Validation opinion
Revision of the monitoring plan

Title of project activity:			
Project for the catalytic reduction of N2O emissions with a secondary catalyst inside the ammonia reactor of the nitric acid plant at Dongbu Hannong Chemicals Ltd., Ulsan, Korea ("Dongbu")			
CDM reference number:		DNV project No.:	
1443		PRJC-346332-2011-CCS-NOR	
Type of revision:	☐ Proposed revision only includes the request by the CDM EB ☐ Proposed revision includes not only the request by the CDM EB but also additional revisions proposed by the PP/DOE ☒ Proposed Revision includes revisions proposed by the PP/DOE		
Date	Work carried out by:	Work verified by:	Approved by:
30 March 2012	Patrice Massicard	Rafi-ud-Din Khawaja	Trine Kopperud

1 Description of the changes to the monitoring plan

The proposed revision of the monitoring plan concerns the monitoring of the nitric acid production (NAP).

In the registered PDD version 2.1 of 30 March 2010, NAP was determined using a multi-source mass balance, according to the following formula:

Today's tank level
– Yesterday's tank level
+ Weighbridge sales
+ Flow meter measurements from tank to concentration plant
+ Blending (60, 68 and 70%) nitric acid
– 98% concentrated acid transfer
= Total daily NA Production

In addition, a coriolis flow meter is installed at the outlet of the plant (but before the storage tank), measuring the nitric acid flow at a constant concentration of 65% and standard specific gravity of 1.373.

Furthermore, as per the PDD version 2.1 of 30 March 2010, every day at midnight a measurement of the acid level inside the storage tank is taken. Each day at 8:00 a.m. two samples are taken, one from the product line (V1001) before the storage tank and one from the storage tank itself (TK1001), both are then analyzed in the on-site lab for specific concentration and specific gravity. The results from this analysis are then used to adjust the flow meter and tank level measurements according to the measured specific concentration and gravity.

The mass balance calculation method was selected by the project owner as the main source for the NAP value, as it was considered more reliable and accurate than the coriolis flowmeter (Tag No FT-1303, accuracy 1%).

In order to simplify the procedure for NAP determination, and in the same time increase the reliability and accuracy of the monitoring, the project owner decided to replace the existing coriolis flow meter by a more accurate flow meter (Tag No FQI-1303, accuracy 0.1%), including automatic concentration measurement. The new meter was installed in June 2010, which was verified by DNV during the site visits of the 4th and 5th verifications. However, since only partial data were available from the new meter for the 4th monitoring period, the project participant decided to apply the mass balance method until the end of the 4th monitoring period, and subsequently request a revision of the monitoring plan and use the data from the new meter for the 5th monitoring period onwards.

The nitric acid concentration will still be measured manually by regular sampling, as a backup for the automatic measurement. Moreover, the previous mass balance method will also be used as backup in case of complete failure of the new coriolis flow meter.

2 Assessment of the revision of the monitoring plan

The proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions

The level of accuracy of the new coriolis flow meter is higher than the existing mass balance method, as demonstrated below:

- The accuracy of the new coriolis flow meter is 0.1%, as confirmed by the instrument's nameplate and calibration certificate dated 8 June 2011. It was installed in June 2010, and has been used for the NAP measurements during the 5th monitoring period. The DNV audit team confirmed the installation, calibration and accuracy of the new meter during the on-site audit for the 5th monitoring period of December 2011.
- The mass balance method involves measurements of 2 tank levels, 2 weighbridges, one magnetic volume flow meter and one density meter. The accuracy of the magnetic flow meter (tag no FQI-2202) itself is 0.6%, which is confirmed by the calibration certificate from the Korean laboratory accreditation scheme KOLAS, dated 29 January 2010.
- The accuracy of the previous flow meter was 1%, which was confirmed by instrument specifications during previous verifications by DNV.

Therefore, the accuracy of the new flow meter is better (lower accuracy value) than both the mass balance method and the previous coriolis flow meter.

The proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity whilst ensuring the conservativeness of the emission reductions calculation

The proposed revision of the monitoring plan is in accordance with the approved monitoring methodology AM0034 (version 2), while increasing the accuracy of the measurement. There

is no impact on the conservativeness of the emission reductions calculation as the improved accuracy may result in higher or lower values depending on actual readings.

The findings of previous verification reports, if any, have been taken into account

There is no finding from previous verification reports which need to be taken into account in the revision of the monitoring plan.

3 Validation opinion

DNV recommends the approval of the revised monitoring plan submitted by the project participants.

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