Developed by	Approved by
Director V. Vovchak _____ (signature)	Director general I. Buga _____ (signature)

Revamping of sintering and blast-furnace production at OJSC "Dniprovsky Integrated Iron and Steel Works named after Dzerzhynsky"

UA1000274, Track 1

Annual Monitoring Report

Version 2 of 30th of May 2011
Monitoring period: 1st January 2008 – 31st December 2009

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List of abbreviations

DIISW - PJSC «Dniprovsky Integrated Iron and Steel Works named after Dzerzhynsky»;
AIE – Accredited independent entity;
JI – Joint Implementation;
BF – Blast Furnaces;
SP – Sinter Plant;
FER – Fuel and Energy Resources.

1. Project summary

The proposed Joint Implementation project[1] considers complex resource-saving effect related with implementation of new SP and BF#4, gradual reconstruction of the remaining BFs ##8, 9, 12 and 1M with application of state of the art technologies and equipment. Also, project activity envisages technological improvements in the process of sintering and pig iron production.

The project measures and activities that have been and will be implemented at DIISW (concerning pig iron production process) lead to increase of SP and BFs productivity, reduction of specific coke, other fuel and materials consumption and, therefore, reduction of GHG emissions.

2. Status of the project pursuant to the monitoring period

Emission reductions during the period of 1st January 2008 to 31st December 2009 were achieved by implementation of the following measures:

#	Measures	2004	2005	2006	2007	2008	2009
1	**Technological improvements of the BFs operation:** - improvement of blast furnace coke quality; - decreasing the silicon content in the pig iron; - decreasing the BFs idle times and downtime; - partial substitution of the limestone by lime; - improvement of quality of agglomerate.						
2	**Renewal and reconstruction of BF#1M**						
3	**Implementation of a new oxygen plant АКАр 40/53-4**						
4	**Modernization of the sintering process:** - improvements of solid fuel burning process, which is part of the sintering charge; - increase of the level of steel waste utilization; - implementation of the state-of-the-art dust suppression and gas purification facilities; - optimization of limestone decomposition reaction; - improvement of natural gas burning process, which is supplied to burners for the ignition of sintering charge; - improvements of chemical composition of sinter charge; - reduction of fine fraction content in agglomerate.						

[1] The letter of approval was received from the Government of the Netherlands (Ministry of Economic Affairs, reference: 2011JI15 of 10.05.2011).

The following measures: *technological improvements of the BFs operation* and *modernization of the sintering process* are implemented from the beginning of the proposed project activity till 2020 (during the whole project lifetime).

3. Parameters monitored according to the monitoring plan

During the project activity the total pig iron production, fuel and energy resource consumption at the plant are being monitored. The baseline of the project is based on historical data of fuel and energy resources consumption for pig iron production at DIISW during the period of 01/01/1999 – 31/12/2003.

Carbon emission factors for electricity consumption are based on the Orders of the National Environmental Investment Agency of Ukraine (NEIA) № 62 of April 15, 2011[2] for the year 2008 and № 63 of April 15, 2011[3] for the year 2009.

In accordance with mentioned above decrees issued by NEIA for the 1st – class electricity consumers the carbon emission factor for electricity consumption is equal to:
- 1,082 $kgCO_{2e}$/kWh in 2008;
- 1,096 $kgCO_{2e}$/kWh in 2009;

The use of the emission factor for the 1st – class electricity consumers is justified by the resolution of National Electricity Regulatory Commission of Ukraine № 1052 of 13 August 1998[4], according to the resolution the 1st – class electricity consumers are the consumers, who:
1) receive electricity from electricity supplier at the point of sale of electricity with the degree of voltage 27.5 kV and above;
2) connected to the power rails of power plants (except hydroelectric, which produce electricity periodically), as well as to power rails of substations of the electricity grid with voltage of 220 kV and above, regardless voltage level at the point of sale of electricity by the power supplier to consumer;
3) is the industrial enterprise with average monthly rate of electricity consumption - 150 million kWh and above for the technological needs of production, regardless of the voltage level at the point of sale of electricity by the power supplier to consumer.

Based on the information stated above, DIISW refers to the 1st – class electricity consumers[5].

All data, used in this chapter, are based on information, confirmed by DIISW documents. This information is available to the AIE, also regarding the interconnection with the baseline and project line tables, presented below.

Colors that are used in the tables are described below:

[2] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[3] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[4] http://energetik.org.ua/node/90
[5] The following information is proved by electricity supply agreements.

Project line	Baseline
Name of each indicator	Name of each indicator
Volume of FER consumption	Volume of FER consumption
Emission factor for FER	Emission factor for FER
Volume of CO_2 emissions	
Blank cell	

The emission factors for natural gas, coke and anthracite are identified in the following way:

1) Emission factor for natural gas consumption is based on fixed calorific value of natural gas which is in accordance with DIISW average historical data. Calorific value of natural gas is at the level of 8100 kcal/m^3.

2) In order to calculate emission factor for coke due to its production and consumption based on actual carbon content, the following formula was used:

$EF_{ra} = (C_{coke} * 44/12) + 0,56$

where:

EF_{ra} – emission factor for coke, tonnes CO_{2e}/tonne of coke;
C_{coke} – carbon content of coke, %;
0,56 – CO_{2e} emission factor for coke production, tonnes CO_{2e}/tonne of coke produced.

The carbon content of coke is calculated by the following formula:

$C_{coke} = 100 – (C_{ash} + C_{sulphur} + C_{volatile\ matters})$

where:

C_{ash} – ash content of coke, %;
$C_{sulphur}$ – sulfur content of coke, %;
$C_{volatile\ matters}$ – volatile matters content of coke, %.

3) In order to follow conservativeness of the approach, taking into account that various ranks of anthracite are consumed under the project activity in different technological processes and also because it is complicated to calculate actual weighted average of anthracite net calorific value, the carbon emission factor for anthracite is based on carbon content of anthracite which is in accordance with IPCC 1996 data[6] and on net calorific value of anthracite which in accordance with IPCC 2006 data[7].

[6] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 2), Chapter 1 (Energy), Table 1-1 (continued), page 1.13 - http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref1.pdf
[7] 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Section 1.4.2 *Emission Factors,* Table 1.2, page 18 - http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

Project line

Classification number	Data variable	Unit	2008	2009
P-1	Total CO_{2e} in the project scenario (PE_i)	Tonnes CO_{2e}	8 442 101	9 209 763
P-2	Total CO_{2e} from Pig Iron ($TCPI_{p,i}$)	Tonnes CO_{2e}	7 656 506	8 258 404
P-3	Total Pig Iron Output ($TPII_{p,i}$)	Tonnes	3 060 211	3 195 230
P-4	Total CO_{2e} from fuel consumption in producing Pig Iron ($TCFCPI_{p,i}$)	Tonnes CO_{2e}	409 204	419 521
P-5	Quantity of each fuel (fpi_p) used in making Pig Iron ($Q_{fpi,p,i}$)	1000 m^3		
	Natural gas (NG)	1000 m^3	216 166	221 616
P-6	Emission factor of each fuel $EF_{f,p}$	Tonnes CO_{2e}/1000 m^3		
	Natural gas (NG)[8]	Tonnes CO_{2e}/1000 m^3	1,89301	1,89301
P-7	Total CO_{2e} from electricity consumption in producing Pig Iron ($TCEPI_{p,i}$)	Tonnes CO_{2e}	274 337	286 401
P-8	Electricity Consumed in producing Pig Iron ($ECPI_{p,i}$)	MWh	253 546	261 315
P-9	Emissions Factor for Electricity Consumption $EF_{f,p}$	Tonnes CO_{2e}/MWh	1,082[9]	1,096[10]
P-10	Total CO_{2e} from Inputs into Pig Iron ($TCIPI_{p,i}$)	Tonnes CO_{2e}	6 972 965	7 552 482
P-11	Total CO_{2e} from fuel used to prepare Iron Ore ($TCFIO_{p,i}$)	Tonnes CO_{2e}	34 196	29 566
P-12	Quantity of each fuel (fio_p) used in Sintering ($Q_{fio,p,i}$)	1000 m^3		
	Natural gas (NG)	1000 m^3	18 064	15 619
P-13	Emission factor of each fuel $EF_{f,p}$	Tonnes CO_{2e}/1000 m^3		
	Natural gas (NG)	Tonnes CO_{2e}/1000 m^3	1,89301	1,89301
P-14	Total CO_{2e} from electricity consumption in preparing iron ore ($TCEIO_{p,i}$)	Tonnes CO_{2e}	95 112	112 546
P-15	Electricity Consumed in Sintering ($ECIO_{p,i}$)	MWh	87 904	102 688
P-16	Emissions Factor for Electricity Consumption $EF_{f,p}$	Tonnes CO_{2e}/MWh	1,082	1,096
P-17	Total CO_{2e} from Reducing Agents in Pig Iron Production ($TCRAPI_{p,i}$)	Tonnes CO_{2e}	6 504 684	7 076 211
P-18	Quantity of each reducing agent ($rapi_p$) in Pig Iron Production ($Q_{rapi,p,i}$)	Tonnes		
	Reducing agent (coke)	Tonnes	1 663 264	1 838 034

[8] Emission factor for natural gas is based on Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 2), Chapter 1 (Energy), Table 1-1 (continued), page 1.13 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref1.pdf) and fixed net calorific value of natural gas which is in accordance with DIISW average historical data.

[9] http://www.neia.gov.ua/nature/doccatalog/document?id=127171

[10] http://www.neia.gov.ua/nature/doccatalog/document?id=127172

	Reducing agent (anthracite)	**Tonnes**	112 870	84 101
P-19	**Emission factor of each reducing agent, $EF_{ra,p}$**	**Tonnes CO_{2e}/Tonne**		
	Default emission factor[11]	**Tonnes CO_{2e}/Tonne**	3,733	3,730
	Default emission factor[12]	**Tonnes CO_2/Tonne**	2,62	2,62
P-20	**Total CO_{2e} from other inputs ($TCOIPI_{p,i}$)**	**Tonnes CO_{2e}**	**338 973**	**334 158**
P-21	**Quantity of each other input ($oipi_p$) in Pig Iron Production ($Q_{oipi,p,i}$)**	**Tonnes**		
	Limestone	**Tonnes**	569 802	632 019
	Dolomite	**Tonnes**	147 887	65 835
	Pellets	**Tonnes**	590 595	822 221
P-22	**Emission factor of each other input, $EF_{oi,p}$**	**Tonnes CO_{2e}/Tonne**		
	Default emission factor[13]	**Tonnes CO_{2e}/Tonne**	0,44	0,44
	Default emission factor[14]	**Tonnes CO_{2e}/Tonne**	0,477	0,477
	Default emission factor[15]	**Tonnes CO_{2e}/Tonne**	0,03	0,03
P-23	**Total tones of CO_{2e} related to the balance of process need of energy required for the project activity ($TCBPN_{p,i}$)**	**Tonnes CO_{2e}**	**785 595**	**951 359**
P-24	**Total CO_{2e} from fuel consumption for balance of process needs of project activity ($TCFCBPN_{p,i}$)**	**Tonnes CO_{2e}**	**144 265**	**119 722**
P-25	**Quantity of each fuel ($fbpn_p$) used for balance of process needs ($Q_{fbpn,p,i}$)**	**1000 m^3**		
	Natural gas (NG)	**1000 m^3**	76 209	63 244
P-26	**Emission factor of each fuel $EF_{f,p}$**	**Tonnes CO_{2e}/1000 m^3**		
	Natural gas (NG)	**Tonnes CO_{2e}/1000 m^3**	1,89301	1,89301
P-27	**Total CO_{2e} from electricity consumption for balance of process needs of project activity ($TCEBPN_{p,i}$)**	**Tonnes CO_{2e}**	**641 330**	**831 637**
P-28	**Electricity Consumed for balance of process needs ($ECBPN_{p,i}$)**	**MWh**	592 726	758 793

[11] Emission factor for coke consumption is based on actual carbon content of coke and emission factor for coke production, which is in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Metal Industries Emissions, Section 4.2.2.3 *Choice of Emission Factors*, Table 4.1, page 4.25 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_4_Ch4_Metal_Industry.pdf).

[12] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 2), Chapter 1 (Energy), Table 1-1 (continued), page 1.13 - http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref1.pdf and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Section 1.4.2 *Emission Factors,* Table 1.2, page 18 - http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

[13] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Section 2.5.2 *Emissions estimation methodology for CO_2*, page 2.10 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf).

[14] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Section 2.5.2 *Emissions estimation methodology for CO_2*, page 2.10 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf).

[15] In accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Metal Industries Emissions, Section 4.2.2.3 *Choice of Emission Factors*, Table 4.1, page 4.25 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_4_Ch4_Metal_Industry.pdf).

P-29	Emissions Factor for Electricity Consumption $EF_{f,p}$	Tonnes CO_{2e}/MWh	1,082	1,096

Baseline

Classification number	Data variable	Unit	2008	2009
B-1	Total CO_{2e} in the project scenario (BE_i)	Tonnes CO_{2e}	10 107 617	10 568 919
B-2	Total CO_{2e} from Pig Iron ($TCPI_{b,i}$)	Tonnes CO_{2e}	8 646 197	9 027 385
B-3	Total Pig Iron Output ($TPII_{b,i}$)	Tonnes	3 060 211	3 195 230
B-4	Total CO_{2e} from fuel consumption in producing Pig Iron ($TCFCPI_{b,i}$)	Tonnes CO_{2e}	423 795	442 493
B-5	Quantity of each fuel (fpi_b) used in making Pig Iron ($Q_{fpi,b,i}$)	1000 m^3		
	Natural gas (NG)	1000 m^3	223 874	233 751
B-6	Emission factor of each fuel $EF_{f,b}$	Tonnes CO_{2e}/1000 m^3		
	Natural gas (NG)	Tonnes CO_{2e}/1000 m^3	1,89301	1,89301
B-7	Total CO_{2e} from electricity consumption in producing Pig Iron ($TCEPI_{b,i}$)	Tonnes CO_{2e}	221 323	234 078
B-8	Electricity Consumed in producing Pig Iron ($ECPI_{b,i}$)	MWh	204 550	213 575
B-9	Emissions Factor for Electricity Consumption $EF_{f,b}$	Tonnes CO_{2e}/MWh	1,082	1,096
B-10	Total CO_{2e} from Inputs into Pig Iron ($TCIPI_{b,i}$)	Tonnes CO_{2e}	8 001 079	8 350 814
B-11	Total CO_{2e} from fuel used to prepare Iron Ore ($TCFIO_{b,i}$)	Tonnes CO_{2e}	58 480	61 060
B-12	Quantity of each fuel (fio_b) used in Sintering ($Q_{fio,b,i}$)	1000 m^3		
	Natural gas (NG)	1000 m^3	30 893	32 256
B-13	Emission factor of each fuel $EF_{f,b}$	Tonnes CO_{2e}/1000 m^3		
	Natural gas (NG)	Tonnes CO_{2e}/1000 m^3	1,89301	1,89301
B-14	Total CO_{2e} from electricity consumption in preparing iron ore ($TCEIO_{b,i}$)	Tonnes CO_{2e}	194 888	206 119
B-15	Electricity Consumed in Sintering ($ECIO_{b,i}$)	MWh	180 118	188 065
B-16	Emissions Factor for Electricity Consumption $EF_{f,b}$	Tonnes CO_{2e}/MWh	1,082	1,096
B-17	Total CO_{2e} from Reducing Agents in Pig Iron Production ($TCRAPI_{b,i}$)	Tonnes CO_{2e}	7 299 432	7 615 576
B-18	Quantity of each reducing agent ($rapi_b$) in Pig Iron Production ($Q_{rapi,b,i}$)	Tonnes		
	Reducing agent (coke)	Tonnes	1 887 502	1 970 780
	Reducing agent (anthracite)	Tonnes	96 713	100 980
B-19	Emission factor of each reducing agent, $EF_{ra,b}$	Tonnes CO_{2e}/Tonne		

	Default emission factor	**Tonnes CO_{2e}/Tonne**	3,733	3,73
	Default emission factor	**Tonnes CO_{2e}/Tonne**	2,62	2,62
B-20	**Total CO_{2e} from other inputs ($TCOIPI_{b,i}$)**	**Tonnes CO_{2e}**	**448 279**	**468 058**
B-21	**Quantity of each other input ($oipi_b$) in Pig Iron Production ($Q_{oipi,b,i}$)**	**Tonnes**		
	Limestone	**Tonnes**	519 208	542 116
	Dolomite	**Tonnes**	427 609	446 476
	Pellets	**Tonnes**	528 605	551 927
B-22	**Emission factor of each other input, $EF_{oi,b}$**	**Tonnes CO_{2e}/Tonne**		
	Default emission factor	**Tonnes CO_{2e}/Tonne**	0,440	0,440
	Default emission factor	**Tonnes CO_{2e}/Tonne**	0,477	0,477
	Default emission factor	**Tonnes CO_{2e}/Tonne**	0,030	0,030
B-23	**Total tones of CO_{2e} related to the balance of process need of energy required for the project activity ($TCBPN_{b,i}$)**	**Tonnes CO_{2e}**	**1 461 420**	**1 541 534**
B-24	**Total CO_{2e} from fuel consumption for balance of process needs of project activity ($TCFCBPN_{b,i}$)**	**Tonnes CO_{2e}**	**304 102**	**317 519**
B-25	**Quantity of each fuel ($fbpn_b$) used for balance of process needs ($Q_{fbpn,b,i}$)**	**1000 m^3**		
	Natural gas (NG)	**1000 m^3**	160 645	167 732
B-26	**Emission factor of each fuel $EF_{f,b}$**	**Tonnes CO_{2e}/1000 m^3**		
	Natural gas (NG)	**Tonnes CO_{2e}/1000 m^3**	1,89301	1,89301
B-27	**Total CO_{2e} from electricity consumption for balance of process needs of project activity ($TCEBPN_{b,i}$)**	**Tonnes CO_{2e}**	**1 157 318**	**1 224 015**
B-28	**Electricity Consumed for balance of process needs ($ECBPN_{b,i}$)**	**MWh**	1 069 610	1 116 802
B-29	**Emissions Factor for Electricity Consumption $EF_{f,b}$**	**Tonnes CO_{2e}/MWh**	1,082	1,096
B-30	**Total CO_{2e} per 1 tonne of Pig Iron produced ($TCPTPIP_b$)**	**Tonnes CO_{2e}/1 t. of Pig Iron Produced**	**3,303**	**3,308**

The calculations of GHG emission reductions, indicated in the tables, are based on the real data of FER consumption both for baseline and project line, according to the methodology. The information regarding emission reductions data are given in the next chapter.

Calculation of emission reductions is based on conservative assumptions, which can be proved by the following facts:
- the price of natural gas in the baseline period was lower than in the project line period. That's why there were no substitutes of natural gas by coal as it was in project line period. As a result, such substitution decreased the total amount of emission reductions;

- the quality of iron-bearing materials in project line period sometimes was lower in comparison with the baseline period. That was the reason of the total amount of emission reductions decrease.

No leakages are generated within proposed project activity.

4. Emission reductions calculations

The emission reductions[16], examined in this monitoring report, were generated during the whole monitoring period. The monitoring was based on actual data (mentioned in the reporting documents) of output production and FER consumption under the project line and baseline scenarios as it is required by the JI Project Design Document (PDD).

	2008	2009	Totally
Baseline Emissions, t CO_{2e}	10 107 617	10 568 919	**20 676 536**
Project Emissions, t CO_{2e}	8 442 101	9 209 763	**17 651 864**
Emission Reductions, t CO_{2e}	**1 665 516**	**1 359 156**	**3 024 672**

5. Measures to ensure the accuracy of the results

The monitoring of JI project indicators at DIISW is realized on regular basis where the system of data collection on FER consumption is being used. The data needed for the monitoring of the project is collected during the process of normal equipment use. The production facilities of the plant are equipped with the measuring devices such as scales, meters and gas, water, steam, electricity consumption meters[17]. The monitoring of the project formed an organic part of routine monitoring of manufacturing process. This allows receiving data regarding the project continuously.

The quality assurance procedures are based on the Plant's ISO 9001:2001 quality management system (QMS), which was further upgraded to the more recent ISO 9001:2008[18] version[19]. The QMS covers the whole of the Plant's production process. Furthermore, an OHSAS 18000 industrial safety management system and an ISO 14000 environmental management system were implemented in 2009[20]. Compliance audits for the mentioned above standards are performed in accordance with regulatory documents of DIISW "Guidance on quality management systems" and "Standard on internal audits". The bureau of standardized certification is responsible for management, realization and storage of audits data. The audits are conducted on monthly basis in accordance with schedule developed at the beginning of each year by the group of accredited auditors of the bureau of standardized certification. The person responsible for appropriate

[16] Project and baseline emissions (which are provided in this chapter) are rounded to the whole figure (1t) and are based on calculations which are demonstrated in the attached excel file. The file is provided to the verifier.
[17] The list of monitoring equipment is provided in Annex 1 of this monitoring report.
[18] http://www.dmkd.dp.ua/sites/new.dmkd.dp.ua/files/sertif01.jpg
[19] Certificates were issued by UkrSEPRO (no. 2.008.04188 dd. 29/01/2010) and TÜV SÜD (no. 12 100 37982 dd. 22/03/2010).
[20] Relevant certificates were issued by TÜV Thuringen (nos. TIC 1511610202 dd. 02/03/2010 and TIC 1510410697 dd. 02/03/2010, respectively).

implementation of the audits is the Chief of technological control of the plant. In addition, the Plant has a number of other certificates[21], which proof the project monitoring quality assurance.

Best available techniques are used in order to minimize uncertainties. Uncertainties are generally low - typically below 2% for all parameters that are or will be monitored. All the equipment used for monitoring purposes is in line with national legislative requirements and standards and also with ISO 9001:2001 standards. Details are given in STP 230-35-07 *Metrological Support of* Measuring *Equipment*. The data will be cross checked as well as internal audits and corrective actions are taken as defined in STP 230-18-03 *Quality Management System Internal Audits*.

The reporting risk is rather low. In case of having problems with certain monitoring devices, the accounting system is organized in such way that allows double checking of all the data. Ultimately all information can be proven by independent invoices with the third parties.

6. Roles and obligations

Control over consumption of energy resources, input material and production is monitored by a separate unit of the steel mill (Unit for Control and Automation) with a help of different meters all operating in accordance to the national standards of Ukraine and documented in Guiding Metrological Instructions of DIISW. Responsibilities for monitoring are defined in the table below.

Responsibility	**Specialist Responsible**
Overall project responsibility	Chief Engineer
Overall responsibility for Monitoring Report	Technical Department Head
Data for Blast Furnaces	Blast Furnace Shop Manager
Data for Sinter Plant	Sinter Plant Manager
Data for balance of process needs	Head of CHP, Deputy Chief Energy Specialist

The monitoring procedures and responsibilities at DIISW are regulated by STP 230-35-07 *Metrological Support of Measuring Equipment* and national standards, including:

1) *Metrological Product Quality Assurance* (RMI-I-19.0.1-07);
2) Metrological Due Diligence of Documentation (RMI-I-19.0.2-07) and STP 11.02-00 *Organisation and Performance of Metrological Due Diligence of Standards and Technical Documentation;*
3) *Management of Metering Devices* (RMI-I-19.1.1-07).

The procedures for calibration of all monitoring equipment are described in RMI-I.19.0.1-07 and RMI-I.19.1.1-07.

[21] Relevant information may be provided upon request.

Control of metering process and requirements to metrological support of metering equipment is assured as provided in DSTU 3921.1-1999 (ISO 10012-1:1992) *Requirements to Quality Assurance of Metering Equipment* and DSTU 3921.2- 2000 (ISO 10012-2:1997) *Quality Assurance by Means of Metering Equipment*[22].

The Chief Metrological Specialist (Head of I&C Department) is in charge for maintenance of the monitoring equipment and installations as well as for their accuracy required by paragraphs 2.1.1, 3.1.1, 7.1 of the Regulation PP 229-Э-056-863/02-2005 *On Metrological Services of the Iron Works*, STP 230-35-07 *Metrological Support of Measuring Equipment*, *Guideline on Plant Metrology Department*, and I.19.0.1-07. In case of defect discovered in the monitoring equipment the actions of the personnel are determined by STP 230-35-07 *Metrological Support of Measuring Equipment*, *Guideline on Plant Metrology Department*, and I.19.0.1-07 (p.5.4.4).

The measurement of the parameters included into the monitoring plan of the project is envisaged by the provisions of the STP 230-35-07 *Metrological Support of Measuring Equipment*, *Guideline on Plant Metrology Department*, and I.19.0.1-07 (paragraph 5.3.2).

The measurements are conducted on continuous basis and automatically according to the STP 230-35-07 *Metrological Support of Measuring Equipment* and I-19.1.1-07 (p. 5.4).

The data required to be monitored under the proposed JI project was routinely collected within the normal operations of the DIISW. Together with this data collection was an integral part of routine monitoring. Data was compiled in (i) day-to-day records, (ii) quarterly records, and (iii) annual records. Data were collected in the electronic database of PJSC "DIISW" and in printed documents. All records were finally stored in Planning Department.

The results of the measurements are being used by relevant services and technical personnel of the Steel Mill.

The direction of DIISW organized appropriate staff training to operate the project equipment. With the project equipment introduction the workers of DIISW had the opportunity to update their working skills, stimulated by the permanent educational theoretical and practical courses at the Steel Plant. In the reporting period the following trainings were conducted[23]:

- From 2005 - 2010 - the course on professional development in the sphere of sintering production related to usage of ignition hearth with 8 burners;
- In 2008 - the course on professional development on the utilization of АКАр 40/53-4 facility;
- In 2008 - trainings on BFs hydraulic equipment utilization and repair;

[22] The instructions have been developed in accordance with ISO 9001:2001 requirements. They secure accuracy of all the measurements done using monitoring equipment.
[23] The confirming documents are available upon request.

- In 2008 – trainings on maintenance and equipment repair of hydraulic pneumatic equipment and systems of oil and grease;
- In 2008 – trainings on machinery of air-separation in oxygen shop.

Annex 1: The list of monitoring equipment

Classification number	Explanation	Type of monitoring equipment	Serial number	Frequency of verification (calibration)
1	2	3	4	5
P-3 **B-3**	Scales for weighing pig iron	Т-2390ВВ-200Э/1С	90	Once a year
P-5 **B-5**	BF-1m Natural gas consumption meter	Сапфир-М	2619588	Once in 2 years
P-5 **B-5**	BF-1m Natural gas pressure meter	Сапфир –М	3484802	Once in 2 years
P-5 **B-5**	BF-1m Natural gas consumption meter	Сапфир –М	3981694	Once in 2 years
P-5 **B-5**	BF-1m Natural gas pressure meter	Сапфир –М	2800644	Once in 2 years
P-5 **B-5**	BF-8 Natural gas consumption meter	Сапфир- М	3850732	Once in 2 years
P-5 **B-5**	BF-8 Natural gas pressure meter	Сапфир- М	3393821	Once in 2 years
P-5 **B-5**	BF-8 Natural gas consumption meter	Сапфир- М	3831731	Once in 2 years
P-5 **B-5**	BF-8 Natural gas pressure meter	Сапфир – М	3483807	Once in 2 years
P-5 **B-5**	BF-9 Natural gas consumption meter	Метран-100	66737	Once a year
P-5 **B-5**	BF-9 Natural gas pressure meter	Метран-100	65430	Once a year
P-5 **B-5**	BF-9 Natural gas consumption meter	Метран-100	133425	Once a year

P-5 **B-5**	BF-9 Natural gas pressure meter	Метран-100	135282	Once a year
P-5 **B-5**	BF-12 Natural gas consumption meter	Сапфир –М	10612957	Once a year
P-5 **B-5**	BF-12 Natural gas pressure meter	АИР -20	31275	Once a year
P-5 **B-5**	BF-12 Natural gas consumption meter	Сапфир –М	7173694	Once in 2 years
P-5 **B-5**	BF-12 Natural gas pressure meter	Сапфир –М	3493886	Once in 2 years
P-8 **B-8**	Electric substation of Blast-furnace shop			
	Electricity meter #9	И670	168282	Once in 2 years
	Electricity meter #10	И43	0193831	Once in 2 years
	Electricity meter #11	ИТ	111336	Once in 2 years
	Electricity meter #12	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #13	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #14	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #15	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #16	ЕвроАльфа	0132770	Once in 2 years
	Electricity meter #17	ЕвроАльфа	0112774	Once in 2 years
	Electricity meter #18	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #19	ЕвроАльфа	011327xx	Once in 2 years
	Electricity meter #20	ЕвроАльфа	01132789	Once in 2 years
	Electricity meter #21	ЕвроАльфа	01132791	Once in 2 years
	Electricity meter #22	ЕвроАльфа	01132768	Once in 2 years
	Electricity meter #23	ЕвроАльфа	01132786	Once in 2 years

	Electricity meter #24	И43	113604	Once in 2 years
	Electricity meter #25	И43	201587	Once in 2 years
	Electricity meter #26	И43	127390	Once in 2 years
	Electricity meter #27	И670	377402	Once in 2 years
	Electricity meter #28	И670	919893	Once in 2 years
	Electricity meter #29	И670	225147	Once in 2 years
	Electricity meter #30	ЕвроАльфа	011327xx	Once in 2 years
Р-12 **В-12**	Sinter plant Natural gas consumption meter	Сапфир М 5444 Сапфир М 5444	3939733 3639990	Once a year Once a year
Р-12 **В-12**	Sinter plant Natural gas pressure meter		6655718	Once in 2 years
Р-15 **В-15**	Electric substation of Sinter plant			
	Electricity meter #1	И670	748236	Once in 2 years
	Electricity meter #2	И670	306278	Once in 2 years
	Electricity meter #3	ИТ	690221	Once in 2 years
	Electricity meter #4	И670	611825	Once in 2 years
	Electricity meter #5	И670	306278	Once in 2 years
	Electricity meter #6	И670	096022	Once in 2 years
	Electricity meter #7	И670	748215	Once in 2 years
	Electricity meter #8	ЕвроАльфа	011327xx	Once in 2 years
Р-15 **В-15**	Electric substation of Lime shop			
	Electricity meter #69	И670	793180	Once in 2 years
	Electricity meter #70	И670	4039180	Once in 2 years
	Electricity meter #71	И670	328129	Once in 2 years

	Electricity meter #72	И670	178238	Once in 2 years
Р-18 **В-18**	Scales for weighing coke and anthracite	2370ВВ-150Э/2С	70	Once a year
Р-18 **В-18**	Scales for weighing coke and anthracite	2392ВВ-50 ЭНД	29	Once a year
Р-21 **В-21**	Scales for weighing limestone, dolomite and pellets	2370ВВ-150Э/2С	70	Once a year
Р-21 **В-21**	Scales for weighing limestone, dolomite and pellets	2392ВВ-50 ЭНД	29	Once a year
Р-25 **В-25**	CHP Natural gas consumption meter	Сапфир	517758	Once a year
Р-28 **В-28**	Electric substation of Water supply shop			
	Electricity meter #106	И670	113950	Once in 2 years
	Electricity meter #107	ИТ	691814	Once in 2 years
	Electricity meter #108	И670	966102	Once in 2 years
	Electricity meter #109	И670	377764	Once in 3 years
	Electricity meter #110	И670	866529	Once in 3 years
	Electricity meter #111	И670	193939	Once in 2 years
	Electricity meter #112	И670	225779	Once in 2 years
	Electricity meter #113	И670	238767	Once in 2 years
	Electricity meter #114	И670	146522	Once a year
	Electricity meter #115	И670	366136	Once in 2 years
	Electricity meter #116	И670	068744	Once in 2 years
	Electricity meter #117	И670	193710	Once in 2 years
	Electricity meter #118	И670	339824	Once in 2 years
	Electricity meter #119	И670	366523	Once in 2 years
	Electricity meter #120	И670	019735	Once in 2 years

	Electricity meter #121	И43	866520	Once in 3 years
	Electricity meter #122	И670	019789	Once in 3 years
	Electricity meter #123	И670	350268	Once in 2 years
	Electricity meter #124	И670	941305	Once in 2 years
	Electricity meter #125	И670	306134	Once a year
	Electricity meter #126	И670	361757	Once in 3 years
	Electricity meter #127	ИТ	643225	Once in 2 years
	Electricity meter #128	И670	233827	Once a year
	Electricity meter #129	И670	096018	Once a year
	Electricity meter #130	И670	565029	Once in 2 years
	Electricity meter #131	И43	040203	Once in 2 years
	Electricity meter #132	И43	327773	Once in 2 years
	Electricity meter #133	И670	158520	Once in 2 years
	Electricity meter #134	И670	658480	Once in 2 years
	Electricity meter #135	И670	690834	Once in 2 years
	Electricity meter #136	И670	367119	Once in 2 years
	Electricity meter #137	И670	163142	Once in 2 years
	Electricity meter #138	И670	658480	Once in 2 years
	Electricity meter #139	И670	690834	Once in 2 years
Р-28 **В-28**	Electric substation of Oxygen shop			
	Electricity meter #140	И670	352685	Once in 2 years
	Electricity meter #141	И670	224848	Once in 2 years
	Electricity meter #142	И670	306059	Once in 2 years
	Electricity meter #143	И670	690664	Once in 2 years

	Electricity meter #144	И673	037041	Once in 2 years
	Electricity meter #145	И670	430830	Once in 2 years
	Electricity meter #146	И670	052826	Once in 2 years
	Electricity meter #147	И670	797420	Once in 2 years
	Electricity meter #148	И670	374202	Once in 2 years
	Electricity meter #149	И670	166841	Once in 2 years
	Electricity meter #150	И670	619944	Once in 2 years
	Electricity meter #151	И670	020245	Once in 2 years
	Electricity meter #152	ЕТ	8876	Once in 2 years
	Electricity meter #153	ЕТ	8875	Once in 2 years
Р-28 **В-28**	Electric substation of Gas shop			
	Electricity meter #166	И670	306434	Once in 2 years
	Electricity meter #167	И670	444223	Once in 2 years
	Electricity meter #168	И670	042771	Once in 2 years
	Electricity meter #169	И670	480854	Once in 2 years
	Electricity meter #170	И670	672417	Once in 2 years
	Electricity meter #171	И670	143921	Once in 2 years
	Electricity meter #172	И670	605102	Once in 2 years
	Electric substation of CHP			
	Electricity meter #154	И670	095620	Once in 2 years
	Electricity meter #155	И670	642969	Once in 2 years
	Electricity meter #156	ИТ	004276	Once in 2 years
	Electricity meter #157	И670	172761	Once in 2 years
	Electricity meter #158	И670	366528	Once in 2 years

	Electricity meter #159	И670	233380	Once in 2 years
	Electricity meter #160	И43	047265	Once in 2 years
	Electricity meter #161	И670	130468	Once in 2 years
	Electricity meter #162	И670	722744	Once in 2 years
	Electricity meter #163	И670	603211	Once in 2 years
	Electricity meter #164	И670	366162	Once in 2 years
	Electricity meter #165	И196	076698	Once in 2 years