

**Open joint-stock company**  
**«TERRITORIAL GENERATING COMPANY NO. 2» («TGC-2» OJSC)**  
**HEADQUARTERS IN ARKHANGELSK REGION**  
**Arkhangelsk CHP-plant**  
**19 Talazhskoye highway, 163045 Arkhangelsk,**  
**tel.: (8182) 46-33-59, fax: (8182) 27-51-16,**  
**e-mail: atec@tgc-2.ru**

Our ref: 2101-04-216 dated: May 31, 2010

**Appraisal report**  
**on heat exchange elements replacement**

Dear Vladimir Igorevich,

There are 6 boiler units of TGM-84 «Б» type operating at Arkhangelsk CHP-plant. Nominal steam capacity of the boiler equals 420 t/hr. Mazut of M-100 type as the main fuel type is used.

In 2006 during midlife repair, the replacement of RAH heat exchange elements of cold and hot ends of boiler unit No.4 by CMKA<sup>®</sup> heat exchange elements produced by «Northern Interindustry Company «The Alternative» was executed.

During under control operation after heat exchange elements replacement, quick tests of the boiler unit No.4 were carried out in order to determine technical and economical parameters of boiler functioning.

The results were as follows:

No.	Parameters of technical condition	Operation tests data		
		Before repair Apr. 3, 2006	After repair Sept. 21, 2006	Current condition Apr. 23, 2010
1	Fuel	Mazut M-100		
2	Steam capacity, tons/hour	410	285	380
3	RAH resistance by gas, (A, B), kg/m <sup>2</sup>	102/110	60/60	95/98
4	RAH resistance by air, (A, B), kg/m <sup>2</sup>	99/25	60/--	114/113
5	Flows in RAH, %	31.7	24.1	39.4
6	Air temperature at RAH inlet (A, B), °C	84/92	95/116	93/108
7	Temperature of released gases, °C	180	163	154
8	Difference in gas temperature before RAH and air temperature behind RAH, °C	68	34	27
9	Heat loss with released gases, %	8.27	7.44	7.66
10	Boiler gross efficiency, %	91.13	91.96	91.89
11	Specific power consumption for traction and blast, kWatt-hour/Gcal	6.83	6.56	7.52

In 2005 during midlife repair, the replacement of RAH heat exchange elements of cold and hot ends of boiler unit No.5 by CMKA<sup>®</sup> heat exchange elements produced by «Northern Interindustry Company «The Alternative» was executed.

The results were as follows:

№	Parameter	Operation tests data		
		Before repair Apr. 26, 2005	After repair Jul. 10, 2005	Current condition May 05, 2010
1	Fuel	Mazut of M-100 type		
2	Steam capacity, tons/hour	418	410	420
3	RAH resistance by gas, (A, B), kg/m <sup>2</sup>	160/120	120/135	90/88
4	RAH resistance by air, (A, B), kg/m <sup>2</sup>	155/135	--/140	120/120
5	Flows in RAH, %	27.6	18.5	22.8
6	Air temperature at RAH inlet (A, B), °C	102/106	95/90	94/95
7	Temperature of released gases, °C	188	162	162
8	Difference in gas temperature before RAH and air temperature behind RAH, °C	47	29	40
9	Heat loss with released gases, %	8.18	7.18	7.57
10	Boiler gross efficiency, %	91.39	92.41	92.02
11	Specific power consumption for traction and blowing, kWatt-hour/Gcal	7.70	6.71	7.86

The heat exchange elements produced by «Northern Interindustry Company «The Alternative» provide required air heating, lowering of released gases temperature, reduction of heat loss with released gases that results in increasing of boiler gross efficiency i.e. correspond to improved heat-exchange parameters in comparison with previous heat exchange elements.

Technical Director

A.V.Glebov

M.N.Demetyev.  
007 (8182) 46-32-14