

**APPROVED**

P.Boyko, Director

## **MONITORING REPORT**

# **Co-destruction of HFC23 and SF6 at "KCKK Polymer Plant" Ltd**

**JI registration reference N: 0109**

**Version 3.0**

**26 October 2011**

**6<sup>th</sup> Monitoring period: 01.07.2011 - 30.09.2011**

**RU 1000201**

**Project operator: HaloPolymer-Kirovo-Chepetsk, Ltd**

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## **SECTION A. PROJECT AND MONITORING INFORMATION**

### A.1. Project title and reference

The project title: Co-destruction of HFC23 and SF6 at "KCKK Polimer Plant" Ltd

The sectoral scope: 11 Fugitive emissions from production and consumption of HFC and SF6

JI registration number: 0109

PDD reference: Version 1.1, Date 22 July 2008

PDD Verification: issued by Det Norske Veritas on the 27 November 2008

### A.2. Monitoring period

1<sup>st</sup> Verification (monitoring period 01.04.2008 - 31.12.2008): issued by Bureau Veritas Certification Holding SAS on the 20 April 2009

2<sup>nd</sup> Verification (monitoring period 01.01.2009 - 31.12.2009): issued by Bureau Veritas Certification Holding SAS on the 4 June 2010

3<sup>rd</sup> Verification (monitoring period 01.01.2010 - 31.12.2010): issued by Bureau Veritas Certification Holding SAS on the 28 June 2011

4<sup>th</sup> Verification (monitoring period 01.01.2011 - 31.03.2011): issued by Bureau Veritas Certification Holding SAS on the 28 June 2011

5<sup>th</sup> Verification (monitoring period 01.04.2011 – 30.06.2011): issued by Bureau Veritas Certification Holding SAS on the 22 August 2011

### **6<sup>th</sup> Verification (monitoring period 01.07.2011 – 30.09.2011): in progress**

7<sup>th</sup> Verification (monitoring period 01.10.2011 – 31.12.2011): expected on 01.02.2012

8<sup>th</sup> Verification (monitoring period 01.01.2012 - 31.03.2012): expected on 01.05.2012

9<sup>th</sup> Verification (monitoring period 01.04.2012 – 30.06.2012): expected on 01.08.2012

10<sup>th</sup> Verification (monitoring period 01.07.2012 – 30.09.2012): expected on 01.11.2012

11<sup>th</sup> Verification (monitoring period 01.10.2012 – 31.12.2012): expected on 01.02.2013

### A.3. Project description

HaloPolymer Kirovo-Chepetsk, LLC (former KCKK Polymer plant Ltd) is the largest producer of fluoroplastics in Russia (over 70%) and the only producer of specialized grades of fluoroprenes, fluoroplastic suspensions, fluorinated liquids and lubricants. For further details about Polymer plant visit [www.halopolymer.com](http://www.halopolymer.com).

The HCFC22 and SF6 production activity leads to a formation of dangerous wastes in liquid and gaseous forms, including the formation of GHG:

HFC23 waste is an inevitable by-product of HCFC22 production. The main sources of HFC23 waste emissions are the HCFC22 condensation and rectification columns in HCFC22 production line (in operation from 1951);

SF6 waste is an inevitable by-product of SF6 production. The main source of SF6 waste emissions is the SF6 rectification unit in SF6 production line (in operation from 1998).

The HFC23 and SF6 formation as by-products depend on the production volumes (the HCFC22 and SF6 production power are 23100 tons HCFC22 and 720 tons SF6 per year) and the quality (purity) of HCFC22 and SF6 produced.

Prior to the starting date of the project:

the HFC23 waste was generally released into the atmosphere and partly destructed;

the SF6 waste was generally released into the atmosphere and never destructed in the past.

The baseline scenario is the continuation of the existence practice under which the HFC23 and SF6 wastes were generally released to the atmosphere and would be inevitably released to the atmosphere in the lack of the destruction capacities and industrial safety requirements.

The project scenario envisages a total destruction of HFC23 and SF6 wastes from sources within the project boundary in the comparison of the baseline scenario under which the HFC23 and SF6 wastes would be released to the atmosphere.

#### A.4. Project methodology

Baseline methodology: The baseline is based on the selected elements of the approved CDM methodology AM0001: Incineration of HFC23 waste streams (version 05.1).

Monitoring methodology: The monitoring plan is based on the selected elements of the approved CDM methodology AM0001: Incineration of HFC23 waste streams (version 05.1).

The monitoring plan is revised in accordance with paragraph 40 of the Guidance on criteria for baseline setting and monitoring (version 03). See Appendix 3 for Revised Monitoring Plan.

#### A.5. Project implementation

The project implementation includes development, design, engineering, procurement, finance, construction, operation and maintenance of a system for collection, storage and thermal oxidation of HFC23 and SF6 wastes followed by treatment of combustion gases (absorption and neutralization) prior to safe disposal of all emissions and discharges.

The project implementation is finished in 2008. The destruction process has been started from 01.04.2008.

#### A.6. Project participants

Project operator and investor: HaloPolymer Kirovo-Chepetsk, LLC

Russian Federation, 613040 Kirovo-Chepetsk, Zavodskaya str., 17a

The owner of "KCKK Polymer plant" decided to change the brand name of a legal entity and the approval of the charter in the new edition. March 09, 2011 to the Unified State Register of Legal Entities entry was made to change the brand name of "KCKK Polymer plant" on "HaloPolymer Kirovo-Chepetsk" and re-charter in the new edition. Changing the name is not a reorganization, not alter the rights and responsibilities of the entity. Occurring in the text of the Report of the name of the investor "KCKK Polymer plant" and "HaloPolymer Kirovo-Chepetsk" are considered equal.

#### A.7. Project status

The project has a letter of approval from Party A from 23.07.2010 and Party B. from 26.10.2010

CAR 01 (pending approval by Host Party) and CAR 02 (pending written project approval by Party B) from Determination Report issued by DNV remained open. The project goes under the Track 1, so there is no need to close these CARs in Determination Report issued by DNV.

##### A.7.1. Revisions to monitoring plan

No new revisions are introduced in the present monitoring report for the III-rd quarter of 2011, which is developed in full compliance with the revised monitoring plan that is presented in Appendix 3.

However revisions and deviations were included in the monitoring reports for previous periods. To provide transparency regarding what revisions and when they were introduced and verified the history of their introduction is presented further:

The first revisions to the monitoring plan were provided in the monitoring report for the 1<sup>st</sup> monitoring period of 01.01.2008 - 31.12.2008 in April of 2009. The revisions were associated with a change of the method of determining such key variables as the quantities of technological emissions of HFC-23 and SF6; the quantities of commercial HFC-23 and SF6 produced, the measurement of HFC-23 and SF6 concentrations in the waste, the volume of effluent gases and HFC-23 concentration, data storage etc. Those revisions were accepted and verified by AIE, i.e. Bureau Veritas Certification Holding SAS (Verification report No. Russia/0020-3/2009 rev.01 issued on 20 April 2009). The detailed description of the revisions and justification/explanation of those are provided in the Appendix 1. to the present monitoring report.

Subsequently, the second revisions were included in the monitoring report (version 2.0 issued on 21.05.2010) for monitoring period of 01.01.2009 - 31.12.2009. Apart from improvement of justification of the revisions introduced in the previous period, the new revisions were associated with determination of electricity consumption, the quantity of gaseous

emissions; environmental monitoring issues; QC and QA procedure etc. The revisions were accepted and verified by Bureau Veritas Certification Holding SAS (Verification report No. Russia/0071-3/2010 rev.01 issued on 04 June 2010). The detailed description of the revisions and justification/explanation of those are provided in the Appendix 2 to the present Monitoring report.

In June of 2011 the methodology of monitoring based on the selected elements of the approved CDM methodology AM0001 "Incineration of HFC23 waste streams (version 05.1)" was reconsidered and eliminated by the project participant. Instead, an original JI-approach was applied for monitoring. Revisions introduced in the monitoring plan represent elimination of such factors as the cut-off conditions and baseline quantity of HFC23 and SF6 destroyed, which are, in first case, inapplicable due the absence of accurate and representative information, and, in the second case, are inapplicable due to erroneous use of the maximum permissible emissions as a measure of the state regulation of emissions of such gases and due to the absence of information that HFC23 and SF6 were historically destroyed. More detailed justification of revisions made contains in the Appendix 3.

The following monitoring reports (that were based on the revised monitoring plan) for the 3<sup>rd</sup> monitoring period of 01.01.2010 – 31.12.2010 and the 4<sup>th</sup> monitoring period of 01.01.2011-03.03.2011 (versions 2.1 issued on 24.06.2011) were developed and submitted for verification . The revisions, revised monitoring plan and revised monitoring reports were accepted and verified by Bureau Veritas Certification Holding SAS (Verification reports No. Russia-ver/0141/2010/rev.01 and No. Russia-ver/0142/2010/rev.01 issued on 28.06.2011). The description and explanation of the revisions are included Appendix 4.

The next monitoring report for the 5<sup>th</sup> monitoring period of 01.04.2011 -30.06.2011 did not include any new revisions and was developed in compliance with the revised monitoring plant. The monitoring report was verified by Bureau Veritas Certification Holding SAS (No. Russia-ver/0160/2011 issued 22.08.2011).

#### A.8. Emissions reductions

The expected and generated emission reductions are shown in table below:

Number of monitoring period	Length of the monitoring period	Generated emission reductions
1 <sup>st</sup> monitoring period	01.04.08 - 31.12.08	598 984
2 <sup>nd</sup> monitoring period	01.01.09 - 31.12.09	1 031 807
3 <sup>rd</sup> monitoring period	01.01.10 - 31.12.10	3 548 915
4 <sup>th</sup> monitoring period	01.01.11 - 31.03.11	884 976*
5 <sup>th</sup> monitoring period	01.04.11 - 30.06.11	2 237 130
<b>6<sup>th</sup> monitoring period</b>	<b>01.07.11 – 30.09.11</b>	<b>2 328 186</b>
7 <sup>th</sup> monitoring period	01.10.11 – 31.12.11	n/a
8 <sup>th</sup> monitoring period	01.01.12 - 31.03.12	n/a
9 <sup>th</sup> monitoring period	01.04.12 – 30.06.12	n/a
10 <sup>th</sup> monitoring period	01.07.12 – 30.09.12	n/a
11 <sup>th</sup> monitoring period	01.10.12 – 31.12.12	n/a

\* Note: The reason for preparing MR for three months instead of a year is the wish of the Buyer to contract the ERU from the project on quarterly basis.

#### A.9. Contact information

Project operator:

HaloPolymer Kirovo-Chepetsk, LLC , Russian Federation, 613040 Kirovo-Chepetsk, Zavodskaya str.,  
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Holding company:

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Igor Kuznetsov, Project director  
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## SECTION B. MONITORING ACTIVITIES

### B.1. Monitoring process

The monitoring process is executed according to the Corporate standard 6-020-2009 "GHG Utilization" (monitoring procedure). The key elements of monitoring process are described below:

Measurement of HFC23 / SF6 waste generated and supplied for destruction

Variables:  $q\_HFC23_y$ ,  $q\_SF6_y$ ,  $q\_G\_HFC23_y$ ,  $q\_G\_SF6_y$

$q\_G\_HFC23_y$  is the HFC23 waste generated during the quarter  $y$ , kg

$q\_G\_SF6_y$  is the SF6 waste generated during the quarter  $y$ , kg

$q\_HFC23_y$  is the HFC23 waste supplied for destruction during the quarter  $y$ , kg

$q\_SF6_y$  is the SF6 waste supplied for destruction during the quarter  $y$ , kg

The measurement of HFC23 waste generated and supplied for destruction are performed based on the stationary mass flow meters incorporated in the Automated Process Control System (APCS). APCS provides automated processing, storage, registration and archiving of technological process data with functionality of data protection and security. The consistency of data is provided by means of software.

The measurement of HFC23 / SF6 waste generated are made by stationary mass flow meter (Siemens, Germany) installed on the outlet pipelines from emission sources. The readings are automatically collected, stored and processed by APCS.

The measurement of HFC23 / SF6 waste supplied for destruction is made by two down-in-line stationary mass flow meter (Siemens, Germany) installed on the inlet pipelines to the destruction unit. The readings are automatically collected, stored and processed by APCS. The APCS automatically calculates the conservative value of the HFC23 / SF6 waste supplied for destruction based on readings from two down-in-line mass flow meters.

The stationary mass flow meters are incorporated in Automated Process Control System (APCS) based on the hardware and software system CENTUM CS 3000 (Yokogawa, Japan). CENTUM CS 3000 system provides automated processing, storage, registration and archiving of technological process data with functionality of data protection and security. The consistency of data is provided by means of software.

The daily reports are automatically generated by APCS software and stored on the workstations (2 mirror hard drives), printed from workstations and copied to storage server every day. Reports include hourly readings of mass flow meters and the conservative calculation of the HFC23 / SF6 waste supplied for destruction based on readings from two down-in-line mass flow meters.

The daily reports are stored on the workstation during 35 days and on the storage server during 10 years. The stored data is additionally archived to CD/DVD and stored during 10 years. The monthly printed reports are archived during 10 years.

The data from the daily reports are retrieved for any period by special software (internal audit program) which uses data from the storage server. This program is used for data gathering and printing. The monthly reports generated by the program are verified and archived.

Calculation of volume of effluent gases emitted from destruction Variables:

$q\_ND_y$

$q\_ND_y$  is the volume of gaseous emissions from destruction process during the quarter  $y$ , m<sup>3</sup>

The measurement of effluent gases from the destruction unit is made by analytical method apart of the APCS from 01.09.2008 (stationary volume flow meter works improperly due to condensed moisture). For that purpose the speed of effluent gas is measured weekly by portable flow meter (Testo-425). The measurements are documented and summary reports are archived during 10 years. The measurements are used for calculation of effluent gases volume (average effluent gas speed for a period is multiplied by area of the venting pipe and length of period).

Calculation of HFC23 / SF6 mass content in HFC23 / SF6 waste generated and supplied for destruction

Variables:  $C\_HFC23_y$ ,  $C\_SF6_y$ ,  $C\_G\_HFC23_y$ ,  $C\_G\_SF6_y$

$C\_G\_HFC23_y$  is the average monthly content of HFC23 in HFC23 waste generated during the quarter  $y$ , %

$C\_G\_SF6_y$  is the average monthly content of SF6 in SF6 waste generated during the quarter  $y$ , %

$C\_HFC23_y$  is the average monthly content of HFC23 in HFC23 waste supplied for destruction during the quarter  $y$ , %

$C_{SF6y}$  is the average monthly content of SF6 in SF6 waste supplied for destruction during the quarter  $y$ , %

The calculations of HFC23 / SF6 mass content are performed by laboratory weekly based on the gas samples from outlet pipelines from emission sources and inlet pipelines to the destruction unit. Gas samples are analyzed to measure HFC23 / SF6 volume contents and sample's density by chromatographs (Chromas GX-1000). The calculation of HFC23 / SF6 mass content is made under approved methods.

The mass HFC23 / SF6 contents are calculated based on volume contents and sample's density. HFC23 / SF6 mass content is calculated as:  $X_m = (M * X_v) / (V_m * p)$ , where

$M$  - molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)

$X_v$  - HFC23 / SF6 molar volume content in sample (%)

$V_m$  - molar volume (constant - 24,04 dm<sup>3</sup>/mole for gas)

$p$  - sample's density (g/dm<sup>3</sup>)

The results of analysis are regularly checked for repeatability and consistency.

The results of analysis are documented and archived, cross-checked with previous results. Background data and results are stored in laboratory. Monthly reports which include results of the weekly analysis are archived during 10 years.

Measurement of HFC23 / SF6 concentration in effluent gases from destruction process

Variables:  $C_{ND\_HFC23y}$ ,  $C_{ND\_SF6y}$

$C_{ND\_HFC23y}$  is the average monthly concentration of HFC23 in gas effluents during the quarter  $y$ , mg/m<sup>3</sup>

$C_{ND\_SF6y}$  is the average monthly concentration of SF6 in gas effluents during the quarter  $y$ , mg/m<sup>3</sup>

The measurement of HFC23 / SF6 concentration in effluent gases are performed by laboratory weekly based on the gas samples from the venting pipe after destruction unit. Gas samples are analyzed based on approved method, measurements are made by chromatographs (Chromas GX-1000).

The results of analysis are regularly checked for repeatability and consistency. The results of analysis are documented and archived, cross-checked with previous results. Initial data and results are stored in laboratory. Month and annual reports which include results of the weekly analysis are archived during 10 years.

Measurement of HFC23 recovered for sale

Variable:  $S_{HFC23y}$

$S_{HFC23y}$  is the HFC23 recovered for sale during the year  $y$ , t

The HFC23 quantity recovered for sale (if applicable) is determined as HFC23 gross output (commercial output measured by scales + change in inventory measured by level meter). The readings from level meters are taken at the end of each month and recorded. The readings from scales are recorded during the month. Based on the records the gross output of HFC23 is calculated monthly.

The HFC23 production is included in monthly production reports and passed to production accounting department which cross-checked data with production and accounting reports and prepared a summary report for GHG calculation.

Measurement of electricity consumption by the destruction process

Variable:  $EC_y$

$EC_y$  is the electricity consumption by the thermal destruction unit during the quarter  $y$ , MWh

The electricity consumption is measured by meters (feeders). The readings from feeders are gathered weekly and passed to electricity service organization which provided reports on electricity consumption during a month. These reports are used for GHG calculation.

Initial data treatment

The monthly reports which summarize the monitoring information are collected by project operator for verification and GHG calculation. These reports (or annual summary reports) are to be used to prepare monitoring reports.



## B.2. Monitoring equipment

The monitoring equipment comprises mass flow meters, level meters, scales, chromatographs and other equipment. The key equipment is listed below:

Mass flow meters	Range	Relative error	Absolute error
SITRANS FC MASSFLO MASS 2100/6000 Ex DI 6 mm	0-60 kg/hour	0,5%	0,050 kg/hour
SITRANS FC MASSFLO MASS 2100/6000 Ex DI 3 mm	0-10 kg/hour	0,5%	0,005 kg/hour

The flow meters are installed on the outlet pipelines from emission sources (1\*2 flow meters) and on the inlet to the destruction unit (2\*2 parallel meters). The zero check of the parallel flow meters was conducted every week and didn't indicate that the flow meter was not stable. The readings from mass flow meters are automatically processed by APCS based on the CENTUM CS 3000.

In compliance with the requirements of the Federal Agency for Technical Control and Metrology all the monitoring equipment is regularly inspected, checked and calibrated (if necessary) during the monitoring period.

## B.3. Monitoring data

The data presented in this monitoring report has been collected in line with the monitoring plan. The Appendix 3 summarizes monitored data (calculated in Excel from project operator's reports).

Measurement of HFC23 / SF6 waste generated and supplied for destruction

Variables:  $q_{HFC23y}$ ,  $q_{SF6y}$ ,  $q_{G\_HFC23y}$ ,  $q_{G\_SF6y}$

$q_{G\_HFC23y}$  is the HFC23 waste generated during the quarter y, kg

$q_{G\_SF6y}$  is the SF6 waste generated during the quarter y, kg

$q_{HFC23y}$  is the HFC23 waste supplied for destruction during the quarter y, kg

$q_{SF6y}$  is the SF6 waste supplied for destruction during the quarter y, kg

The daily data for calculation of  $q_{HFC23y}$ ,  $q_{SF6y}$ ,  $q_{G\_HFC23y}$ ,  $q_{G\_SF6y}$  is collected from storage server using APCS by server administrator and processed in MS Excel by the head of Environmental department. The summary results are verified by supervisors by means of internal audit program and cross-checking with documented reports.

Calculation of the volume of effluent gases emitted from destruction

Variables:  $q_{NDy}$

$q_{NDy}$  is the volume of gaseous emission from destruction process during the quarter y, m3

The data for calculation of  $q_{NDy}$  (flow speed of effluent gas) is provided by chief mechanic department and proceeded in MS Excel by the head of Environmental department. The summary results and calculation are verified by supervisors.

Calculation of HFC23 / SF6 mass contents in HFC23 / SF6 waste generated and supplied for destruction

Variables:  $C_{HFC23y}$ ,  $C_{SF6y}$ ,  $C_{G\_HFC23y}$ ,  $C_{G\_SF6y}$

$C_{G\_HFC23y}$  is the average annual content of HFC23 in HFC23 waste generated during the year y, %

$C_{G\_SF6y}$  is the average annual content of SF6 in SF6 waste generated during the year y, %

$C_{HFC23y}$  is the average annual content of HFC23 in HFC23 waste supplied for destruction during the year y, %

$C_{SF6y}$  is the average annual content of SF6 in SF6 waste supplied for destruction during the year y, %

The data for calculation of  $C_{HFC23y}$ ,  $C_{SF6y}$ ,  $C_{G\_HFC23y}$ ,  $C_{G\_SF6y}$  (results of analysis) is provided by laboratory and processed in MS Excel by the head of Environmental department. The summary results and calculation are verified by supervisors.

Measurement of HFC23 / SF6 concentration in effluent gases from destruction process

Variables:  $C_{ND\_HFC23y}$ ,  $C_{ND\_SF6y}$

$C_{ND\_HFC23y}$  is the average monthly concentration of HFC23 in gas effluents during the quarter y, mg/m3

$C_{ND\_SF6y}$  is the average monthly concentration of SF6 in gas effluents during the quarter y, mg/m3

The data for calculation of  $C_{ND\_HFC23y}$ ,  $C_{ND\_SF6y}$  (results of analysis) is provided by laboratory and processed in MS Excel by the head of Environmental department. The summary results and calculation are verified by supervisors.

Measurement of HFC23 waste recovered for sale

Variables:  $S_{HFC23y}$

$S_{HFC23y}$  is the HFC23 recovered for sale during the quarter y, t

The data for calculation of  $S_{HFC23y}$  is provided by production accounting department and processed in MS Excel by the head of Environmental department. The summary results and calculation are verified by supervisors. HFC23 was not recovered for sale in the third quarter of 2011.

Measurement of electricity consumption by destruction process

Variable:

$EC_y$  is electricity consumption by the thermal destruction unit during the quarter y, MWh

The data for calculation of  $EC_y$  is provided by chief power engineer department and processed in MS Excel by the head of Environmental department. The summary results and calculation are verified by supervisors.

Predefined data for calculations

Predefined data for calculations are taken from PDD by the head of Environmental department (exception - see Appendix 2) and verified by the supervisors.

#### B.4. Environmental control

The environmental impact of the project in the monitoring period was assessed in terms of formation of gaseous, liquid and solid wastes.

The control of emissions of HFC23, SF6 and others pollutants in effluent gas from the destruction unit as well as their adherence to emission levels was conducted by accredited Laboratory of environmental protection in accordance with a schedule as:

HFC23, SF6, CO – 1 time per month  
HCl, HF, Cl<sub>2</sub>, NO<sub>2</sub> – 6 times per year

The quarterly emissions estimates are: CO (1,532 kg), HF (0,080 kg), HCl (0,557 kg), Cl<sub>2</sub> (0,072 kg), NO<sub>2</sub> (0,409 kg). The emissions of these pollutants didn't exceed the allowed levels. The dioxins formation in effluent gases was conducted 1 time and showed also satisfactory results.

Due to absorption and neutralization of effluent gases the following liquid wastes were produced: HF solution (29,86 t), KOH solution (3,606 t). The liquid wastes were utilized as commercial products.

The wastes in solid form were not produced due to the project activity.

#### B.5. Quality assurance and quality control

Quality assurance and quality control are performed according to the registered PDD.

The quality of electronic calculations and electronic data transfer to the monitoring report is provided by the project owner. The background data is transmitted by the project owner in electronic form. Additionally the scanned copies of monthly reports are submitted. All the calculations are made automatically using MS Excel based on the formulas of monitoring plan. The quality of data inserted in MS Excel, formulas used in MS Excel is checked by audit service project owner which signs the MS Excel spreadsheets with background data and MR with final calculation.

All data will be stored in archive in electronic and paper form during 10 years, but not less than 2 years after the end of the crediting period or the last issue of ERUs.

#### B.6. Operational and administrative structure

The operational and management structure comprises Project operator and Holding company:

Project operator, HaloPolymer Kirovo Chepetsk, LLC, operates the project and executes the monitoring plan, analyses data and prepares the monitoring reports.

Monitoring report for III-rd quarter of 2011,  
Version 3.0 dated 26 October 2011  
Co-destruction of HFC23 and SF6 at "KCKK Polimer Plant" Ltd

Holding company, HaloPolymer, OJSC supervises the execution and progress of the project.

The monitoring procedures are executed by the project operator according to the Corporate standard 6-0202009 "GHG Utilization" (monitoring procedure) set forth by the Order of the Director №7 dated 11.01.2009. The monitoring data has to be recorded under established procedures and persons responsible for data collection and storage have been appointed.

## SECTION C. CALCULATIONS OF GHG REDUCTIONS

### C.1. Calculation process

The calculation process includes the following steps:

The calculation of key variables

Calculation of the project GHG emissions

Calculation of the baseline GHG emission

Calculation of the GHG leakages

Calculation of the GHG emission reductions

The calculation is performed in MS Excel based on the background data provided by the project owner. All the computations are made automatically using predefined formulas from the monitoring plan (see Appendix 1). The computations are shown in Appendix 4.

The key background data for calculation was inserted in MS Excel file as database (daily measurements of mass flow meters). Other background data was inserted manually from the summary reports. All the background data in MS Excel file was verified by project operator based on printed reports and internal audit program. The printed lists with background data from MS Excel file were signed.

### C.2. The calculation of key variables

The calculations of key variables were made in MS Excel based on the verified background data.

The values of  $q_{G\_HFC23y}$ ,  $q_{G\_SF6y}$ ,  $q_{HFC23y}$ ,  $q_{SF6y}$  were calculated as sum of daily values of these variables obtained from the database provided by the project operator.

The value of  $q_{NDy}$  was calculated as the sum of monthly values which are the product of average speed of effluent gases during the month, the area of venting pipe and the length of the corresponding month (the shutdown time was not used in the calculation).

The values of  $C_{G\_HFC23y}$ ,  $C_{G\_SF6y}$ ,  $C_{HFC23y}$ ,  $C_{SF6y}$ ,  $C_{ND\_HFC23y}$ ,  $C_{ND\_SF6y}$  were calculated as the quarterly average of monthly values (the average values of mass content or concentration during the month).

The values of  $S_{HFC23y}$  and  $ECy$  were calculated as the sum of the monthly values. HFC23 was not recovered for sale in the third quarter of 2011, thus  $S_{HFC23y} = 0$ .

In below table the input data for calculation of the key variables is presented.

Table C.2.1 Input data for calculation of key variables

Variable	Months			Total/average
	July.11	August.11	September.11	2011
$q_{HFC23y}$ (kg)	78 478	78 989	73 999	231 466
$q_{SF6y}$ (kg)	3 676	3 124	2 795	9 595
$q_{G\_HFC23y}$ (kg)	78 508	79 197	74 013	231 718
$q_{G\_SF6y}$ (kg)	3 699	3 142	2 809	9 650
$q_{NDy}$ (m3)	347 148	341 792	332 659	1 021 600
$C_{HFC23y}$ (%)	80,12	79,54	76,13	78,59
$C_{SF6y}$ (%)	85,19	95,95	80,40	87,18
$C_{G\_HFC23y}$ (%)	80,11	79,42	76,36	78,63

C_G_SF6y (%)	85,09	95,73	80,42	87,08
C_ND_HFC23y (mg/m3)	1,415	1,000	1,000	1,14
C_ND_SF6y (mg/m3)	0,100	0,100	0,100	0,10
S_HFC23y (t)	0,000	0,000	0,000	0
ECy(MWh)	36,928	37,120	37,384	111

The main project metrics were calculated as:

$$G\_HFC23_y = q\_G\_HFC23_y \times 10^{-3} \times C\_G\_HFC23_y \times 10^{-2}$$

$$G\_SF6_y = q\_G\_SF6_y \times 10^{-3} \times C\_G\_SF6_y \times 10^{-2}$$

$$Q\_HFC23_y = q\_HFC23_y \times 10^{-3} \times C\_HFC23_y \times 10^{-2}$$

$$Q\_SF6_y = q\_SF6_y \times 10^{-3} \times C\_SF6_y \times 10^{-2}$$

$$ND\_HFC23_y = q\_ND_y \times C\_ND\_HFC23_y \times 10^{-9}$$

$$ND\_SF6_y = q\_ND_y \times C\_ND\_SF6_y \times 10^{-9}$$

$$L\_HFC23_y = G\_HFC23_y - Q\_HFC23_y - S\_HFC23_y$$

$$L\_SF6_y = G\_SF6_y - Q\_SF6_y$$

The monthly results of calculation of key variables are shown in Appendix 3. The quarterly results of calculation are shown in table below:

Table C.2.2 The values of key variables

HFC23 generated from HCFC22 production		HFC23 supplied for destruction	
q_G_HFC23 <sub>y</sub> , kg	231 718	q_HFC23 <sub>y</sub> , kg	231 466
C_G_HFC23 <sub>y</sub> , %	78,63	C_HFC23 <sub>y</sub> , %	78,59
G_HFC23 <sub>y</sub> , t	182,19	Q_HFC23 <sub>y</sub> , t	181,92
HFC23 leaked before destruction		HFC23 not destructed after destruction	
-		q_ND <sub>y</sub> , m3	1 021 600
-		C_ND_HFC23 <sub>y</sub> , mg/m3	1,138
L_HFC23 <sub>y</sub> , t	0,28	ND_HFC23 <sub>y</sub> , t	0,00116
SF6 generated from SF6 production		SF6 supplied for destruction	
q_G_SF6 <sub>y</sub> , kg	9 650	q_SF6 <sub>y</sub> , kg	9 595
C_G_SF6 <sub>y</sub> , %	87,08	C_SF6 <sub>y</sub> , %	87,18
G_SF6 <sub>y</sub> , t	8,40	Q_SF6 <sub>y</sub> , t	8,37
SF6 leaked before destruction		SF6 not destructed after destruction	
- -		q_ND <sub>y</sub> , m3	1 021 600
-		C_ND_SF6 <sub>y</sub> , mg/m3	0,1
L_SF6 <sub>y</sub> , t	0,04	ND_SF6 <sub>y</sub> , t	0,00010

### C.3. Calculation of the project GHG emissions

The project GHG emissions were calculated using the following formula:

$$E_{DP_y} = ND\_HFC23_y \times GWP\_HFC23 + ND\_SF6_y \times GWP\_SF6 + Q\_HFC23_y \times EF$$

where

ND\_HFC23<sub>y</sub> is the quantity of HFC23 not destroyed in the unit during the third quarter of 2011, t;

ND\_SF6<sub>y</sub> is the quantity of SF6 not destroyed in the unit during the third quarter of 2011, t;

Q\_HFC23<sub>y</sub> is the quantity of HFC23 supplied for destruction into the unit during the third quarter of 2011, t;

EF is the emissions factor that determines the amount of CO<sub>2</sub> generated per 1 tone of destroyed HFC23. According to CDM methodology AM0001, EF = 0,62857 t CO<sub>2</sub>-e/t;

GWP\_HFC23 is the Global Warming Potential (GWP) that converts 1 tone of HFC23 to tones of CO<sub>2</sub> equivalent, t CO<sub>2</sub>-e/t. The approved GWP value for HFC23 is 11 700 t CO<sub>2</sub>-e/t for the first commitment period under the Kyoto Protocol;

GWP\_SF6 is the Global Warming Potential (GWP) for conversion of 1 ton of SF6 o tons of CO<sub>2</sub> equivalent, t CO<sub>2</sub>-e/t. The approved GWP value for SF6 is 23 900 t CO<sub>2</sub>-e/t for the first commitment period under the Kyoto Protocol.

The project GHG emissions		
E_DP <sub>y</sub>	t CO <sub>2</sub> -e	130,40

### C.4. Calculation of the baseline GHG emissions

The baseline GHG emissions were calculated with using the following formulas:

$$BE_y = Q\_HFC23_y \times GWP\_HFC23 + Q\_SF6_y \times GWP\_SF6$$

The baseline GHG emissions		
BE <sub>y</sub>	t CO <sub>2</sub> -e	2 328 377

### C.5. Calculation of the GHG leakages

The GHG leakages were calculated using the following formula:

$$L_y = E_{Cy} \times EF_{CO_2, grid, y} \times 10^{-3}$$

The  $EF_{CO_2, grid, 2011} = 542 \text{ kg CO}_2/\text{MWh}$

GHG leakage		
$L_y$	t CO <sub>2</sub> -e	60,40

#### C.6. Calculation of GHG emission reductions

The GHG emission reductions were calculated using the following formula:

$$ER_y = BE_y - E_{DP_y} - L_y$$

The GHG emission reductions		
$ER_y$	t CO <sub>2</sub> -e	2 328 186

# **APPENDIX 1. REVISIONS TO MONITORING PLAN ADOPTED FOR MONITORING PERIOD OF 01.01.2008-31.12.2008**

<b>D.7 Planned deviations</b>			
Nº of formula or table	As stated in PDD	Applied in monitoring	Reason of deviation
1	2	3	4
D.1, Description of monitoring plan chosen, p.1	1. The quantity of technological emissions of HFC23 and SF6 from HCFC22 and sulfur hexafluoride production lines is measured continuously by mass flow meters installed on the unloading pipelines from emission sources. Content of HFC23 and SF6 is measured by laboratory chromatographs once a week or more often in case of technological mode change.	1. The quantity of technological emissions of HFC23 and SF6 from HCFC22 and sulfur hexafluoride production lines is measured continuously by mass flow meters installed on the outlet pipelines from emission sources.  The HFC23 and SF6 mass content in HFC23/SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case of technological mode change) using analytical method.	The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.  HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: $X_m = (M * X_v) / (V_m * p)$ , where  M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)  Xv – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007  Vm – molar volume (constant - 24,04 dm <sup>3</sup> /mole for gas)  p – sample's density (g/dm <sup>3</sup> ) to be measured using approved method MZ-110-2008



1	2	3	4
D.1, Description of monitoring plan chosen, p.2	2. The quantity of HFC23 and SF6 supplied to the thermal hydrolysis unit is measured continuously by two down-the-line flow meters installed on each waste feeding line. Content of HFC23 and SF6 is measured by laboratory chromatographs once a week or more often in case of technological mode change.	2 The HFC23 / SF6 waste quantity supplied to the thermal hydrolysis unit is measured continuously by two down-the-line flow meters installed on each waste feeding line (readings are automatically recorded hourly). The HFC23 / SF6 mass content in the HFC23/SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case technological mode change) using analytical method.	<p>The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.</p> <p>HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: <math>X_m = (M * X_v) / (V_m * p)</math>, where</p> <p>M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)</p> <p>X<sub>v</sub> – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007</p> <p>V<sub>m</sub> – molar volume (constant - 24,04 dm<sup>3</sup>/mole for gas)</p> <p>p – sample's density (g/dm<sup>3</sup>) to be measured using approved method MZ-110-2008</p>

D.1, Description of monitoring plan chosen, p. 3	3. The volume of effluent gases from the unit is measured by a volumetric meter. HFC23 content in the gases is measured by laboratory chromatograph once a week.	3. The volume of effluent gases from the unit is calculated based on the average flow speed (measured by portable flow meter weekly) and the length of the monitoring period (the shutdown time is not considered for conservatism). The HFC23 and SF6 mass contents in the influent gases are measured by chromatograph (sample analysis is performed once a week).	In August of 2008 the volume meter installed on effluent gas line after a column 5/8 failed. The reason of improper ability – a significant amount of condensed moisture carried away by a stream of gas after columns of sanitary treatment. From 09/01/2008 the decision was made to define the flow of effluent gases once a week by thermo anemometer «TESTO – 425». As a result of direct measurement velocity of an air stream ( $u$ , km/s) is defined. Monthly gas flow is defined by the formula:
Table D.1.1.1, Parameter $q_{NDy}$ Column 3	Volume flow sensor	Portable thermoanemometer	$q_{NDy}^* = u_{cp} F 3600 \cdot T$ , <b>(D.3-4)</b>  Where $F$ - the area of air duct, m <sup>3</sup> $u_{cp}$ - monthly average value of air stream velocity, km/s $T$ (Operating time) is the operating time of the thermohydrolysis unit, hour/month. The change of method of determining the effluent gas flow $q_{NDy}$ was approved by the positive decision of the expert organization (Appendix D-4). Note: Considering the conclusion of the expert organization (Appendix D-5) instead of parameter $T$ (Operating work) «the quantity of thermohydrolysis reactor operating work hours per month» the calendar fund of working hours is used in the formula (D.3-4)
Table D.1.1.1, Parameter $q_{NDy}$ Column 5	(m) Measured	(m) Measured + (c) calculated	
Table D.1.1.1, Parameter $q_{NDy}$ Column 6	Every month (measurement every hour)	Every month (measurement every week)	
Table D.1.1.1, Parameter $q_{NDy}$ Column 8	Electronic and paper	paper	
D.1, Description of monitoring plan chosen, p. 5	5. The quantity of produced SF6 is determined on a monthly basis as a sum of the product loaded into cylinders and containers (measured by scales) and the finished product left in the collector (measured by the collector level meter).	5. The quantity of produced SF6 is determined on a monthly basis as a sum of the product loaded into cylinders and containers (measured by scales) and of the residual products in tanks (measured by tank-level gauge) and by deduction from the sum obtained of residual products in tanks on a first date of a month passed.	In PDD for SF6 output determining the surplus of final product on the first day of month passed was not taken into account.

<p>D.1, Description of monitoring plan chosen of, p. 4</p>	<p>4. The quantity of produced HCFC22 is determined on a monthly basis as a sum of commercial HCFC22 output (measured by collector level meter) and the readings of the mass flow meter of tetrafluorethylene (monomer -4) production further multiplied by HCFC22 consumption factor for monomer-4 production.</p>	<p>The quantity of produced HCFC22 is determined on a monthly basis as a sum of</p> <ul style="list-style-type: none"> <li>- quantity of inventories of HCFC-22 and monomer-4 multiplied by HCFC-22 consumption factor for monomer-4 production. (is determined by level gauges in collector tanks and by method of inventory measurement). ,</li> <li>- quantity of commercial HCFC-22 output (it is measured by a mass flow meter),</li> <li>- quantity of monomer-4 passed for production of shops 76, 145 and 22 (measured by mass flow meters) with multiplication by HCFC-22 consumption factor for monomer-4 production, and subtraction of HCFC-22 quantity of inventory and a monomer-4 with multiplication by HCFC-22 consumption factor for monomer-4 production on the beginning of accounting (is determined by level gauges in collector tanks and by method of inventory measurement).</li> </ul>	<p>In PDD, for determination of the current HCFC-22 production the inventories surplus of HCFC-22 and monomer-4 in the beginning and end of an accounting month were not taken into account. Quantity of commercial HCFC-22 produced is measured by mass flow meter. *Note. Factors of raw materials and power consumption are established annually the next year on the basis of actual norms of the consumption for a fiscal year. The consumption factor of HCFC-22 for monomer-4 production for 2008 has been established by "Norms of the consumption of raw materials, materials and power in shop 76 for 2008» № 01/08/1411kt dd 12/13/2007, approved by the chief engineer of plant.</p>
<p>D.1, Description of monitoring plan chosen, p 6</p>	<p>6 The quantity of HFC23 recovered for sale is determined on a monthly basis as a sum of the amount of the product loaded into cylinders and containers (measured by scales) and finished product left in the collector (measured by the level meter of the finished product collector).</p>	<p>6. The quantity of HFC23 recovered for sale is determined on a monthly basis as a sum of the amount of the product loaded into cylinders and containers (measured by scales) and a residual product in co;ectors (measured by the level meters) and by subtraction from the sum of the residual product in collectors on the 1st day of a month passed.</p>	<p>In PDD, the residual finish product on the first day of the month passed for HFC23 output determination were not be considered</p>

Table D.1.1.1, parameter $C_{HFC23}$ Column 5	(m) Measured	(m) Measured + (c)calculated	The method allowing making direct measurement of HFC-23 mass content in gas emissions is absent. HFC-23 and SF6 mass content are calculated by the formula :
Table D.1.1.1, parameter $C_{G_{HFC23}}$ Column 5	(m) Measured	(m) Measured + (c)calculated	$X_M = \frac{MX}{24.04 \rho}$ , where M- molecular mass of component determined (70.014 for HFC-23 and 146.050 for SF6), g/mole X- volume (mole) ratio of component determined from test gotten by direct measurement by the method MZ -111-2007, % 24.04 – molar volume of gas, driven to temperature 200C and pressure 760 mm.HG, dm <sup>3</sup> /mole $\rho$ – density of test, determined by the method MZ 110-2008, g/dm <sup>3</sup>
Table D.1.1.1, parameter $C_{SF6}$ Column 5	(m) Measured	(m) Measured + (c)calculated	
Table D.1.1.1, parameter $C_{G_{HFC-23}}$ $C_{C_{SF6}}$ Column 5	(m) Measured	(m) Measured + (c)calculated	
Table D.1.1.1, parameter $S_{HFC23}$ Column 8	Electronic and Paper	Paper	Readings of level gauge of collectors are provided for only in paper.
Table D.1.1.1, parameter $P_{HCFC22}$ Column 5	Electronic and Paper	Paper	Readings of level gauge of collectors are provided for only in paper. Electronic report on mass flowmeters readings for month is formed and printed on paper medium on 0.00 hour of 1-st date of month. Readings of meters are set to zero. Electronic storage is not provided.
Table D.1.1.1, parameter $P_{SF6}$ Column 8	Electronic and Paper	Paper	Readings of level meters of collectors is provided only in paper. Fill in of a product is made on scales on the automated system of a filling in with electronic printing of the specification on quantity of product filled. Electronic storage is not provided.

Table D.1.1.1, parameter $EC_y$ Column 8	Electronic	Paper	Readings of meter is provided only in paper. . Electronic storage is not provided.
Table D.1.1.1, parameter $C_{ND} SF_6 y$ Column 9	Measured weekly. If the thermal hydrolysis unit stops additional analyses are performed to estimate <u>SF6 leaks</u> .	Measurements are made once a week.	Measurement of SF6 and HFS-23 concentration in emissions during reactor stops is not provided because at a reactor stop cutoff valves on pipelines of SF6 and HFS-23 supply are automatically shut (during 0,5 s) and entry of gases in the reactor is stops. Considerable volume (3,8 m3) and high temperature (1100-1300oC) of reaction zone cause a delayed action of thermodestruction process - by results of measurment for temperature decrease in a zone of reaction from 1200°C to 1100°C it is required not less than 30 seconds. Preservation of the high temperatures in the reactor during specified time provides full destruction of residual quantities of trifluoromethane and SF6, being in flame of torch and incoming from pipelines at the moment of a stop.  Absence of greenhouse gases in emissions after the furnace during the period of stops is confirmed by actual measurement and the positive conclusion of the expert organization (Annex D-5).
Table D.1.1.1, parameter $C_{ND} HFC23 y$ Column 9	Measured weekly. If the thermal hydrolysis unit stops additional analyses are performed to estimate <u>SF6 leaks</u> .	Measurements are made once a week.	
D.1-10 Parameter value $P_{HCFC22 Hist, max}$	16956.5	12717.375	Monitoring of parameter was introduced from the 1st April 2008. In emission reduction calculations $\frac{3}{4}$ from 16956.5 was assumed.
D.1-11 Parameter value $P_{SF_6 Hist, max}$	219.9	164.925	Monitoring of parameter was introduced from the 1st April 2008. In emission reduction calculations $\frac{3}{4}$ from 219.9 was assumed.
D.1-15 Parameter value $MPE_{HFC23 Hist, min}$	83.4	65.55	Monitoring of parameter was introduced from the 1st April of 2008. In emission reduction calculations $\frac{3}{4}$ from 83.4 was assumed.

D.1-16 Parameter value $MPE\_SF_6\ Hist, min$	6.02	4.515	Monitoring of parameter was introduced from the 1 <sup>st</sup> April 2008. In emission reduction calculations $\frac{3}{4}$ from 6.02 was assumed.
D.1-17 Value of emission factor	$EF_{CO2, grid, 2008} = 565 \text{ kg CO}_2/\text{MWh}$	$EF_{CO2, grid, 2008} = 504 \text{ kg CO}_2/\text{MWh}$	CO2 emission factor for electricity generation consumed from the grid is taken from Operational Guidelines for Project Design Documents of Joint Implementation Project. Volume 1: General guidelines, Ministry of Economic Affairs of the Netherlands, May 2004, Version 2.3
D.1-17 Formula for calculation	$Ly = ECy * EF_{CO2, grid, y} * 10^{-3}$		Electricity loss factor in the grid of 1.2 is taken into account in the formula.

## APPENDIX 2. REVISIONS TO MONITORING PLAN ADOPTED FOR MONITORING PERIOD OF 01.01.2009-31.12.2009

Revision 1	Registered PDD / Intended deviation / Explanation and Justification
D.1. Description of monitoring plan chosen Item 1	The quantity of technological emissions of HFC23 and SF6 from HCFC22 and SF6 production lines is measured continuously by mass flow meters installed on the outlet pipelines from emission sources. Content of HFC23 and SF6 is measured by laboratory chromatographs once a week or more often in case technological mode change.
	The HFC23 / SF6 waste quantity generated by production process is continuously measured by mass flow meter installed on the outlet pipelines from emission sources (readings are automatically recorded hourly). The HFC23 / SF6 mass content in the HFC23 / SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case technological mode change) using analytical method.
	Clarification. The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.
	HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: $X_m = (M \cdot X_v) / (V_m \cdot p)$ , where M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6) Xv – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007 Vm – molar volume (constant - 24,04 dm <sup>3</sup> /mole for gas) p – sample's density (g/dm <sup>3</sup> ) to be measured using approved method MZ-110-2008
Revision 2	Registered PDD / Intended deviation / Explanation and Justification
D.1. Description of monitoring plan chosen Item 2	The quantity of HFC23 and SF6 supplied to the thermal hydrolysis unit is measured continuously by two down-the-line flow meters installed on each waste feeding line (readings are automatically recorded hourly). Content of HFC23 and SF6 is measured by laboratory chromatographs once a week or more often in case technological mode change.
	The HFC23 / SF6 waste quantity supplied to the thermal hydrolysis unit is measured continuously by two down-the-line flow meters installed on each waste feeding line (readings are automatically recorded hourly). The HFC23 / SF6 mass content in the HFC23 / SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case technological mode change) using analytical method.
	The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.

	<p>HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: <math>X_m = (M * X_v) / (V_m * p)</math>, where</p> <p>M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)</p> <p><math>X_v</math> – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007</p> <p><math>V_m</math> – molar volume (constant - 24,04 dm<sup>3</sup>/mole for gas)</p> <p>p – sample's density (g/dm<sup>3</sup>) to be measured using approved method MZ-110-2008</p>
<b>Revision 3</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The volume of effluent gases from the unit is measured by a volumetric meter. HFC23 content in the gases is measured by laboratory chromatograph once a week.
Item 3	<p>The volume of effluent gases from the unit is calculated based on the average flow speed (measured by portable flow meter weekly) and the length of the monitoring period (the shutdown time is not considered for conservatism). The HFC23 and SF6 mass contents in the influent gases are measured by chromatograph (sample analysis is performed once a week).</p> <p>The volume meter works improperly due to condensed moisture in effluent gases. Therefore, from 01.09.2008 the volume of effluent gases from the unit is calculated based on the effluent gas flow speed (m/sec) measured by portable flow meter weekly and the length of the monitoring period (the shutdown time is not considered to provide conservative estimations) as:</p> <p><math>q_{NDy} = V * F * T</math>, where:</p> <p>V – monthly average gas flow speed (m/sec) F – sectional area of gas outlet pipe (m<sup>2</sup>)</p> <p>T – length of period (sec)</p> <p>This method is approved by independent expert. This deviation leads to the more conservative GHG reductions calculation.</p>
<b>Revision 4</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The quantity of produced HCFC22 is determined on a monthly basis as a sum of commercial HCFC22 output (measured by collector level meter) and the readings of the mass flow meter of tetrafluorethylene (monomer -4) production further multiplied by HCFC22 consumption factor for monomer-4 production.
Item 4	<p>The HCFC22 quantity produced is determined monthly as a sum of HCFC22 gross output (commercial output measured by mass meter + change in inventory measured by level meter) and monomer-4 gross production (commercial output measured by mass meter + change in inventory measured by level meter) multiplied by HCFC22 consumption factor for monomer-4 production.</p> <p>Clarification. According to the registered PDD the HCFC22 and monomer-4 inventories are not included in calculation. Therefore,</p>



	the gross output (commercial output + change in inventory) should be determined.
<b>Revision 5</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The quantity of produced SF6 is determined on a monthly basis as a sum of the product loaded into cylinders and containers (measured by scales) and the finished product left in the collector (measured by the collector level meter).
Item 5	The SF6 quantity produced is determined monthly as SF6 gross output (commercial output measured by scales + change in inventory measured by level meter).
	Clarification. According to the registered PDD the SF6 inventory is not included in calculation. Therefore, the gross output (commercial output + change in inventory) should be determined.
<b>Revision 6</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The quantity of HFC23 recovered for sale is determined on a monthly basis as a sum of the amount of the product loaded into cylinders and containers (measured by scales) and finished product left in the collector (measured by the level meter of the finished product collector).
Item 6	The HFC23 quantity recovered for sale (if applicable) is determined monthly as HFC23 gross output (commercial output measured by scales + change in inventory measured by level meter).
	Clarification. According to the registered PDD the HFC23 inventory is not included in calculation. Therefore, the gross output (commercial output + change in inventory) should be determined.
<b>Revision 7</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	Electricity consumption is measured by an electricity meter.
Item 7	Electricity consumption is measured by an electricity meter and calculated annually.
	Clarification. The more detailed description is provided. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 8</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The quantity of gaseous emissions (CO, HCl, HF, Cl2, organic carbon, dioxins and NOx) is measured in compliance with the current environmental standards of Russia.
Item 8	The quantities of gaseous emissions (HFC23, SF6, HCl, HF, Cl2, CO, NO2 and dioxins) are measured in compliance with the current

	environmental standards of Russia.
	The HFC23, SF6 emissions are included, organic carbon is excluded. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 9</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1. Description of monitoring plan chosen	The amount of liquid effluents and its parameters (pH, COD BOD, suspended solids, fluorides and metals) are not measured as only utilizable wastes are generated in the production process.
Item 9	The quantities of liquid effluents (HF solution, KOH solution) are measured annually.
	The quantities of liquid influents are measured. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 10</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived ID 1. q_HFC23 <sub>y</sub>	<p>Data variable: Quantity of HFC23 wastes supplied to destruction process</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured in parallel by two flow meters</p> <p>Recording frequency: Monthly (measured not less than once per hour)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured directly before the unit. Monthly data is the sum of the accumulated data. Readings are taken at least once an hour and the lowest reading of the two flow meters is chosen.</p>
	<p>Data variable: HFC23 waste quantity supplied to destruction process</p> <p>Source of data: 2 mass flow meters</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (hourly readings)</p> <p>Proportion of data to be monitored: 100%</p>

	<p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured in parallel by 2 mass flow meters directly before the unit. Readings are taken hourly and processed by APCS, the lowest reading is chosen automatically by APCS. Monthly data is the sum of the accumulated data.</p> <p>Clarification. This deviation doesn't influence the GHG reductions calculation.</p>
<b>Revision 11</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
<p>D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived</p> <p>ID 2. C_HFC23<sub>y</sub></p>	<p>Data variable: Concentration of HFC23 supplied to destruction process</p> <p>Source of data: Chromatograph</p> <p>Data unit: %</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (weekly measurements)</p> <p>Proportion of data to be monitored: -</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: -</p> <p>Data variable: HFC23 mass content in HFC23 waste supplied to destruction process</p> <p>Source of data: Chromatograph</p> <p>Data unit: %</p> <p>Determination method: (m) measured, (c) calculated</p> <p>Recording frequency: Monthly (weekly measurements)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.</p> <p>The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.</p> <p>HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: <math>X_m = (M * X_v) / (V_m * p)</math>, where</p>

	<p>M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)</p> <p>Xv – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007</p> <p>Vm – molar volume (constant - 24,04 dm<sup>3</sup>/mole for gas)</p> <p>p – sample's density (g/dm<sup>3</sup>) to be measured using approved method MZ-110-2008</p>
<b>Revision 12</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
<p>D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived</p> <p>ID 3. q_ND<sub>y</sub></p>	<p>Data variable: Volume of gaseous effluent from the unit</p> <p>Source of data: Volumetric flow meter</p> <p>Data unit: m<sup>3</sup></p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly (measurements once per hour)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: -</p>
	<p>Data variable: Volume of gaseous effluent from the unit</p> <p>Source of data: Portable flow meter</p> <p>Data unit: m<sup>3</sup></p> <p>Determination method: (m) measured, (c) calculated</p> <p>Recording frequency: monthly (weekly measurements)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Paper</p> <p>Comment: Calculated conservatively based on effluent gas flow speed and length of the period.</p>
	<p>The volume meter works improperly due to condensed moisture in effluent gases. Therefore, from 01.09.2008 the volume of effluent gases from the unit is calculated based on the effluent gas flow speed (m/sec) measured by portable flow meter weekly and the length of the monitoring period (the shutdown time is not considered to provide conservative estimations) as:</p> <p>q_ND<sub>y</sub> = V * F * T, where:</p>

	<p>V – monthly average gas flow speed (m/sec) F – sectional area of gas outlet pipe (m<sup>2</sup>)</p> <p>T – length of period (sec)</p> <p>This method is approved by independent expert.</p> <p>The data is archived only in paper form. This deviation leads to the more conservative GHG reductions calculation.</p>
Revision 13	Registered PDD / Intended deviation / Explanation and Justification
<p>D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived</p> <p>ID 4. C_ND_SF6<sub>y</sub></p>	<p>Data variable: Concentration of SF6 in gaseous effluents from the unit</p> <p>Source of data: Chromatograph</p> <p>Data unit: mg/m<sup>3</sup></p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly</p> <p>Proportion of data to be monitored: -</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured weekly. If the thermal hydrolysis unit stops additional analysis are performed to estimate SF6 leaks.</p>
	<p>Data variable: SF6 concentration in gaseous effluents from the unit</p> <p>Source of data: Chromatograph</p> <p>Data unit: mg/m<sup>3</sup></p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly (weekly measurements)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: If the SF6 concentration is not detectable than the value is conservatively taken to be equal 0,1 mg/m<sup>3</sup>. Monthly data is the average of the calculated data.</p>
	<p>Additional analysis to estimate HFC23 / SF6 leaks is not performed if the thermal hydrolysis unit stops. The preservation of high temperature in destruction unit during min 30 sec provides full destruction of residual HFC23 / SF6 gases and, therefore, prevents HFC23 / SF6 leaks. Absence of HFC23 / SF6 leaks if the thermal hydrolysis unit stops is confirmed by independent expert.</p>

	This deviation doesn't influence the GHG reductions calculation.
<b>Revision 14</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived ID 5. C_ND_HFC23 <sub>y</sub>	<p>Data variable: Concentration of HFC23 in gaseous effluents from the unit</p> <p>Source of data: Chromatograph</p> <p>Data unit: mg/m<sup>3</sup></p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly</p> <p>Proportion of data to be monitored: -</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured weekly. If the thermal hydrolysis unit stops additional analysis are performed to estimate HFC23 leaks.</p>
	<p>Data variable: HFC23 concentration in gaseous effluents from the unit</p> <p>Source of data: Chromatograph</p> <p>Data unit: mg/m<sup>3</sup></p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly (weekly measurements)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: If the HFC23 concentration is not detectable than the value is conservatively taken to be equal 1,0 mg/m<sup>3</sup>. Monthly data is the average of the calculated data.</p>
	<p>Additional analysis to estimate HFC23 / SF6 leaks is not performed if the thermal hydrolysis unit stops. The preservation of high temperature in destruction unit during min 30 sec provides full destruction of residual HFC23 / SF6 gases and, therefore, prevents HFC23 / SF6 leaks. Absence of HFC23 / SF6 leaks if the thermal hydrolysis unit stops is confirmed by independent expert.</p> <p>This deviation doesn't influence the GHG reductions calculation.</p>
<b>Revision 15</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1.1.3. Relevant data	Data variable: Quantity of HFC23 recovered for sale

<p>necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived</p> <p>ID 6. S_HFC23<sub>y</sub></p>	<p>Source of data: Scales and level meter in the collector</p> <p>Data unit: t</p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: -</p> <hr/> <p>Data variable: HFC23 quantity recovered for sale Source of data: Scales and level meter in the collector Data unit: t</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Paper</p> <p>Comment: Not applied if there is no HFC23 recovered for sale from HFC23 waste or there is no technical possibility.</p> <hr/> <p>The data is archived only in paper form. This deviation doesn't influence the GHG reductions calculation.</p>
Revision 16	Registered PDD / Intended deviation / Explanation and Justification
<p>D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived</p> <p>ID 7. q_G_HFC23<sub>y</sub></p>	<p>Data variable: Quantity of HFC23 wastes at the outlet of shop No. 76</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: monthly (readings are recorded weekly)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic</p> <p>Comment: -</p>

	<p>Data variable: HFC23 waste quantity generated</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (hourly readings)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured by mass flow meter directly after emission sources. Readings are taken hourly and processed by APCS. Monthly data is the sum of the accumulated data.</p>
	Clarification. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 17</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
<p>D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived</p> <p>ID 8. q_G_SF6<sub>y</sub></p>	<p>Data variable: Quantity of SF6 wastes at the outlet of rectification column of shop No. 2</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (readings are recorded weekly)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic</p> <p>Comment: -</p>
	<p>Data variable: SF6 waste quantity generated</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (hourly readings)</p> <p>Proportion of data to be monitored: 100%</p>



	<p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured by mass flow meter directly after emission sources. Readings are taken hourly and processed by APCS. Monthly data is the sum of the accumulated data.</p> <p>Clarification. This deviation doesn't influence the GHG reductions calculation.</p>
<b>Revision 18</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
<p>D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived</p> <p>ID 9. <math>q_{SF_6}</math></p>	<p>Data variable: Quantity of SF6 wastes supplied for destruction from shop No. 2</p> <p>Source of data: Mass flow meter</p> <p>Data unit: kg</p> <p>Determination method: (m) measured in parallel by flow meter</p> <p>Recording frequency: Monthly (measured not less than once per hour)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic</p> <p>Comment: Measured directly before the unit. Monthly data is the sum of the accumulated data. Readings are taken at least once an hour and the lowest reading of the two flow meters is chosen.</p> <p>Data variable: SF6 waste quantity supplied for destruction</p> <p>Source of data: 2 mass flow meters (in parallel)</p> <p>Data unit: kg</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly (hourly readings)</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Measured in parallel by 2 mass flow meters directly before the unit. Readings are taken hourly and processed by APCS, the lowest reading is chosen automatically by APCS. Monthly data is the sum of the accumulated data.</p> <p>Clarification. This deviation doesn't influence the GHG reductions calculation.</p>
<b>Revision 19</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived ID 10. C_G_HFC23 <sub>y</sub>	Data variable: Concentration of HFC23 in wastes at the outlet of shop No. 76 Source of data: Chromatograph Data unit: % Determination method: (m) measured Recording frequency: Monthly (readings are recorded weekly) Proportion of data to be monitored: - How will the data be archived: Electronic and paper Comment: -
	Data variable: HFC23 mass content in HFC23 waste generated Source of data: Chromatograph Data unit: % Determination method: (m) measured Recording frequency: Monthly (weekly measurements) Proportion of data to be monitored: 100% How will the data be archived: Electronic and paper Comment: Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
	<p>The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation.</p> <p>HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: <math>X_m = (M * X_v) / (V_m * p)</math>, where</p> <p>M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6)</p> <p>X<sub>v</sub> – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007</p> <p>V<sub>m</sub> – molar volume (constant - 24,04 dm<sup>3</sup>/mole for gas)</p> <p>p – sample's density (g/dm<sup>3</sup>) to be measured using approved method MZ-110-2008</p>
<b>Revision 20</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived ID 11. C_G_SF6 <sub>y</sub>	Data variable: Concentration of SF6 in wastes at the outlet of rectification column of shop No. 2 Source of data: Chromatograph Data unit: % Determination method: (m) measured Recording frequency: Monthly (readings are recorded weekly) Proportion of data to be monitored: - How will the data be archived: Electronic and paper Comment: -
	Data variable: SF6 mass content is SF6 waste generated Source of data: Chromatograph Data unit: % Determination method: (m) measured and (c) calculated Recording frequency: Monthly (weekly measurements) Proportion of data to be monitored: 100% How will the data be archived: Electronic and paper Comment: Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
	The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation. HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: $X_m = (M * X_v) / (V_m * p)$ , where M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6) X <sub>v</sub> – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007 V <sub>m</sub> – molar volume (constant - 24,04 dm <sup>3</sup> /mole for gas) p – sample's density (g/dm <sup>3</sup> ) to be measured using approved method MZ-110-2008
<b>Revision 21</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived  ID 12. C_SF6 <sub>y</sub>	Data variable: Concentration of SF6 in wastes supplied for destruction from shop No. 2 Source of data: Chromatograph Data unit: % Determination method: (m) measured Recording frequency: Monthly (readings are recorded weekly) Proportion of data to be monitored: - How will the data be archived: Electronic and paper Comment: -
	Data variable: SF6 mass content in SF6 waste supplied for destruction Source of data: Chromatograph Data unit: % Determination method: (m) measured and (c) calculated Recording frequency: Monthly (weekly measurements) Proportion of data to be monitored: 100% How will the data be archived: Electronic and paper Comment: Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
	The HFC23 / SF6 mass content is calculated due to absence of direct method to measure HFC23 / SF6 mass content in HFC23 / SF6 waste. This deviation doesn't influence the GHG reductions calculation. HFC23 / SF6 mass content is calculated based on approved method No. 01/38-09/171 as: $X_m = (M * X_v) / (V_m * p)$ , where M – molar mass (constants - 70,014 g/mole for HFC23 and 146,050 g/mole for SF6) X <sub>v</sub> – HFC23 / SF6 molar volume content in sample (%) to be measured using approved method MZ-111-2007 V <sub>m</sub> – molar volume (constant - 24,04 dm <sup>3</sup> /mole for gas) p – sample's density (g/dm <sup>3</sup> ) to be measured using approved method MZ-110-2008
<b>Revision 22</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>

<p>D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived</p> <p>ID 13. P_HCFC22<sub>y</sub></p>	<p>Data variable: The quantity of HCFC22 produced at the plant, which is a source of HFC23 emissions</p> <p>Source of data: Level meter in the collector and readings of mass flow meter of monomer-4 production multiplied by the HCFC22 consumption factor for monomer-4 production</p> <p>Data unit: t</p> <p>Determination method: (m) measured and (c) calculated</p> <p>Recording frequency: Monthly</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Electronic and paper</p> <p>Comment: Data for application of the cut-off condition</p>
	<p>Data variable: HCFC22 quantity produced</p> <p>Source of data: Mass flow meters and level meter in the collector</p> <p>Data unit: t</p> <p>Determination method: (m) measured and (c) calculated</p> <p>Recording frequency: Monthly</p> <p>Proportion of data to be monitored: 100%</p> <p>How will the data be archived: Paper</p> <p>Comment: Data for application of the cut-off condition</p>
	<p>The readings of level meter and mass meters are recorded only in paper form. The mass meters are reset monthly. The electronic form is not used. This deviation doesn't influence the GHG reductions calculation.</p>
<b>Revision 23</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
<p>D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and</p>	<p>Data variable: Quantity of SF6 produced at the plant</p> <p>Source of data: Scales and level meter in the collector</p> <p>Data unit: t</p> <p>Determination method: (m) measured</p> <p>Recording frequency: Monthly</p>

archived ID 14. P_SF6 <sub>y</sub>	Proportion of data to be monitored: 100% How will the data be archived: Electronic and paper Comment: Data for application of the cut-off condition
	Data variable: SF6 quantity produced Source of data: Scales and level meter in the collector Data unit: t Determination method: (m) measured Recording frequency: Monthly Proportion of data to be monitored: 100% How will the data be archived: Paper Comment: Data for application of the cut of condition.
	The readings of level meter and scales are recorded only in paper form. The electronic form is not used. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 24</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project ID 15. EC <sub>y</sub>	Data variable: Electricity consumption for destruction process Source of data: Meter Data unit: MWh Determination method: (m) measured Recording frequency: Monthly Proportion of data to be monitored: 100% How will the data be archived: Electronic Comment: -
	Data variable: Electricity consumption for destruction process Source of data: Meter Data unit: MWh

	Determination method: (m) measured Recording frequency: Monthly Proportion of data to be monitored: 100% How will the data be archived: Paper Comment: -
	The readings are recorded only in paper form. The electronic form is not used. This deviation doesn't influence the GHG reductions calculation.
<b>Revision 25</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project	Gaseous effluents (CO, HCl, HF, Cl <sub>2</sub> , dioxin and NOX) are regularly measured at the thermal destruction unit in accordance with the approved rules. The enterprise files annual consolidated reports on emissions as per the official annual statistical form 2-TP (air) Air protection data, which contains information on amounts of trapped and neutralized atmospheric pollutants, itemized emissions from specific sources, number of emission sources, measures on reduction of emissions to the atmosphere, emissions from particular groups of pollution sources. The enterprise is subject to regular control by state bodies of environmental supervision. The Head of Environmental Department of "KCKK Polimer Plant" Ltd. is responsible for collection, storage and analysis of data regarding the environmental impact of the project in the region.
	Gaseous effluents (HFC23, SF6, CO, HCl, HF, Cl <sub>2</sub> , NO <sub>2</sub> and dioxins) are measured in compliance with the current environmental standards of Russia: HFC23, SF6, CO – 1 time per month HCl, HF, Cl <sub>2</sub> , NO <sub>2</sub> – 6 time per year Dioxins – 1 time per year The enterprise is subject to regular control by state bodies of environmental supervision and has the following reporting obligations as per official annual statistic forms: statistical form 2-tp (air) Data on Atmospheric Air containing information on the quantities of trapped and destroyed air pollutants, detailed emissions of specific pollutants, number of emission sources, emission reduction actions and emissions from separate groups of pollutant sources. The Head of Environmental Department is responsible for collection, storage and analysis of data regarding the environmental impact of the project.
	Clarification. The more detailed description is provided.
<b>Revision 26</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored ID 1. q_HFC23 <sub>y</sub> ID 9. q_SF6 <sub>y</sub>	<p>Low uncertainty level</p> <p>Measured by two down-the-line flow meters. Instrument error <math>\pm 0.5\%</math>. Following the conservative approach the least value of the two flow meters is taken into consideration at each data reading. If the readings of the flow meters differ by greater than twice their claimed accuracy then measures are taken to remedy the fault. Flow meters shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the flow meters shall be conducted every week. If the zero check indicates that the flow meter is not stable, an immediate calibration of the flow meter shall be undertaken.</p>
	<p>Low uncertainty level</p> <p>Measured by two down-the-line mass flow meters. Instrument error <math>\pm 0,5\%</math>. Readings are automatically collected, stored, processed and protected from any corrections by APCS. APCS should automatically calculate the conservative value by taking the least value of the two mass flow meters at each data reading.</p> <p>The daily reports with corresponding accumulated data from APCS should be archived in electronic form. The data should be verified monthly and the reports with corresponding verified data should be archived in paper form.</p> <p>Mass flow meters shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the flow meters shall be conducted every week. If the zero check indicates that the flow meter is not stable, an immediate calibration of the flow meter shall be undertaken. If the readings of the mass flow meters differ by greater than twice their claimed accuracy then measures are taken to remedy the fault.</p>
	<p>Clarification. The more detailed description is provided.</p>
<b>Revision 27</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored ID 2. C_HFC23 <sub>y</sub> ID 10. C_G_HFC23 <sub>y</sub> ID 11. C_G_SF6 <sub>y</sub> ID 12. C_SF6 <sub>y</sub>	<p>Low uncertainty level</p> <p>Cross-checked with the previous chromatograph analysis. Frequency of recalibration is in compliance with the requirements of the Federal Agency for Technical Control and Metrology. Relative error of used methodologies correspondingly is: ID 2 – 5%, ID 10 – 5%, ID 11 –5%, ID 12 –5%.</p>
	<p>Low uncertainty level</p> <p>Calculated by approved method (relative error – 5%) based on sample's analysis. Sample's analysis includes volume content and density analysis measurements by chromatograph. The measurements and calculation of mass content should be performed by laboratory personnel (assistant), documented in paper form and archived in electronic form. The results are to be verified. The data should be cross-checked with the previous data and summarized in the monthly reports.</p> <p>Chromatographs shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology: absolute calibration – 1 time per year, calibration measurement – 1 time per quarter.</p>



	Clarification
<b>Revision 28</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored	Medium uncertainty level Cross-checked with the previous chromatograph analysis. Frequency of recalibration is in compliance with the requirements of the Federal Agency for Technical Control and Metrology. Relative error of used methodologies correspondingly is: ID 4 – 20%, ID 5 – 24%.
ID 4. C_ND_SF6 <sub>y</sub>	Law uncertainty level Measured by chromatograph (relative error: ID 4 – 20%, ID 5 – 25%) under approved method. The accuracy of the measurements has little influence on accuracy of GHG emission reduction calculations. To provide conservative estimation the concentration of HFC23 and SF6 is taken to be equal 1,0 mg/m <sup>3</sup> for HFC23 and 0,1 mg/m <sup>3</sup> for SF6 correspondingly if the HFC23 or SF6 concentration is not detectible by chromatographs.  The measurements of concentration should be performed by laboratory personnel (assistant), documented in paper form and archived in electronic form. The analysis results are to be verified. The data should be cross-checked with the previous data by the head of laboratory and summarized in the monthly report.  Chromatographs shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology: absolute calibration – 1 time per year, calibration measurement – 1 time per quarter.
ID 5. C_ND_HFC23 <sub>y</sub>	
	Clarification. The more detailed description is provided.
<b>Revision 29</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored	Low uncertainty level Flow meter is subject to regular calibration. The accuracy of the equipment has little influence on accuracy of GHG emission reduction calculations.
ID 3. q_ND <sub>y</sub>	Low uncertainty level Measured by portable flow meter and calculated based on the calendar length of period (hours/period). To provide conservative estimate the shutdown time of the destruction unit is not included in calculation. The accuracy of the equipment and the method has little influence on accuracy of GHG emission reduction calculations.  Portable flow meter is subject to regular calibration in compliance with the requirements of the Federal Agency for Technical Control and Metrology.

	Clarification due to change of measurement method.
<b>Revision 30</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored ID 6. S_HFC23 <sub>y</sub>	Low uncertainty level Cross-checked with accounting reports.
	Low uncertainty level Measured by scales and level meter in the collector. The measurements should be performed by shop personnel, documented and archived in paper form. The background data should be verified and summarized in the monthly reports. The monthly reports should be cross-checked with accounting reports.
	The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.
	Clarification. The more detailed description is provided.
<b>Revision 31</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored ID 7. q_G_HFC23 <sub>y</sub> ID 8. q_G_SF6 <sub>y</sub>	Low uncertainty level Instrument error $\pm 0.5\%$ . Frequency of recalibration is in compliance with the requirements of the Federal Agency for Technical Control and Metrology.
	Low uncertainty level Measured by mass flow meter. Instrument error $\pm 0,5\%$ . Readings are automatically collected, stored, processed and protected from any corrections by APCS. The daily reports with corresponding accumulated data should be archived in electronic form. The data should be verified monthly and the reports with corresponding verified data should be archived in paper form.
	Mass flow meters shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the mass flow meter shall be conducted on demand. If the zero check indicates that the mass flow meter is not stable, an immediate calibration of the mass flow meter shall be undertaken.
	Clarification. The more detailed description is provided.
<b>Revision 32</b>	<b>Registered PDD / Intended deviation / Explanation and Justification</b>
D.2. Quality control (QC) and quality assurance (QA)	Low uncertainty level Cross-checked with production and accounting reports.

<p>procedures undertaken for data monitored</p> <p>ID 13. P_HCFC22<sub>y</sub></p> <p>ID 14. P_SF6<sub>y</sub></p>	<p>Low uncertainty level</p> <p>Measured by mass meters and level meter. The measurements should be documented and archived in paper form. The background data should be verified and summarized in the monthly reports. The monthly reports should be cross-checked with production and accounting reports.</p> <p>The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.</p> <p>Clarification. The more detailed description is provided.</p>
<p><b>Revision 33</b></p>	<p><b>Registered PDD / Intended deviation / Explanation and Justification</b></p>
<p>D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored</p> <p>ID 15. EC<sub>y</sub></p>	<p>Low uncertainty level</p> <p>Electricity meter is subject to regular calibration.</p> <p>Low uncertainty level</p> <p>Measured by electricity feeders and calculated. The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.</p> <p>Clarification. The more detailed description is provided.</p>
<p><b>Revision 34</b></p>	<p><b>Registered PDD / Intended deviation / Explanation and Justification</b></p>
<p>D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan</p>	<p>The monitoring plan described above was set forth by the Order of the Director of the Plant №153 dated 01.04.2008. According to this document all readings in line with the monitoring plan have to be recorded under an established procedure and persons responsible for data collection and storage appointed, namely – technologists of the corresponding shops (2, 22, 76) and chief power engineer of the enterprise starting on April 1, 2008. Production Manager – Deputy Director for Ecology, was appointed responsible for the execution of the Order.</p> <p>The terms and procedures identified for day-to-day records handling and dealing with erroneous measurements are provided in the following documents:</p> <ol style="list-style-type: none"> <li>1. Methodologies M-256-2-2007, MZ-57-2007 and MZ-111-2007.</li> <li>2. "Calculation algorithms" to performance specification for technological programming of circuits APB, APS, APR and APM database "Unit for thermal destruction of FOC".</li> </ol> <p>All input data is regularly collected. The Head of Technical Department and the Head of Environmental Department of "KCKK Polimer Plant" Ltd. are responsible for data submission and execution of reporting documentation under the project.</p> <p>Calculations of emission reductions will be prepared by Camco International on annual basis (by February 15) as required by the</p>

	<p>Russian JI Regulation.</p> <p>All data will be stored at least for two years after the last ERU tranche under the project.</p> <p>Additional details of procedures for unit operation, maintenance and personnel training are described in Annex 4.</p> <p>The operational and management structure comprises Project operator, Technical consultant and Holding company.</p> <p>The monitoring procedures are executed by the Project operator according to Corporate standard 6-020-2009 "GHG Utilization" (monitoring procedure) set forth by the Order of the Director № 7 dated 11.01.2009. According to the mention papers all readings in line with the monitoring plan have to be recorded under an established procedures and persons responsible for data collection and storage appointed starting on 01.04.2008.</p> <p>The monitoring report is prepared by Technical consultant.</p> <p>The project execution is supervised by the Holding company Halopolymer.</p> <p>Clarification. Operational and management structure is advanced as described in Corporate standard 6-020-2009 "GHG Utilization" for better monitoring process.</p>
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### APPENDIX 3. JUSTIFICATION OF REVISIONS TO MONITORING PLAN AND REVISED MONITORING PLAN

In compliance with the paragraph 40 of the "Guidance on criteria for baseline setting and monitoring, Version 02" the project participants are encouraged to improve the monitoring process and its results. Revisions, if any, to the monitoring plan to improve the accuracy and/or applicability of information collected shall be justified by the project participants and shall be submitted for the determination referred to in paragraph 37 of the JI guidelines by the AIE. In this case the AIE shall determine whether the proposed revisions improve accuracy and/or applicability of information collected, compared to the original monitoring plan without changing conformity with the relevant rules and regulations for the establishments of monitoring plans and in case of a positive determination, shall proceed with the determination referred to in paragraph 37 of the JI guidelines.

Revisions introduced in the monitoring plan of the project design document (PDD) of the above project<sup>1</sup> represent elimination of such factors *as the cut-off conditions and baseline quantity of HFC23 and SF<sub>6</sub> destroyed*, which are, in first case, inapplicable due the absence of accurate and representative information, and, in the third case, are inapplicable due to erroneous use of the maximum permissible emissions as a measure of the state regulation of emissions of such gases and due to the absence of information that HFC23 and SF<sub>6</sub> were historically destroyed in the old thermal hydrolysis unit.

Below the reasons of elimination of these factors from the monitoring plant are provided in a greater detail.

#### Revision 1: Cut-off conditions

Baseline emissions in the monitoring plan of the PDD are made with allowance for cut-off conditions (formulas D.1-10 and D.1-11).

$$G_{HFC23,y} \leq \min \left\{ P_{HCFC22,y}; P_{HCFC22,Hist,max} \right\} w_h$$

$$G_{SF_6,y} \leq \min \left\{ P_{SF_6,y}; P_{SF_6,Hist,max} \right\} w_s,$$

где  $P_{HCFC22,y}$  - is the amount of HCFC22 produced at "KCKK Polimer Plant" Ltd. during the year y, t;

$P_{SF_6,y}$  - is the amount of saleable SF<sub>6</sub> produced at "KCKK Polimer Plant" Ltd. during the year y, t;

$P_{HCFC22,Hist,max}$  - is the maximum annual amount of HCFC22 produced at the plant during the historical period. For  $P_{HCFC22,Hist,max}$  the maximum annual volume of HCFC22 production at "KCKK Polimer Plant" Ltd. during the period of 2002-2004 was taken. According to Section B.1  $P_{HCFC22,Hist,max} = 16\,956.5\,t\,(2004)$ ;

$P_{SF_6,Hist,max}$  - is the maximum annual amount of saleable SF<sub>6</sub> produced at the plant during the historical period, t. For  $P_{SF_6,Hist,max}$  the maximum annual volume of saleable SF<sub>6</sub> produced at "KCKK Polimer Plant" Ltd. during the 2002-2004 was taken. According to Section B.1  $P_{SF_6,Hist,max} = 219.9\,t\,(2004)$ ;

<sup>1</sup> A JI-specific approach is used for monitoring with the elements of approved CDM methodology AM0001/Version 05.1 "Incineration of HFC23 waste streams", which are associated with the application of this methodology for determining SF<sub>6</sub> emission reductions and introduction of the maximum permissible emissions as a measure of the state regulation of HFC-23 and SF<sub>6</sub> emissions.

$w_h$  - is the fraction of HFC23 per unit of HCFC-22 produced at the plant. For the fraction  $w_h$  its minimum average annual value according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004 were assumed. According to Section B.1  $w_h = 1.06\%$  (2004);

$w_s$  - is the fraction of SF<sub>6</sub> contained in waste flows from rectification column of SF<sub>6</sub> production per unit of saleable SF<sub>6</sub> produced at the plant. For the fraction  $w_s$  its minimum average annual value according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004 was assumed. According to Section B.1  $w_s = 1.40\%$  (2002).

***Justification of inapplicability of the maximum annual amount of HCFC22 produced at the plant during the historical period 2002-2004.***

The values of annual amounts of HCFC22 produced in 2002-2004 were provided in the table B.1-1 "Data needed for calculation of GHG emission reductions" of PDD:

Table 1. Annual amounts of HCFC22 produced in 2002-2004 provided in the PDD

Designation	Unit	2002	2003	2004
<i>P<sub>HCFC22y</sub></i>	t	13 135,4	10 562,7	16 956,5

But these values are inaccurate and therefore cannot be representative. It should be noted that historically until 2003 the Plant had no reliable method for the calculation of the actual output of HCFC22 as it was not a target product and its production (except of saleable HCFC-22 that made 4-6% of overall HCFC-22 production) was not monitored.<sup>2</sup> From 2003 separate norm of consumption HCFC22 per unit of M-4 produced was accepted. However this consumption norm was determined on the base of parameters measured during HCFC-22 production process with the use of metering equipment of lower accuracy class than those of nowadays. For example, the measurement of quantities of HCFC-22, monomer-4, fluoroplastics was implemented with use of buoy level gages with accuracy class of 1.5 and diaphragm flowmeters with diaphragm manometers (accuracy class 2-2.5). In 2005 under modernization of monitoring system at the Plant the new high precision metering devices were introduced. From 2005 on, more accurate radar level gages "VEGA" (accuracy class 0.5) and mass flow meters "PROMASS" (accuracy class 0.15) are used to control output of products including HCFC22 at the Plant. The high quality and accuracy of measurements are provided through automatization of the processes by introduction at the Plant of the workstation<sup>3</sup>. Below is the table showing the old norms of HCFC-22 consumption per unit of M-4 produced that were before 2005 and the new norms that were introduced after 2005.

Table 2. Norm of HCFC-22 consumption per M-4 produced at KCKK Polymer Plant<sup>4</sup>

Designation	Unit	2002	2003	2004	2005	2006
HCFC-22 consumption per unit of M-4	t/t	No norms existed	2,14	2,14	2,12	2,07

<sup>2</sup> Reference On setting consumption norms on HCFC-22 production

<sup>3</sup> Reference On instrumentation control of HCFC-22 production

<sup>4</sup> Reference On norms on consumption of HCFC-22 per unit of M-4 produced.

produced						
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For 2011 the norm of HCFC-22 consumption per unit of M-4 equals to 2,054 t/t. The recalculation of HCFC-22 production during 2002-2004 with the use of this more accurate norm gives divergence from the values of HCFC produced in 2002-2004 provided in the PDD.

Table 3. Divergence in values HCFC-22 production in 2002-2004<sup>5</sup>

Designation	Unit	2002	2003	2004
HCFC-22 production recalculated according to PDD	t	13 135	10 563	16 957
HCFC-22 production recalculated according to 2011 norm	t	12 029	9 970	15 363
Absolute divergence	т	-1107	-593	-1594
<i>Relative divergence</i>	%	<i>-9,2</i>	<i>-5,9</i>	<i>-10,4</i>

The divergence in values of HCFC-22 production in 2002-2004 is considerable ranging within -5,9% till -10,4%. Therefore the values of HCFC-22 production in 2002-2004 in PDD are inaccurate and, hence, cannot be applicable for setting the cut-off condition for the baseline GHG emissions calculation.

As was provided in the PDD the cut-off conditions were set to exclude the possibility of manipulating the production process to increase the quantity of waste. However HCFC22 production at the Plant does, in no way, associated with manipulation as this product is manufactured exclusively to meet delivery obligations in front of purchasers and for being a feedstock for fluoroplastics production.

In the following tables the figures on production of fluoroplastics, gross output of HCFC22 and stocks as well as the average prices for 2000-2007 are presented<sup>6</sup>:

<sup>5</sup> Reference from HaloPolymer Kirovo-Chepetsk. Calculations of HCFC-22 production .

<sup>6</sup> Reference data provided by the economic department of "HaloPolimer Kirovo-Chepetsk"

Table 4. HCFC22 output and average shipping price

Year	HCFC22					
	Gross output	Output for sale	Stocks of finished goods as of the 1 <sup>st</sup> January	Stocks of semi-finished goods as of 1 <sup>st</sup> January	Stocks of goods-in-process as of the 1 <sup>st</sup> January	Average shipping price, Rubles/t
2000	19159	376,96	4,46	0	0	43 613
2001	17113	74,377	6,8	0	0	52 921
2002	13135	154,214	0	0	0	41 825
2003	10563	59,812	0	0	0	42 598
2004	16957	13,72	0	0,02	0,88	45 455
2005	18117	15,44	0	0	27,22	48 075
2006	16487	7,14	0	0	41,4	62 470
2007	17922	388,759	0	0	52,898	57 848



Table 5. Production of F-4 and average shipping price

Year	F-4					
	Gross output	Output for sale	Stocks of finished goods as of the 1st January	Stocks of semi-finished goods as of 1st January	Stocks of goods-in-process as of the 1st January	Average shipping price, Rubles/t
2000	6 957,00	6 407,55	55,88	10,73	118,15	158 031
2001	6 302,90	5 861,87	16,87	5,68	107,5	163 008
2002	4 947,00	3 865,35	270,36	5,67	117,02	164 606
2003	3 682,50	3 058,17	445,15	4,63	249,71	144 458
2004	5 722,50	4 881,56	33,21	0	43,15	129 115
2005	6 499,90	5 777,64	79,99	14,4	89,99	136 792
2006	5 986,70	4 909,23	364,68	13,5	84,79	121 944
2007	6 546,00	5 000,69	225,99	2,73	58,91	140 199

It follows from the above tables that the Plant does not manufacture HCFC22 in excessive quantities purposefully intending to increase the formation of HFC23. The quantity of HCFC22 production depends on the impact of the favorable situation on the market what is confirmed by positive HCFC22 price rise dynamics. Moreover the increase of F-4 prices stimulates production and, hence, increased consumption of HCFC22 for F-4 production. At the same time there is no overstocking of HCFC22, it confirmed by insignificant figures of stocks of goods-in-process.

Resume:

1. Values presented in the table B1-1 of PDD, on the base of which the maximum annual amount of HCFC-22 produced at the Plant during the historical period are defined, are not accurate. Those values were defined with use of old consumption norms that were calculated on the base of parameters measured during HCFC-22 production process with the use of metering equipment of lower accuracy class.
2. Recalculation of historical HCFC-22 production of the period of 2002-2004 with the new accurate norms of 2011 year gives more precise values, which considerably (from -5,9% up to -10,4%) deviate from those of provided in PDD.
3. Any manipulations associated with artificial overstating of HCFC22 production to increase purposefully formation of HFC23 are ruled out at the Plant.

In connection with above such factor as *the maximum annual amount of HCFC22 produced at the plant during the historical period 2002-2004* is inapplicable and therefore it must be eliminated as the cut-off condition for calculation of the baseline GHG emissions from the monitoring plan of the mentioned project.

*Justification of inapplicability of minimum average annual value of fraction of HFC23 per unit of HCFC-22 produced at the plant according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004.*

The values of the fraction of HFC23 per unit of HCFC-22 produced in 2002-2004 were provided in the line  $w_h$  of the table B.1-1 "Data needed for calculation of GHG emission reductions" of PDD:

Table 6. Fraction of HFC23 per unit of HCFC-22 produced in 2002-2004 as per PDD

Designation	Unit	2002	2003	2004	2005	2006
$w_h$	%	1,31	1,59	1,06	1,15	1,41

However these figures cannot be justified by the Plant's data as it is quite unclear what the point was (or the points were) which data were taken from for defining  $w_h$ . The matter is that this factor can be calculated given the results of composition analysis of the HCFC-22 production as after synthesis reactor so in the other HCFC22 production line points. Therefore the above figures are not justified and, thus, are not representative.

The accurate and justified figures of the fraction of HFC23 per unit of HCFC-22 produced in 2002-2006 are obtained from the monthly technical reports on production of fluoroplastics, monomer-4 and HCFC-22 for this period<sup>7</sup>. The averaged data on HCFC-22 composition are recorded in the technical reports from the logs of control of raw HCFC-22 production. The control is provided for ensuring the desired quality of HCFC-22. Performance control data including HFC23 concentration are periodically registered with those logs. Each gas sampling result is registered and signed by the operator with indication of the date, time, and position where HCFC-22 raw gas was measured including gas content with HFC-23 concentration. The averaging of HFC23 concentration is made taking into account the time of HCFC reactor's operation and periodicity of sampling. So, averaging HFC23 content on the annual base is giving the accurate  $w_h$  values, which are backed by the documentary evidences. Therefore the average annual fractions of HFC23 validated by approved technical reports are actual and reliable information. Based on these data the following  $w_h$  values were obtained.

Table 7. Actual average annual values of the fraction of HFC23 per unit of HCFC-22 in 2002-2004 obtained from the technical reports and deviation from  $w_h$  values in PDD<sup>8</sup>

Designation	Unit	2002	2003	2004
$w_h$	%	1,67	1,89	2,19

<sup>7</sup> Reference "Scanned copies of technical reports on production of fluoroplastics, M-4, HCFC-22 for the period of 2002-2006". As examples the January reports of each year in 2002-2006 are provided.

<sup>8</sup> Reference "On findings of synthesis-gas control during HCFC-22 production"

Deviation from $w_h$ values in PDD	%	27,48	18,87	106,60
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As can be seen by comparison of the above tables 6 and 7 the divergence between the  $w_h$  values in PDD and those obtained through averaging actual annual data from the technical reports is considerable.

Direct measurements of the waste HFC-23 gas fed to destruction under the project give more accurate results. Data on the waste gas are directly measured in the points set at the pipelines offtaking after the rectification column to the destruction unit. Based on measurements the mass flow, chemical composition and density of the gas are defined. Devices used for measurements of these data undergo periodically through calibration and testing procedure in compliance with the requirements of the Federal Agency for Technical Control and Measurements and have the high accuracy level.

Resume:

1. Data provided in the table B1-1 of PDD, on the base of which the minimum value of the fraction of HFC23 per unit of HCFC-22 produced at the plant in the period of 2002-2004, cannot be justified by the Plant's documentary evidences therefore these data are not representative.
2. The representative data on values of the fraction of HFC23 per unit of HCFC-22 produced at the Plant can only be obtained from the monthly technical reports on production of fluoroplastics, monomer-4 and HCFC-22. Given averaging, on a yearly basis, the  $w_h$  values based on the data of the technical reports differ considerably from PDD  $w_h$  values.
3. In connection with above *the minimum average annual value of fraction of HFC23 per unit of HCFC-22 produced at the "KCKK Polimer Plant" Ltd during the period 2002-2004* must be eliminated as the cut-off condition for calculation of the baseline GHG emissions from the monitoring plan of the mentioned project.

***Justification of inapplicability of the factors «the maximum annual volume of saleable SF<sub>6</sub> produced at "KCKK Polimer Plant" Ltd. during the 2002-2004» and « the fraction of SF<sub>6</sub> contained in waste flows from rectification column of SF<sub>6</sub> production per unit of saleable SF<sub>6</sub> produced at the plant ».***

In PDD the values of annual volume of saleable SF<sub>6</sub> produced at "KCKK Polimer Plant" Ltd. and the fraction of SF<sub>6</sub> contained in waste flows from rectification column of SF<sub>6</sub> production per unit of saleable SF<sub>6</sub> produced at the plant during the 2002-2005 are provided in table "Data needed for calculation of GHG emission reductions":

Table 8. Annual volumes and the fraction of SF<sub>6</sub> contained in waste flows from rectification column of SF<sub>6</sub> production per unit of saleable SF<sub>6</sub> produced at the Plant during the 2002-2005

Designation	Unit	2002	2003	2004	2005
$P_{SF_6}$	t	157,80	158,2	219,90	391
$w_s$	%	1,4	3,04	2,28	1,4

The cut-off conditions are represented by the following:

The maximum annual amount of saleable SF<sub>6</sub> produced at the plant during the historical period is 219.9 t (2004). For the fraction  $w_s$  its minimum average annual value according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004 was assumed. According to Section B.1  $w_s = 1.40\%$  (2002).

However, these conditions are inapplicable by the following reason:

According to the applicability criteria provided in AM0001/Version 05.1 "Incineration of HFC23 waste streams", the production facility must have an operating history at least of three years between the beginning of the year 2000 and has been in operation from 2005 until the start of the project activity.

However, the operation activity for production of SF<sub>6</sub> started at the KCKK Polimer Plant only in 2006. Equipment for production of SF<sub>6</sub> was installed in 1998, and in 1998-2006 the starting-up and adjustment works as well as the experimental-industrial tests were implemented. Therefore this methodology and the cut-off conditions are not applicable for SF<sub>6</sub> utilization project activity at the Plant.

Besides, as can be seen from the table 8 the values of  $w_s$  are not stable from year to year that can be explained by the adjustment period.

From 2006 on, subject to adjustment of the process, the production operations started<sup>9</sup>. In 2006-2010 the output of saleable SF<sub>6</sub> rose up by 50% on average as compared with the adjustment period. The formation of the waste SF<sub>6</sub> became more stable showing only two plateaus: one of 3,5% in 2007-2008 and then a slide down to about 2% in 2009-2010. The figures on saleable and  $w_s$  are presented in the following table:

Table 9. Actual values of saleable SF<sub>6</sub> and  $w_s$  from the start of operation activity at the Plant

Designation	Unit	2006	2007	2008	2009	2010
$P_{SF_6y}$	t	449	280	359	322	344
$w_s$	%	1,3	3,5	3,5	2,0	1,9

Therefore the maximum annual volume of saleable SF<sub>6</sub> produced at "KCKK Polimer Plant" Ltd. during the 2002-2004 and the fraction of SF<sub>6</sub> contained in waste flows from rectification column of SF<sub>6</sub> production per unit of saleable SF<sub>6</sub> produced at the plant are not applicable as the cut-off conditions for the monitoring of the baseline emissions.

General resume on cut-off conditions:

Thus, the cut-off conditions imposed under the PDD are inaccurate or are not representative and must be eliminated from the monitoring. Therefore for enhancing accuracy and applicability of data used for the monitoring the GHG baseline emissions will be defined as HFC23 and SF<sub>6</sub> waste streams quantities supplied to destruction unit per the reporting period, which will be obtained through direct and on-line measurement of waste HFC-23 and SF<sub>6</sub> gas flow with the use of the certified and calibrated measurement devices.

### **Revision 2: Baseline quantity of HFC23 and SF<sub>6</sub> destroyed during the year**

Baseline GHG emissions during the year are defined according to the formula D.1-12 provided in the monitoring plant of PDD:

$$BE_y = (Q_{HFC23y} - B_{HFC23y}) * GWP_{HFC23} + (Q_{SF_6y} - B_{SF_6y}) * GWP_{SF_6y}$$

where  $Q_{HFC23y}$  – is the quantity of HFC23 supplied for destruction into the unit during the year  $y$ , t;

$B_{HFC23y}$  – is the baseline quantity of HFC23 destroyed during the year  $y$ , t;

$Q_{SF_6y}$  – is the quantity of SF<sub>6</sub> supplied for destruction into the unit during the year  $y$ , t;

$B_{SF_6y}$  – is the baseline quantity of HFC23 destroyed during the year  $y$ , t.

<sup>9</sup> Reference dd. 08.06.2011 № 01/62-13/20 "On formation of waste SF<sub>6</sub>".

At the same time, according to the formula D.1-15:  
 $B_{HFC23y} = G_{HFC23y} - S_{HFC23y} - MPE_{HFC23_{Hist,min}}$   
If  $B_{HFC23y} < 0$ , then we take  $B_{HFC23y} = 0$ ;  
and according to the formula D1.-16  
 $B_{SF_{6,y}} = G_{SF_{6,y}} - MPE_{SF_{6,y}_{Hist,min}}$   
if  $B_{SF_{6,y}} < 0$ , then we take  $B_{HFC23y} = 0$ ;

where  $G_{HFC23y}$  – is the amount of HFC23 generated in HCFC22 production line during the year  $y$ , t;  
 $G_{SF_{6,y}}$  – is the amount of SF6 contained in waste flows from the rectification column of SF6 production during the year  $y$ , t;  
 $S_{HFC23y}$  – Quantity of HFC23 recovered for sale during the year  $y$ , t;  
 $MPE_{HFC23_{Hist,min}}$  – is the minimum level of the maximum permissible emissions (MPE) of HFC23 to the atmosphere from sources within the project boundary (condensation and rectification column of HCFC22 production line and rectification column of saleable HFC23 production line) during the year  $y$  based on historical data (2002-2004), t. According to Section B. 1  $MPE_{HFC23_{Hist,min}} = 83,4$  t.  
 $MPE_{SF_{6,y}_{Hist,min}}$  – is the minimum level of the maximum permissible emissions (MPE) of SF6 to the atmosphere from sources within the project boundary (SF6 rectification column) during the year  $y$  based on historical data (2002-2004), t. According to Section B. 1  $MPE_{SF_{6,y}_{Hist,min}} = 6,02$  t.

The revision introduced in the monitoring plan of PDD envisages canceling the application of the minimum level of the maximum permissible emissions (MPE) of HFC23 and SF<sub>6</sub> to the atmosphere from sources within the project boundary on a ground that MPE was erroneously taken in the PDD for the fraction of the waste stream required to be destroyed by the regulations.

The methodology AM0001/Version 05.2 "Incineration of HFC23 waste streams prescribes to define "the baseline quantity of HFC-23 destroyed as the quantity of the HFC-23 waste streams required to be destroyed by the applicable regulation or:

$$B_{HFC_{23}} = Q_{HFC23y} \cdot r_y$$

Where:

$r_y$  – is the fraction of the waste stream required to be destroyed by the regulations that apply during the year. In the absence of regulations requiring the destruction of HFC-23 waste,  $r_y = 0$ . Absent regulations on HFC-23 emissions, the HFC23 waste is typically released to the atmosphere so the baseline is zero destruction."

The government environmental control is stipulated by the federal laws such as "On environment protection", "On atmosphere air protection", "On epidemiological welfare of population", Decrees of the Government of Russian Federation dd. 15.01.2001 or 15.01.2001 № 31 «On approval of Regulation on the government control over protection of atmospheric air» and dd. 23.08.2000 № 622 «On approval of Regulation on the government monitoring service for state of the environment». None of these legislative documents does provide for the requirement of obligatory destruction of the HFC-23 and SF<sub>6</sub> waste stream. Due to low hazard grade the payments for emissions of HFC23 and SF<sub>6</sub> are not collected as according to Decree of the Government of RF dd. 12.06.2003 № 344 "On norms of payments for emissions in the atmospheric air" the norms of payments are not provided for".

Besides, plants themselves elaborate projections of maximum permissible emissions of polluting substances in atmospheric air with a purpose to meet the requirements of hygienic criteria of the quality of atmospheric air (MPC) within and beyond sanitary-protection zone (SPZ), including the territories of human settlements,.

Thus, it is MPC on the boundary of sanitary-protection zone of a plant that is a measure of the government control. Values of MPE of polluting substances in the atmosphere are defined by a plant itself subject to compliance with MPC on the boundary of SPZ.

According to the environment department of *HaloPolimer Plant Kirovo-Chepetsk Ltd*: "The monitoring of the content in atmospheric air of HFC23 and SF<sub>6</sub> is not a subject of the government and production - industrial control due to the low hazard of these substances and to the small quantity of their gross emissions. Payments for emissions of HFC23 and SF<sub>6</sub> are not collected as according to Decree of the Government of RF dd. 12.06.2003 № 344 "On norms of payments for emissions in the atmospheric air" the norms of payments are not provided for".

According to the reference provided by the laboratory of environment protection of *HaloPolimer Plant Kirovo-Chepetsk Ltd*<sup>10</sup>: "Calculation of diffusion of emissions for the Plant according to UPRZA program "Ecolog", ver. 3.0 demonstrated that possible maximum permissible emissions made 330 g/s for HFC23 and 600 g/s for SF<sub>6</sub>. At the same time MPC of human settlements is not exceeded, the maximum pollution level of the atmospheric air makes 0,96-0,98 units of MPC. Subject to possible irregularity of the maximum emission (g/s) from the medium emission (g/s) by 3 times the gross emission of HFC23 makes 3500 t/y, of SF<sub>6</sub> 6300 t/y".

It means, in fact, that the Plant could, without a damage to environment, and without breaking the environmental legislation, in 2010 (as in any year of the considered period of 2000-2012) emit in the atmosphere all waste HFC23 and SF<sub>6</sub> not destroying any of it. At the same time the set MPC would not be exceeded. Besides, there are no data in place which could confirm that *HaloPolimer Plant Kirovo-Chepetsk Ltd* historically destroyed HFC23 and SF<sub>6</sub>, which are not the hazard substances. The legislation does not provide for compulsory destruction of HFC23 and SF<sub>6</sub> therefore utilization of these gases were not monitored. Moreover, available facts prove the contrary. Prior the project became operational it is fluorine-organic compounds (FOC) of the first and third degree of hazard that were destructed in the thermal pyrolysis unit in the first place. The total quantity of those FOC exceeded the capacity of the old destruction unit. As of process regulation the maximum volume of gaseous FOC supply into the unit is under of 16 m<sup>3</sup>/h (70-80 kg/h) and of liquid FOC is 40 l/h (6-8 kg/h). The total capacity of gaseous and liquid FOC destruction unit is under 90 kg/h (the maximum projected capacity is 1000 kg/h). However, incomplete pyrolysis of FOC can lead to formation of carbon monoxide and emissions of toxic FOC, including tetrafluoroethylene (TFE), hexafluoroisopropylene (HFP), trifluorochloroethylene (TFCE) and perfluoroisobutylene in the atmosphere. Therefore, FOC were supplied in the thermal hydrolysis unit at increased loads which were up 130 kg/h<sup>11</sup>, which ruled out the possibility of the supply of additional volumes of other non-hazard gases such as HFC23 and SF<sub>6</sub>. It means that waste HFC23 and SF<sub>6</sub> were emitted in full.

#### Resume:

1. Use of the minimum level of the maximum permissible emissions of HFC23 and SF<sub>6</sub> in the atmosphere from sources within the project boundary is inapplicable from the methodological viewpoint as there are not regulations in the Russian Federation requiring the destruction of HFC-23 and SF<sub>6</sub> waste streams.
2. To exceed MPC *HaloPolimer Plant Kirovo-Chepetsk Ltd* will have to increase HFC23 emissions higher than 3500 t/y and SF<sub>6</sub> emissions higher than 6300 t/y. But it is physically impossible given the production level in 2010 that was 291,52 t of HFC23 and 344,202 t of SF<sub>6</sub>.
3. Historically the Plant did not destroy HFC23 and SF<sub>6</sub>. Due to the absence of hazard the government monitoring of these gases was not implemented and payments for their emissions were not collected.
4. Therefore all baseline waste HFC23 and SF<sub>6</sub> were emitted in atmosphere.

i.e. the formula D 1-12 of the monitoring plan must be as below:

$$BE_y = Q_{HFC23y} * GWP_{HFC23} + Q_{SF_{6,y}} * GWP_{SF_6}$$

<sup>10</sup> Reference of Laboratory of environment protection of HaloPolimer Plant Kirovo-Chepetsk Ltd dd 17.02.2010 № 01/43-03/73

<sup>11</sup> Technical reports on production of perfluorocarbon liquids and lubricants, SF<sub>6</sub> and carbon fluorine. KCKK Polimer Plant, 2008

## ***Revised Monitoring Plan***

### **D.1. Description of monitoring plan chosen:**

The monitoring system is based on the approved CDM methodology AM0001 (Version 05.1) "Incineration of HFC23 waste streams". The monitoring includes measurements of the following parameters (see Figure D.1-1):

1. The HFC23 / SF6 waste quantity generated by production process is continuously measured by mass flow meter installed on the outlet pipelines from emission sources (readings are automatically recorded hourly). The HFC23 / SF6 mass content in the HFC23 / SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case technological mode change) using analytical method.
2. The HFC23 / SF6 waste quantity supplied to the thermal hydrolysis unit is measured continuously by two down-the-line flow meters installed on each waste feeding line (readings are automatically recorded hourly). The HFC23 / SF6 mass content in the HFC23 / SF6 waste produced is calculated based on volume content and sample's density (measured by chromatograph once a week or more often in case technological mode change) using analytical method.
3. The volume of effluent gases from the unit is calculated based on the average flow speed (measured by portable flow meter weekly) and the length of the monitoring period (the shutdown time is not considered for conservatism). The HFC23 and SF6 mass contents in the influent gases are measured by chromatograph (sample analysis is performed once a week).
4. The HFC23 quantity recovered for sale (if applicable) is determined monthly as HFC23 gross output (commercial output measured by scales + change in inventory measured by level meter).
5. Electricity consumption is measured by an electricity meter and calculated annually.
6. The quantities of gaseous emissions (HFC23, SF6, HCl, HF, Cl2, CO, NO2 and dioxins) are measured in compliance with the current environmental standards of Russia.
7. The quantities of liquid effluents (HF solution, KOH solution) are measured in compliance with the current environmental standards of Russia.

All the measuring equipment meets up-to-date standards and is subject to regular calibration.

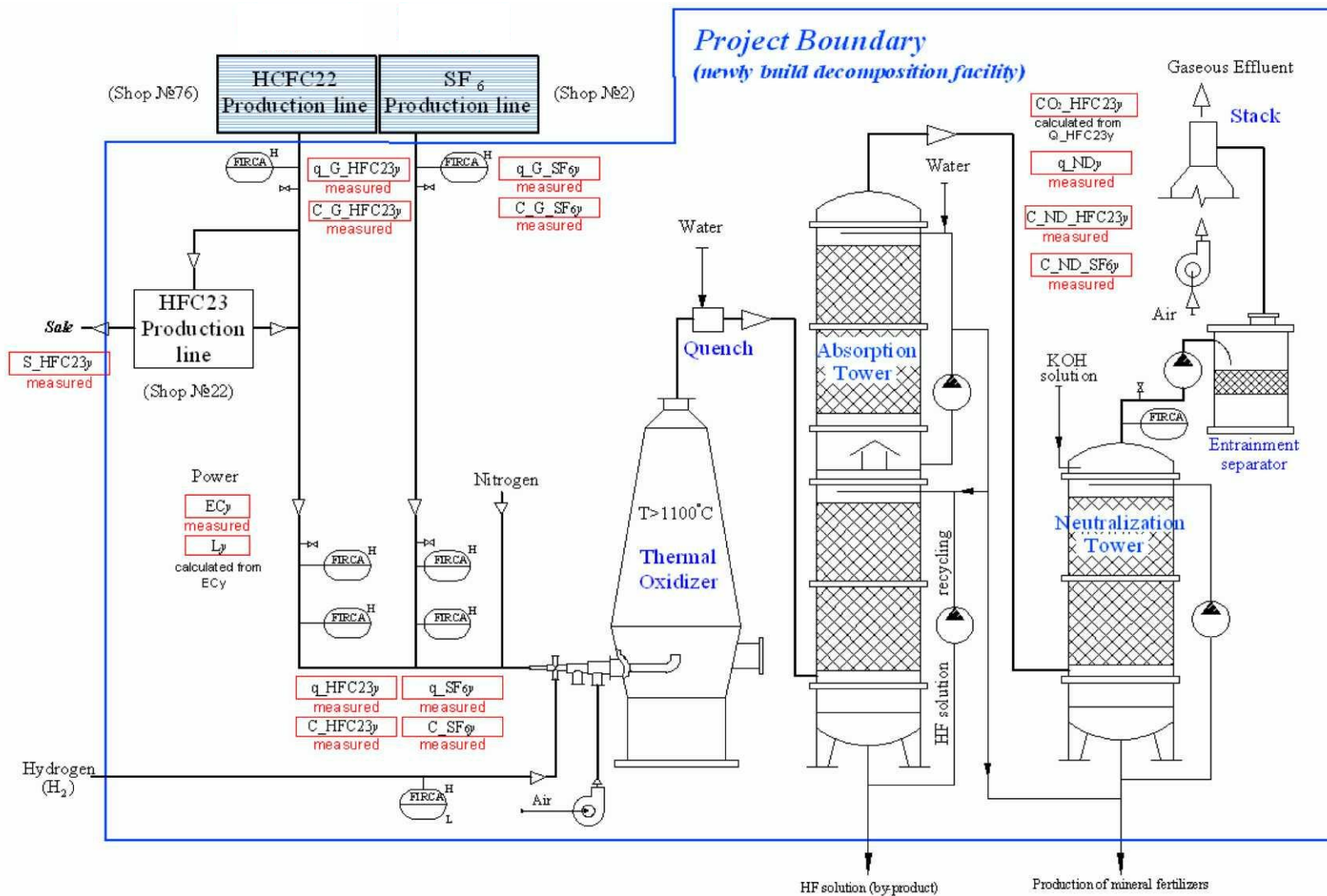


Figure D.1-1. The principal monitoring diagram



**D.1.1. Option 1 –Monitoring of the emissions in the project scenario and the baseline scenario:**

<b>D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:</b>								
ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. q_HFC23 <sub>y</sub>	HFC23 waste quantity supplied to destruction process	2 mass flow meters in parallel	Kg	(m) measured	Monthly (hourly readings)	100%	Electronic and paper	Measured in parallel by 2 mass flow meters directly before the unit. Readings are taken hourly and processed by APCS, the lowest reading is chosen automatically by APCS. Monthly data is the sum of the accumulated data.
2. C_HFC23 <sub>y</sub>	HFC23 mass content in HFC23 waste supplied to destruction process	Chromatograph	%	(m) measured (c) calculated	Monthly (weekly measurements)	100%	Electronic and paper	Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
3. q_ND <sub>y</sub>	Volume of gaseous effluent from the unit	Portable flow meter	m <sup>3</sup>	(m) measured (c) calculated	Monthly (weekly measurements)	100%	Paper	Calculated conservatively based on effluent gas flow speed and length of the period.

4. C_ND_SF6 <sub>y</sub>	SF6 concentration in gaseous effluents from the unit	Chromatograph	mg/m3	(m) measured	Monthly (weekly measurements)	100%	Electronic and paper	If the SF6 concentration is not detectible than the value is conservatively taken to be equal 0,1mg/m3. Monthly data is the average of the calculated data.
5. C_ND_HFC23 <sub>y</sub>	HFC23 concentration in gaseous effluents from the unit	Chromatograph	mg/m3	(m) measured	Monthly (weekly measurements)	100%	Electronic and paper	If the HFC23 concentration is not detectible than the value is conservatively taken to be equal 1,0 mg/m3. Monthly data is the average of the calculated data.

#### D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):

The project GHG emissions during the year y, t CO<sub>2</sub>-e:

$$E_{DP_y} = ND_{HFC23_y} \times GWP_{HFC23} + ND_{SF6_y} \times GWP_{SF6_y} + Q_{HFC23_y} \times EF, \quad (D.1-1)$$

where ND<sub>HFC23<sub>y</sub></sub> is the quantity of HFC23 not destroyed in the unit during the III-rd Quarter 2011, t;

ND<sub>SF6<sub>y</sub></sub> is the quantity of SF6 not destroyed in the unit during the III-rd Quarter 2011, t;

Q<sub>HFC23<sub>y</sub></sub> is the quantity of HFC23 supplied for destruction into the unit during the III-rd Quarter 2011, t;

EF is the emissions factor that determines the amount of CO<sub>2</sub> generated per 1 tone of destroyed HFC23. According to AM0001, EF = 0,62857 t CO<sub>2</sub>-e/t;

GWP<sub>HFC23</sub> is the Global Warming Potential (GWP) that converts 1 tone of HFC23 to tones of CO<sub>2</sub> equivalent, t CO<sub>2</sub>-e/t. The approved GWP value for HFC23 is 11 700 t CO<sub>2</sub>-e/t for the first commitment period under the Kyoto Protocol;

GWP<sub>SF6</sub> is the Global Warming Potential (GWP) for conversion of 1 ton of SF6 o tons of CO<sub>2</sub> equivalent, t CO<sub>2</sub>-e/t. The approved GWP value for SF6 is 23 900 t CO<sub>2</sub>-e/t for the first commitment period under the Kyoto Protocol.

$$ND_{HFC23_y} = q_{ND_y} \times C_{ND\_HFC23_y} \times 10^{-9}, \quad (D.1-2)$$

$$ND_{SF6_y} = q_{ND_y} \times C_{ND\_SF6_y} \times 10^{-9}, \quad (D.1-3)$$

$$Q_{\text{HFC23}_y} = q_{\text{HFC23}_y} \times 10^{-3} \times C_{\text{HFC23}_y} \times 10^{-2},$$

(D.1-4)

where  $q_{\text{ND}_y}$  is volume of gaseous emissions from destruction process during the III-rd Quarter 2011,  $\text{m}^3$ ;

$q_{\text{HFC23}_y}$  is the amount of HFC23 wastes supplied for destruction during the III-rd Quarter 2011, kg;

$C_{\text{ND}_y}$  is the average concentration of HFC23 in gaseous emissions from the unit during the III-rd Quarter 2011,  $\text{mg}/\text{m}^3$ ;

$C_{\text{ND}_y}$  is the average concentration of SF6 in gaseous emissions from the unit during the III-rd Quarter 2011,  $\text{mg}/\text{m}^3$ ;

$C_{\text{HFC23}_y}$  is the average concentration of HFC23 in wastes supplied for destruction during the III-rd Quarter 2011, %;

**D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:**

ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
6. $S_{\text{HFC23}_y}$	HFC23 quantity recovered for sale	Scales and level meter in the collector	t	(m) measured	Monthly	100%	Paper	Not applied if there is no HFC23 recovered for sale from HFC23 waste or there is no technical possibility
7. $q_{\text{G}_y}$	HFC23 waste quantity generated	Mass flow meter	kg	(m) measured	Monthly (hourly readings)	100%	Electronic and paper	Measured by mass flow meter directly after emission sources. Readings are taken hourly and processed by APCS. Monthly data is the sum of the accumulated data.
8. $q_{\text{G}_y}$	SF6 waste quantity generated	Mass flow meter	kg	(m) measured	Monthly (hourly readings)	100%	Electronic and paper	Measured by mass flow meter directly after emission sources. Readings are taken hourly and

								processed by APCS. Monthly data is the sum of the accumulated data.
9. q_SF6 <sub>y</sub>	SF6 waste quantity supplied for destruction	2 mass flow meters (in parallel)	kg	(m) measured	Monthly (hourly readings)	100%	Electronic and paper	Measured in parallel by 2 mass flow meters directly before the unit. Readings are taken hourly and processed by APCS, the lowest reading is chosen automatically by APCS. Monthly data is the sum of the accumulated data.
10. C_G_HFC23 <sub>y</sub>	HFC23 mass content in HFC23 waste generated	Chromatograph	%	(m) measured	Monthly (weekly measurements)	100%	Electronic and paper	Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
11. C_G_SF6 <sub>y</sub>	SF6 mass content in SF6 waste generated	Chromatograph	%	(m) measured (c) calculated	Monthly (weekly measurements)	100%	Electronic and paper	Mass content is calculated based on volume content and density using approved method. Monthly data is the average of the calculated data.
12. C_SF6 <sub>y</sub>	SF6 mass contents in SF6 waste supplied for destruction	Chromatograph	%	(m) measured (c) calculated	Monthly (weekly measurements)	100%	Electronic and paper	Mass content is calculated based on volume content and density using

								approved method. Monthly data is the average of the calculated data.
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**D.1.1.4. Description of formulae used to estimate .baseline emissions (for each gas, source etc.; emissions in units of CO2 equivalent):**

At first HFC23 and SF<sub>6</sub> leaks to the atmosphere within the project boundary are calculated according to actual data during the Quarter y, t:

$$L_{HFC23y} = (G_{HFC23y} - Q_{HFC23y} - S_{HFC23y}) \times GWP_{HFC23}, \quad (D.1-5)$$

$$L_{SF6y} = (G_{SF6y} - Q_{SF6y}) \times GWP_{SF6},$$

$$G_{HFC23y} = q_{G\_HFC23y} \times 10^{-3} \times C_{G\_HFC23y} \times 10^{-2}, \quad (D.1-6)$$

$$Q_{HFC23y} = q_{HFC23y} \times 10^{-3} \times C_{HFC23y} \times 10^{-2} \quad (D.1-7)$$

where  $G_{HFC23y}$  is the HFC23 generated during the III-rd Quarter 2011, t

$G_{SF6y}$  is the SF<sub>6</sub> generated during the III-rd Quarter 2011, t

$Q_{HFC23y}$  is the HFC23 supplied for destruction during the III-rd Quarter 2011, t

$Q_{SF6y}$  is the quantity of SF<sub>6</sub> supplied for destruction to the unit during the III-rd Quarter 2011, t;

$S_{HFC23y}$  is the amount of HFC23 recovered for sale during the III-rd Quarter 2011, t.

$q_{HFC23y}$  is the HFC23 waste supplied for destruction during the III-rd Quarter 2011, kg

$C_{HFC23y}$  is the average annual concentration of HFC23 in HFC23 waste supplied for destruction during the III-rd Quarter 2011, %

$$G_{SF6y} = q_{G\_SF6y} \times 10^{-3} \times C_{G\_SF6y} \times 10^{-2}, \quad (D.1-8)$$

$$Q_{SF6y} = q_{SF6y} \times 10^{-3} \times C_{SF6y} \times 10^{-2}, \quad (D.1-9)$$

where  $q_{G\_HFC23y}$  is the HFC23 waste generated during the III-rd Quarter 2011, kg

$q\_G\_SF6_y$  is the SF6 waste generated during the III-rd Quarter 2011, kg

$q\_SF6_y$  is the SF6 waste supplied for destruction during the III-rd Quarter 2011, kg

$C\_G\_HFC23_y$  is the average concentration of HFC23 in HFC23 waste generated during the III-rd Quarter 2011, %

$C\_G\_SF6_y$  is the average concentration of SF6 in SF6 waste generated during the III-rd Quarter 2011, %

$C\_SF6_y$  is the average concentration of SF6 in SF6 waste supplied for destruction during the III-rd Quarter 2011, %

Baseline GHG emissions during the Quarter y, t CO<sub>2</sub>-e:

$$BE_y = Q\_HFC23_y \times GWP\_HFC23 + Q\_SF6_y \times GWP\_SF6,$$

(D.1-10)

**D.1.2. Option 2 - Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):**

**D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO<sub>2</sub> equivalent):**

This section is not applicable to this project.

<b>D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:</b>								
ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

**D.1.3. Treatment of leakage, in the monitoring plan:**

As shown in Section B, only GHG emissions due to grid electricity consumption for operation of the new FOC thermal destruction unit are significant leakages.

<b>D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor Leakage effects of the project:</b>								
ID number <i>(Please use numbers to ease cross-referencing to D.2.)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
15. ECy	Electricity consumption for destruction process	Meter	MWh	(m) measured	Monthly	100%	Paper	

**D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

Leakages due to grid electricity consumption during the Quarter y are calculated as follows, t CO<sub>2</sub>:

$$L_y = EC_y \times EF_{CO_2,grid,y} \times 10^{-3}, \quad (D.1-11)$$

Where EC<sub>y</sub> is electricity consumption by the thermal destruction unit during the III-rd Quarter 2011, MWh;

EF<sub>CO<sub>2</sub>,grid,y</sub> is the CO<sub>2</sub> emissions factor for grid electricity during the year y, kg CO<sub>2</sub>/MWh. According to Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1. General guidelines. Version 2.3. Ministry of Economic Affairs of the Netherlands. May 2004. GHG emission factor for grid electricity consumed in Russia varies for different years of the crediting period (2008-2012) as follows: EF<sub>CO<sub>2</sub>,grid,2008</sub> = 565 kg CO<sub>2</sub>/MWh, EF<sub>CO<sub>2</sub>,grid,2009</sub> = 557 kg CO<sub>2</sub>/MWh, EF<sub>CO<sub>2</sub>,grid,2010</sub> = 550 kg CO<sub>2</sub>/MWh, EF<sub>CO<sub>2</sub>,grid,2011</sub> = 542 kg CO<sub>2</sub>/MWh, EF<sub>CO<sub>2</sub>,grid,2012</sub> = 534 kg CO<sub>2</sub>/MWh;

**D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO<sub>2</sub> equivalent):**

Emission reductions during the year y measured in t CO<sub>2</sub>e are calculated as follows:

$$ER_y = BE_y - E_{DPy} - L_y \quad (D.1-12)$$

**D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:**

Gaseous effluents (HFC23, SF6, CO, HCl, HF, Cl2, NO2 and dioxins) are measured in compliance with the current environmental standards of Russia:

HFC23, SF6, CO - 1 time per month

HCl, HF, Cl2, NO2 - 6time per year

Dioxins - 1 time per year

The enterprise is subject to regular control by state bodies of environmental supervision and has the following reporting obligations as per official annual statistic forms: statistical form 2-tp (air) Data on Atmospheric Air containing information on the quantities of trapped and destroyed air pollutants, detailed emissions of specific pollutants, number of emission sources, emission reduction actions and emissions from separate groups of pollutant sources.

The Head of Environmental Department is responsible for collection, storage and analysis of data regarding the environmental impact of the project.

<b>D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:</b>		
Data (Indicate table and ID number)	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
Table D.1.1.1 ID 1 Table D.1.1.3 ID 9	low	<p>Measured by two down-the-line mass flow meters. Instrument error <math>\pm 0,5\%</math>. Readings are automatically collected, stored, processed and protected from any corrections by APCS. APCS should automatically calculate the conservative value by taking the least value of the two mass flow meters at each data reading.</p> <p>The daily reports with corresponding accumulated data from APCS should be archived in electronic form. The data should be verified monthly and the reports with corresponding verified data should be archived in paper form.</p> <p>Mass flow meters shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the flow meters shall be conducted every week. If the zero check indicates that the flow meter is not stable, an immediate calibration of the flow meter shall be undertaken. If the readings of the mass flow meters differ by greater than twice their claimed accuracy then measures are taken to remedy the fault.</p>



Table D.1.1.1 ID 2 Table D.1.1.3 ID 10 Table D.1.1.3 ID 11 Table D.1.1.3 ID 12	low	Calculated by approved method (relative error - 5%) based on sample's analysis. Sample's analysis includes volume content and density analysis measurements by chromatograph. The measurements and calculation of mass content should be performed by laboratory personnel (assistant), documented in paper form and archived in electronic form. The results are to be verified. The data should be cross-checked with the previous data and summarized in the monthly reports. Chromatographs shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology: absolute calibration - 1 time per year, calibration measurement - 1 time per quarter.
Table D.1.1.1 ID 4 Table D.1.1.1 ID 5	low	Measured by chromatograph (relative error: ID 4 - 20%, ID 5 - 25%) under approved method. The accuracy of the measurements has little influence on accuracy of GHG emission reduction calculations. To provide conservative estimation the concentration of HFC23 and SF6 is taken to be equal 1,0 mg/m <sup>3</sup> for HFC23 and 0,1 mg/m <sup>3</sup> for SF6 correspondingly if the HFC23 or SF6 concentration is not detectible by chromatographs. The measurements of concentration should be performed by laboratory personnel (assistant), documented in paper form and archived in electronic form. The analysis results are to be verified. The data should be cross-checked with the previous data by the head of laboratory and summarized in the monthly report. Chromatographs shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology: absolute calibration - 1 time per year, calibration measurement - 1 time per quarter.
Table D.1.1.1 ID 3	low	Measured by portable flow meter and calculated based on the calendar length of period (hours/period). To provide conservative estimate the shutdown time of the destruction unit is not included in calculation. The accuracy of the equipment and the method has little influence on accuracy of GHG emission reduction calculations. Portable flow meter is subject to regular calibration in compliance with the requirements of the Federal Agency for Technical Control and Metrology.
Table D.1.1.3 ID 6	low	Measured by scales and level meter in the collector. The measurements should be performed by shop personnel, documented and archived in paper form. The background data should be verified and summarized in the monthly reports. The monthly reports should be cross-checked with accounting reports. The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.

Table D.1.1.3 ID 7 Table D.1.1.3 ID 8	low	Measured by mass flow meter. Instrument error $\pm 0,5\%$ . Readings are automatically collected, stored, processed and protected from any corrections by APCS. The daily reports with corresponding accumulated data should be archived in electronic form. The data should be verified monthly and the reports with corresponding verified data should be archived in paper form. Mass flow meters shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the mass flow meter shall be conducted on demand. If the zero check indicates that the mass flow meter is not stable, an immediate calibration of the mass flow meter shall be undertaken.
Table D.1.3.1 ID 13	low	Measured by electricity feeders and calculated. The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.

**D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:**

The operational and management structure comprises Project operator and Holding company.

The monitoring procedures are executed by the Project operator according to the Corporate standard 6-020-2009 "GHG Utilization" (monitoring procedure) set forth by the Order of the Director №7 dated 11.01.2009. According to the mentioned document all readings in line with the monitoring plan have to be recorded under an established procedure and persons responsible for data collection and storage appointed starting on 01.04.2008.

The monitoring report is prepared by the Project operator.

The data monitored and required for verification are to be kept for two years after the last transfer of ERUs for the project.

The project execution is supervised by the Holding company Halopolymer.

#### APPENDIX 4. REVISIONS TO MONITORING PLAN ADOPTED FOR THE 3<sup>RD</sup> AND 4<sup>TH</sup> MONITORING PERIODS

<b>Deviation 1</b>	<b>Registered PDD/Description/Justification</b>
D.1 Description of monitoring plan chosen The HCFC-22 quantity produced	The HCFC22 quantity produced is determined monthly as a sum of HCFC22 gross output (commercial output measured by mass meter + change in inventory measured by level meter) and monomer-4 gross production (commercial output measured by mass meter + change in inventory measured by level meter) multiplied by HCFC22 consumption factor for monomer-4 production.
	Correction: This paragraph was removed from D.1 as HCFC22 quantity produced is not monitored as HCFC-22 production is eliminated from the monitoring plan
	Justification: The quantity of HCFC-22 produced was previously determined subject to the requirement of the cut-off condition. The cut-off condition set the maximum annual HCFC-22 quantity that is eligible for crediting (P_HCFC22,max) that is the lower value between: (a) the actual HCFC-22 production in year y (P_HCFC22); and (b) the maximum historical HCFC-22 production level (P_HCFC22 <sub>Hist,max</sub> ) at this plant (in tonnes of HCFC22) during any of the last three years between 2002-2004. According to the new revisions to the monitoring plan presented in detail in Appendix 1 the cut-off conditions are eliminated from the monitoring as the values for determining the maximum annual HCFC-22 quantity in 2002-2004 were incorrect. Therefore the quantity of HCFC-22 produced is unnecessary to determine in the monitoring of emission reduction of this project as well.
<b>Deviation 2</b>	<b>Registered PDD/Description/Justification</b>
D.1 Description of monitoring plan chosen The SF6 quantity produced	The SF6 quantity produced is determined monthly as SF6 gross output (commercial output measured by scales + change in inventory measured by level meter).
	Correction: This paragraph was removed from D.1 as SF-6 quantity produced is not monitored as SF-6 production is eliminated from the monitoring plan
	Justification: The quantity of SF6 produced was previously determined subject to the requirement of the cut-off condition. The cut-off condition set the maximum annual SF6 quantity that is eligible for crediting (P_SF6y,max) that is the lower value between: (a) the actual SF6 production in year y (P_SF6y); and (b) the maximum historical SF6 production level (P_SF6 <sub>Hist,max</sub> ) at this plant (in tonnes of SF6) during any of the last three years between 2002-2004. According to the new revisions to the monitoring plan presented in detail in Appendix 1 the cut-off conditions are eliminated from the monitoring as the values for determining the maximum annual SF6 quantity in 2002-2004 were not applicable. Therefore the quantity of SF6 produced is unnecessary to determine in the monitoring of emission reduction of this project as well.

<b>Deviation 3</b>	<b>Registered PDD/Description/Justification</b>
D 1.1.3 Item 13. P_HCFC22y, HCFC22 quantity produced	Data for application of the cut-off condition Correction: HCFC22 quantity produced is not monitored as cut-off condition is eliminated from the monitoring plan Justification: Please see above justification to deviation 1
<b>Deviation 4</b>	<b>Registered PDD/Description/Justification</b>
D 1.1.3 Item 14. P_SF6y, SF6 quantity produced	Data for application of the cut-off condition Correction: SF6 quantity produced is not monitored as cut-off condition is eliminated from the monitoring plan Justification: Please see above justification to deviation 2
<b>Deviation 5</b>	<b>Registered PDD/Deviation/Justification</b>
Subsection 1.1.4., formulas D 1.10 – D 1-11	<p>Further baseline calculations are made <u>with allowance for the cut-off conditions</u>:</p> $G_{\text{HFC23}y} < \text{MIN}\{P_{\text{HFC22}y}; P_{\text{HFC22hist,max}}\} \times w_h \quad (\text{D.10})$ $G_{\text{SF6}y} < \text{MIN}\{P_{\text{SF6}y}; P_{\text{SF6hist,max}}\} \times w_s, \quad (\text{D.11})$ <p>where <math>P_{\text{HFC22}y}</math> is the amount of HCFC22 produced at "KCKK Polimer Plant" Ltd. during the year y, t;  <math>P_{\text{SF6}y}</math> is the amount of saleable SF6 produced at "KCKK Polimer Plant" Ltd. during the year y, t;  <math>P_{\text{HFC22hist,max}}</math> is the maximum annual amount of HCFC22 produced at the plant during the historical period, t. For <math>P_{\text{HFC22hist,max}}</math> we take the maximum annual volume of HCFC22 production at "KCKK Polimer Plant" Ltd. during the period of 2002-2004. According to Section B.1 <math>P_{\text{HFC22hist,max}} = 16\,956,5 \text{ t (2004)}</math>;  <math>P_{\text{SF6hist,max}}</math> is the maximum annual amount of saleable SF6 produced at the plant during the historical period, t. For <math>P_{\text{SF6hist,max}}</math> we take the maximum annual volume of saleable SF6 produced at "KCKK Polimer Plant" Ltd. during the 2002-2004. According to Section B.1 <math>P_{\text{SF6hist,max}} = 219,9 \text{ t (2004)}</math>;  <math>w_h</math> is the fraction of HFC23 per unit of HCFC22 produced at the plant. For the fraction <math>w_h</math> we assume its minimum average annual value according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004. According to Section B.1 <math>w_h = 1,06\% \text{ (2004)}</math>;  <math>w_s</math> is the fraction of SF6 contained in waste flows from rectification column of SF6 production per unit of saleable SF6 produced at the plant. For the fraction <math>w_s</math> we assume its minimum average annual value according to actual data of "KCKK Polimer Plant" Ltd. during the period 2002-2004. According to Section B.1 <math>w_s = 1,40\% \text{ (2002)}</math>.</p> <p>Corrections: the formulas are not applicable for the calculation of the baseline emissions as the cut-off conditions are eliminated from the monitoring plan  Justification: Please see above justifications to deviations 1 and 2</p>
<b>Deviation 6</b>	<b>Registered PDD/Deviation/Justification</b>
Subsection 1.1.4, formulas D.1-12-D.1-16	$BE_y = (Q_{\text{HFC23}y} - B_{\text{HFC23}y}) \times GWP_{\text{HFC23}} + (Q_{\text{SF6}y} - B_{\text{SF6}y}) \times GWP_{\text{SF6}}, \quad (\text{D.1-12})$ <p>where <math>B_{\text{HFC23}y}</math> is the baseline quantity of HFC23 destroyed during the year y, t;  <math>B_{\text{SF6}y}</math> is the baseline quantity of SF6 destroyed during the year y, t.  <math>Q_{\text{HFC23}y} = G_{\text{HFC23}y} - S_{\text{HFC23}y} - L_{\text{HFC23}y}, \quad (\text{D.1-13})</math>  <math>Q_{\text{SF6}y} = G_{\text{SF6}y} - L_{\text{SF6}y}, \quad (\text{D.1-14})</math>  <math>B_{\text{HFC23}y} = G_{\text{HFC23}y} - S_{\text{HFC23}y} - MPE_{\text{HFC23}y}, \text{ if } B_{\text{HFC23}y} &lt; 0, \text{ then we take that } B_{\text{HFC23}y} = 0, \quad (\text{D.1-15})</math></p>

	<p><math>B_{SF6y} = G_{SF6y} - MPE_{SF6hist,min}</math>, if <math>B_{SF6y} &lt; 0</math>, then we take that <math>B_{SF6y} = 0</math>, (D.1-16) where <math>G_{HFC23y}</math> is the amount of HFC23 generated in HCFC22 production line with allowance for the cut-off condition (D.1-10) during the year y, t; <math>G_{SF6y}</math> is the amount of SF6 with allowance for the cut-off condition (D.1-11) contained in waste flows from the rectification column of SF6 production during the year y, t</p> <p>Correction: the formulas D.1-12-D.1-16 are not applicable for the calculation of the baseline emissions as:</p> <ol style="list-style-type: none"> <li>1. the cut-off conditions are eliminated from the monitoring plan;</li> <li>2. MPE was erroneously taken for a state measure of regulation of HFC-23 and SF6 emissions.</li> </ol> <p>The baseline GHG emissions is determined according to the formula: <math>BE_y = Q_{HFC23y} \times GWP_{HFC23} + Q_{SF6y} \times GWP_{SF6}</math></p> <p>Justification: Please see above justification to deviation 1 and 2. The use of MPE (the minimum level of the maximum permissible emissions) of HFC23 and SF6 in the atmosphere from sources within the project boundary is inapplicable from the methodological viewpoint as there are no regulations in the Russian Federation requiring the destruction of HFC-23 and SF6 waste streams.</p>
<b>Deviation 7</b>	<b>Registered PDD/Deviation/Justification</b>
Table D 2., ID 13, ID 14	<p>Measured by mass meters and level meter. The measurements should be documented and archived in paper form. The background data should be verified and summarized in the monthly reports. The monthly reports should be cross-checked with production and accounting reports. The equipment shall be calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology.</p> <p>Correction: this QC&amp;QA is not applicable as the volumes of HCFC-22 and SF6 are not monitored because monitoring are eliminated from the monitoring plan</p>
	<p>Justification: The reasons for elimination of HCFC-22 and SF6 production quantities from the monitoring plan are presented above in the justifications to deviation 1 and 2. Therefore these are quantities are not measured and there is no need to exercise QC&amp;QA procedure for the measuring equipment designated for determining such substances.</p>

#### APPENDIX 5. STATUS OF QA AND QC PROCEDURES

Department	Equipment name	Factory number	Verification date	
			Last	Next
27	Mass flow meter «Sitrans FC MassFlo»	7ME411419722N517	02.02.2009	02.02.2013
27	Mass flow meter «Sitrans FC MassFlo»	7ME411421822N018	02.02.2009	02.02.2013
27	Mass flow meter «Sitrans FC MassFlo»	7ME411421722N018	02.02.2009	02.02.2013
27	Mass flow meter «Sitrans FC MassFlo»	7ME411431822N028	02.02.2009	02.02.2013
27	Mass flow meter «Sitrans FC MassFlo»	7ME411421522N018	02.02.2009	02.02.2013
27	Mass flow meter «Sitrans FC MassFlo»	7ME411421922N018	12.03.2009	12.03.2013
104	Meter CA4YU672M	395405	March 2011	March 2015
104	Meter CA4YU672M	012302	June 2009	June 2013
20	Thermoanemometer TESTO 425	01026331	10.09.2010	11.09.2011

## **APPENDIX 6. INDEPENDENT EXPERT'S OPINION ON JUSTIFICATION OF REVISIONS TO MONITORING PLAN**











## **APPENDIX 7. LETTER OF APPROVAL**







