended, but considered as a necessity during the pilot operation.</p> <p>During preliminary verification it was observed that the monitoring plan of the Monitoring Report is different from the monitoring plan from the validated PDD. These differences have been described in detail in the verification report for 2007. None of these changes are structural and do not influence the collection or accuracy of data.</p> <p>The monitoring plan as described in the Monitoring Report was accepted as best practice and therefore accepted.</p>	FAR1 was raised to request revision of the MP:

**Section 3: Verification of the data presented**

**1.1 Parameter: Operation hours t** (key factor 1)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	Has the method of collecting the operation hours changed since the previous verification?	No changes to the method of collecting the operation hours since the preliminary verification. Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.	4, 5, 23, SV	No
<b>Data collection</b>	How are data collected? Interview staff in the control room and observe entries being made in the logbook.	The operating time of the installation (written down in the shift log) is manually transferred to the calculation programme.	4, 5, SV	No
<b>Data management</b>	Check who is responsible for signing of the logbook. Are there QA / QC procedures in place? Is staff adequately trained?	This meter calculates the flow of N <sub>2</sub> O and provides a check that the combustion reactor was operational. The shift manager is responsible for signing of the logbook. The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available. Staff is trained to perform its specific tasks and is highly aware of the issues of this project.	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	Check the operation log, DCS readings and calculation spreadsheet.	The operation log was checked for May 2008: 744 hrs. The nitric acid plant shut down from 3 <sup>rd</sup> – 31 <sup>st</sup> August for maintenance. Therefore the	4, 5, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	Calculate the monthly totals for at least 1 month and compare with the calculations.	amount of operational hours in that month differs from the average amount of hours during the monitoring period.		

Period	Reported value in hrs	Verified value in hrs	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	636	636	No differences were observed	No issues
February 2008	696	696	No differences were observed	No issues
March 2008	506	506	No differences were observed	No issues
April 2008	587	587	No differences were observed	No issues
May 2008	744	744	No differences were observed	No issues
June 2008	720	720	No differences were observed	No issues
July 2008	744	744	No differences were observed	No issues
August 2008	86	86	No differences were observed	No issues
September 2008	720	720	No differences were observed	No issues
October 2008	464	464	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

## 1.2 Parameter: Quantity of gaseous ammonia to the ammonia combustion reactor $P_{NH_3}$ (key factor 2)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
Changes compared to	Has the method of collecting the	A new data collection system was intro-	4, 5, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>previous verification</b>	<p>quantity of gaseous ammonia to the combustion reactor changed since the previous verification? Has the meter been changed? Are there changes to the system?</p>	<p>duced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system. The meter has not been changed. Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.</p>		
<b>Data collection</b>	<p>How are data collected? Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.</p> <p>Check the calibration of the following meters: FE0237 (flow meter) FT0237 (transmitter) TE0206 (temp. transmitter) PT0236 (pressure transmitter)</p> <p>Interview plant manager regarding malfunctioning of the meters (if any).</p>	<p>Data are collected through a flow meter with throttle (Orifice <math>\pm</math> 0.5% accuracy), temperature and pressure compensation. Instrument specification and test protocol (by Emerson Process Management, manufacturer of equipment) received for flow meter, thermocouple and pressure transmitter. For the flow meter, there is also a "dimensional check certificate" from Mattech. All calibration certificates for the meters were reviewed and found to be in order. No meters were malfunctioning during the monitoring period.</p>	4, 5, 12, 23, SV	No
<b>Data management</b>	<p>Check the raw data sheet and look for comments and highlighted values. Has the responsibility for the data been transferred to a new person? Are there QA / QC procedures in place?</p>	<p>Verification focussed on data from May 2008 and September 2008. Staff is highly educated, very motivated and capable of performing their assigned tasks. Spreadsheet with monitored data is derived from DSC system, then completely copied to spreadsheet containing values</p>	4, 5, 6, 8, 9, 10, SV	No



What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	Is staff adequately trained?	only, and sent to Katalin Almásy, environmental engineer responsible for the monitoring data.		
<b>Corroborate data</b>	<p>Compare data from DCS with data in calculation spreadsheet. Focus on comments, highlighted values and times where shut downs and other system failures occurred.</p> <p>Take a sample of 10% of all data or 2 months and sample all uncommon data sets.</p> <p>Check the operation log, DCS readings and calculation spreadsheet.</p> <p>Check logbook for calamities</p>	<p>Manual transfer has been witnessed and it was observed that the spreadsheet is copied from the DCS to the calculations spreadsheet (Ctrl-C; Ctrl-V, values only). It is unlikely that errors will occur from this transfer.</p> <p>Data were verified for May 2008 and September 2008.</p> <p>Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.</p> <p>xx The nitric acid plant shut down from 3<sup>rd</sup> – 31<sup>st</sup> August for maintenance. However, the ammonia plant was still operational and continued production of ammonia. As a consequence, the value for August 2008 does not show large differences compared to the other months.</p>	4, 5, 23, SV	No

Period	Reported value in Nm3/h	Verified value in Nm3/h	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	23,674	23,674	No differences were observed	No issues
February 2008	25,174	25,174	No differences were observed	No issues
March 2008	22,254	22,254	No differences were observed	No issues
April 2008	23,185	23,185	No differences were observed	No issues
May 2008	22,883	22,883	No differences were observed	No issues
June 2008	20,767	20,767	No differences were observed	No issues

Period	Reported value in Nm3/h	Verified value in Nm3/h	If different, summary of issues that caused the difference	Describe how issue was solved
July 2008	24,064	24,064	No differences were observed	No issues
August 2008	22,849	22,849	No differences were observed	No issues
September 2008	22,912	22,912	No differences were observed	No issues
October 2008	23,819	23,819	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

### 1.3 Parameter: Natural gas consumption of ammonia production $P_{ng}$ (key factor 3)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	Has the method of collecting the natural gas consumption of the ammonia production changed since the previous verification?	No changes to the method of collecting the natural gas consumption of ammonia production compared to the preliminary verification.  The company's provider of natural gas (based in Ukraine) was not able to deliver NG as per the contract because of the Gazprom crisis in the summer of 2008. The company is now purchasing NG on the stock market.  Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.	4, 5, 23, SV	No
<b>Data collection</b>	How are data collected? Interview staff responsible for the data collection and review the results derived from the SAP system regarding the NG	Data are collected from the company's SAP system once a month. Total amount of natural gas used for the ammonia production is divided by the total amount of ammonia production.	4, 5, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	consumption of NH3 production.			
<b>Data management</b>	<p>Check who is responsible for the data of the SAP system. Are there QA / QC procedures in place? Is staff adequately trained?</p>	<p>Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations. The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available. Staff is trained to perform its specific tasks and is highly aware of the issues of this project.</p>	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	<p>Review the results derived from the SAP system regarding the NG consumption of NH3 production and compare them with the calculation spreadsheet. Calculate the monthly totals for at least 1 month and compare with the calculations.</p>	<p>Monthly totals for May 2008 (1096) and September 2008 (1082) were checked and found to be in order.  The nitric acid plant shut down from 3<sup>rd</sup> – 31<sup>st</sup> August for maintenance. Therefore the amount of NG in that month differs from the average amount of NG during the monitoring period. The amount of NG is so high as the combustion reactor needs a lot of NG to start up and arrive and the required temperature. Figures were verified.</p>	4, 5, 23, SV	No

Period	Reported value in gNm3/t NH3	Verified value in gNm3/t NH3	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	1087	1087	No differences were observed	No issues
February 2008	1082	1082	No differences were observed	No issues
March 2008	1451	1451	No differences were observed	No issues
April 2008	1185	1185	No differences were observed	No issues
May 2008	1096	1096	No differences were observed	No issues
June 2008	1100	1100	No differences were observed	No issues

Period	Reported value in gNm <sup>3</sup> /t NH <sub>3</sub>	Verified value in gNm <sup>3</sup> /t NH <sub>3</sub>	If different, summary of issues that caused the difference	Describe how issue was solved
July 2008	1113	1113	No differences were observed	No issues
August 2008	2388	2388	No differences were observed	No issues
September 2008	1082	1082	No differences were observed	No issues
October 2008	1081	1081	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

#### 1.4 Parameter: Quantity of nitric acid produced F<sub>HNO<sub>3</sub></sub> (Key factor 4)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	Has the method of collecting the quantity of nitric acid produced changed since the previous verification?	A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.  Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.	4, 5, 23, SV	No
<b>Data collection</b>	How are the data collected? Interview staff responsible for the data collection and review the results derived from the SAP system regarding the NG consumption of NH <sub>3</sub> production. Check calibration for mass flow	Data are monitored with a mass flow meter from Micro Motion and transferred to the company's SAP system once a month. Parameter is of minor importance to the project but required by the ERPA. Calibration report of the manufacturer received and reviewed, dated 25/09/2006.	4, 5, 13, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	meter.	Instrument to be calibrated every 5 years.		
<b>Data management</b>	Check who is responsible for the data of the SAP system. Are there QA / QC procedures in place? Is staff adequately trained?	Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.  The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.  Staff is trained to perform its specific tasks and is highly aware of the issues of this project.	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	Review the results derived from the SAP system regarding the quantity of nitric acid produced and compare them with the calculation spreadsheet.  Calculate the monthly totals for at least 1 month and compare with the calculations.	Monthly totals for May 2008 (46,764) and September 2008 (45,315) were checked and found to be in order.  The nitric acid plant shut down for maintenance from 3-31 August, Therefore the amount of nitric acid is much lower compared to the other months of the monitoring period. Figures were verified with collected figures from the DCS system.	4, 5, 23, SV	No

Period	Reported value in t/month	Verified value in t/month	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	43,142	43,142	No differences were observed	No issues
February 2008	47,942	47,942	No differences were observed	No issues
March 2008	33,612	33,612	No differences were observed	No issues
April 2008	38,134	38,134	No differences were observed	No issues
May 2008	46,764	46,764	No differences were observed	No issues
June 2008	45,259	45,259	No differences were observed	No issues
July 2008	49,080	49,080	No differences were observed	No issues
August 2008	5,374	5,374	No differences were observed	No issues

Period	Reported value in t/month	Verified value in t/month	If different, summary of issues that caused the difference	Describe how issue was solved
September 2008	45,315	45,315	No differences were observed	No issues
October 2008	31,340	31,340	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

## 1.5 Parameter: Quantity of natural gas to the Combined reactor $V_{NG}$ (key factor 5)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	Has the method of collecting the quantity of natural gas to the combined reactor changed since the previous verification? Has the meter been changed? Are there changes to the system?	A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.  The company's provider of natural gas (based in Ukraine) was not able to deliver NG as per the contract because of the Gazprom crisis in the summer of 2008. The company is now purchasing NG on the stock market.  No meter changes.  Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.	4, 5, 23, SV	No
<b>Data collection</b>	How are data collected? Check calibration of the following meters:	Data are collected by Rotameter (volume-flow meter $\pm 1,5$ % accuracy) with temperature and pressure compensation (The accuracy of the circle related to the measured	4, 5, 14, 19, 20, 23, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	FE0834 (flow meter) TT0808 (temp. transmitter) PT0804 (pressure transmitter)  Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.  Interview plant manager regarding malfunctioning of the meters (if any).	value <2,65 %).  Instrument specification and test protocol (Emerson Process Management) received for PT 100 (temperature; manufacturer Rosemount, same group as Emerson) and pressure transmitter (Rosemount).  All calibration certificates for the meters were reviewed and found to be in order.  No meters were malfunctioning during this monitoring period.		
<b>Data management</b>	Check the raw data sheet and look for comments and highlighted values.  Has the responsibility for the data been transferred to a new person?  Are there QA / QC procedures in place?  Is staff adequately trained?	Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.  The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.  Staff is trained to perform its specific tasks and is highly aware of the issues of this project.	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	Compare data from DCS with data in calculation spreadsheet. Focus on comments, highlighted values and times where shut downs and other system failures occurred.  Take a sample of minimum 10% of all data or 2 months and sample all uncommon data sets.	Manual transfer has been witnessed and it was observed that the spreadsheet is copied from the DCS to the calculations spreadsheet (Ctrl-C; Ctrl-V, values only). It is unlikely that errors will occur from this transfer.  Data from May 2008 (18,736) and September 2008 (24,371) were verified.  Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.  The nitric acid plant shut down for maintenance from 3-31 August, Therefore the	4, 5, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
		amount of NG is much lower compared to the other months of the monitoring period. Figures were verified with collected figures from the DCS system.		

Period	Reported value in gNm3/month	Verified value in gNm3/month	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	15,804	15,804	No differences were observed	No issues
February 2008	17,684	17,684	No differences were observed	No issues
March 2008	12,837	12,837	No differences were observed	No issues
April 2008	17,771	17,771	No differences were observed	No issues
May 2008	18,736	18,736	No differences were observed	No issues
June 2008	18,205	18,205	No differences were observed	No issues
July 2008	19,680	19,680	No differences were observed	No issues
August 2008	2,121	2,121	No differences were observed	No issues
September 2008	24,731	24,731	No differences were observed	No issues
October 2008	18,864	18,864	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

**1.6 Parameter: Quantity of gaseous ammonia to combined reactor**  
**m<sub>NH3</sub>** (key factor 8)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
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What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	<p>Has the method of collecting the quantity of gaseous ammonia to the combined reactor changed since the previous verification?</p> <p>Has the meter been changed?</p> <p>Are there changes to the system?</p>	<p>A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.</p> <p>Due to the financial crisis the plant was shut down from 20/10/2008 until 01/03/2009.</p>	4, 5, 23, SV	No
<b>Data collection</b>	<p>How are data collected?</p> <p>Check calibration of the following meters: FE0834 (flow meter) TT0808 (temp. transmitter) PT0804 (pressure transmitter)</p> <p>Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.</p> <p>Interview plant manager regarding malfunctioning of the meters (if any).</p>	<p>Data are monitored by Coriolis-type mass-flow meter <math>\pm 0,15</math> % accuracy. (The accuracy of the circle related to the measured value <math>&lt; 0,6</math> %).</p> <p>All calibration certificates for the meters were reviewed and found to be in order.</p> <p>No meters were malfunctioning this monitoring period.</p>	4, 5, 15, SV	
<b>Data management</b>	<p>Check the raw data sheet and look for comments and highlighted values.</p> <p>Has the responsibility for the data been transferred to a new person?</p> <p>Are there QA / QC procedures in place?</p> <p>Is staff adequately trained?</p>	<p>Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.</p> <p>The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.</p> <p>Staff is trained to perform its specific tasks and is highly aware of the issues of this project.</p>	4, 5, 6, 8, 9, 10, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Corroborate data</b>	<p>Compare data from DCS with data in calculation spreadsheet. Focus on comments, highlighted values and times where shut downs and other system failures occurred.</p> <p>Take a sample of 10% of all data or 2 months and sample all uncommon data sets.</p>	<p>Manual transfer has been witnessed and it was observed that that the spreadsheet is copied from the DCS to the calculations spreadsheet (Ctrl-C; Ctrl-V values). It is unlikely that errors will occur from this transfer.</p> <p>Data from May 2008 and September 2008 were verified and no differences were observed.</p> <p>Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.</p> <p>The nitric acid plant shut down for maintenance from 3-31 August, Therefore the amount of gaseous ammonia to the reactor is much lower compared to the other months of the monitoring period. Figures were verified with collected figures from the DCS system.</p>	4, 5, 23, SV	No

Period	Reported value in t/month	Verified value in t/month	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	57.71	57.71	No differences were observed	No issues
February 2008	77.65	77.65	No differences were observed	No issues
March 2008	57.23	57.23	No differences were observed	No issues
April 2008	67.90	67.90	No differences were observed	No issues
May 2008	76.84	76.84	No differences were observed	No issues
June 2008	76.25	76.25	No differences were observed	No issues
July 2008	80.30	80.30	No differences were observed	No issues

<b>Period</b>	<b>Reported value in t/month</b>	<b>Verified value in t/month</b>	<b>If different, summary of issues that caused the difference</b>	<b>Describe how issue was solved</b>
August 2008	9.44	9.44	No differences were observed	No issues
September 2008	80.18	80.18	No differences were observed	No issues
October 2008	55.61	55.61	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

**1.7 Parameter: N2O concentration at the inlet of R-104 (AIR0802B)**  
(key factor 10)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	<p>Has the method of collecting the N2O concentration at the inlet of R-104 changed since the previous verification?</p> <p>Has the meter been changed?</p> <p>Are there changes to the system?</p>	<p>A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.</p> <p>The meter has not been changed.</p>	4, 5, SV	No
<b>Data collection</b>	<p>How are data collected?</p> <p>Check calibration of the following equipment: AIR0802B (gas analyzer) Calibration gases of the analyzer</p> <p>Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.</p> <p>Interview plant manager regarding malfunctioning of the meters (if any).</p>	<p>Data are monitored through Horiba VA-3011.</p> <p>Maintenance and calibration are performed two times a year by Enviplus (representative of Horiba): maintenance and calibration report is available (24/02/2008).</p> <p>Manual calibration by own personnel is performed once a month. The results of these calibrations are not logged (on paper, control charts). They are stored in the analyser. It is advisable to keep the values for zero and span before and after each calibration in order to evaluate the drift between two calibrations (or to perform just a control of zero and span and keep this on SPC control charts).</p> <p>Test report of the installation from the supplier (Horiba) is present, the analyser has a type approval (by TÜV), a QAL 1 report is available for the O2 and N2O measurement.</p>	4, 5, 7, 17, 18, 22, 23, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
		<p>All relevant data are collected with a frequency of 10 values per second, the treatment of the data is done with a software package of Emerson (commercial available).</p> <p>Periodic (preventive) maintenance of the analysers is done during periods of shut down of the NH3 reactor.</p> <p>No malfunctioning of meters during this monitoring period.</p>		
<b>Data management</b>	<p>Check the raw data sheet and look for comments and highlighted values.</p> <p>Has the responsibility for the data been transferred to a new person?</p> <p>Are there QA / QC procedures in place?</p> <p>Is staff adequately trained?</p>	<p>Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.</p> <p>The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.</p> <p>Staff is trained to perform its specific tasks and is highly aware of the issues of this project.</p>	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	<p>Compare data from DCS with data in calculation spreadsheet. Focus on comments, highlighted values and times where shut downs and other system failures occurred.</p> <p>Take a sample of 10% of all data or 2 months and sample all uncommon data sets.</p>	<p>Manual transfer has been witnessed and it was observed that the spreadsheet is copied from the DCS to the calculations spreadsheet (Ctrl-C; Ctrl-V values). It is highly unlikely that errors will occur from this transfer.</p> <p>Data from May 2008 and September 2008 were verified.</p> <p>Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.</p> <p>Data of shutdowns were reviewed and it was observed that the average period of the meter being out of range was 4 minutes, which was found to be acceptable. These shutdowns happened on:</p>	4, 5, 23, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
		<p>07/04/2008: technical problems – signal of analyser changed to Emerson (back-up system).</p> <p>13/05/2008: analyser back to Horiba.</p> <p>04/08/2008: shut down for maintenance. Maintenance lasted until 30/08/2008.</p> <p>Calibrations of the analyser were carried out on:</p> <p>08/02/2008; 22/04/2008; 20/06/2008; 25/06/2008; 26/06/2008; 01/09/2008</p>		

Period	Reported value in ppmv	Verified value in ppmv	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	1363	1363	No differences	No issues
February 2008	1195	1195	No differences	No issues
March 2008	1146	1146	No differences	No issues
April 2008	1157	1157	No differences	No issues
May 2008	1163	1163	No differences	No issues
June 2008	1140	1140	No differences	No issues
July 2008	1156	1156	No differences	No issues
August 2008	1066	1066	No differences	No issues
September 2008	1042	1042	No differences	No issues
October 2008	1088	1088	No differences	No issues
November 2008	0	0	No differences	No issues
December 2008	0	0	No differences	No issues

## 1.8 Parameter: O<sub>2</sub> concentration in the tail gas emitted (AI0807) (key factor 11)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
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What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	<p>Has the method of collecting the O2 concentration in the tail gas emitted changed since the previous verification?</p> <p>Has the meter been changed?</p> <p>Are there changes to the system?</p>	<p>A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.</p> <p>The meter has not been changed.</p>	4, 5, SV	No
<b>Data collection</b>	<p>How are data collected?</p> <p>Check calibration of the following equipment: AI0807 (gas analyzer) Calibration gases of the analyzer</p> <p>Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.</p> <p>Interview plant manager regarding malfunctioning of the meters (if any).</p>	<p>Data are collected through the CEMS (continuous emission monitoring system)</p> <p>Data are analysed by a Horiba CMA 622</p> <p>Calibration gas was checked and found to be in order. Calibrations of the analyser are undertaken once a month and a note is made in the shift logbook and the calamity logbook. No paper trail of these calibrations available.</p> <p>Calibration certificates for analyser were checked and found to be in order.</p> <p>No meters were malfunctioning during this monitoring period.</p>	4, 5, 17, 18, 20, 23, 25, SV	No
<b>Data management</b>	<p>Check the raw data sheet and look for comments and highlighted values.</p> <p>Has the responsibility for the data been transferred to a new person?</p> <p>Are there QA / QC procedures in place?</p> <p>Is staff adequately trained?</p>	<p>Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.</p> <p>The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.</p> <p>Staff is trained to perform its specific tasks and is highly aware of the issues of this project.</p>	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	<p>Compare data from DCS with data in calculation spreadsheet. Focus on comments,</p>	<p>Manual transfer has been witnessed and it was observed that the spreadsheet is copied from the DCS to the calculations</p>	4, 5, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
	<p>highlighted values and times where shut downs and other system failures occurred.</p> <p>Take a sample of 10% of all data or 2 months and sample all uncommon data sets.</p>	<p>spreadsheet (Ctrl-C; Ctrl-V values). It is unlikely that errors will occur from this transfer.</p> <p>Data from May 2008 and September 2008 were verified and no differences were observed.</p> <p>Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.</p>		

Period	Reported value in %	Verified value in %	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	2.94	2.94	No differences were observed	No issues
February 2008	2.96	2.96	No differences were observed	No issues
March 2008	2.77	2.77	No differences were observed	No issues
April 2008	2.78	2.78	No differences were observed	No issues
May 2008	2.78	2.78	No differences were observed	No issues
June 2008	2.76	2.76	No differences were observed	No issues
July 2008	2.80	2.80	No differences were observed	No issues
August 2008	2.68	2.68	1081 No differences were observed	No issues
September 2008	2.70	2.70	No differences were observed	No issues
October 2008	2.80	2.80	No differences were observed	No issues
November 2008	0	0	No differences were observed	No issues
December 2008	0	0	No differences were observed	No issues

## 1.9 Parameter: N2O concentration in the tail gas emitted (key factor 12)



What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
<b>Changes compared to previous verification</b>	<p>Has the method of collecting the N<sub>2</sub>O concentration in the tailgas emitted changed since the previous verification?</p> <p>Has the meter been changed?</p> <p>Are there changes to the system?</p>	<p>A new data collection system was introduced within the company, called PHD. This system was implemented between April 2008 and October 2008. The nitric acid plant only got the PHD system in October 2008, just before the shutdown of the plant. The majority of the monitoring data were collected by the DCS system.</p> <p>The meter has not been changed.</p>	4, 5, 23, SV	No
<b>Data collection</b>	<p>How are data collected?</p> <p>Check calibration of the following equipment: AIR0802B (gas analyzer) Calibration gases of the analyzer</p> <p>Interview staff in the control room and observe data being transferred from DCS to calculation spreadsheet.</p> <p>Interview plant manager regarding malfunctioning of the meters (if any).</p>	<p>Data are monitored through a Horiba VA-3001</p> <p>Maintenance and calibration are performed two times a year by Enviplus (representative of Horiba): maintenance and calibration report is available ( 24/02/2008).</p> <p>Manual calibration by own personnel is performed once a month. The results of these calibrations are not logged (on paper, control charts). They are stored in the analyser. It is advisable to keep the values for zero and span before and after each calibration in order to evaluate the drift between two calibrations (or to perform just a control of zero and span and keep this on SPC control charts).</p> <p>Frequency of calibration according to procedure; drift of zero and span <math>\leq 0,5\%</math> of the range.</p> <p>Test report of the installation from the supplier (Horiba) is present, the analyser has a type approval (by TÜV), a QAL 1 report is available for the O<sub>2</sub> and N<sub>2</sub>O measurement.</p> <p>All relevant data are collected with a frequency of 10 values per second, the treatment of the data is done with a software</p>	4, 5, 7, 16, 17, 18, 20, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
		<p>package of Emerson (commercial available).</p> <p>Periodic (preventive) maintenance of the analysers is done during periods of shut down of the NH3 reactor.</p> <p>The averaging of the logged data by the software is done correctly.</p>		
<b>Data management</b>	<p>Check the raw data sheet and look for comments and highlighted values.</p> <p>Has the responsibility for the data been transferred to a new person?</p> <p>Are there QA / QC procedures in place?</p> <p>Is staff adequately trained?</p>	<p>Data are sent to Katalin Almásy, who is responsible for all monitoring data and calculations.</p> <p>The company is ISO 9001 and ISO14001 certified and QA/QC procedures are available.</p> <p>Staff is trained to perform its specific tasks and is highly aware of the issues of this project.</p>	4, 5, 6, 8, 9, 10, SV	No
<b>Corroborate data</b>	<p>Compare data from DCS with data in calculation spreadsheet. Focus on comments, highlighted values and times where shut downs and other system failures occurred.</p> <p>Take a sample of 10% of all data and sample all uncommon data sets.</p>	<p>Manual transfer has been witnessed and it was observed that the spreadsheet is copied from the DCS to the calculations spreadsheet (Ctrl-C; Ctrl-V values). It is highly unlikely that errors will occur from this transfer.</p> <p>Data from May 2008 and September 2008 were verified.</p> <p>Logbook for calamities was reviewed for the whole monitoring period. Restarts are described in accordance with the dates in the MR.</p> <p>Data of shut downs were reviewed and it was observed that the average period of the meter being out of range was 4 minutes, which was found to be acceptable.</p> <p>These shutdowns happened on: 07/04/2008: technical problems – signal of analyser changed to Emerson (back-up system).</p>	4, 5, 23, SV	No

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
		13/05/2008: analyser back to Horiba. 04/08/2008: shut down for maintenance. Maintenance lasted until 30/08/2008. Calibrations of the analyser were carried out on: 08/02/2008; 22/04/2008; 20/06/2008; 25/06/2008; 26/06/2008; 01/09/2008		

Period	Reported value in ppmv	Verified value in ppmv	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	17.2	17.2	No differences	No issues
February 2008	3.4	3.4	No differences	No issues
March 2008	4.9	4.9	No differences	No issues
April 2008	5.0	5.0	No differences	No issues
May 2008	2.4	2.4	No differences	No issues
June 2008	1.6	1.6	No differences	No issues
July 2008	1	1	No differences	No issues
August 2008	10.9	10.9	No differences	No issues
September 2008	9	9	No differences	No issues
October 2008	4	4	No differences	No issues
November 2008	0	0	No differences	No issues
December 2008	0	0	No differences	No issues

#### Section 4: External data used

### 1.10 Parameter: GWP N<sub>2</sub>O

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
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What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
Data collection	Source?	IPCC 2006	4, 5, 21, 23, SV	No
Corroborate data	Cross check	N/A	-	NO

Period	Reported value	Verified value	If different, summary of issues that caused the difference	Describe how issue was solved
September – December 2007	310	310	No difference observed	No issues

### 1.11 Parameter: Calorific value of natural gas (key factor 6)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
Data collection	Source?	Data provided by gas supplier MOL Földgázz szállító Zrt	4, 5, 11	No issues
Corroborate data	Cross check	N/A	-	No issues

Period	Reported value in MJ/gNm <sup>3</sup>	Verified value in MJ/gNm <sup>3</sup>	If different, summary of issues that caused the difference	Describe how issue was solved
January 2008	33.99	33.99	No differences	No issues
February 2008	34.08	34.08	No differences	No issues
March 2008	34.09	34.09	No differences	No issues
April 2008	34.12	34.12	No differences	No issues
May 2008	34.11	34.11	No differences	No issues
June 2008	34.25	34.25	No differences	No issues
July 2008	34.28	34.28	No differences	No issues
August 2008	34.34	34.34	No differences	No issues
September 2008	34.32	34.32	No differences	No issues

Period	Reported value in MJ/gNm <sup>3</sup>	Verified value in MJ/gNm <sup>3</sup>	If different, summary of issues that caused the difference	Describe how issue was solved
October 2008	34.34	34.34	No differences	No issues
November 2008	0	0	No differences	No issues
December 2008	0	0	No differences	No issues

## 1.12 Parameter: CO<sub>2</sub>e emission factor of natural gas (key factor 7)

What to check	How to check it and sampling plan	Findings and samples taken	Ref. ID	Issues (incl NIRs/CARs)
Data collection	Source?	By decree	4, 5, 22, SV	No issues
Corroborate data	Cross check	N/A	-	No issues

Period	Reported value in t CO <sub>2</sub> /MJ	Verified value	If different, summary of issues that caused the difference	Describe how issue was solved
January – December 2008	0.0000561	0.0000561	No difference observed	No issues

### Section 5: ERU calculations

What to check	How to check it and sampling plan	Findings	Ref. ID	Issues (incl NIRs/CARs)
ERUs	Emission reductions to be calculated following correct	As this project does not use an approved methodology (project was validated before methodologies were approved), it has been	All references	No

What to check	How to check it and sampling plan	Findings	Ref. ID	Issues (incl NIRs/CARs)
	monitoring of baseline parameters and project line parameters	decided that a 5% uncertainty is acceptable, therefore the amount of baseline emissions has to be corrected with 2.95% in order to be conservative		

Period	Reported value in t CO <sub>2</sub> e	Verified value	If different, summary of issues that caused the difference	Describe how issue was solved
01/01/2008 to 31/12/2008	<b>834200</b>	<b>834200</b>	No difference observed	No difference observed

### Reference list

ID	Documents	Description
1	N <sub>2</sub> O emissions reduction project at the new acid plant at Nitrogénművek Rt. – Project Idea Note 2004	Project Idea Note
2	N <sub>2</sub> O emissions reduction project at the new acid plant at Nitrogénművek Rt. – Project Design Document, 2005	Project Design Document
3	Determination of the N <sub>2</sub> O Emissions Reduction Project at the new acid plant at Nitrogénművek Rt - 2005	Determination Report SGS
4	N <sub>2</sub> O emissions reduction project at the new nitric acid plant of Nitrogénművek Zrt. Monitoring report for the period between 1st January 2008 and 31st December 2008. Dated 15/05/2009.	Monitoring Report
5	Calculations_to_Monitoring_Report_2008_090515.xls	Calculation spreadsheet
6	ME 7.5.-S-K1 Procedure for Nitric Acid Plant	QA/QC Procedure
7	KU-1 Instruction for calibration laboratory	
8	Job descriptions	
9	Internal QS training 2007	
10	Internal QS audits 2008	
11	Monthly record from ‘MOL Földgázz szállító Zrt.’ from 01/01/2008 to 31/12/2008	

ID	Documents	Description
12	Key factor 2 (ref. MP): instrument specification and test protocol (by Emerson Process Management, manufacturer of equipment) received for flow meter, thermocouple and pressure transmitter. For the flow meter, there is also a “dimensional check certificate” from Mattech.	
13	Key factor 4 (ref. MP): mass flow meter from Micro Motion: “Transmitter configuration report” and calibration report of the manufacturer received	
14	Key factor 5 (ref. MP): instrument specification and test protocol (by Emerson Process Management) received for PT 100 (temperature; manufacturer Rosemount, same group as Emerson) and pressure transmitter (Rosemount).	
15	Key factor 8 (ref. MP): mass flow meter from Micro Motion: “Transmitter configuration report” and calibration report of the manufacturer received	
16	Key factor 11 (ref. MP): QAL 1 certificate	
17	Key factor 11, 12 and 13 (ref. MP): maintenance and calibration report, test report and calibration protocol	QAL1 TÜV Horiba
18	Certificates of calibration gases	
19	Test report	QAL2 report
20	FT 0802 nat. gas meter.pdf	ISO17025 calibration report of NG flow meter
21	IPCC 2006	
22	Decree CO2e emission factor of natural gas	
23	AU4i	Preliminary verification checklist SGS