JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: 15 June 2006

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SECTION A. General description of the project

A.1. Title of the project:

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SF_6 destruction at JSC "HaloPolymer Perm"

Sectoral scope: 11 (Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride)
Version: 6
Date: 2/11/2011

A.2. Description of the project:

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Project activity presented in the PDD has been implemented at the JSC "HaloPolymer Perm" since 2007 and includes destruction of SF_6 emissions. The decision on the project start was made with consideration of JI-related earnings resulted from sale of GHG emission reductions to be achieved from SF_6 destruction. Except ERUs selling the project has no other income source and, therefore, there is no other stimulus for its implementation.

The aim of the project is to destruct SF6 waste streams contributing thus to the improvement of environment situation in Perm-city and to reduction of GHG emissions. SF_6 is a GHG gas with a high global warming potential (GWP) that is 23 900 tonnes of CO2 equivalent per one tonne of SF_6.

The project is implemented at JSC "HaloPolymer", Perm, Perm Krai, Russia. The plant produces fluorine - containing products: fluoroplastics, fluoropolymers, and various goods manufactured from them, hydrogen fluoride, halocarbons R14 (CF4), R22 (HCFC-22), R125 (C2F5H), R318 (C4F8), chemical agents, and hydrofluoric acids.

Situation existing prior to the starting date of the project

SF_6 production line was put into operation in 1982. During the process a considerable part of sulphur hexafluoride (approximately 20% of SF_6 output) is lost as emissions at rectification columns.

The enterprise has relevant experience of fluorine organic compounds (FOC) destruction. Thermal destruction unit for fluorine organic compounds was installed at the plant and have been successfully operated since 1987. All equipment and technology are certified in compliance with the Russian standards and meet all applicable environmental requirements. JSC HaloPolymer Perm is obliged to destroy the following waste flows, due to their high toxicity levels:

Liquid wastes
1. Still bottoms (residues) with increased water concentration from monomer 4 production; and still bottoms (residues) from HCFC 22 production;
2. Still bottoms (residues) from monomer 4 production, after R-318C and R-124a have been extracted;
3. Still bottoms from R-125 production;
4. Waste compressor oil contaminated with fluorine-containing products and liquid waste with methanol content from workshop No 26.

Gaseous wastes:
5. R-125 and halocarbon-318C blow-offs;
6. Monomer 4 production blow-offs.

At present, there is no requirement for the compulsory destruction of SF_6 in Russia. The plant has the official "Allowance for the emission of polluting substances in the atmosphere" that includes, among others, SF_6. Under the document, all SF_6 produced at the plant may be emitted into atmosphere without exceeding sanitary and hygienic norms.

Baseline scenario

In the absence of the legislative and economic incentives to utilize (or destruct) wastes of SF_6 production the plant would continue to emit the SF_6 containing gaseous wastes in the atmosphere. This situation is the baseline scenario.

Project scenario

Realization of the proposed project activity is implemented under the second stage of modernization of the thermal destruction unit (TDU)[1] and leads to destruction of SF_6 waste streams at the FOC thermal destruction unit and includes the following measures:

- Installation of stillage residue receiver;
- Installation of blowing-off transmission line from SF_6 production to thermal destruction unit with installation of receiver;
- Installation of measuring and control equipment.

For destruction of wastes in TDU the natural gas is directed in the TDU. SF_6 is utilized along with the gaseous wastes of HCFC-22 and monomer-4 production, but in a separate furnace unit of TDU. The technology and equipment for the project are developed by a domestic special-purpose institute and are certified in conformity with the norms of the Russian Federation and meet all environment protection requirements. Detailed information on the technology used in the project is presented in A.4.2. subsection.

The history of the project

Initially, the SF_6 destruction project was intended to be an integral component of the comprehensive JI project that included destruction of both GHG gases HFC-23 and SF_6. For this, modernization of the TDU including installation of control and monitoring system as well as receiver vessels, relocation of the waste injection jets, and construction of waste gas transmission lines was planned which led to an efficient waste destruction. The go-decision on the JI project was made at JSC "HaloPolymer Perm" on 22.03.2007[2].
In June 2007 the management of the Company decided to part the realization of the JI project in two separate projects: HFC-23 destruction project and SF_6 destruction project[3]. The point is that the CDM approved methodology AM 0001 "Incineration of HFC-23 waste streams" (Version 05.1) that was intended to be used for development of the PDD requires addressing (among others) historical data of share of HFC-23 and SF_6 formation and their concentrations. A reason for the decision to part the projects was the availability of such historical data for HFC-23 and the absence of those for SF_6. The Company's technical regulation at that time did not provide for the monitoring of SF_6 wastes as it was unnecessary: because of low-hazard class of SF_6 its emissions were not reported to the state supervisory organization and the Company did not calculate the maximum permissible emission. Therefore, to gather historical data on actual SF_6 waste formation and its concentration in gaseous wastes it was decided to elaborate a separate project for SF_6 destruction project in three years after the project would become operational. These data were intended to be provided through

[1] First stage of TDU modernization is associated with destruction of HFC-23 waste streams.

[2] For reference see the minutes of discussion dd. 22.03.2007

[3] For reference see the minutes of discussion dd. 22.06.2007

direct measurement of waste gaseous streams containing SF_6 and of concentrations, which had never been done before.

In the period of June-December of 2007 the Company carried out the following activities:

- developed a process scheme of HFC-23 and SF_6 destruction, feasibility study and technical design;
- technical design underwent the necessary approval procedure with a state supervisory organization;
- bought, installed and commissioned the project equipment.

Thus, since the beginning of 2008 the HFC-23 and SF_6 have been incinerated at the thermal destruction unit. The detailed schedule of the project realization is provided in A 4.2. subsection.

A.3. Project participants:

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Party involved	Legal entity project participants (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A - Russian Federation (Host party)	Joint Stock Company "HaloPolymer Perm" Open Joint Stock Company "HaloPolymer"	No
Party B To be determined at the later stage	-	-

HaloPolymer Perm, **JSC** is one of the largest chemical enterprises in Russia, was established in Perm in 1942. Currently the enterprise employs over 1.5 thousand highly-qualified workers. Aspiring to work for community's welfare, the enterprise contributes to the improvement of Perm's social sphere. The enterprise pays much attention to environmental issues and has its own environment improvement agenda. JSC HaloPolymer Perm fulfilled the obligations of Vienna Convention of 1995 (on Protection of the Ozone Layer) and Montréal protocol of 1987 (on Emission of Ozone-Depleting Substances) by having, in due time, discontinued production of ozone depleting halocarbons and having switched to production of ozone friendly ones. Provision of normal work conditions, protection of personnel and public health are of the enterprise's priorities.

Now JSC HaloPolymer Perm is one of the Russian market leaders in production of unique fluorine-containing products: fluoroplastics, fluoropolymers, and various goods manufactured from them, hydrogen fluoride, halocarbons 14, 22, 125, 318, chemical agents, and hydrofluoric acids. Produce of JSC HaloPolymer Perm is purchased by enterprises of Western Europe, America and Asia.

In 2003 International Quality Management System as per ISO 9001:2000 was established at the Company. In 2006 its functioning was certified by Certification Body TÜV CERT (Germany) according to results of accreditation audit (Certificate No. 15 100 21322 dated 29 November 2006).

OJSC HaloPolymer is a Moscow-based holding company that managing activities of JSC "HaloPolymer Perm". OJSC HaloPolymer coordinates and manages all organizational, technic-economic and other issues associated with development of this JI project and with promotion of this in the international carbon market.

A.4. Technical description of the project:

A.4.1. Location of the project:

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A.4.1.1. Host Party(ies):

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Russian Federation

A.4.1.2. Region/State/Province etc.:

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Perm Krai

A.4.1.3. City/Town/Community etc.:

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The city of Perm

A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):

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The project activity is located Perm. Perm is a city in the European part of Russia, the administrative centre of Perm Krai, a port on the Kama River. The population of Perm as of January 2007 stood at 970 000 people.

Geographic latitude: 58°01′N. Geographic longitude: 56°14′E. Time zone: GMT 5:00.[4]

The climate of Perm is continental. Average summer and winter temperatures are +20.5°C and -17.5 respectively. Average air humidity is 75%. Average snow cover depth is 55 cm.

Perm is the largest economic centre of Perm Krai and one of the largest economic centers in Russia. The city economy is characterized, primarily, by developed heavy industry. Core industries are power engineering, oil and gas processing, machine-building, chemical and petrochemical industries, woodworking, printing and food industry.

Fig. 4.1. Location of Perm on the map

[4] Information source: http://travel.org.ua/sunrise/coordinates.php?regionID=59

Figures A.4-2 and A.4.3 show the exact location of the JSC "HaloPolymer Perm" installations in which the project activity is implemented.

Fig. A.4-2. Location of JSC "HaloPolymer Perm"

A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

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As per technical documentation when SF_6 is produced the process wastes occur, which are direct and irretrievable. There were activities at the HaloPolymer Perm plant for decreasing the share of such wastes. At annual production rate of 20-800 tonnes the wastes share ranged within 13%-30% of SF_6 output quantity in mass terms. The plant has relevant expertise of fluorocarbon compounds (FCC) utilization. Since 1987 the thermal destruction unit for neutralization of flourochlorcarbon compounds has been in operation. The equipment and technology are certified in conformity with the norms of Russian Federation and meet environment requirements. The existing process scheme provides for simultaneous destruction of waste gases from monomer-4 production, stillage bottoms from monomer-4 and PCFC-22 production, stillage bottoms and waste gases from Freon-318S and Freon-125 production installations, as well as waste gases from HCFC-22 rectification column, which contains HFC-23 and from SF_6 rectification columns which contain SF_6.

The implementation schedule of the SF6 destruction project in 2007 is presented on the following table[5].

#	Activities	June	June	July	Aug	Sept	Oct	Nov	Dec
1.	Development of Feasibility Study, and preparation of material for PDD								
2.	Preparation of technical design documentation and EIA								
3.	Installation and commissioning of the project equipment								

The SF_6 destruction project carried out under the second stage of the TDU modernization includes implementation of the following measures:

- Installation of stillage residue receiver;

[5] Detailed scheme is available on request

- Installation of blowing-off transmission line from SF_6 production to thermal destruction unit with installation of receiver;
- Installation of measuring and control equipment.

Main technical characteristics of equipment involved in the project:

#	Item	Description	Technical data	Parameters to control
1	Stillage residue receiver (position E-28). Designed for evaporation of stillage residue	Vertical cylindrical apparatus with elliptical bottoms and casing	Volume: 0,6 m^3 Diameter: 900 mm Casing diam: 1000 mm Height: 1655 mm Working pressure: 4.0 MPa	Level range: within 0% through 80% of receiver's capacity; Pressure: 0,1-1,4 MPa
2	Receiver for waste collection (position E-9)	Vertical cylindrical apparatus with elliptical bottoms and casing. At the inlet of E9 two mass flow meters PROMASS 83F08 are installed.	Diameter: 2000 mm Length: 5580 mm Safety valve go-off pressure: 0,33 MPa Tension membrane go-off pressure: 0,255 – 0,3 MPa	Pressure: 0-0,25 MPa Pressure between membrane and safety valve: 0 MPa Waste flow: 0-20 kg/h Waste content: weekly
3	Blowing-off transmission line	Gas pipeline with total length of 1221 m incl.:	- 814 m of pipeline with diam. 45*3 mm is passing overhead, - 407 m with diam. 32*3 is passing in the shop	Pressure: up to 1,6 MPa (16 кгс/$см^2$); Temperature:(+30^0C÷-30^0C)

All information of values of process parameters is channeled to automated work station.
The technology used in the project was developed by the State Institute for Applied Chemistry (Saint-Petersburg) and is specified by the following characteristics:

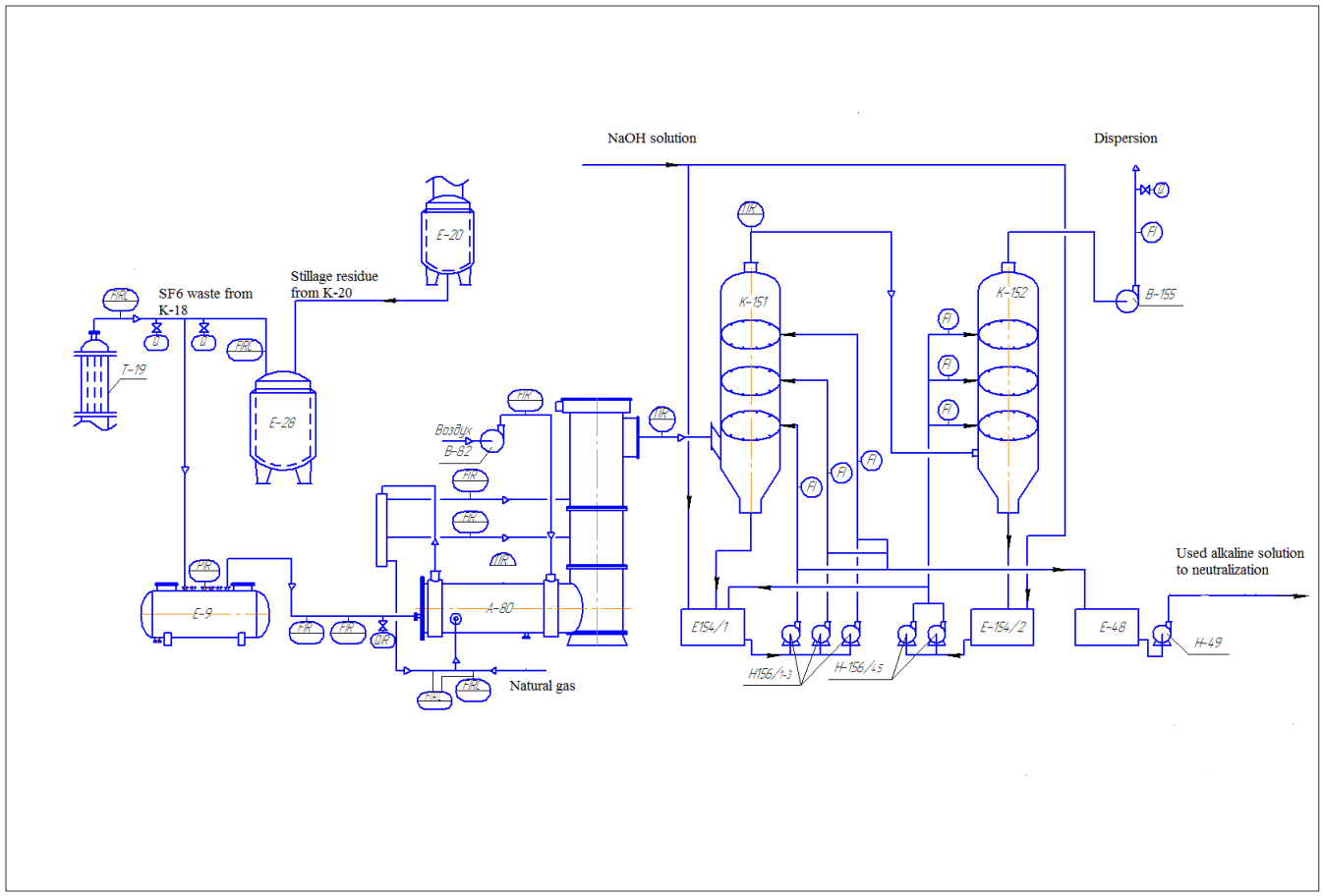
- Efficient incineration under high temperatures at the decomposition zone;
- Burner's design provides for a good mixing of hot gases and wastes in a turbulent stream;
- Stable and quick gas treatment allows avoiding the formation of dioxins;
- Reliability and durability of the installation's elements due to the use of high-tech materials.

Description of SF_6 waste decomposition process

Process waste gases from rectification column K-18 of SF_6 production through the pipeline are directed under pressure of 1.6 MPa to the vessel-receiver E-9 (shop 26) and further through the pressure reduction unit and measuring point are come in the thermal destruction unit (TDU) A-80/$_{1-3}$. Liquid stillage bottoms of SF_6 production are periodically fed from the rectification column K-20 in the tank E-28, where they are evaporated and are mixed in the pipeline with waste gases from the column K-18 and are fed further to TDU under own pressure (up to 1.6 MPa). The composition of the waste gases is measured at the inlet of the TDU by the lab chromatographs. The inlet of the TDU is also equipped with two consecutive mass flow meters working in parallel. The average composition of SF_6 waste streams are as follows:

Component	Waste gases from K-18	Stillage bottoms from K-20
Sulphur hexafluoride (SF_6)	85.0-90.0	99.95-99.997
Oxigen (O_2)	2.5-6.0	–
Azot (N_2)	3.0-6.0	–
Freon-14 (CF_4)	2.0-4.0	–
Sulphur oxifluoride ($S_xF_yO_n$)	–	0.002–0.05

Fig. A.4.2.1. Schematic diagram of SF6 destruction process



Thermal destruction of SF_6 wastes is carried out in the TDU at the temperature of 1100ºC. TDU consist of horizontal part (cyclone pre-furnace) and mixing zone as well as vertical part, i.e. oxidation zone. As a fuel the natural gas is used, the blowing air is directed in TDU from turbo-gas blower B-82.

The air is fed in the TDU cooling jacket and further through the collector come in to the burners and the oxidation zone for oxidation of combustion semi products and for cooling exhaust gases. The natural gas is fed to the appropriate burners. In the cyclone pre-furnace the burners of special construction are installed that provide for both the efficient combustion of the natural gas and rotary motion of combustion products.

The combustion products from TDU A-80 come in the high-temperature absorber K-151 for the first stage of treatment at the temperature of under 800ºC. The absorber represents a hollow metal column and has three irrigation floors. Irrigating alkaline solution is directed by the centrifugal pumps $H\text{-}156/_{1\text{-}3}$ from the vessel $E\text{-}154/_1$ in the sprayers of the absorber on each floor. In the absorber a part of the solution evaporates and is removed along with gases, the surplus solution is coming back in the vessel $E\text{-}154/_1$. The vessel $E\text{-}154/_1$ is replenished with the irrigating solution from the second treatment stage from the vessel $E\text{-}154/_2$ by the pumps $H\text{-}156/_{4,\,5}$ or with a fresh alkaline solution. Simultaneously with the treatment the gases in the absorber K-151 are cooled down.

Partially purified and cooled below 90ºC gases are supplied in the second treatment stage at the absorber 152. The absorber represents a hollow metal column lined from within with carbon and graphite tiles with three tiers of nozzles. At the nozzle is fed watering alkaline solution with centrifugal pumps H-156

/ 4, 5 from the tank E-154 / 2. Drain excess irrigating solution from the absorber K-152 is carried by gravity into the tank E-154 / 2. After cleaning in absorbers K-151 and TO-152 products of combustion are directed to the dispersal of smoke exhauster B-155. Gas composition is determined after the exhauster and analytical chromatography.

The spent caustic solution from the tank E-154/$_{1, 2}$ is sent to the collector E-48 and pumped H-49 via a neutralization plant for further processing and disposal. After homogenization, neutralization and bleaching effluents are discharged into the river of Kama. Laboratory of OAO "Perm Halopolymer" makes regular environmental monitoring of the effluent.

The project implementation will utilize the entire volume of waste sulfur hexafluoride from the rectification column. That will reduce greenhouse gas emissions.

The used thermal destruction technology allows utilization of waste with an efficiency of 99.99% with virtually no formation of dioxins, as evidenced by direct measurements of exhaust gases and no significant impact on the environment, which is the best available technology.

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

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The project envisages utilization of the total waste gases containing sulfur hexafluoride from the stage of rectification, emitted to the atmosphere prior the project. Given the high value of the global warming potential of this gas the project realization will significantly reduce harmful anthropogenic interference with the climate system, i.e, to reduce GHG emissions in tonnes of CO2 equivalent. The company has an official permit that establishes emission levels of harmful substances into the atmosphere, including the SF_6. The entire volume of emissions from rectification columns can be thrown into the atmosphere without exceeding the sanitary standards for the Sanitary Protection Zone (SPZ).

Without the JI project company would continue to emit SF_6 in accordance with existing practice, based on the following premises:

1. The environmental legislation of the Russian Federation does not require the full use of sulfur hexafluoride emissions. SF_6 assigned to 4th class of danger, i.e., it is considered to be practically safe for the environment and humans.

2. SF_6 applies to greenhouse gases and is characterized by a high global warming potential (GWP). However, no restrictions on GHG emissions for the industrial enterprises in Russia exist.

3. Utilization of sulfur hexafluoride is associated with considerable costs, but it does not bring any economic benefit, except for the gains from the sale of emission reductions in the carbon market under the flexible mechanisms of Kyoto Protocol.

4. Despite the fact that emissions of sulfur hexafluoride in the Russian Federation are regulated by law, the fee for these emissions has not been established.

The project is not a common practice in Russia. Under the existing practice manufacturers of sulfur hexafluoride throw blow-offs, not disrupting the Russian environmental standards.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

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	Years
Length of the crediting period	5
Year	Estimate of annual emission reductions in tonnes of CO_2equivalent
2008	2 347 724
2009	2 059 009
2010	2 346 012
2011	2 575 582
2012	4 378 805
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	13 707 132
Annual average of emission reductions over the crediting period (tonnes of CO_2 equivalent)	2 741 426

A.5. Project approval by the Parties involved:

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On September 15, 2011 the Government of the Russian Federation adopted a resolution # 780 "On Measures for the Implementation of Article 6 of the Kyoto Protocol to the UN Framework Convention on Climate Change" . This document approves Regulations on the implementation of article 6 of the Kyoto Protocol. According to paragraph 2 of the Resolution, the projects will be approved by the Ministry of Economic Development of the Russian Federation.

In accordance with the law of the Russian Federation applicable to the implementation of JI projects, the Project can be approved after a positive opinion is given by the Accredited Independent Entity.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

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The description and justification of the chosen baseline scenario is carried out in accordance with appendix B of JI Guidelines and on the basis of the "Guidance on criteria for baseline setting and monitoring" (Version 03) using the following stepwise JI-specific approach:

Step. 1. Indication and description of the approach chosen regarding baseline setting

Step. 2. Application of the chosen approach.

Below is a detailed description of these steps.

Step 1. Indication and description of the approach chosen regarding baseline setting

A baseline is identified by listing and describing plausible scenarios on the basis of conservative assumptions and selecting the most plausible one. A baseline is established taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector.

Thus, to identify the baseline scenario the following steps are to be taken:

- *Identification of the plausible alternative scenarios;*
- *Description of the key factors and analysis of their influence on these alternative scenarios;*
- *Selection of the most likely alternative scenario.*

Step 2. Application of the chosen approach

Identification of the plausible alternative scenarios

The following alternative scenarios are being considered:

Alternative scenario 1. Continuation of the situation prior the project implementation, i.e. continuation of SF_6 emissions containing in waste streams generated during SF6 production process

This scenario represents a continuation of SF_6 emissions in the atmosphere, which are a process waste in the production of sulfur hexafluoride in rectification columns.

Russian environmental legislation does not require manufacturers to destruct SF_6. Therefore implementation of this alternative is a plausible scenario.

Alternative scenario 2. The project itself that is SF_6 destruction in the thermal destruction unit without being registered as a JI-project activity.

The project includes reconstruction of existing SF_6 production and modernization of the thermal destruction unit (TDU) control system and includes the following measures:

• Installation of the vessel-collector of stillage bottoms in Bldg. 135 shop 22
• Installation of waste transmission lines from the production of sulfur hexafluoride to TDU with the

installation of the receiver;
• Installation of instrumentation and control equipment.

The natural gas is used as a fuel. SF_6 is destroyed together with the gaseous waste products of freon-22 and tetrafluoroethylene (monomer 4). Technology and equipment are developed by the Russian specialized institution. All the equipment and technology conform to the norms of the Russian Federation and meet all environmental requirements.

In the process of the project implementation at the TDU the following amounts of sulfur hexafluoride are incinerated:

Table B.1.1. SF_6 quantities destroyed/to be destroyed at TDU

Years	2008 (fact)	2009 (fact)	2010 (fact)	2011 (prognosis)	2012 (prognosis)
SF_6, tonnes	98,26	86,17	98,21	108	183

Implementation of this scenario requires 5 900 000 rubles[6].

Description of the key factors and analysis of their influence on these alternative scenarios

According to the paragraph 25 of the Guidance on criteria for baseline setting and monitoring (Version 03) the following key factors that affect a baseline shall be taken into account, e.g.:
(a) Sectoral reform policies and legislation;
(b) Economic situation/growth and socio-demographic factors in the relevant sector as well as resulting predicted demand. Suppressed and/or increasing demand that will be met by the project can be considered in the baseline as appropriate (e.g. by assuming that the same level of service as in the project scenario would be offered in the baseline scenario);
(c) Availability of capital (including investment barriers);
(d) Local availability of technologies/techniques, skills and know-how and availability of best available technologies/techniques in the future;
(e) Fuel prices and availability;
(f) National and/or subnational expansion plans for the energy sector .

Below the influence of these key factors on each alternative scenario is considered:

Key factor: Sectoral reform policies and legislation

The government environmental control in the Russian Federation 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 от 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 legislatorial documents does provide for the requirement of obligatory destruction of the SF_6 waste stream.

None of these documents does include requirements for mandatory destruction of sulfur hexafluoride, which poses no threat to human health, being a low-hazard substance.

[6] Source of information: Budget of expenditures on installation and operation of the unit for thermal destruction of SF6 emissions presented by JSC "HaloPolymer Perm" is available on the auditor's request.

In accordance with the laws the federal authorities within their competence exercise the social and hygienic monitoring of ambient air in populated places, including the monitoring of maximum permissible concentration (MPC).

The plants themselves elaborate projections of maximum permissible emissions (MPE) 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.

At the same time due to a low hazard grade the payments for emissions of SF6 are not charged as according to the 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 for emissions of such a gas are not provided for.

According to calculations the surplus of SF_6 emissions over the MPC level on the border of the SPZ "Halopolymer Perm" can occur when the MPE is equal 11 067 tonnes of SF_6 per year[7]. At maximum plant's SF_6 production capacity equal to 1100 tons per year exceeding the MPE, in principle, impossible.

It means, in fact, that the plant can, without a damage to environment, and without breaking the environmental legislation, emit in the atmosphere all waste SF_6 not destroying it. At the same time the set MPC would not be exceeded.

Conclusion:

Therefore this key factor cannot be the barrier for development of the alternative scenario 1. It should also be noted that this factor also does not adversely impact the development of the alternative scenario 2.

Key factor: Economic situation/growth and socio-demographic factors in the sector

Production of sulfur hexafluoride at JSC "Halopolymer Perm" began in 1982. It is mainly used as a gas insulator in electrical devices for power substations. Being an insulating gas, in contrast to transformer oil, which is generally used now, SF_6 is environmentally safe, non-flammable, chemically inert, non-toxic, has better characteristics.

Over the past years demand for SF_6 is increased in the Russian market. This is because the power substations in Russia began a massive replacement of equipment with transformer oil with similar equipment with SF_6 to avoid repeated failure at a transformer substation in the south of Moscow, which has arisen as a result of fire that led to the massive power outage in the capital.

In response to growing demand, there was reconstruction of individual units of SF_6 production including - synthesis, pyrolysis, neutralization, fractionation. This significantly improved the quality of the product. In 2012, the annual release of sulfur hexafluoride can reach about 1100 tons.

[7] The calculation of MPC was provided by OOO "BELZ" on 30/05/2011 and approved by General Director of HaloPolymer Perm.

Volume of process waste depends on the volume of production, technology used and the desired quality (purity) of the basic product - sulfur hexafluoride. Given a full load of equipment (1100 tons of sulfur hexafluoride in the year), process waste may be up to 20%. In the following table the quantities of SF_6 production and process waste for the period of 2008-2012 are represented.

Table B.1.2. SF_6 production and process waste at the JSC "HaloPolymer Perm" for the period of 2008-2012[8]

Years	2008 (fact)	2009 (fact)	2010 (fact)	2011 (forecast)	2012 (forecast)
SF_6 output, tons	570	510	589	647	1100
SF_6 waste, tons	98,26	86,17	98,21	108	183

According to the alternative 1 SF_6 process waste from rectification columns are emitted in the atmosphere. Under the alternative 2 SF_6 is incinerated in the thermal destruction unit.

Conclusion:
As seen from above, this key factor does not influence the development of the considered alternatives. In both scenarios the growing demand for SF_6 can be met by the SF_6 production facilities of "HaloPolymer Perm".

Key factor: Availability of capital (investment barrier)

For the alternative 1 investment capital is not required, since the activities under this scenario are carried out under normal production practices. This key factor has no effect on the alternative 1.

For the alternative 2 the investment barrier exists as the project implementation required to make the initial investment of 5 900 thousand Rubles and will require making further capital expenditures in the renovation of the project equipment in every 5 years. In addition the company has to bear annual expenses associated with operation of the project equipment. The return of invested and to be invested funds without selling ERUs is impossible. The cost analysis provided by the Economics Department of JSC "HaloPolymer Perm" [9] is presented in the following table:

Table B.1.3. Simple Cost Analysis of SF_6 destruction project

Alternative 1	Alternative 2[10]
No costs required for implementation of this scenario.	Capital Expenditures include:
	- Technical design 359 thousand Rubles
	- Installation works 3480 thousand Rubles
	- Project Equipment 1840 thousand Rubles
	- Commissioning 221 thousand Rubles
	Total CAPEX: 5 900 thousand Rubles
	Total operation costs over 2008-2012: **28 951 thousand Rubles (or 5 790 thousand Rubles** per year on average**)**

[8] The data for 2008-2010 are actual figures achieved during monitoring of SF_6 destruction at JSC "HaloPolymer Perm", the data for 2011-2012 are forecast figures provided by the head of fluoroplastics and gases section of OJSC "HaloPolymer".

[9] Source of information: Budget of expenditures on installation and operation of the unit for thermal destruction of SF6 emissions presented by JSC "HaloPolymer Perm" is available on the auditor's request.

[10] Source of information: Budget of expenditures on installation and operation of the unit for thermal destruction of SF6 emissions presented by JSC "HaloPolymer Perm" is available on the auditor's request.

The only source of the revenue is a cash receivables coming in from ERU selling. Therefore without this income source investments in the alternative 2 will not be returned.

Conclusion:
In a typical (non-Kyoto-associated) investment practice financing is available only for profitable business, and not for projects without any financial return. According to the financial policy of JSC "HaloPolymer Perm" it is only those investment projects are eligible for financing that have pay-back periods no longer than 3 years. Therefore, the Company takes the investment risk considering Kyoto-related profits from ERU selling. Thus, there is an obvious investment barrier to alternatives 2.

Key factor: Local availability of technologies/techniques, skills and know-how and availability of best available technologies/techniques in the future

Output of sulfur hexafluoride and related technological waste in the air emissions takes place within the current production activities that have been carried out since 1982. During this period JSC "HaloPolymer Perm" acquired the necessary equipment, attracted and trained experienced professionals as well as developed the technology for the production of sulfur hexafluoride. Therefore, this factor is not a barrier to the scenario 1.

In contrast, at the start of the project the Company has neither the expertise nor methods of measuring of SF6 waste streams, let alone trained personnel for the operation of project equipment. To implement JI project the Company had to establish (in the course of three and a half years) the SF_6 emissions data base as the monitoring of SF_6 was not provided prior the project implementation. Previously there was no need to determine SF_6 emissions due to low hazard of this gas.

Conclusion:

To implement this project the Company had to develop new measurement methods, to train the personnel and to introduce monitoring points. This indicates at the significant influence of this factor to the alternative 2.

Key factor: Fuel prices and availability

This key factor does not influence the alternative scenarios 1 and 2. The SF6 is not destroyed under alternative1; therefore the natural gas is not required.

The policy of the Government of the Russian Federation in the field of energy-supply and energy-efficiency does not provide for imposing the limits on Russian industry as a whole and on chemical sector in particular. Therefore there is no barrier for alternative 2.

Key factor: National and/or subnational expansion plans for the energy sector

The project implementation corresponds to the legislation of Russian Federation and is in line with a general concept of long-term development of the energy sector.
So this key factor is not a risk for the alternative scenarios 1 and 2.

Selection of the most likely alternative scenario.

To summarize the arguments presented above, in the following table provides a generalized factor analysis of the alternative scenarios.

Table B.1.4. Factor analysis of the alternative scenarios

№	Factor	Scenario 1	Scenario 2
1.	Sectoral reform policies and legislation	No influence	No influence
2.	Economic situation	No influence	No influence
3.	Availability of capital (Investment barrier)	No influence	Represents a barrier
4.	Availability of technology, equipment, skills and best practices	No influence	Represents a barrier
5.	Fuel prices and availability	No influence	No influence
6.	National and/or subnational expansion plans for the energy sector	No influence	No influence

Based on such analysis it is clear that the key factors contributing to implementation of the alternative scenario 1. The third and fourth factors are significant barriers to the development of the alternative scenario 2. Therefore, the alternative scenario 1 that is *Continuation of the situation prior the project implementation, i.e., continuation of SF_6 emissions containing in waste streams generated during SF6 production process* is the baseline in the absence of the project activity.

Theoretical description of the baseline

Under the baseline scenario all the waste SF6 (which is generated in the rectification columns 18 and 20 and incinerated in the TDU under the project activity) is emitted in the atmosphere. Therefore the baseline SF_6 emissions are defined according the following formulas:

(B.1) $$BEy=Q_SF_6\,y*GWP_{SF6}$$

BEy the baseline SF_6 emissions for the reporting period, in tonnes of CO_2 equivalent, tCO_2e;

$Q_SF_{6\,y}$ the baseline SF_6 emissions for the reporting period, in tonnes of SF_6, tSF_6;

GWP_{SF6} Global Warming Potential for SF_6 is equal to 23 900 tCO_2e/tSF_6

(B.1.2) $$Q_SF_6\,y = 0.001* q_SF_6y * W_{SF6,y}*10^{-2}$$

q_SF_6y the amount of wastes containing SF6 supplied for destruction during the reporting period, kg;

$w_{SF6,y}$ the average mass concentration of SF6 in the wastes supplied for destruction during the reporting period, %.

Key information and data for establishing the baseline are provided in the following tables:

Data/Parameter	q_SF_6y
Data unit	Kg
Description	The amount of wastes containing SF6 supplied for destruction during the reporting period
Time of determination/monitoring	Quarterly
Source of data (to be) used	Mass flow meter PROMASS 83F08
Value of data applied calculations/determinations)	<table><tr><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr><tr><td>105492</td><td>92415</td><td>105363</td><td>115686</td><td>196684</td></tr></table>
Justification of the choice cription of measurement methods and procedures (to be) applied	The amount of wastes containing SF_6 supplied for destruction are measured with two mass flow meters installed consecutively
QC/QA procedures (to be) applied	Flow meters are calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the flow meters are 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.
Any comment	-

Data/Parameter	$w_{SF6,y}$
Data unit	%
Description	The average concentration of SF6 in the wastes supplied for destruction during the reporting period
Time of determination/monitoring	Quarterly
Source of data (to be) used	Chromatograph “Crystal-lux-4000”
Value of data applied (for ex-ante calculations/determinations)	<table><tr><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr><tr><td>93,24</td><td>93,23</td><td>93,20</td><td>93,20</td><td>93,20</td></tr></table>
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The average concentration is needed to define the net quantity of SF_6 in the amount of waste gases supplied for destruction. The readings are registered weekly.

QC/QA procedures (to be) applied	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.
Any comment	-

Data/Parameter	GWP_{SF6}
Data unit	$tCO2e/tSF_6$
Description	Global Warming Potential for SF_6
Time of determination/monitoring	Once, when PDD is determined
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value of data applied (for ex-ante calculations/determinations)	23 900
Justification of the choice of data or description of measurement methods and procedures (to be) applied	GWP has a constant value for the period of 2008-2012
QC/QA procedures (to be) applied	-
Any comment	-

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

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Step 1. Indication and description of the approach applied

For demonstration of additionality a JI-specific approach is applied, therefore according to the Annex 1 of Guidelines on criteria for baseline setting and monitoring (Version 3) paragraph 44a, additionality will be demonstrated by using the following approach:

(a) Provision of traceable and transparent information showing that the baseline was identified on the basis of conservative assumptions, that the project scenario is not part of the identified baseline scenario and that the project will lead to reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs.

Step2. Application of the approach chosen.

Additionality of the proposed project shall be proved in accordance with requirement Annex I, item A (a) of "Guidance on criteria for baseline setting and monitoring" (version 03). This approach is applicable since the approved CDM methodology has not been used in the project context. The following steps will be considered under this approach:

At the Step 2 "Application of the approach chosen" the alternatives to the project activity which could be a baseline scenario will be identified and evaluation of their conformity with relevant legislation will be carried out.

At the Step 3 "Provision of additionality proofs" justification of additionality will be done based on consideration of economic attractiveness of alternative technological options of SF6 destruction. Further on, common practice analysis will be conducted to determine the extent to which the proposed project activity has already diffused in the Russian Federation.

We detailed described and analyzed the alternatives and selected the two alternatives as the most probable scenarios as **viable ones (see B.1.):**

Alternative scenario 1. Continuation of the situation prior the project implementation, i.e., continuation of SF_6 emissions containing in waste streams generated during SF6 production process.(considered as the baseline scenario)

Alternative scenario 2. The project itself that is "SF_6 destruction in the thermal destruction unit without being registered as a JI-project activity"(considered as the project scenario)

None of the proposed alternatives contradicts to the environment legislation adopted in the Russian Federation. More detailed discussion of that is provided in Section B1 under consideration of the key factor "*Sectoral reform policies and legislation*".

Step 3. Provision of additionality proofs.

Identification of significant barriers to project implementation

The proposed project cannot be considered as the baseline because of the economic barrier to project implementation, which could have precluded its approval by the management of JSC "HaloPolymer

Perm".

Economic barrier

For the alternative 1 the investment capital is not required, since the activities under this scenario are carried out under normal production practices.

Implementation of the project activity, that is alternative 2, has been associated with the need to carry certain capital investments and operational costs. Neutralization of sulfur hexafluoride required commissioning of new equipment for the collection and supply to the destruction of gaseous waste containing SF_6, as well as the whole set of instruments.

It should be noted that in addition to the initial capital investment the operation of the new installation requires a significant investment in overhaul every 5 years (requires a complete upgrade of equipment), as well as significant annual operating costs. Thus, the company actually took on a commitment to incur substantial costs to provide a new level of industrial and environmental safety, expecting to receive money from the sale of emission reduction units (ERUs).

To justify the presence of the economic barrier the simple cost analysis is further conducted. The application of this type of analysis is chosen because the proposed project activity generates no economic benefits other than JI-related income.

Table B.2.1. Simple Cost Analysis

Alternative 1	Alternative 2[11]
No costs required for implementation of this scenario.	Capital Expenditures include:
	- Technical design 359 thousand Rubles
	- Installation works 3480 thousand Rubles
	- Project Equipment 1840 thousand Rubles
	- Commissioning 221 thousand Rubles
	Total CAPEX: 5 900 thousand Rubles
	Total operation costs over 2008-2012: **28 951 thousand Rubles (or 5 790 thousand Rubles** per year on average**)**

The high level of OPEX is explained by high costs of raw material (caustic soda,) energy resources, maintenance etc that make OPEX comparable with initial CAPEX.

It is quite obvious that without JI-related incomes the project activity lacks any economic sense. The decision to initiate investment in this project (design and installation scheme for the collection and transmission) from its own funds was adopted in 2007, according to which the project could be implemented in accordance with Article 6 of the Kyoto Protocol to the UN Framework Convention on Climate Change.

Common practice analysis

There are no activities similar to the proposed project activity in the Russian Federation that are being or have been implemented without JI. There are only two companies that produce sulphur hexafluoride in Russia: JSC "HaloPolymer Perm" and "HaloPolymer Kirovo-Chepetsk", LLC at the City of Kirovo-Chepetsk. Before 2008 when SF6 destruction activities began these companies did not use their thermal

[11] Source of information: Budget of expenditures on installation and operation of the unit for thermal destruction of SF6 emissions presented by JSC "HaloPolymer Perm" is available on auditors' request

destruction units for such purposes, because of lack of economic sense and the absence of legislative requirement on SF6 utilization. Russian law does not require incineration of sulphur hexafluoride. Emissions of sulphur hexafluoride are practically harmless, and pay for them are not charged. There are no restrictions on greenhouse gas emissions for individual enterprises in Russia and they are not expected to be imposed, at least until 2012.
The above companies implement SF6 utilization projects under JI-mechanism of Kyoto Protocol as the only motivation to implement the projects is getting the profit generated from ERUs sale.

Therefore activities similar to SF6 destruction project at JSC "HaloPolymer Perm" have not been implemented without JI. Thus, such activity is not common in the Russian Federation.
Conclusion:

Implementation of the project activity faces significant economic barrier which is confirmed by the simple cost analysis. The analysis has shown that the project activity is not financially attractive without registration as JI. Common practice analysis has demonstrated that all the examples of SF6 destruction projects in the Russian Federation are claimed as JI project activity. Having all the mentioned the project is additional.

B.3. Description of how the definition of the project boundary is applied to the project:

>>
As prescribed in the Guidance on criteria for baseline setting and monitoring (Version 03) "In the case of a JI project aimed at reducing emissions, the project boundary shall:
(a) Encompass all anthropogenic emissions by sources of GHGs which are:
(i) Under the control of the project participants;
(ii) Reasonably attributable to the project; and
(iii) Significant, i.e. the source accounts, on average per year over the crediting period,
for more than 1 per cent of the annual average anthropogenic emissions by sources of GHGs, or
exceeds an amount of 2,000 tonnes of CO2 equivalent, whichever is lower; and

(b) Be defined on the basis of a case-by-case assessment with regard to the criteria referred to in subparagraph (a) above.

Project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected.
All sources of leakage that are included shall be quantified and a procedure for an ex ante estimate shall be provided. Only those emission sources that account for, on average per year over the crediting period, more than 1 per cent of the difference between project and baseline emissions, or which exceed an amount of 2,000 tonnes of CO2 equivalent, whichever is lower, shall be included".

The project boundary includes the gases and emission sources associated with SF6 waste stream destruction. Initially the project owners considered destruction at the TDU of two gases HFC-23 and SF_6 under the separate projects. The explanation of that is provided in the section A.2 This project considers only SF6 destruction activities including relevant technology line but does not include HFC-23 destruction activities.

Please see subsection A.1. for reference. In the following table the emission sources and GHG types are considered as to including them in the baseline or project boundary.

Table B.3.1. GHG emission sources

	Source	GHG	Incl/excl	Comments
Baseline	SF_6 waste gases supplied for destruction	SF_6	**Include**	**Main baseline emission source**
Project activity	SF_6 emissions, that were not destructed in TDU	**SF_6**	**Include**	
	Emissions from natural gas combustion for destruction process	**CO_2**	**Include**	**Main project emission source**
		CH_4	Exclude	<1% of project. emissions Appropriate calculations are presented in E1. section
		N_2O	Exclude	<1% of project emissions Appropriate calculations are presented in E1. section
Leakage	Emissions associated with grid electricity supply for SF_6 destruction	**CO_2**	**Include**	Though the leakage is <1% of difference between project and baseline emissions, these emissions are taken into account to be conservative.
		CH_4	Exclude	<1% of difference between project and baseline emissions (it follows from the following consideration: it's about 80% of Ural grid power stations are fuelled with natural gas[12]. At combustion of 1 TJ of the natural gas it is emitted 56 tonnes of CO_2 and 0,001 of tCH_4 that[13] is 0,001*21=0,021tCO_2e. It means that net CO_2 emits 2667 times higher than CH_4 (in CO_2 equivalent). Therefore if CO_2 emissions <1%, than CH_4 emission <1% by default).
		N_2O	Exclude	<1% of difference between project and baseline emissions (it follow from below consideration: at combustion of 1 TJ of the natural gas it is emitted 56 tonnes of CO_2 emits and 0,0001 of t N_2O that[14] is 0,0001*310=0,031tCO2e. It means that net CO_2 emits 1810 times higher than N_2O (in CO2 equivalent). Therefore, if CO_2 emissions <1%, than N_2O emissions <1%

[12] Fig 4-17 (b) Forecast annual electric energy mix for IPS Urals. European Bank for Reconstruction and Development. Baseline Study. Development of the electricity carbon emission factors for Russia. 09 Sept. 2010.

[13] Information source: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

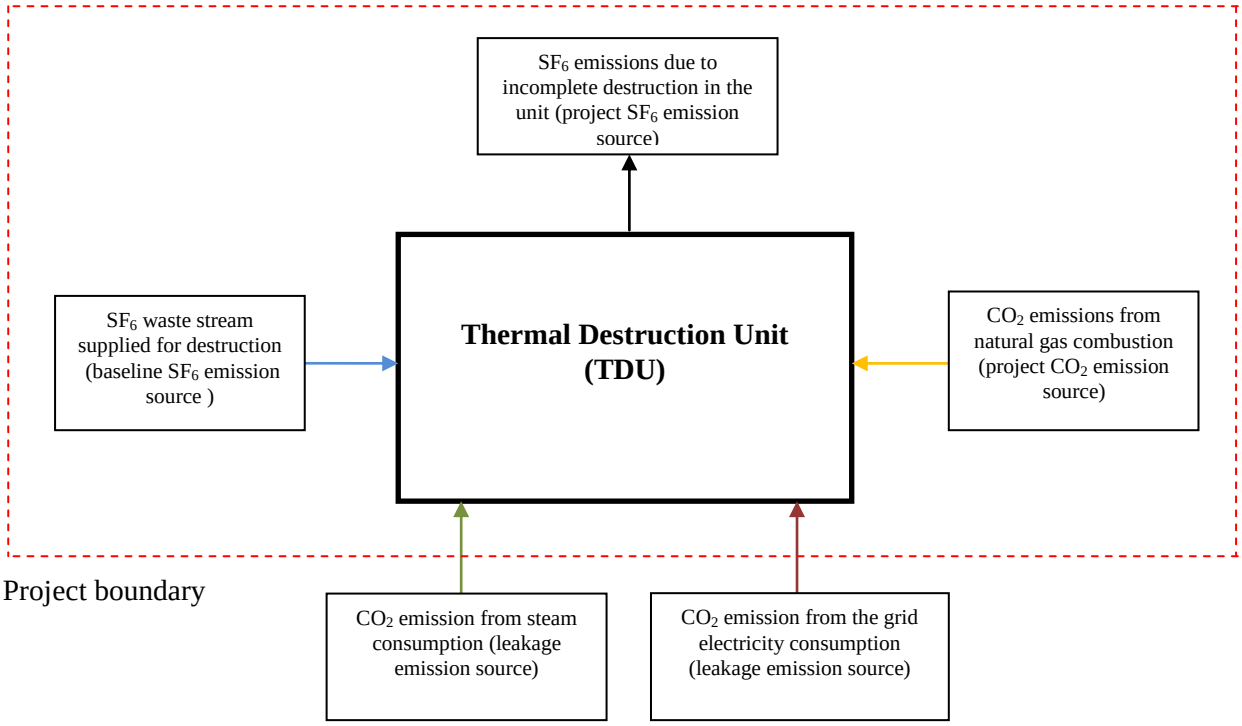
[14] Information source: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

	Emissions associated with pumping of alkaline solution in absorbers K-151 and K-152	CO_2 CH_4 N_2O	Exclude	Electricity consumption for such pumping is provided from the grid. Therefore these emissions have been already included in the emissions associated with grid electricity supply for SF_6 destruction (see above)
	Emissions associated with steam supply for SF_6 destruction	**CO_2**	**Include**	<1% of difference between project and baseline emissions (see ex-ante calculation in E2 section)
		CH_4	Exclude	<1% of difference between project and baseline emissions (it follows from below consideration: at combustion of 1 TJ of the natural gas it is emitted 56 tonnes of CO_2 and 0,001 of tCH_4 that[15] is 0,001*21=0,021tCO2e. It means that net CO_2 emits 2667 times higher than CH4 (in CO2 equivalent). Therefore if CO2 emissions <1%, than CH4 emission <1% by default)
		N_2O	Exclude	<1% of project emissions of difference between project and baseline emissions (it can be seen from the following consideration: at combustion of 1 TJ of the natural gas it is emitted 56 tonnes of CO_2 emits and 0,0001 of t N_2O that[16] is 0,0001*310=0,031tCO2e. It means that net CO_2 emits 1810 times higher than N_2O (in CO2 equivalent). Therefore, if CO_2 emissions <1%, than N_2O emissions <1% by default)
	Emission associated with leaks with waste waters	SF_6	Exclude	During incineration SF6 decomposes in SO3 and HF. Alkaline solution treats those combustion gases remained after incineration with formation of NaF, Na_2SO_4 and H_2O. Therefore there is no SF_6 emission from this source.

[15] Information source: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

[16] Information source: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

The delineation of the project boundary and the gases and sources included as well as leakage emissions and sources is provided on the following diagramme.



B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

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Date of the baseline setting is 01/08/2011.
The baseline was developed by specialists of OJSC "HaloPolymer".

Contact e-mail address: i.kuznetsov@halopolymer.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

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The starting date of the project is 01/11/2007, which is the date when the installation of project equipment started.

C.2. Expected operational lifetime of the project:

>>

Expected operational lifetime of the project is 20 years/240 months: from 01/01/2008 through 01/10/2028. This span corresponds to technological service life of the project equipment.

C.3. Length of the crediting period:

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Length of the crediting period corresponds to the budget period of Kyoto Protocol and makes 5 years/60 months (from 01/01/2008 through 31/12/2012).In the case of the renewal of the Kyoto Protocol, the said crediting period can be extended accordingly.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

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The monitoring plan is described throughout a section D in accordance with paragraph 30 of the Guidance on criteria for baseline setting and monitoring. Project developer applies its own methodology for monitoring plan (JI specific approach) in accordance with paragraph 9 (a) of the Guidance on criteria for baseline setting and monitoring (Version 03), and other applicable JI guidelines. The JI-approach includes consideration of the following steps:

Step 1. Indication and description of the approach chosen regarding monitoring

Step 2. Application of the approach chosen

Below the approach is presented in more detail.

Step 1. Indication and description of the approach chosen regarding monitoring

Project description

The SF_6 destruction at JSC "HaloPolymer Perm" is a second separate project aimed at reduction of GHG gases that has been implementing at the Company since January of 2008. The history of the project implementation is provided in the Section A2 of this PDD. Therefore the monitoring plan includes aspects (variables, factors, procedures etc) relating only to monitoring of SF_6 destruction.

The destruction (incineration) of SF_6 containing in the waste gases coming from the rectification columns of SF6 production is carried out in the thermal destruction unit (TDU). Practically all SF6 is burned in the TDU, merely very negligible part of SF6 contains in the exhaust gas. For destruction purposes the natural gas is supplied in the TDU where it burns. It should be noted that not only waste streams from HFC-23 and SF_6 are incinerated in TDU, but wastes from other production shops not included in the Kyoto project as well. To determine the natural gas quantity supplied for destruction of HFC-23 and SF_6 the total natural gas consumption is measured and after that the natural gas specifically used for destruction of SF6 is recalculated. For operation of TDU the supply of electricity and steam is also needed which, are fed from external sources located outside of the project boundary: the electricity imported from the grid whereas the steam generated at and transmitted from the local heat and power plant.

GHG gases and sources

Based on the above description the following gases from sources will be considered in the monitoring plan:

Source	GHG gas
Baseline emission source: Waste SF_6 emissions that were avoided as a result of the project realization	SF_6
Project emission source: SF_6 emissions that were not destructed in TDU	SF_6
Project emission source: Emissions from natural gas combustion for destruction process	CO_2
Leakage source: Consumption of electricity for SF_6 destruction	CO_2
Leakage source: Consumption of heat for SF_6 destruction	CO_2

¶

Step 2. Application of the approach chosen

Data and parameters monitored

In compliance with the Guidelines for Users of the JI PDD Form version 04, in section D it is necessary to examine in detail and clearly mark the data and ratios, which are:

a) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD;
b) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD; and
c) Data and parameters that are monitored throughout the crediting period.

In the following table the data and parameters are provided:

Data and parameters that are not monitored throughout the crediting period but determined only once (and thus remain fixed throughout the crediting period)	Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD	Data and parameters that are monitored throughout the crediting period
Global Warming Potential for SF_6 (equals to 23 900 tCO_2/tSF_6)[17]	-	Amount of waste gases containing SF_6 supplied for destruction
Conversion factor for natural gas (equals to 33,812 TJ/mln. cubic meters[18])	-	Concentration of SF_6 in waste gases supplied for destruction
CO_2 emission factor for natural gas (equals to 56,1 tCO_2/TJ)	-	Quantity of SF_6 supplied for destruction
CO_2 emission factor for heat (equals to 70,125 tCO_2/MWh) consumption	-	Volume of gaseous emissions from destruction unit
CO_2 emission factor for grid electricity[19] (equals to 0,631 tCO_2/MWh)	-	Concentration of SF_6 in gaseous emissions from destruction unit
-	-	Quantity of SF_6 not destroyed in the unit
-	-	Actual total natural gas consumption for destruction of all wastes incinerated in TDU
		Planned total natural gas consumption for destruction of all wastes incinerated in TDU
-	-	Specific fuel consumption of natural gas for SF6 destruction
		Planned natural gas consumption for SF_6 destruction
-	-	Actual natural gas consumption for SF_6 destruction
-	-	Specific electricity consumption for SF6 destruction

[17] Information source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories

[18] Information source: National Report on Inventory of Anthropogenic Emissions from Sources and Absorption by Sinks of Greenhouse Gases not Regulated by Montreal Protocol for 1990-2009. Part 1. Moscow, 2011. Table 3.5, page 38.

[19] Information source: European Bank for Reconstruction and Development. Baseline Study. Development of the electricity carbon emission factors for Russia. 09 Sept. 2010. Table 5-2. CO2 emission factors for Demand Side for Russian Federation.

		Electricity consumption for SF6 destruction
		Specific heat consumption for SF6 destruction
		Heat consumption for SF6 destruction

Provision of conservatism:

1. The measurement of amount of SF_6 waste supplied for destruction is made by two down-in-line stationary mass flow meters installed on the inlet pipelines to the destruction unit. The readings are automatically collected, stored and processed by Automated Process Control System (APCS). The APCS automatically calculates the conservative value of the SF_6 waste supplied for destruction based on the readings from two down-in-line mass flow meters.
2. The measurement of natural gas consumption is carried out since the start of operation of Kyoto project and is common for both HFC-23 and SF_6 destruction process. Actually the consumption of natural gas has been already taken into account in HFC-23 project and consecutive monitoring reports. But for conservatism sake the same values of natural gas consumption are also applied for SF_6 destruction project.
3. As prescribed in the paragraph 18 of Guidance on criteria for baseline setting and monitoring (Version 03) "Project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected. All sources of leakage that are included shall be quantified and a procedure for an ex ante estimate shall be provided. Only those emission sources that account for, on average per year over the crediting period, more than 1 per cent of the difference between project and baseline emissions, or which exceed an amount of 2,000 tonnes of CO2 equivalent, whichever is lower, shall be included. The leakage assessment provided below shows that these emissions are less than 1% of the difference between project and baseline emissions. Nevertheless those emissions will be taken in to account in the monitoring to be conservative.
4. When assessing CO_2 emission factor from heat consumption, it is assumed that the heat efficiency of a combined heat and power plant is 40% . However, according to a scientific article published by Novosibirsk State Technical University the heat production efficiency of CHPP is 54,7%[20]. But we take 40% to be more conservative.

Leakage assessment

The leakage emission sources are:

1. CO_2 emissions associated with grid electricity supply for SF_6 destruction;
2. CO_2 emissions associated with heat (steam) supply for SF_6 destruction.

[20] http://www.esco-ecosys.ru/2010_3/art040.pdf. See Fig. 4.8 "Energy flows of split and combined process on page 59"

Estimation of CO_2 leakage emissions

1. *GHG leakage emission source: CO_2 emissions associated with grid electricity supply for SF_6 destruction*
GHG: CO_2

Such emissions are determined according to the formula:

$$LE_{ELECy} = ECy * EF_{CO2,ELEC,y} * 10^{-3} \quad \text{D.1}$$

Where

ECy is consumption of the electricity for destruction unit, MWh;

$$ECy = SEC,y * q_SF6,y \quad \text{(D.2)}$$

SEC,y - is specific electricity consumption for SF6 destruction, MWh/t;

A source of information on the electricity consumption for destruction process is the actual data from JSC "HaloPolymer Perm" for 2008-2010 . Electricity consumption for 2011 and 2012 is estimated as a product of the amount of waste gases containing SF6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of specific electricity consumption for destruction of SF6 during the period of 2008-2010. The maximal value of electricity consumption was in 2010, therefore it will be used for estimation[21].

q_SF_6,y - the amount of waste gases containing SF_6 supplied for destruction the reporting period y, t;

[21] Document "Indicators of destruction process monitoring" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request

Table E 2-1. CO_2 emissions due to electricity consumption for destruction of SF_6

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Amount of waste gases containing SF_6 supplied for destruction[22]	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Specific electricity consumption for SF6 destruction	$SEC_{,ELEC,y}$	MWh/t				9,347	9,347
3.	Electricity consumption	EC,y	MWh	733,660	413,000	984,779	1081,267	1838,321
4.	CO_2 emission factor for grid electricity[23]	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0,631	0,631	0,638	0,668	0,712
5.	CO_2 emissions due to electricity consumption for destruction of SF_6	$LE_{ELEC,y}$	tCO_2	462,94	260,60	628,29	722,29	1308,88

[22] Information source: actual data of monitoring of SF6 destruction in 2008-2010 and forecast for 2011-2012 provided by JSC "HaloPolymer Perm"

[23] Information source: European Bank for Reconstruction and Development. Baseline Study. Development of the electricity carbon emission factors for Russia. 09 Sept. 2010. Table 5-2. CO2 emission factors for Demand Side for Russian Federation.

2. GHG leakage emission source: CO_2 emissions associated with heat supply for SF_6 destruction
GHG: CO_2

Such emissions are determined according to the formula:

$$LE_{HEATy} = HCy * EF_{CO2,NG} * 10^{-3} \quad (D.3)$$

HCy is the consumption of the heat for destruction unit, GJ;

$$HCy = SHC,_{HEAT,y} * q_SF6,y \quad (D.4)$$

$SHC,_{HEAT,y}$ - is the specific heat consumption for SF6 destruction, GJ/t

A source of information on the heat consumption for destruction process is the actual data from JSC "HaloPolymer Perm" for 2008-2010. Heat consumption for 2011 and 2012 is estimated as a product of the amount of waste gases containing SF6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of specific heat consumption for destruction of SF6 during the period of 2008-2010. The maximal value of heat consumption was in 2010, therefore it will be used for estimation.

$EF_{CO2,NG}$ – CO_2 emission factor for heat consumption tCO_2/TJ. This factor equal to 140,3 tCO_2/TJ and is determined by division of CO_2 emission factor for the natural gas[24] (56,1 tCO2 – the value is taken from 2006 IPCC Guidelines for National GHG Inventories) in 0,4 (heat efficiency of combined heat and power plant).

[24] Main type of fuel for heat and power plants in Perm krai.

Table E 2-2. CO2 emissions due to heat consumption for destruction of SF6

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Amount of waste gases containing SF_6 supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Specific heat consumption for SF6 destruction	$SHC_{,HEAT,y}$	GJ/t				4,370	4,37021
3.	Heat consumption	HC,y	GJ	338,201	203,441	460,458	505,573	859,552
4.	CO_2 emission factor for heat consumption	$EF_{CO2,HEAT,y}$	tCO_2/TJ	140,3	140,3	140,3	140,3	140,3
5.	CO_2 emissions due to heat consumption for destruction of SF_6	$LE_{HEAT,y}$	tCO_2	47,43	28,53	64,58	70,91	120,55

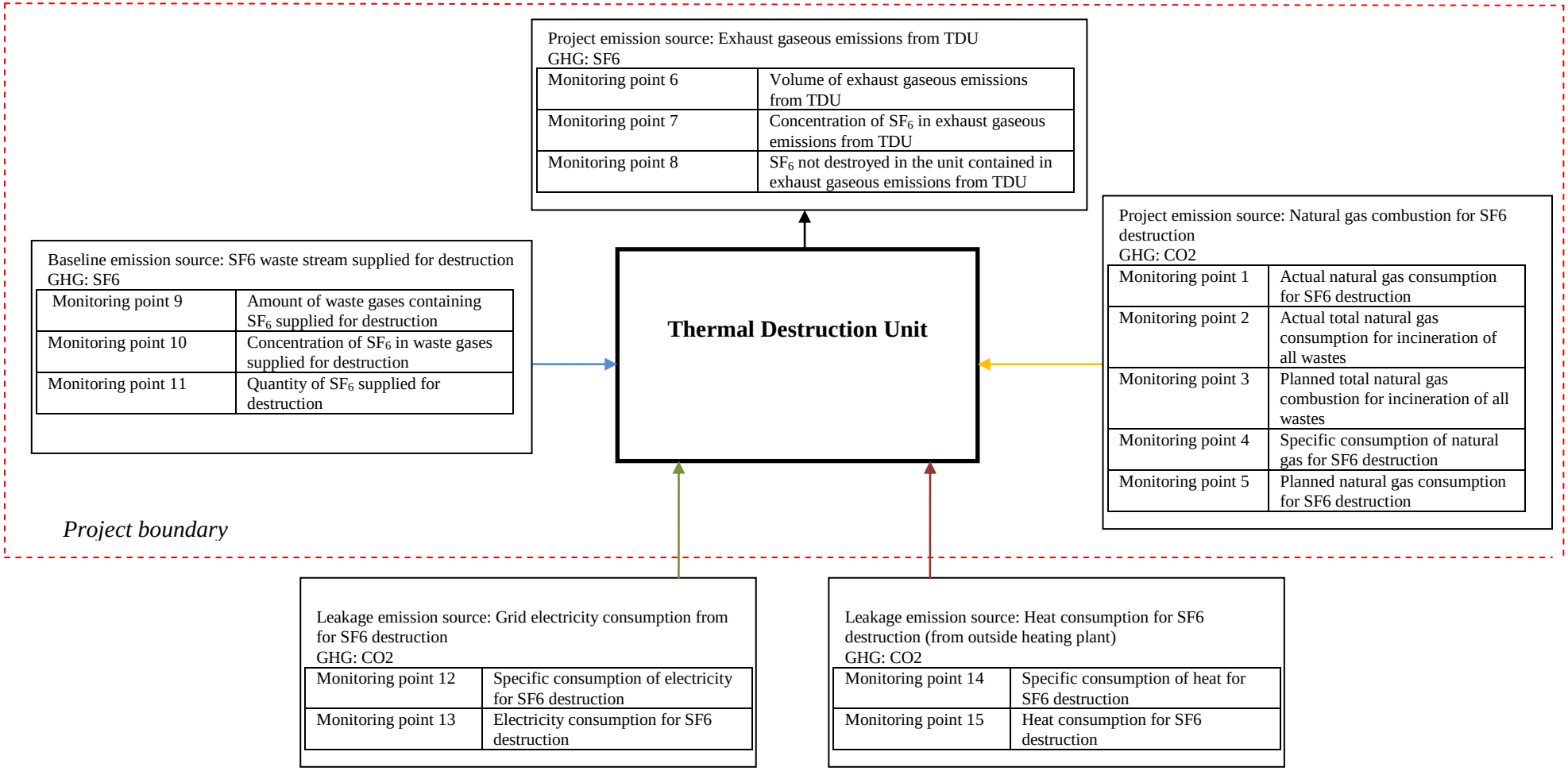
The difference between the project emission and baseline emissions and percentage of that difference of leakage emissions are provided in the below table:

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Baseline emissions	BE	tCO2e	2348499	2059529	2347169	2576885	4381102
2.	Project emissions	PE	tCO2e	265	230	465	510	867
3.	Difference	ER	tCO2e	2348 234	2059 299	2346 704	2576 375	4380 235
4.	Total leakage	LE	tCO2e	510	289	693	793	1429
5.	Percentage of the difference	-	%	0,02%	0,01%	0,03%	0,03%	0,03%

The assessment of leakage emissions related to supply of electricity and steam provided above demonstrates that average per year over the crediting period leakage is far less than 1% of the difference between project and baseline emissions. Nevertheless leakage is taken for calculating emission reductions to be conservative.

The scheme of the monitoring is provided on the following diagram.

Fig. D.1-1. Monitoring points



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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	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. $FC_{NG,SF6y_fact}$	*Actual natural gas consumption for SF_6 destruction process over a reporting period y*	*See formula D.1.-2*	*m^3*	*c*	*monthly*	*100%*	*Electronic/paper*	*Actual natural gas consumption is determined each month on a basis of the planned norm of natural gas consumption for GHG gas destruction and taken in into account overconsumption or saving of natural gas supplied in TDU over a past month.*
2. FC_{NGy_total}	*Total measured consumption of the natural gas for destruction of all wastes incinerated in TDU over a*	*Mass flow meter*	*m^3*	*m*	*monthly*	*100%*	*Electronic/paper*	*Apart from GHG gases (HFC-23 and SF6) also wastes from other production facilities are incinerated in*

	reporting period y							*TDU. Only the total natural gas supplied in TDU for destruction of all wastes is measured by volume flow meter.*
3.$FC_{NG_total_plan}$	*Estimated total consumption of the natural gas for destruction of all wastes incinerated in TDU over a reporting period y*	*Calculation provided by the production manager of the shop 26.*	*M3*	*c*	*Monthly*	*100%*	*Electronic/paper*	*Production manager of the shop 26 (where TDU is installed) estimates each month the planned volume of natural gas consumed for destruction of all wastes. For this he multiplies the quantity of an incinerated waste by a planned norm of natural gas consumption to destruct the waste.*
4. $SFC_{NG,SF6}$	*Specific consumption of natural gas for destruction of SF_6*	*The planned norm of natural gas consumption for destruction of GHG gases*	*Ths m^3/t*	*c*	*Yearly*	*100%*	*Electronic/paper*	*Planned norms are established on yearly basis by Technical Department and approved by Chief Engineer*

								(subject to reconsideration depending on actual gas consumption norms over the year past). The actual consumption norms are calculated each month according to the Method of calculation of natural gas consumption for combustion of separate waste types approved by Chief Engineer of JSC Halogen on 29/08/08.
5. $FC_{NG,SF6,y_plan}$	*The planned natural gas consumption for SF_6 destruction over a reporting period y*	*Formula D1.-4*	*m^3*	*c*	*monthly*	*100%*	*Electronic/paper*	*See section D 1.1.2.*
6. q_NDy	*Volume of exhaust gaseous emissions from destruction unit over a reporting period y*	*Mobile flow meter*	*m^3*	*m*	*Weekly*	*100%*	*Electronic/paper*	*Measurement of effluent gases from the destruction unit is made by analytical*

								method. For that purpose the speed of effluent gas is measured weekly by portable flow meter. The measurements are documented and summary reports are archived during 10 years. 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).
7. $w_{SF6,ND\ y}$	*Concentration of* SF_6 *in gaseous emissions from destruction unit over a reporting period y*	*Chromatograph*	mg/m^3	*m*	*Weekly*	*100%*	*Electronic/paper*	*Measurement of 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 methods, measurements are made by chromatographs.
8. ND_SF6 y	*Quantity of SF6 not destroyed in the unit during the reporting period y*	*Formula D.1-2*	*t*	*C*	*Quarterly*	*100%*	*Electronic/paper*	*See section D 1.1.2.*

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

>>

GHG project emissions during reporting period *y*, tCO_2e:

$$PE_y = ND_SF_{6\,y} * GWP_{SF_6} + FC_{NG,SF6y_fact} * CF_{NG} * EF_{CO2,NG} * 10^{-6} \quad (D.1.-1)$$

Where

$ND_SF_{6\,y}$ is the quantity of SF_6 not destroyed in the unit during the reporting period *y*, t;

GWP_{SF_6} is the Global Warming Potential (GWP) for SF_6, t CO_2e/t SF_6. The approved GWP value for SF_6 is 23 900 t CO_2e/t SF_6 for the first commitment period under the Kyoto Protocol.

$FC_{NG,SF6y_fact}$ is the actual natural gas consumption for SF_6 destruction process over a reporting period *y*, m^3;

$$FC_{NG,SF6,y_fact} = FC_{NG,SF6,y_plan} * FC_{NGy_total_measured} / FC_{NGy_total_plan} \quad (D.1.-2)$$

$FC_{NG_total\ measured}$ is the measured total consumption of natural gas for destruction of all wastes incinerated in the TDU over a reporting period *y*, m^3;

$FC_{NG_total_plan}$ - is the planned total consumption of natural gas for destruction of all wastes incinerated in the TDU, over a reporting period *y* m^3. The estimate of the planned total consumption is provided by the production manager of the shop 26.

$FC_{NG,SF6,y_plan}$ is the planned natural gas consumption for SF_6 destruction process over a reporting period *y*, m^3 (D.1.-3)

$FC_{NG,SF6,y_plan} = 0{,}001 * q_SF_6\,y * SFC_{NG,SF6_plan}$ (D.1.-4)

$SFC_{NG,SF6_}$ is specific natural gas consumption for destruction of SF6; as $SFC_{NG,SF6}$ the planned norm of natural gas consumption for destruction of GHG gases is assumed to be conservative, ths m^3/t;

$q_SF_6\,y$ is the amount of waste gases containing SF_6 supplied for destruction over a reporting period *y*, kg

CF_{NG} – conversion-to-energy units factor for natural gas, equals to 33,812 TJ/mln m^3;[25]

$EF_{CO2,NG}$ – CO_2 emission factor for the natural gas combustion, equals to 56,1 tCO_2/TJ;

$ND_SF_{6\,y} = q_ND_{\,y} * W_{SF6,ND\,y} * 10^{-9}$ (D.1-5)

$q_ND\,y$ is the volume of exhaust gaseous emissions from destruction unit over a reporting period *y*, m^3;

$W_{SF6,ND\,y}$ – is the mass concentration of SF_6 in gaseous emissions from destruction unit, mg/m^3

[25] This value is taken from National Report on Cadaster of Anthropogenic Emissions from Sources and Absorption by Sinks of Greenhouse Gases Not Regulated by Montreal Protocol for 1990-2009. Part 1. Moscow, 2011. Table 3.5, page 38.

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 *(Please use numbers to ease cross-referencing to D.2.)*	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
9. $q_SF_6\ y$	*Amount of waste gases containing SF_6 supplied for destruction*	*two mass flow meter*	*Kg*	*m*	*Monthly (continues measurement)*	*100%*	*Electronic/paper*	*Measured directly before thermal destruction unit. Monthly data is the sum of the accumulated data.*
10. $W_{SF6,PJ}y$	*Concentration of SF_6 in waste gases supplied for destruction*	*Chromatograph*	*%*	*m*	*Weekly*	*100%*	*Electronic/paper*	*Measured once per day*
11. Q_SF6 y	*Quantity of SF_6 supplied for destruction in the unit*	*Formula D1-7*	*t*	*c*	*Quarterly*	*100%*	*Electronic/paper*	*See subsection D 1.1.4 below*

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

>>

GHG baseline emissions during the reporting period *y*, tCO_2e:

$$BE_y = Q_SF_{6\,y} * GWP_{SF_{6\,y}} \qquad \text{(D1.-6)}$$

Where

$Q_SF_{6\,y}$ is the quantity of SF_6 supplied for destruction in the unit during the reporting period y, tSF_6

$$Q_SF_6\,y = 0{,}001 * q_\,SF_6\,y * w_{SF6,y} * 10^{-2} \quad \text{(D1.-7)}$$

$q_\,SF_6\,y$ is the amount of waste gases containing SF_6 supplied for destruction, kg;

$w_{SF6,y}$ is the concentration of SF_6 in waste gases supplied for destruction, %.

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

This section is not applicable.

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	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.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

>> N/a

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

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 number *(Please use numbers to ease cross-referencing to D.2.)*	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
12. $SEC_{ELEC,y}$	*Specific electricity consumption for SF_6 destruction*	*Planned electricity consumption norm for destruction of GHG gases*	*MWh/t*	*c*	*Yearly*	*100%*	*Electronic/paper*	*For determining electricity consumption the planned consumption norm is applied at the JSC "HaloPolymer Perm". Planned norms are established on yearly basis for the next year by Technical Department and approved by Chief Engineer (subject to reconsideration depending on actual electricity consumption over the year past).*

13. EC,y	*Electricity consumption for SF_6 destruction*	*Data on monitoring of TDU operation in 2008-2010. For estimation of electricity consumption in 2011-2012 see the formula D1.-9*	*MWh*	*c*	*Monthly*	*100%*	*Electronic/paper*	*Electricity consumption for SF6 destruction is calculated by the project manager of the shop 26 and checked by the head of Technical Department*
14. $SHC_{HEAT,y}$	*Specific heat consumption for SF6 destruction*	*Planned norm of heat consumption norm for destruction of GHG gases*	*GJ/t*	*c*	*Yearly*	*100%*	*Electronic/paper*	*For determining heat consumption the planned consumption norm is applied at the JSC "HaloPolymer Perm". Planned norms are established on yearly basis by Technical Department and approved by Chief Engineer (subject to reconsideration depending on actual heat consumption over the year past).*

15. HC,y	*Heat consumption for SF6 destruction*	*Data on monitoring of TDU operation in 2008-2010. For estimation of heat consumption in 2011-2012 see the formula D.1-11 below*	*GJ*	*c*	*Yearly*	*100%*	*Electronic/paper*	*Heat consumption for SF6 destruction is calculated at Technical Department*

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

>>

1. Leakage CO2 emissions associated with grid electricity supply for SF6 destruction

Such emissions are determined according to the formula:

$$LE_{ELEC,y} = ECy * EF_{CO2,ELEC,y} * 10^{-3} \quad \text{(D.1.-8)}$$

Where

ECy is consumption of the electricity for destruction of SF_6, MWh;

$$ECy = SEC_{ELEC,y} * q_SF6,y \quad \text{(D.1-9)}$$

$SEC_{ELEC,y}$ - is the specific electricity consumption for SF6 destruction, MWh/t[26];

q_SF6,y - the amount of waste gases containing SF6 supplied for destruction the reporting period y, t;

2. Leakage CO2 emissions associated with heat supply for SF6 destruction.

[26] The planned consumption norms of energy resources adopted at JSC "HaloPolymer Perm" is available on auditors' request

$LE_{HEATy} = HCy * EF_{CO2,NG} * 10^{-3}$; (D.1-10)

HCy is the consumption of the heat for destruction unit, GJ;

$HCy = SHC,_{HEAT,y} * q_SF6,y$ (D.1-11)

$SHC,_{HEAT,y}$ - is the specific heat consumption for SF6 destruction, GJ/t[27];

$EF_{CO2,NG}$ – CO_2 emission factor for heat consumption tCO_2/TJ. This factor equal to 125140,3 tCO_2/TJ and is determined by division of CO_2 emission factor for the natural gas[28] (56,1 tCO2 – the value is taken from 2006 IPCC Guidelines for National GHG Inventories) in 0,4 (heat efficiency of a combined heat and power plant).

3. Total leakage CO2 emissions

$LEy = LE_{ELEC,y} + LE_{HEATy}$ (D.1-12)

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_2 equivalent):

>>

Emission reductions during the reporting period *y* measured in t CO_2e are calculated as follows:

$ERy = BEy - PEy - LEy$ (D.1-13)

[27] The planned consumption norms of energy resources adopted at JSC "HaloPolymer Perm" is available on auditors' request

[28] Main type of fuel for heat and power plants in Perm krai.

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 (SF_6, HFC-23, CO, HCl, HF, Cl2, 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 Technical Department of JSC Halogen is responsible for collection, storage and analysis of data regarding the environmental impact of the project in the region.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
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	*low*	*Actual natural gas consumption for SF_6 destruction is estimated with the use of approved consumption norms taking into account actual overconsumption or saving of natural gas over the past months. The calculation is provided each month by the production manager of shop 26 according to the Method of calculation of natural gas consumption for combustion of separate waste types approved by Chief Engineer of JSC Halogen on 29/08/08. The calculation checked and analyzed against the natural consumption in previous periods by the head of Technical Department.*
Table D 1.1.1. ID-2	*low*	*Flow meter consisting of standard diaphragm DKS-06-80-А/В-1, differential pressure gage АИР-20-ДД and gas corrector SPG-762. Recalibration interval for the standard diaphragm is 5 years; for differential pressure gage is 2 years and for gas corrector is 4 years. Recalibration is provided by the Department of Chief Metrologist of JSC "HaloPolymer Perm".*
Table D 1.1.1. ID-3	*low*	*Estimation of total consumption of the natural gas for destruction of all wastes incinerated in TDU is provided with the use of approved consumption norms taking into account actual overconsumption or saving of natural gas over the past months. The calculation is provided each month by the production manager of shop 26 according to the Method of calculation of natural gas consumption for combustion of separate waste types approved by Chief Engineer of JSC Halogen on 29/08/08. The calculation checked and analysed against the natural consumption in previous periods by the head of Technical Department.*
Table D 1.1.1. ID-4	*low*	*Planned norms are established on yearly basis by Technical Department and approved by Chief Engineer (subject to reconsideration depending on actual gas consumption norms over the year past).*

Table D 1.1.1. ID-6	*low*	*The measurement is provided by portable flow meter TESTO according to Quantitative Chemical Analysis of Air. Procedure of measurement of SF6 mass concentration in the air of the working zone and in the industrial emissions by gas-chromatographic method. # 469-00-2010 signed by Chief Metrologist and approved by Chief Engineer dd 19/03/2010. The calibration is provided yearly by Perm Centre for Standardization, Metrology and Certification.*
Table D 1.1.1. ID-7	*low*	*Chromatograph LKhM-80 is used. The calibration is provided yearly by Perm Centre for Standardization, Metrology and Certification according to the calibration method. Cross-checked with the previous chromatograph analysis is provided.*
Table D 1.1.1. ID-9	*low*	*According to QMS, the measurement, processing and storage of data on utilization of SF6 waste streams in TDU is carried out by the Automated Process Control System, namely ""APCS of SF6 waste stream utilization". The APCS is established on a base of a programme-technical complex (PTC): SCADA-system "Cascade" (Cheboksary, Russia) and of a multifunctional microprocessor controller "Contrast" KP-500.SF6 waste streams are measured with two on-line mass flow meters PROMASS 83F15. Data from mass flow meters over two parallel channels come in modules of communication devise with object (CDO), which are included in the set the "Contrast" KP-500 controller. Having been processed the information is channeled in the work stations. Failure-tolerance of the system and data safety are guaranteed by two work stations (main and standby) working in a "hot" backup mode. Relative error of PROMASS Flow meter is 0,1%. Recalibration interval of mass flow meters is 4 years. Recalibration is provided by laboratory of the company "Endress+Hauser Flowtec AG"Quantity of SF6 not destroyed in the unit during the reporting period is determined each month with application of data (ID-4 and ID-5) that measured with checked and calibrated instruments.*
Table D 1.1.3. ID-10	*low*	*Sampling of SF6 waste stream for determination of SF6 concentration is carried out according to the approved procedure M14UK2011 "Procedure of measurements of mass shares of oxygen, nitrogen, tetrafluormethane and sulphur hexafluoride in SF6 wastes by chromatographic method".* *Measurements are provided by 2 chromatographs (Cristallux-4000M) according Recalibration interval is 4 years. The calibration is provided yearly by Perm Centre for Standardization, Metrology and Certification.*
Table D 1.1.3. ID-11	*low*	*Quantity of SF_6 supplied for destruction is determined each month with application of data (ID-7 and ID-8) that measured with checked and calibrated instruments.*
Table D 1.1.3. ID-12	*low*	*For determining electricity consumption the planned consumption norm is applied at the JSC "HaloPolymer Perm". Planned norms are established on yearly basis for the next year by Technical Department and approved by Chief Engineer (subject to reconsideration depending on actual electricity consumption over the year past).*
Table D 1.1.3. ID-13	*low*	*Electricity consumption for SF6 destruction is calculated by the project manager of the shop 26 and checked by the head of Technical Department against the electricity consumption over the previous months. If considerable distortion is found the reason of that is analyzed in order to eliminate.*

Table D 1.1.3. ID-14	*low*	*For determining heat consumption the planned consumption norm is applied at the JSC "HaloPolymer Perm". Planned norms are established on yearly basis by Technical Department and approved by Chief Engineer (subject to reconsideration depending on actual heat consumption over the year past).*
Table D 1.1.3. ID-15	*low*	*Heat consumption for SF6 destruction is calculated by the project manager of the shop 26 and checked by the head of Technical Department against the electricity consumption over the previous months. If considerable distortion is found the reason of that is analyzed in order to eliminate.*

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

>>

All aspects of organizational and management structure of monitoring plan of SF6 destruction project are in compliance with the effective Quality Management Standard "Procedure of process organization for destruction of SF_6 " adopted at JSC "HaloPolymer Perm". Under the QMS, the head of Technical Department (TD) is a key focal point at the plant responsible for gathering of relevant parameters and submission of input monitoring data for elaborating a monitoring report. According to QMS the information addressed to him is coming from the following sources:

1. SF_6 waste streams. These data is supplied, daily and weekly, from the engineer-technologist of the shop 22 at which SF_6 is produced:
   -The engineer-technologist prepares and prints out daily reports on SF6 waste streams with a by-hour breakdown in accord with the adopted form[29].
   -The engineer-technologist prepares and prints out monthly reports on SF6 waste streams with a by-day breakdown in accord with the adopted form[30].
   The head of TD checks and signs the reports.
2. SF_6 concentration in waste streams. These data is provided from Quality Management Laboratory. Sampling of SF6 waste streams at the inlet of TDU is carried out by technological service of the shop according to a schedule of analytical control. Under analysis two parallel evaluations are carried out (two chromatograms are recorded, calculated and printed out). Lab assistant fills in a chromatogram certificate that indicates a position, the date and time of sampling and surname of an operator[31]. At the end of analysis each file of chromatogram must be automatically stored in appropriate data base of a personal computer that services the chromatograph. A printed out protocol must include filled chromatogram certificate, chromatogram's curve and the table of peaks with calculation results. Printed out copies are attached in the special file. The head of QM Laboratory controls the accuracy of analysis and the results. Based on monthly data the head of QM Laboratory prepares a report on SF6 mass concentration (%) in a waste stream for all sampling points with attachment of the results of analysis and calculated average monthly concentration. The report is checked and signed by the head of the shop.

[29] See form in the Annex 3. Monitoring Plan

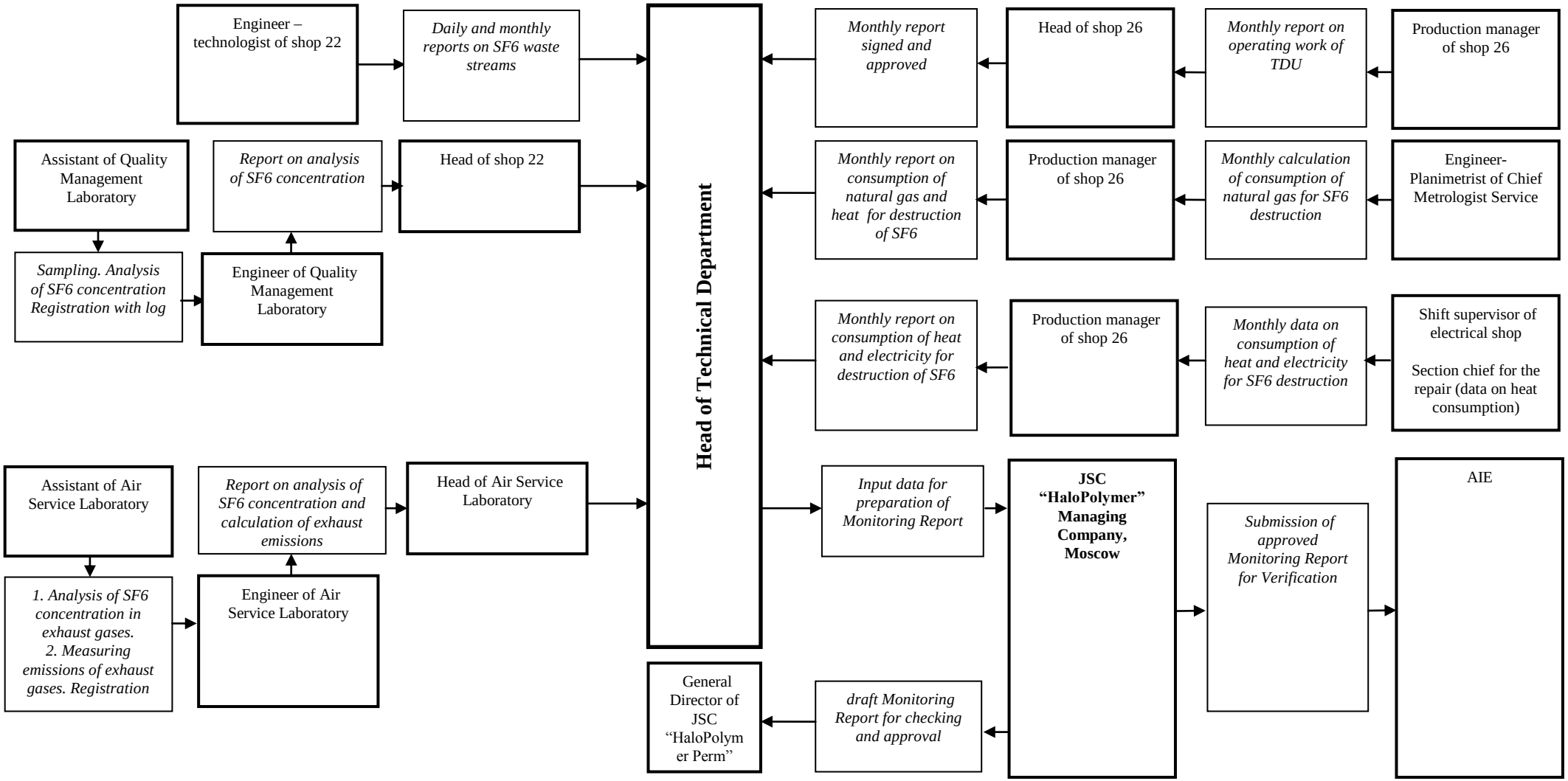
[30] See form in the Annex 3. Monitoring Plan

[31] See the form in Annex 3. Monitoring Plan.

3. SF_6 quantity and concentration in waste streams not destroyed in TDU. These data are provided from the head of air service laboratory. Initial information on analysis of SF_6 concentration in exhaust gases and measuring velocity of exhaust gas stream are prepared by the lab assistant and are registered with the log. Further on the lab engineer prepares weekly and monthly reports on analysis of SF_6 concentration and calculation of exhaust emissions and submits reports to the head of air service laboratory for approval.
4. Time of operation work of TDU. The head of shop 26 (in this shop the thermal destruction unit is installed) provides approved monthly reports to the head of TD. This data is supplied from the production manager of the shop who gathers information from the automated control system.
5. Natural gas consumption for SF6 destruction. This information is submitted from the production manager of the shop 26. The initial data on measurement of total natural gas consumption is gathered and processed by the engineer-planimetrist. The results are provided to the chief metrologist who approves and send them to the production manager of the shop 26. The production manager of the shop 26 calculates each month the planned total natural gas consumption and actual natural gas consumption for destruction of SF6.
6. Electricity and heat consumption for SF6 destruction. This information provided monthly to the head of Technical Department by the production manager of the shop 26. The production manager calculates the monthly heat and electricity consumption multiplying the SF6 waste quantity supplied for destruction by the planned consumption norm of heat or electricity.

Finally the head of TD processes the gathered information and submits it to a managing company, JSC “HaloPolymer”, Moscow. Based on the input data the draft Monitoring Report is prepared and submitted it back to JSC “HaloPolymer Perm” for approval by the General Director. The approved MR is submitted by JSC “HaloPolymer” to AIE for verification. Further on the organizational chart of the monitoring for SF6 destruction project is provided.

Organizational chart of the monitoring for SF_6 destruction project



Calculations of emission reductions will be prepared by specialists of JSC “HaloPolymer” in the end of each reporting period. All data will be stored in paper and electronically at least for two years after the last ERU tranche under the project.

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

>>

Monitoring plan was developed by specialists of OJSC “HaloPolymer”.
Contact e-mail: i.kuznetsov@halopolymer.com

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

>>

GHG project emissions include:

- emissions of SF6 not destroyed in the TDU (emissions along with exhaust gas from the unit)
- emissions of CO2 due to the natural gas consumption for destruction process.

GHG project emission source: SF_6 emissions not destroyed in the TDU (emissions along with exhaust gas from the unit)
GHG: SF_6

$$PE_{ND} = ND_SF_{6\,y} * GWP_{SF_6} \quad \text{E.1-1}$$

Where

PE_{ND} – is project SF_6 emissions not destroyed in the TDU, tCO2e

$ND_SF_{6\,y}$ is the quantity of SF_6 not destroyed in the unit during the reporting period *y*, t;

GWP_{SF_6} is the Global Warming Potential (GWP) for SF_6, t CO_2e/t SF_6. The approved GWP value for SF_6 is 23 900 t CO_2e/t SF_6 for the first commitment period under the Kyoto Protocol.

$$ND_SF_{6\,y} = q_NDy * w_{GE} * 10^{-9}; \quad \text{E.1-2}$$

q_NDy – is the volume of gaseous emissions from destruction unit in the period y, m^3;

w_{GE} is the concentration of SF_6 in gaseous emissions from destruction unit, mg/m^3

A source of information on volumes of gaseous emissions not destroyed and the concentration of SF_6 in gaseous emissions from destruction unit in 2008-2010 is the actual data from JSC "HaloPolymer Perm"[32].

Volumes of gaseous emissions not destroyed for 2011 and 2012 are estimated as a product of the amount of waste gases containing SF_6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of actual share of gaseous emissions formation, w_{GE} (m^3/kg) during the period of 2008-2010 . The maximal value of w_{GE} was in 2010, therefore it will be used for estimation.

[32] Document "Summary monitoring data" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request

Table E.1-1. Estimation of columes of gaseous emissions not destroyed in 2011 and 2012

#	Item	Designation	Units	2008	2009	2010	2011	2012
1.	SF6 waste stream supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Gaseous emissions from destruction unit	q_Ndy	m^3	13783582	17006454	41264135	45307158	77029171
3.	Share of gaseous emissions formation from TDU	W_{GE}	m^3/kg	131	184	**392**	392	392

The concentration of SF6 in gaseous emissions from destruction unit remains constant throughout 2008-2010 and equals to 0,1 mg/m^3, then this value will be the same for 2011-2012.

Table E.1-2. Estimated SF_6 project emissions, in tonnes of CO_2 equivalent

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Volume of gaseous emissions from destruction unit	q_NDy	m3	13783582	17006454	41264135	45307158	77029171
2.	Concentration of SF_6 in gaseous emissions from destruction unit	W_{GE}	mg/m3	0,1	0,1	0,1	0,1	0,1
3.	Global Warming Potential for SF_6	GWP_{SF6}	tCO2/tSF6	23900	23900	23900	23900	23900
4.	Quantity of SF_6 not destroyed in the unit during	PE_{ND}	tSF6	0,001	0,002	0,004	0,005	0,008
			tCO2e	32,943	40,645	98,621	108,284	184,100

2.GHG project emission source: CO2 emissions due to the natural gas consumption for destruction process
GHG: CO_2

$$PE_{CO2,NG} = FC_{NGy} * CF_{NG} * EF_{CO2,NG} * 10^{-6} \quad \text{E.1-3}$$

$PE_{CO2,NG}$ - CO_2 project emissions due to the natural gas consumption for destruction process, tCO2;

FC_{NGy} is the natural gas consumption for destruction process, m^3;

A source of information on the natural gas consumption for destruction process is the actual data from JSC "HaloPolymer Perm" for 2008-2010[33]. Natural gas consumption for 2011 and 2012 is estimated as a product of the amount of waste gases containing SF6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of specific fuel consumption of natural gas for destruction of SF6 during the period of 2008-2010. The maximal value of natural gas consumption was in 2010, therefore it will be used for estimation.

CF_{NG} –is the conversion to energy units factor for natural gas, equals to 33,812 TJ/mln. cubic meters[34]);

$EF_{CO2,NG}$ is the CO2 emission factor for the natural gas combustion, equals to 56,1 tCO_2/TJ [35]

Table E.1-3. Estimated CO2 project emissions associated with natural gas combustion for SF6 destruction

#	Item	Designation	Units	2008	2009	2010	2011	2012
1.	SF6 waste stream supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Specific fuel consumption for SF6 destruction process	SFC,y	ths m3/t	1,16	1,08	**1,831**	1,831	1,831
3.	Natural gas consumption for destruction process	FC_{NGy}	м3	122156	100022	192945	211850	360177
6.	Conversion to energy units factor for natural gas	CF_{NG}	TJ/mln m3	33,812	33,812	33,812	33,812	33,812
7.	CO2 emission factor for the natural gas combustion	$EF_{CO2,NG}$	tCO_2/TJ	56,100	56,100	56,100	56,100	56,100
8.	Project emissions due to natural gas consumption	$PE_{CO2,NG}$	tCO_2e	232	190	366	402	683

3.GHG project emission source: CH4 emissions due to the natural gas consumption for destruction process

[33] Document "Summary monitoring data" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request.

[34] Information source: National Report on Inventory of Anthropogenic Emissions from Sources and Absorption by Sinks of Greenhouse Gases not Regulated by Montreal Protocol for 1990-2009. Part 1. Moscow, 2011. Table 3.5, page 38.

[35] 2006 IPCC Guidelines for National Greenhouse Gas Inventories

GHG: CO_2

$PE_{CH4,NG} = FC_{NGy} * CF_{NG} * EF_{CH4,NG} * 10^{-6} * GWP_{CH4}$ E.1-4

$EF_{CH4,NG}$ is the default CH_4 emission factor [36], equals to 0,001 tCH_4/TJ.

GWP_{CH4} is the Global Warming Potential for Methane, equals to 21 tCO_2e/tCH_4.

Table E.1-4. Estimated CH_4 (in terms of CO_2e) project emissions associated with natural gas combustion of SF6 destruction

#	Item	Designation	Units	2008	2009	2010	2011	2012
1.	Natural gas consumption during destruction process	FC_{NG}	m^3	122156	100022	192945	211850	360177
2.	Conversion to energy units factor for natural gas	CF_{NG}	TJ/mln m^3	33,812	33,812	33,812	33,812	33,812
3.	Default CH_4 emission factor	$EF_{CH4,NG}$	tCH_4/TJ	0,001	0,001	0,001	0,001	0,001
4.	CH_4 emissions	PE_{CH4}	tCH_4	0,00413	0,00338	0,00652	0,00716	0,01218
5.	GWP_{CH4}	GWP_{CH4}	tCO_2e/tCH_4	21	21	21	21	21
6.	CH_4 emissions (in tons of CO_2e) from natural gas combustion	$PE_{CH4,NG}$	tCO_2e	0,0867	0,0710	0,1370	0,1504	0,2557

4.GHG project emission source: N_2O emissions due to the natural gas consumption for destruction process
GHG: N2O

$PE_{N2O,NG} = FC_{NGy} * CF_{NG} * EF_{N2O,NG} * 10^{-6} * GWP_{N2O}$ E.1-5

$EF_{N2O,NG}$ is the default N2O emission factor [37], equals to 0,0001 tN2O/TJ.

[36] Source of information: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

GWP_{N2O} is the Global Warming Potential for N_2O, equals to 21 tCO_2e/tN_2O.

Table E.1-5. Estimated N_2O (in terms of CO_2e) project emissions associated with natural gas combustion for SF_6 destruction

#	Item	Designation	Units	2008	2009	2010	2011	2012
1.	Natural gas consumption during destruction process	FC_{NG}	m^3	122156	100022	192945	211850	360177
2.	Conversion to energy units factor for natural gas	CF_{NG}	TJ/mln m^3	33,812	33,812	33,812	33,812	33,812
3.	Default N_2O emission factor	EFN_2O	tN_2O/TJ	0,00010	0,00010	0,00010	0,00010	0,00010
4.	N_2O project emissions from natural gas combustion	PEN_2O,NG	tN_2O	0,00041	0,00034	0,00065	0,00072	0,00122
5.	GWP N_2O	GWP_{N2O}	tCO_2e/ tN_2O	310	310	310	310	310
6.	N_2O project emissions (in tons of CO2e) from natural gas combustion	PEN_2O,NG	tCO_2e	0,1280	0,1048	0,2022	0,2221	0,3775

[37] Source of information: table 2.2. Default emission factors for stationary combustion in the energy industries. Chapter 2. Stationary Combustion. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Table E.1-6. Estimated total project emissions

#	Item	Designation	Units	2008	2009	2010	2011	2012
1.	Quantity of SF_6 not destroyed in the unit during	PE_{ND}	tCO_2e	33	41	99	108	184
2.	CO2 project emissions from natural gas combustion	$PE_{CO2,NG}$	tCO_2e	232	190	366	402	683
3.	CH_4 project emissions (in tons of CO_2e) from natural gas combustion	$PE_{CH4,NG}$	tCO_2e	0,087	0,071	0,137	0,150	0,256
4.	N_2O project emissions (in tons of CO2e) from natural gas combustion	PEN_2O,NG	tCO_2e	0,128	0,105	0,202	0,222	0,378
5.	Total project emissions	PE	tCO_2e	264,870	230,548	464,949	510,504	867,936

Guidance on criteria for baseline setting and monitoring (Version 03) stipulate that, in the case of a JI project aimed at reducing emissions, the project boundary shall be: significant, i.e. the source accounts, on average per year over the crediting period, for more than 1 per cent of the annual average anthropogenic emissions by sources of GHGs, or exceeds an amount of 2,000 tonnes of CO_2 equivalent.

From that point of view N_2O and CH_4 emissions are negligibly small; each of the them accounts per year over the crediting period 0,04% (N_2O) and 0,03% (CH_4) of the annual average anthropogenic emissions by sources of GHGs. Therefore these emissions are not taken into account for emission reduction calculation.

E.2. Estimated leakage:

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As prescribed in the paragraph 18 of Guidance on criteria for baseline setting and monitoring (Version 03) "Project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected. All sources of leakage that are included shall be quantified and a procedure for an ex ante estimate shall be provided. Only those emission sources that account for, on average per year over the crediting period, more than 1 per cent of the difference between project and baseline emissions, or which exceed an amount of 2,000 tonnes of CO2 equivalent, whichever is lower, shall be included.

The leakage emission sources are:

1. CO_2 emissions associated with grid electricity supply for SF_6 destruction;
2. CO_2 emissions associated with heat (steam) supply for SF_6 destruction.

Estimation of CO_2 leakage emissions

GHG leakage emission source: CO_2 emissions associated with grid electricity supply for SF_6 destruction
GHG: CO_2

Such emissions are determined according to the formula:

$LE_{ELECy} = ECy*EF_{CO2,ELEC,y}*10^{-3}$ E.2-1
Where

ECy is consumption of the electricity for destruction unit, MWh;

ECy =SEC,y* q_SF6,y (E.2-2)

SEC,y - is specific electricity consumption for SF6 destruction, MWh/t;

A source of information on the electricity consumption for destruction process is the actual data from JSC "HaloPolymer Perm" for 2008-2010. Electricity consumption for 2011 and 2012 is estimated as a product of the amount of waste gases containing SF6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of specific electricity consumption for destruction of SF6 during the period of 2008-2010. The maximal value of electricity consumption was in 2010, therefore it will be used for estimation[38].
q_SF_6,y - the amount of waste gases containing SF_6 supplied for destruction the reporting period y, t;

Table E 2-1. CO_2 emissions due to electricity consumption for destruction of SF_6

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Amount of waste gases containing SF_6 supplied for destruction[39]	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Specific electricity consumption for SF6 destruction	$SEC_{,ELEC,y}$	MWh/t	6,95	4,47	**9,35**	9,35	9,35
3.	Electricity consumption	EC,y	MWh	733,660	413,000	984,779	1081,267	1838,321
4.	CO_2 emission factor for grid electricity[40]	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0,631	0,631	0,638	0,668	0,712
5.	CO_2 emissions due to electricity consumption for destruction of SF_6	$LE_{ELEC,y}$	tCO_2	462,94	260,60	628,29	722,29	1308,88

[38] Document "Summary monitoring data" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request

[39] Information source: actual data of monitoring of SF6 destruction in 2008-2010 and forecast for 2011-2012 provided by JSC "HaloPolymer Perm"

[40] Information source: European Bank for Reconstruction and Development. Baseline Study. Development of the electricity carbon emission factors for Russia. 09 Sept. 2010. Table 5-2. CO2 emission factors for Demand Side for Russian Federation.

GHG leakage emission source: CO_2 emissions associated with heat supply for SF_6 destruction
GHG: CO_2
Such emissions are determined according to the formula:

$$LE_{HEATy} = HCy * EF_{CO2,NG} * 10^{-3} \quad \text{(E.2-3)}$$

HCy is the consumption of the heat for destruction unit, GJ;

$$HCy = SHC,_{HEAT,y} * q_SF6,y \quad \text{(E2.-4)}$$

$SHC,_{HEAT,y}$ - is the specific heat consumption for SF6 destruction, GJ/t
A source of information on the heat consumption for destruction process is the actual data from JSC "HaloPolymer Perm" for 2008-2010. Heat consumption for 2011 and 2012 is estimated as a product of the amount of waste gases containing SF6 supplied for destruction (see justification of this data in E.4. subsection) and, to be conservative, the maximal annual value of specific heat consumption for destruction of SF6 during the period of 2008-2010. The maximal value of heat consumption was in 2010, therefore it will be used for estimation.
$EF_{CO2,NG}$ – CO_2 emission factor for heat consumption tCO_2/TJ. This factor equal to 140,3 tCO_2/TJ and is determined by division of CO_2 emission factor for the natural gas[41] (56,1 tCO2 – the value is taken from 2006 IPCC Guidelines for National GHG Inventories) in 0,4(heat efficiency of a combined heat and power plant [42]).

Table E 2-2. CO2 emissions due to heat consumption for destruction of SF6

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1	Amount of waste gases containing SF_6 supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2	Specific heat consumption for SF6 destruction	$SHC,_{HEAT,y}$	GJ/t				4,370	4,37021
3	Heat consumption	HC,y	GJ	338,201	203,441	460,458	505,573	859,552
4	CO_2 emission factor for heat consumption	$EF_{CO2,HEAT,y}$	tCO_2/TJ	140,3	140,3	140,3	140,3	140,3
5	CO_2 emissions due to heat consumption for destruction of SF_6	$LE_{HEAT,y}$	tCO_2	47,43	28,53	64,58	70,91	120,55

[41] Main type of fuel for heat and power plants in Perm krai.

[42] It is conservative assumption as according to a scientific article published by Novosibirsk State Technical University (http://www.esco-ecosys.ru/2010_3/art040.pdf) the heat production efficiency of CHPP is 54,7% (see Fig. 4.8 "Energy flows of split and combined process on page 59").

The difference between the project emission and baseline emissions and percentage of that difference of leakage emissions are provided in the below table:

Table E 2-3. Percentage of leakage emissions

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Baseline emissions	BE	tCO2e	2348499	2059529	2347169	2576885	4381102
2.	Project emissions	PE	tCO2e	265	230	465	510	867
3.	Difference	ER	tCO2e	2348 234	2059 299	2346 704	2576 375	4380 235
4.	Total leakage	LE	tCO2e	510	289	693	793	1429
5.	Percentage of the difference	-	%	0,02%	0,01%	0,03%	0,03%	0,03%

The assessment of leakage emissions related to supply of electricity and steam provided in the subsection E2 of the PDD demonstrates that average per year over the crediting period leakage is far less than 1% of the difference between project and baseline emissions. Nevertheless leakage is taken for calculating emission reductions to be conservative.

E.3. The sum of E.1. and E.2.:

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Table E.3-1. The sum of project emissions and leakage, in tonnes of CO2e.

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Project emissions	PEy	tCO_2e	265	230	465	510	867
2.	Leakage	Ly	tCO_2e	510	289	693	793	1429
3.	Total		tCO_2e	775	520	1157	1303	2297

E.4. Estimated baseline emissions:

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GHG baseline emissions include direct SF6 emissions in the atmosphere, which is prevented as a result of the project implementation. The results of calculation are represented in the table E 4.-1.

GHG baseline emission source: amount of waste gases containing SF_6 supplied for destruction
GHG: SF_6

$$BE_y = Q_SF_{6\,y} * GWP_{SF6\,y} \quad \text{(E.4-1)}$$

Where

$Q_SF_{6\,y}$ is the quantity of SF_6 supplied for destruction in the unit during the reporting period y, tSF_6

$$Q_SF_{6}\,y = 0{,}001 * q_\,SF_{6}\,y * w_{SF6,y} * 10^{-2} \quad \text{(E4.-2)}$$

$q_\,SF_{6}\,y$ is the amount of waste gases containing SF_6 supplied for destruction, kg;

A source of information on the amount of waste gases containing SF6 supplied for destruction process (q_ SF6 y) is the actual data from JSC "HaloPolymer Perm" for 2008-2010[43]. The values of q_ SF6 y supplied for destruction in 2011 and in 2012 are determined as a product of the quantities of SF6 to be produced in 2011-2012 and, to be conservative, of the minimal actual annual share of SF6 waste in 2008-2010 (expressed in kilograms of SF6 waster per tonne of SF6 produced).

The quantities of SF6 to be produced at JSC "HaloPolymer Perm" are 647 tonnes in 2011 and 1100 tonnes in 2012. These amounts are confirmed by the letter from OJSC "HaloPolymer"[44].

The annual average share of waste of SF6 is determined dividing the quantities of SF6 supplied for destruction in the unit into quantities of SF6 produced in 2008-2010. The minimal value of annual share of SF6 waste was in 2010; therefore it will be used for estimation of it in 2011 and 2012.

Table E.4-1. Estimated SF6 waste stream supplied for destruction

№	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	SF6 waste stream supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2.	SF6 produced in 2008-2010	PSF6	t	569,65	510	589	**647**	**1100**
3.	Share of SF6 waste	-	kg/t	185,19	181,06	**178,80**	178,80	178,80

$w_{SF6,y}$ is the concentration of SF_6 in waste gases supplied for destruction, %.

A source of information on the concentration of SF_6 in waste gases supplied for destruction ($w_{SF6,y}$) is the actual data from JSC "HaloPolymer Perm" for 2008-2010. The values of $w_{SF6,y}$ in 2011 and in 2012 are determined as the minimal value of this in 2008-2010, to be conservative. The minimal value of annual share of SF6 waste was in 2010; therefore it will be used for estimation.

[43] Document "Summary monitoring data" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request

[44] The official letter from OJSC "HaloPolymer" dd. 15/09/2011 # 57-1K

Table E.4-2. Estimated baseline emissions, in tonnes of CO2 equivalent

#	Item	Designation	Unit	2008	2009	2010	2011	2012
1.	Amount of waste gases containing SF_6 supplied for destruction	q_SF6y	kg	105492	92415	105363	115686	196684
2.	Average concentration of SF_6 in waste gases supplied for destruction[45]	W_{SF6y}	%	93,24	93,23	**93,20**	93,20	93,20
3.	Quantity of SF_6 supplied for destruction in the unit	Q_SF6y	t	98,26	86	98	108	183
4.	Global Warming Potential for SF6	GWP_{SF6}	tCO2e/tSF6	23900	23900	23900	23900	23900
5.	Baseline emissions	BEy	tCO2e	2348499	2059529	2347169	2576885	4381102

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

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ERy = BEy-PEy-LEy

E.6. Table providing values obtained when applying formulae above:

Years	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
2008	265	510	2 348 499	2 347 724
2009	230	289	2 059 529	2 059 009
2010	465	693	2 347 169	2 346 012
2011	510	793	2 576 885	2 575 582
2012	867	1429	4 381 102	4 378 805
Total (tonnes of CO2 equivalent)	**2 337**	3 715	**13 713 184**	13 707 132

[45] Document "Summary monitoring data" prepared by Technical Department of JSC "HaloPolymer Perm" is available on the auditors 'request"

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

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Article 32 of the Federal Law on Environmental protection #7-FZ prescribes that: "Environmental impact assessment is conducted for economic and other projects, which may directly or indirectly influence the state of the environment, irrespective of ownership type of the subjects of economic and other activities."

The Bashkir republic Environmental Research Center conducted the EIA of the project. The main results of the evaluation of project impact on the environment are as follows.

Impact on the air

As a result of thermal destruction there is no increase in the amounts of sulfur hexafluoride emissions into the atmosphere is going to happen. The degree of purification of the main component (SF6) is not lower than 99.99%, the content of sulfur hexafluoride in the exhaust gases from the unit below the sensitivity of the method (less than 0.1 mg/m3).

Wastewater and their impact

During destruction of sulfur hexafluoride in the thermal destruction unit an additional volume of wastewater containing salts of NaCl and Na2SO4 is produced. The total discharge of harmful substances in the water body (reservoir Votkinskoye) does not exceed the established limits.

Wastes and their impact

Solid wastes, which are additionally formed during sulfur hexafluoride destruction, are the chemical sludge of the wastewater treatment plant at the neutralization station. They are accumulated at the sludge storage.

On the basis the environment impact assessment due to the project implementation the followings findings can be set as follows:

- The project envisages the creation of the installation of high technical level that guarantees safety for its ecological environment;
- The installation will be provided by qualified personnel with experience with similar chemicals and waste;
- The project provides for conservation measures that reduce to the minimum possible negative impact on the environment (emission coefficient of purification of the gas mixture is 99.99%, the formation of liquid and solid industrial wastes within the established limits and permits).

The technical solutions under the proposed project will reduce its environmental impacts and have the following effects:

- Compliance with environmental requirements, reduction of emissions of air pollutants

- Prevention of pollution of water basins above the applicable environmental standards

- Prevention of pollution of territory, surface and ground waters, provided that the requirements for industrial waste storage, disposal and utilization are met.

Moreover, due to the project, the greenhouse gas emissions of JSC "HaloPolymer Perm " will be significantly reduced.

Since the beginning of 2010 the JSC "HaloPolymer Perm" has been developing a justification of the maximal permissible emissions (the volume of MPE). Currently the draft volume of MPE undergoes approval process with supervisory organization.

In 2008 the Company voluntarily addressed Western Ural Department of the Federal Service on Environmental, Technology and Nuclear Supervision (RosTechNadzor) with a proposal to set Maximal Permissible Emission on SF6. In 2009 RosTechNadzor established such MPE in the amount of 18,703 tonnes of SF6. The calculation of project emissions of not destroyed SF6 demonstrates an insignificant level of SF6 emissions[46] which are far less than the set MPE level.

In 2011 the Company addresses an expert organization "BELZ" which carried out the calculation of MPE subject to compliance with the maximal permissible concentration on a boundary of the sanitary-protection zone. The calculation demonstrated that such MPE is 10 times higher than SF6 production capacity of JSC "HaloPolymer Perm". This proves that the project provides no transboundary effects.

*Control of pollutant emissions*On the ground of Time Schedule for MPE Compliance Control on emission sources of JSC "HaloPolymer Perm" approved by Chief Engineer and by a Volga regional office of Federal State Agency "Center of Laboratory Analysis and Technical Measurements" the plant's air service laboratory implements the control for atmospheric pollutant emissions. The thermal destruction unit is registered as a source # 478. Gaseous effluents of HCl, HF, and NO_X are regularly measured on this source. Consolidated amount of atmospheric pollutant emissions is included in the annual report 2-TP (air), which is submitted to Federal Service for Nature Management (Rosprirodnadzor). Additionally to the control program implemented by JSC "HaloPolymer Perm" the Bashkir Republican Scientific-Research Environmental Center monitors dioxins emissions with periodicity of 2 times in a year.
Over the period of implementation of SF6 destruction project there have not been incidents associated with exceeding of consolidated annual pollutant emissions.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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The City-building Code of the Russian Federation RF №.190-FZ prescribes in Article 49, Paragraphs 1,4,5: "Technical design documentation for capital construction projects is subject to state expertise. Specially designated Federal executive authority, or another agency under its jurisdiction carries out state expertise of project documentation. State expertise of project documentation establishes if the project meets the requirements of technical regulations, sanitary, epidemiological, environmental norms, the requirements in the area of protection of cultural heritage, fire safety, industrial, nuclear and radiation safety. State expertise of project documentation also establishes if the project conforms with the results of engineering survey." In other cases if a project is not a capital construction such a state expertise is not carried out.

In the light of abovementioned requirement, environmental impact assessment was done which demonstrates that emissions from the thermal destruction unit have no significant adverse impacts on the environment and do not degrade the health of personnel of OJSC "HaloPolymer Perm".

[46] See table E.1-2 "Estimated SF6 project emissions" of E1 section "Project emissions", line 4.

According to item 11 of the Federal Law of Russian Federation dd. 23.11.1995 # 174-FZ "On environment expertise" the SF6 destruction project is not subject to the state and public environmental expertise as this project is not associated with the new capital construction but represents modernization of the thermal destruction unit for incineration of SF6 without any significant adverse impact on the environment. Therefore the issuance of the conclusions of the state environmental expertise is not required.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

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According to item 11 of the Federal Law of Russian Federation dd. 23.11.1995 # 174-FZ "On environment expertise" the SF6 destruction project is not subject to the state and public environmental expertise as this project is not associated with the new capital construction but represents modernization of the thermal destruction unit for incineration of SF6 without any significant adverse impact on the environment. Therefore the consultations with public organizations were not carried out.

However the information on the SF6 destruction project at JSC "HaloPolymer Perm" was submitted to an independent expert organization, OOO "IKC Promtechbezopastnost" under industrial safety expertise of the project in 2007. The Conclusion # 25-PF/07-EZS/07 dd.26/11/2007 provided by this organization confirmed that the project corresponds to all norms of industrial safety adopted in the Russian Federation.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE INFORMATION

Theoretical description of the baseline

Under the baseline scenario all the waste SF6 (which is generated in the rectification columns 18 and 20 and incinerated in the TDU under the project activity) is emitted in the atmosphere. Therefore the baseline SF_6 emissions are defined according the following formulas:

(B.1) $BEy=Q_SF_6 y*GWP_SF_6$

BEy the baseline SF_6 emissions for the reporting period, in tonnes of CO_2 equivalent, tCO_2e;

$Q_SF_{6\,y}$ the baseline SF_6 emissions for the reporting period, in tonnes of SF_6, tSF_6;

GWP_SF_6 Global Warming Potential for SF_6 is equal to 23 900 tCO_2e/tSF_6

(B.1.2) $Q_SF_6 y = 0.001* q_SF_6y * w_{SF6,y}*10^{-2}$

q_SF_6y the amount of wastes containing SF6 supplied for destruction during the reporting period, kg;

$w_{SF6,y}$ the average concentration of SF6 in the wastes supplied for destruction during the reporting period, %.

Key information and data for establishing the baseline are provided in the following tables:

Data/Parameter	q_SF_6y
Data unit	Kg
Description	The amount of wastes containing SF6 supplied for destruction during the reporting period
Time of determination/monitoring	Quarterly
Source of data (to be) used	Mass flow meter PROMASS 83F08
Value of data applied (for ex-ante c calculations/determinations)	2008: 105492; 2009: 92415; 2010: 105363; 2011: 115686; 2012: 196684
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The amount of wastes containing SF_6 supplied for destruction are measured with two mass flow meters installed consecutively
QC/QA procedures (to be) applied	Flow meters are calibrated in compliance with the requirements of the Federal Agency for Technical Control and Metrology. The zero check on the flow meters are 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.
Any comment	-

Data/Parameter	$W_{SF6,y}$
Data unit	%
Description	The average concentration of SF6 in the wastes supplied for destruction during the reporting period
Time of determination/monitoring	Quarterly
Source of data (to be) used	Chromatograph "Crystal-lux-4000"
Value of data applied (for ex-ante calculations/determinations)	2008: 93,24; 2009: 93,23; 2010: 93,20; 2011: 93,20; 2012: 93,20
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The average concentration is needed to define the net quantity of SF_6 in the amount of waste gases supplied for destruction. The readings are registered weekly.
QC/QA procedures (to be) applied	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.
Any comment	-

Data/Parameter	GWP_SF_6
Data unit	$tCO2э/tSF_6$
Description	Global Warming Potential for SF_6
Time of determination/monitoring	Once, when PDD is determined
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value of data applied (for ex-ante calculations/determinations)	23900
Justification of the choice of data or description of measurement methods and procedures (to be) applied	GWP has a constant value for the period of 2008-2012
QC/QA procedures (to be) applied	-
Any comment	-

Annex 3

MONITORING PLAN

See section D for details

ОАО «Галоген» СТП 49-40-2011 Лист 31 из листов 37
Изменение:
Дата:

Приложение Б.
(обязательное)

Форма рапорта за месяц

Рапорт за месяц года

Дата и время начала формирования рапорта: число 1:00:00

Дата и время конца формирования рапорта: число 1:00:00

Подача технологических выбросов с содержанием элегаза на установку термического обезвреживания отходов УТОО

Число месяца	Количество выбросов выданных из корпуса №135 от поз. Е28 через расходомер №1, кг	Количество выбросов выданных из корпуса №135 от поз. Т19 через расходомер №2, кг	Сумма выбросов выданных из корпуса №135 через расходомер №1 и расходомер №2, кг	Количество выбросов поданных в корпусе №256 на УТОО через расходомер №3, кг	Количество выбросов поданных в корпусе №256 на УТОО через расходомер №4, кг	Наименьшее количество выбросов поданных в корпусе №256 на УТОО, кг	Разница показаний между расходомерами корпуса №135 и корпуса №256, кг
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Сумма:							

Инженер- технолог цеха №22 _____ Начальник технического отдела _____

ОАО «Галоген» СТП 49-40-2011 Лист 32 из листов 37
Изменение:
Дата:

Приложение В.
(обязательное)

Формы журналов
«Состав отходов на выходе из колонны поз. К-18»
«Состав отходов на входе в агрегат УТОО поз. А-80»

Дата	Время отбора	Массовая доля компонента, %				Подпись лаборанта
		Кислород	Азот	Хл-14	Элегаз	

ОАО «Галоген» СТП 49-40-2011 Лист 33 из листов 37
Изменение:
Дата:

Приложение Г.
(обязательное)

Форма справки по содержанию элегаза в составе отходов

Справка по содержанию элегаза в составе отходов.

За период:

Дата	Массовая доля элегаза, %		Примечание
	колонна поз. К-18	на входе в А-80	
среднее			

Начальник лаборатории

Начальник цеха