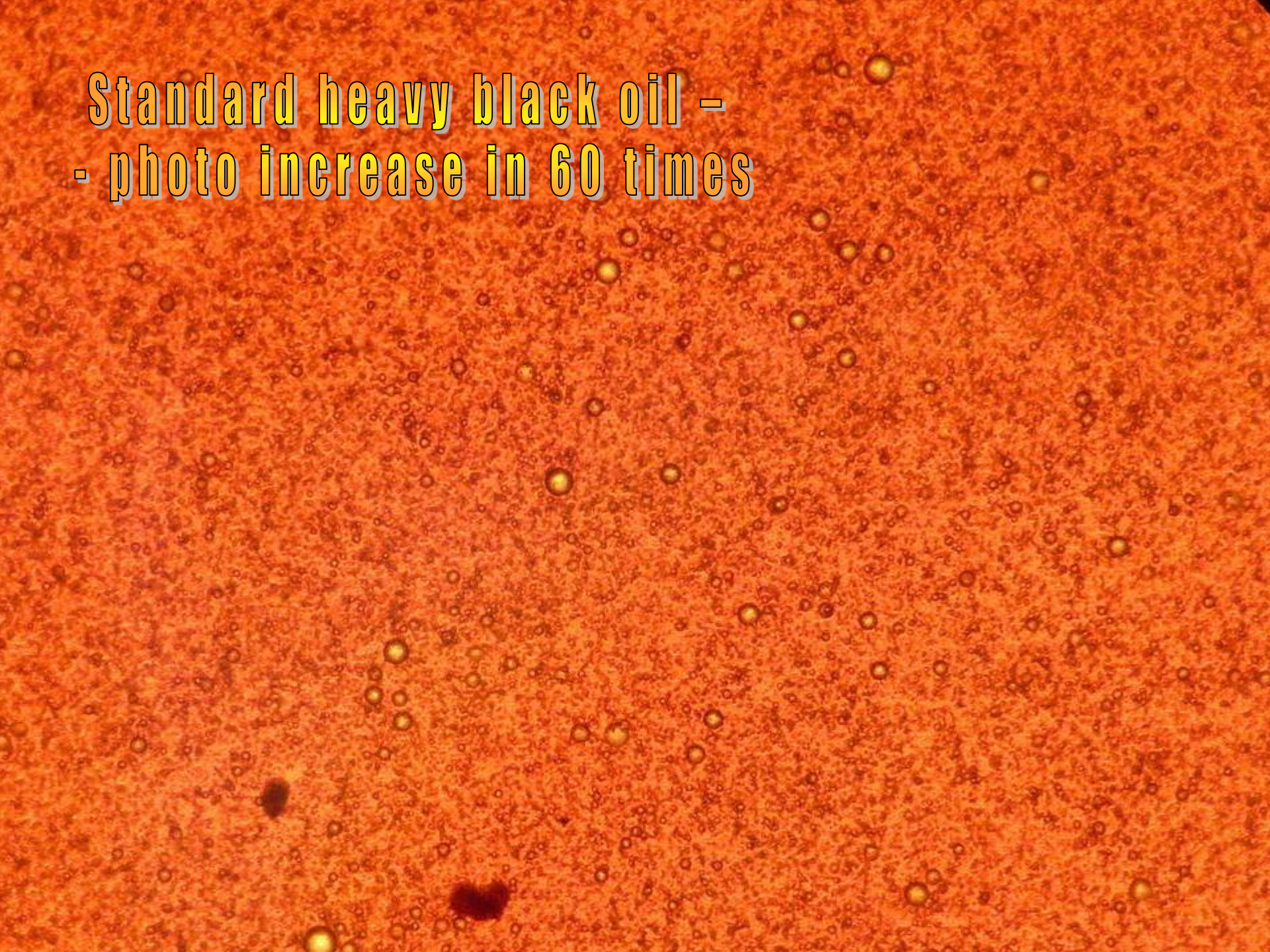
TRGA - devices for full burning and economy boiler fuel (standard and heavy black oil)

TRGA – device without any addition or chemical catalysts.
Fair history of one real installation.
www.afuelsystems.com.ua


Standard heavy black oil –
- photo increase in 60 times

Heavy black oil after processing on TRGA –
- photo increase in 60 times

Technical results

On the basis of the analysis, more than 800 patents of the Russian Federation and 350 patents of Ukraine, We created a ruler units, with high efficiency and productivity (3-120 m. c. p/h), with minimal power consumption (1 kW/h on 1 m. c. p/h and less), with minimal weight and dimensions.

That has allowed to create compact modules for fuel processing or install one into boiler fuel feed with work from regular force pumps.

TRGA- 20 m. cub. P/h

Technical results

Module for fuel processing boiler fuel – work from august 2009.

Private enterprise Ukraine.

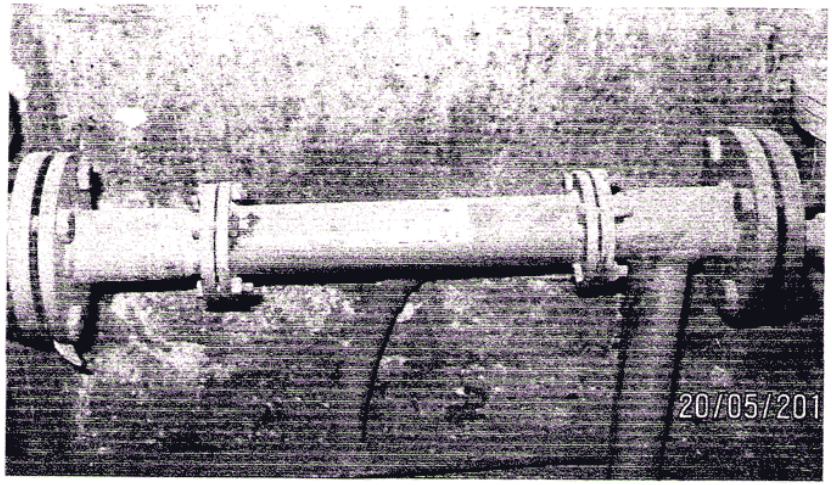
Technical results

Install in boiler fuel feed with work from regular force pumps.

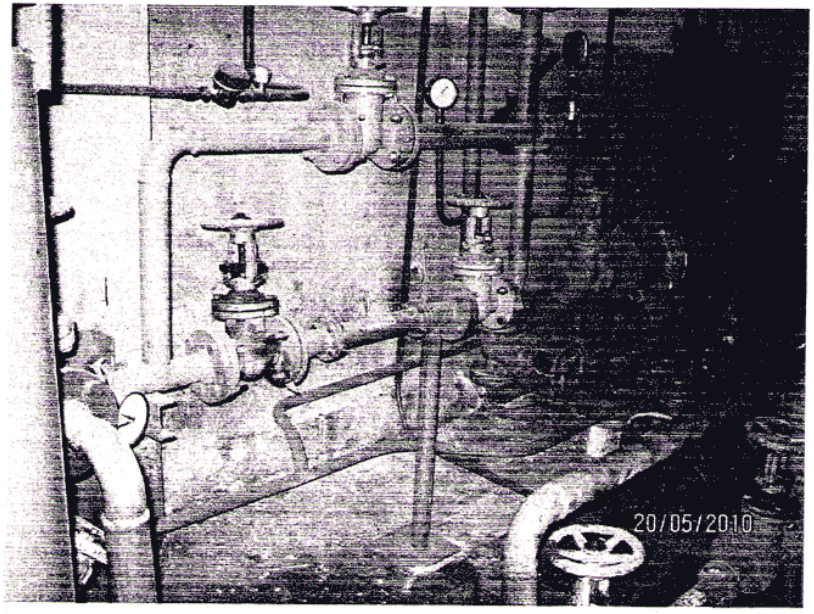
Base for storage nuclear warheads Ukraine.

Work from dec. 2009

Эмульгатор



Эмульгатор и теплообменники



Technical results

Install in boiler fuel feed with work from regular force pumps and for fuel processing in fuel reservoir

Trading port Mariupol, Ukraine.

Recycling of water which is polluted by waste of fuel, oil, black oil…

It is installed on a special boiler-house of trading port Mariupol.

Work from May 2010

Technical results

Install in boiler fuel feed for recycling the mix of water (53%) and black oil (47%) as a fuel.

Boiler-house, Brest Belarus.

Work from Jan. 2009

АЛЬЯНС
НОВА ЕНЕРГІЯ УКРАЇНИ
Громадська Організація Альянс «Нова Енергія України»

ДИПЛОМ

Нагороджується переможець
IV Всеукраїнського конкурсу
проектів з енергозбереження та енергоефективності
"Ярмарок ідей-2009"

ПП Рубан А.В.
в номінації «Кращий реалізований проект»

Голова Правління
Альянсу «Нова Енергія України» *Боровик В. А.*

11.09.2009 fourth Ukrainian exhibition energy-saving technologies. Kiev Ukraine.

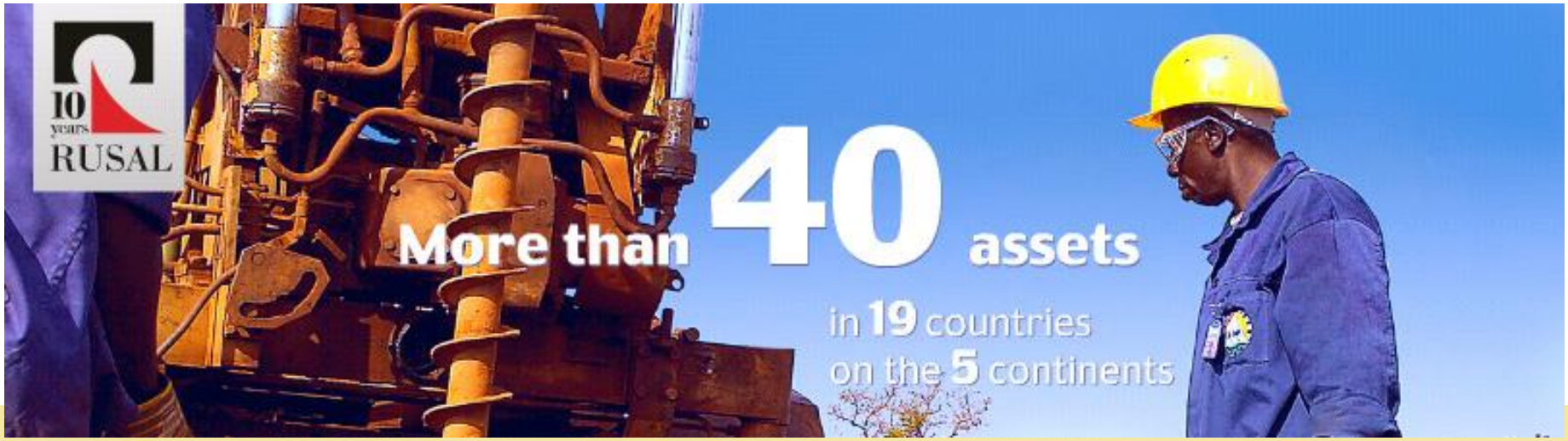
Devices for boiler fuel economy TRGA have won first place in a nomination " The best realized project on energy conservation in Ukraine "

Example of installation – RUSAL, FRIGUIA ALUMINA REFINERY (GUINEA)

Technology
Friguia uses the Bayer process to produce alumina from bauxite

Development
The company has developed a feasibility study for the Friguia Refinery modernization and expansion project. Hatch, the Canadian Engineering Company, and VAMI, the All Russian Aluminum-Magnesium Institute took part in the development of the feasibility study. The 3-year project is directed to increase the plant's capacity from 640,000 tones to 1 mln tones per annum. Modernization of the plant's facilities will also raise the refinery's production performance and reduce operating costs. Currently the feasibility study is a subject to approval by the independent experts.

www.rusal.ru/en/fria_factory.aspx



FRIGUIA ALUMINA REFINERY (GUINEA)

Environment

The refinery's modernization program will significantly reduce the environmental impact: a commitment to use ecologically friendly materials by replacing old equipment with environmentally friendly plant will reduce emissions.

www.rusal.ru/en/fria_factory.aspx

FRIGUIA ALUMINA REFINERY (GUINEA)

During May - July 2010 we have analysed full scheme of a fuel feed and have coordinated - type (model) TRGA, an installation site and the plan of carrying out of industrial tests.

All work under the joint analysis, preparation, carrying out of tests, and control and systematization all received results has executed by Mr. Shljaga S.A. – managing director on power supply FRIGUIA SA.

Mr. Shljaga S.A - personally supervised all stages of installation, start, tests and documented results with computer tables and photographed each step of tests. We thank him for high engineering professionalism, honesty and adherence to principles as the official who protects his enterprise interests.

FRIGUIA ALUMINA REFINERY (GUINEA)


FRIGUIA ALUMINA REFINERY (GUINEA)

Trafigura Limited

Att. Mrs. Selma Bodvards

Nr. : 10404/00013366/10 – Page 1/1
Date : July 21, 2010

Saybolt
A CORE LABORATORIES COMPANY
FAST TO THE POINT.

CERTIFICATE

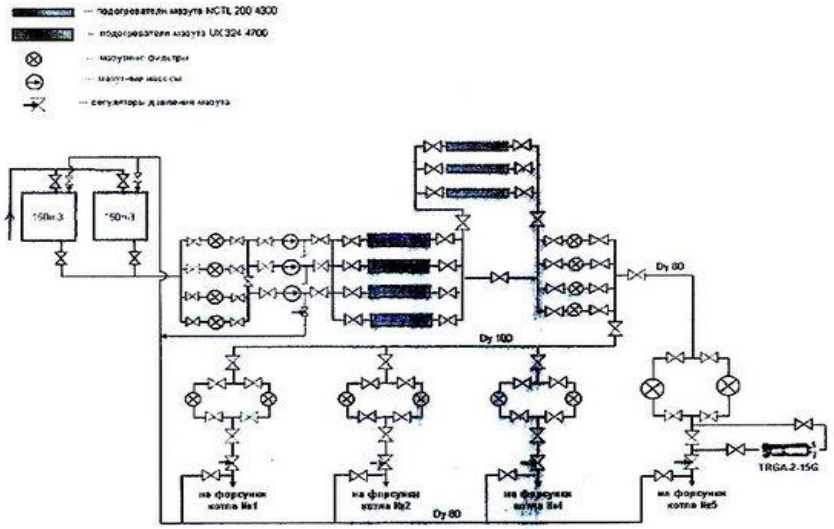
Product : Fueloil
Vessel : mv."Torm Fox"
Location: : Petronor Bilbao

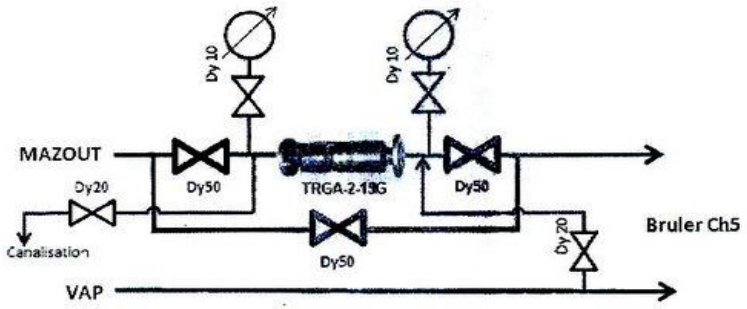
Test	Unit	Method	Results
Density at 15°C	g/ml	ASTM D-4052	0.9893
Sulphur	%m/m	ASTM D-4294	2.55
Viscosity at 50°C	cSt	ASTM D-445	357
Flash Point PM	°C	ASTM D-93	78
Pour Point	°C	ASTM D-97	-12
Vanadium	Mg/kg	ASTM D-5863	201
Vanadium + Sodium	Mg/kg	ASTM D-5863	234
Sodium	Mg/kg	ASTM D-5863	33
Water by Destillation	% v/v	ASTM D-95	0.10
BSW	% v/v	ASTM D-1796	<0.05
Aluminium + Silicon,	Mg/kg	IP 377	16
Hydrogen Sulphide	mg/kg	IP 399	<2
Asphaltenes,	%P	IP 143	9.3
Gross Specific Value (Calculated)	Btu/US gal	ISO 8217+calc	151225
Shell Hot Filtration Test	%m/m	SMS 2696	
Existent Dry Sludge			0.05
Accelerated Dry Sludge			0.04

Analysis run in external lab.


Quality of black oil - a photo of the black oil reheater

III. Схема установки гомогенизатора TRGA-2-15G на котле №5





Директор по Энергообеспечению С.А. Шляга

Согласовано:

Разработчик
гомогенизатора TRGA-2-15G А.В. Рубан

The coordinated place and the scheme of installation of the activator of black oil TRGA

The copy of the official report

RUSAL
FRIGUIA

УТВЕРЖДАЮ
Генеральный директор FRIGUIA SA
_____ Р.М. Кадыров
«13» 10 2010г.

RUSAL FRIGUIA Directeur Général

08.10.2010г. г. Фрия

ОТЧЕТ
по результатам испытаний гомогенизатора TRGA на котле №5 ТЭЦ FRIGUIA SA
(период проведения испытаний: с 01.09.2010г. по 01.10.2010г)

(Котел №5: модель БКЗ-160-9,8-490М производства ОАО «ЭНЕРГОМАШКОРПОРАЦИЯ» Россия; производительность 160 т/час; температура перегретого пара 490 С°; давление перегретого пара 100 bar.)

I. Цели испытаний

1. Добиться улучшения процесса горения мазута на котле №5.
2. Добиться экономии топлива на котле №5.
3. На основании положительных результатов разработать программу установки TRGA на другие котлы ТЭЦ и печи кальцинации завода для снижения затрат на топливо и снижения рисков при использовании мазута с ухудшенным качеством.

II. Установка гомогенизатора TRGA на котле №5

1. Для испытания, совместно с производителем аппарата, был выбран мазутный гомогенизатор модели TRGA-2-15G на рабочее давление до 40 bar и производительностью до 15 т/час мазута. Данные характеристики полностью соответствуют параметрам мазута, подаваемого на котел №5.
2. Силами ремонтного персонала ТЭЦ мазутный гомогенизатор смонтировали на трубопроводе подачи мазута к форсункам котла на прямолинейном участке после регулятора давления мазута перед форсунками. *(Рисунок №1, №2)*

TEST DATA REPORT
TRGA Homogenizer on the Boiler Nr.5, Heat Station FRIGUIA SA
(Period of Tests: 01.09.2010 - 01.10.2010)
(Boiler 5: model БКЗ-160 -9,8-490M, Manufacturer: OJSC «ENERGOMASHCORPORATION», Russia; Output: 160 tons per hour; superheated vapor temperature 490 Co; superheated vapor pressure 100 Bar.)

I. Purpose of Test

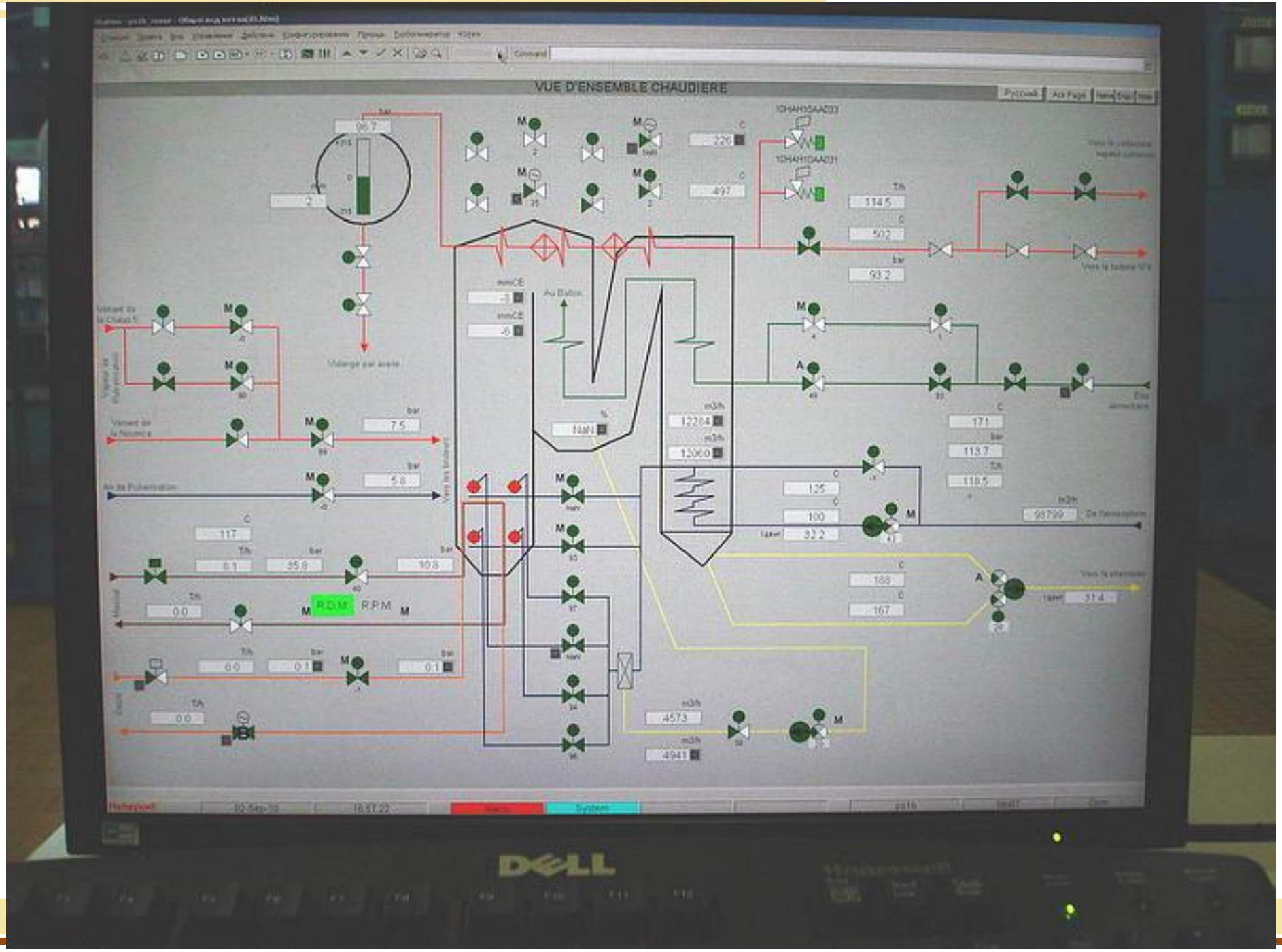
1. To improve the fuel oil combustion in the boiler 5.

2. To achieve the fuel saving in the boiler 5.
3. To develop on the ground of the positive results the installation schedule of TRGA in other heat station boilers and in the factory kilns in order to reduce the fuel consumption as well as the risks at use of the quality-limited fuel oil.

II. TRGA homogenizer installation on the boiler 5

1. TRGA-2-15G fuel oil homogenizer (operating pressure up to 40 Bar, maximal output 15 tons of fuel oil per hour) was selected for testing jointly with the equipment manufacturer. These specifications fully correspond to those of the fuel oil supplied to the boiler 5.

2. The fuel oil homogenizer was installed by the heat station maintenance personnel on the fuel oil supply line to the boiler injectors in the line's straight part, behind the fuel oil pressure controller and in front of the injectors. *(Figures 1, 2)*


VUE D'ENSEMBLE CHAUDIERE
RDM
RPM
DELL


TRGA - start of installation


TRGA - in working

Color of a torch (transparency of the flame) black oil in that boiler, after installation TRGA, comes nearer to a transparency of diesel fuel burning

Transparent flame in all volume of boiler furnace

part from the first report - (4 sept 2010)

“ 3. Plasma of the general torch in boiler furnace are "soft" very and uniform. The torch almost does not lick front and back screens of boiler furnace.

The boiler furnace it is completely looked through. Very well looked through in boiler furnace a top hamper of screens and screen of super heater. Separation of a flame (presence of flying "front sights") completely is absent.

Separation of a flame (flying " fiery flies ") completely are absent.

4. The smoke from a chimney has an easy bluish shade it similar as solar oil but not black oil burns “


www.afuelsystems.com/ru/trga/s46.html
Transparent flame in all volume of boiler furnace

Burning of black oil in boilers without TRGA ---------- and with TRGA

Microsoft Excel - Tabl2.comp.ch5(2)

Файл Правка Вид Вставка Формат Сервис Данные Окно Справка

Введите вопрос

Calibri 10

Ответить с изменениями... Закончить проверку...

Q38 0.0707

--- Burning of black oil without TRGA ---------- burning of black with TRGA

Suivi rendement activateur de mazout

Date	CHAUD-5/КОТЕЛ №5			
	mazout		vapeur,t	cons.spécifique
	m3	t		
1.7.10	205	197,8	2746	0,072
2.7.10	208	200,7	2786	0,072
3.7.10	218	210,4	2912	0,0722
4.7.10	222	214,2	2973	0,0721
5.7.10	215	207,5	2884	0,0719
6.7.10	214	206,5	2876	0,0718
7.7.10	192	185,3	2552	0,0726
8.7.10	201	194,0	2699	0,0719
9.7.10	207	199,8	2775	0,072
10.7.10	204	196,9	2747	0,0717
11.7.10	206	198,8	2760	0,072
12.7.10	204	196,9	2725	0,0722
13.7.10	207	199,8	2777	0,0719
14.7.10	208	200,7	2794	0,0718
15.7.10	216	208,4	2874	0,0725
16.7.10	219	211,3	2918	0,0724
17.7.10	218	210,4	2888	0,0728
18.7.10	218	210,4	2900	0,0725
19.7.10	217	209,4	2902	0,0722
20.7.10	213	205,5	2842	0,0723
21.7.10	216	208,4	2889	0,0721
22.7.10	216	208,4	2899	0,0719
23.7.10	215	207,5	2881	0,072
24.7.10	215	207,5	2867	0,0724
25.7.10	214	206,5	2860	0,0722
26.7.10	214	206,5	2870	0,072
27.7.10	215	207,5	2884	0,0719
28.7.10	206	198,8	2753	0,0722
29.7.10	215	207,5	2864	0,0724
30.7.10	211	203,6	2813	0,0724
31.7.10	206	198,8	2764	0,0719
Mois	6555,0	6325,6	87674,0	**0.0747**

Date	CHAUD-5/КОТЕЛ №5			
	mazout		vapeur,t	cons.spécifique
	m3	t		
1.8.10	206	198,8	2739	0,07258
2.8.10	205	197,8	2733	0,07238
3.8.10	206	198,8	2743	0,07247
4.8.10	206	198,8	2748	0,07234
5.8.10	205	197,8	2708	0,07305
6.8.10	205	197,8	2711	0,07297
7.8.10	208	200,7	2752	0,07294
8.8.10	212	204,6	2734	0,07483
9.8.10	228	220,0	2848	0,07725
10.8.10	214	206,5	2780	0,07428
11.8.10	212	204,6	2730	0,07494
12.8.10	203	195,9	2623	0,07468
13.8.10	205	197,8	2692	0,07349
14.8.10	211	203,6	2780	0,07324
15.8.10	208	200,7	2742	0,0732
16.8.10	197	190,1	2480	0,07666
17.8.10	205	197,8	2675	0,07395
18.8.10	214	206,5	2782	0,07423
19.8.10	216	208,4	2824	0,07381
20.8.10	198	191,1	2594	0,07366
21.8.10	216	208,4	2868	0,07268
22.8.10	215	207,5	2834	0,07321
23.8.10	214	206,5	2821	0,0732
24.8.10	148	142,8	1947	0,07335
25.8.10				
26.8.10				
27.8.10				
28.8.10				
29.8.10				
30.8.10				
31.8.10				
Mois	4957,0	4783,5	64888,0	**0.0737**

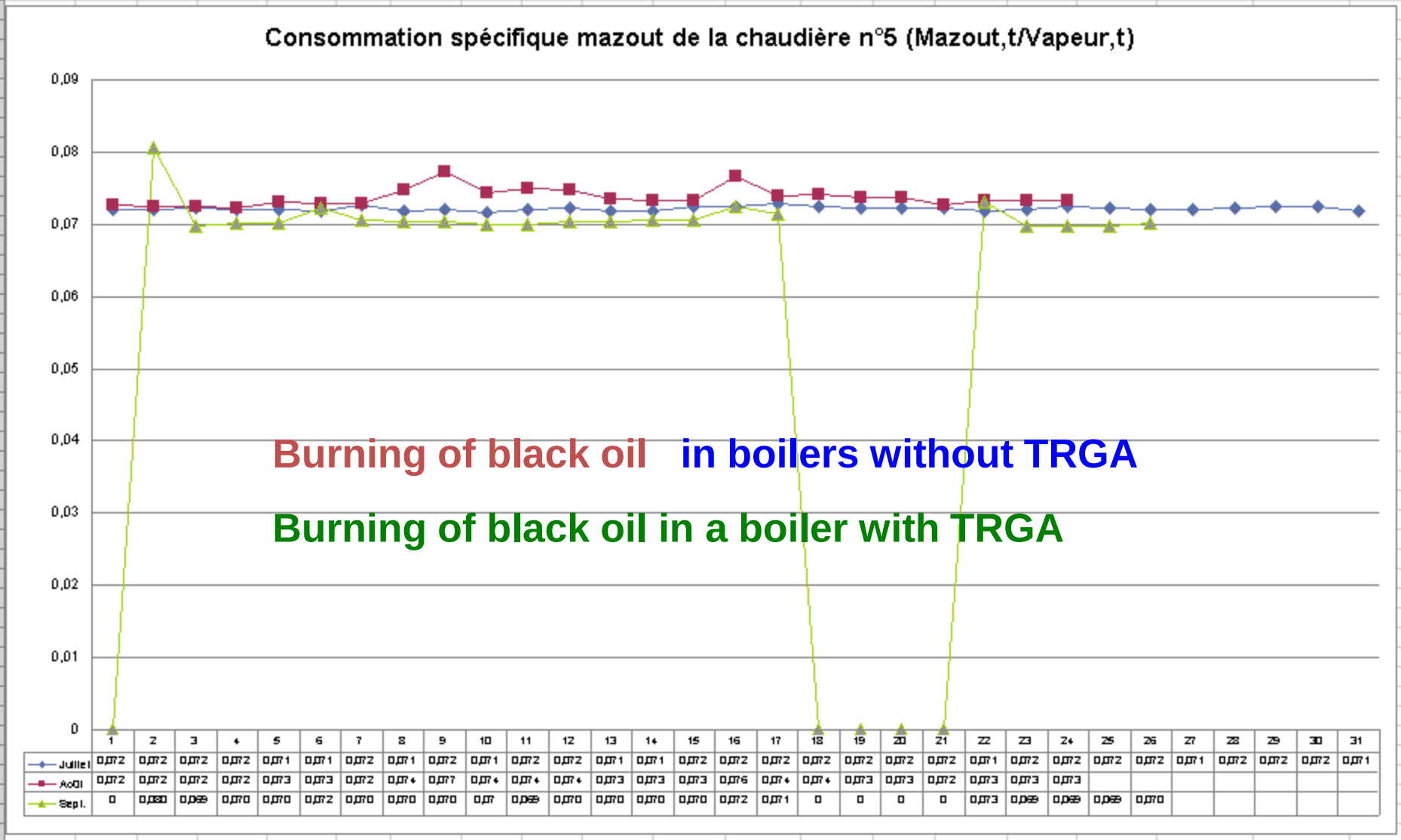
Date	CHAUD-5/КОТЕЛ №5			
	mazout/мазут		vapeur/пар,t	cons.spécifique/
	m3	t		
1.9.10		0,0		0
2.9.10	84	81,1	1006	0,08058
3.9.10	207	199,8	2866	0,0697
4.9.10	211	203,6	2904	0,07012
5.9.10	214	206,5	2939	0,07027
6.9.10	221	213,3	2954	0,0722
7.9.10	221	213,3	3025	0,0705
8.9.10	220	212,3	3016	0,07039
9.9.10	219	211,3	3003	0,07037
10.9.10	219	211,3	3017	0,07005
11.9.10	217	209,4	2997	0,06987
12.9.10	220	212,3	3014	0,07044
13.9.10	221	213,3	3030	0,07038
14.9.10	221	213,3	3026	0,07048
15.9.10	219	211,3	2998	0,07049
16.9.10	209	201,7	2784	0,07244
17.9.10	145	139,9	1957	0,0715
18.9.10	0	0,0	0	0
19.9.10	0	0,0	0	0
20.9.10	0	0,0	0	0
21.9.10	0	0,0	0	0
22.9.10	172	166,0	2270	0,07312
23.9.10	201	194,0	2778	0,06982
24.9.10	202	194,9	2798	0,06967
25.9.10	200	193,0	2764	0,06983
26.9.10	199	192,0	2733	0,07027
27.9.10				
28.9.10				
29.9.10				
30.9.10				
Mois	4242,0	4093,5	57879,0	**0.0707**

Consommation spécifique mazout de la chaudière n°5 (Mazout,t/Vapeur,t)

Файл Правка Вид Вставка Формат Сервис Данные Окно Справка

Q38 0.0707

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
37	31.7.10	206	198,8	2764	0,0719		31.8.10										
38	Mois	6555,0	6325,6	87674,0	0.0747		Mois	4957,0	4783,5	64888,0	0.0737		Mois	4242,0	4093,5	57879,0	0.0707



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Juillet	0,072	0,072	0,072	0,072	0,071	0,071	0,072	0,071	0,072	0,071	0,072	0,072	0,071	0,071	0,072	0,072	0,072	0,072	0,072	0,072	0,072	0,071	0,072	0,072	0,072	0,072	0,071	0,072	0,072	0,072	0,071
Août	0,072	0,072	0,072	0,072	0,073	0,073	0,072	0,074	0,077	0,074	0,074	0,074	0,073	0,073	0,073	0,076	0,074	0,074	0,073	0,073	0,072	0,073	0,073	0,073							
Sept.	0	0,080	0,069	0,070	0,070	0,072	0,070	0,070	0,070	0,07	0,069	0,070	0,070	0,070	0,070	0,072	0,071	0	0	0	0	0,073	0,069	0,069	0,069	0,070					

Feuil1 Feuil2 Feuil3

part from the first report - (4 okt 2010)

**“After the test of Your homogenizers I do now understand that all statements in the internet about 10% fuel savings is a fairy tale for fools 10% is such a big quantity to save that can be either a miracle or a change calorific value of fuel (a major component
fuel which affects its flow)**

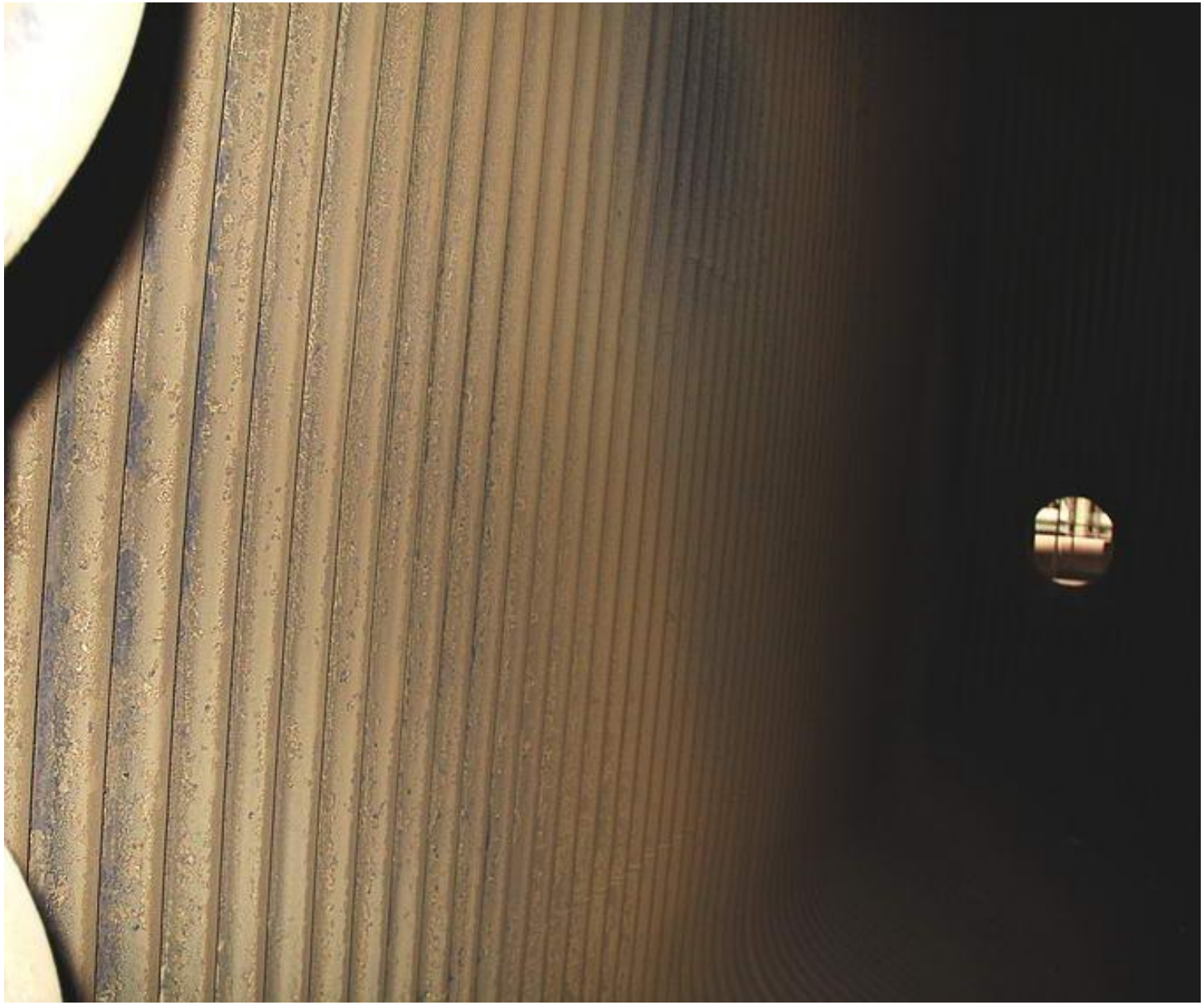
Today, I examined the boiler and inspected heating surface and I must tell you that TRGA works very well. All that we planned get from this unit we got. It allowed us to achieve fuel savings within 3% and this is firstly a fairly large value economy, and it actually achieved.

Really we get reduced contamination of heating surfaces boiler:
- the screens of firing almost completely clean;
- no deposits of soot in the convective mine are no deposits of soot, and in a tubular evaporator preheater.
There is the deposits soot in air heater, but in 10 times smaller and it is only in stagnant zones. And the tubes for flue gas are absolutely clean”

The surface of heat exchanger (inside the boiler) after 30 days work with the fuel homogenizer TRGA

The surface of heat exchanger (inside the boiler) after 30 days work with the fuel homogenizer TRGA

The surface of heat exchanger (inside the boiler) after 30 days work with the fuel homogenizer TRGA

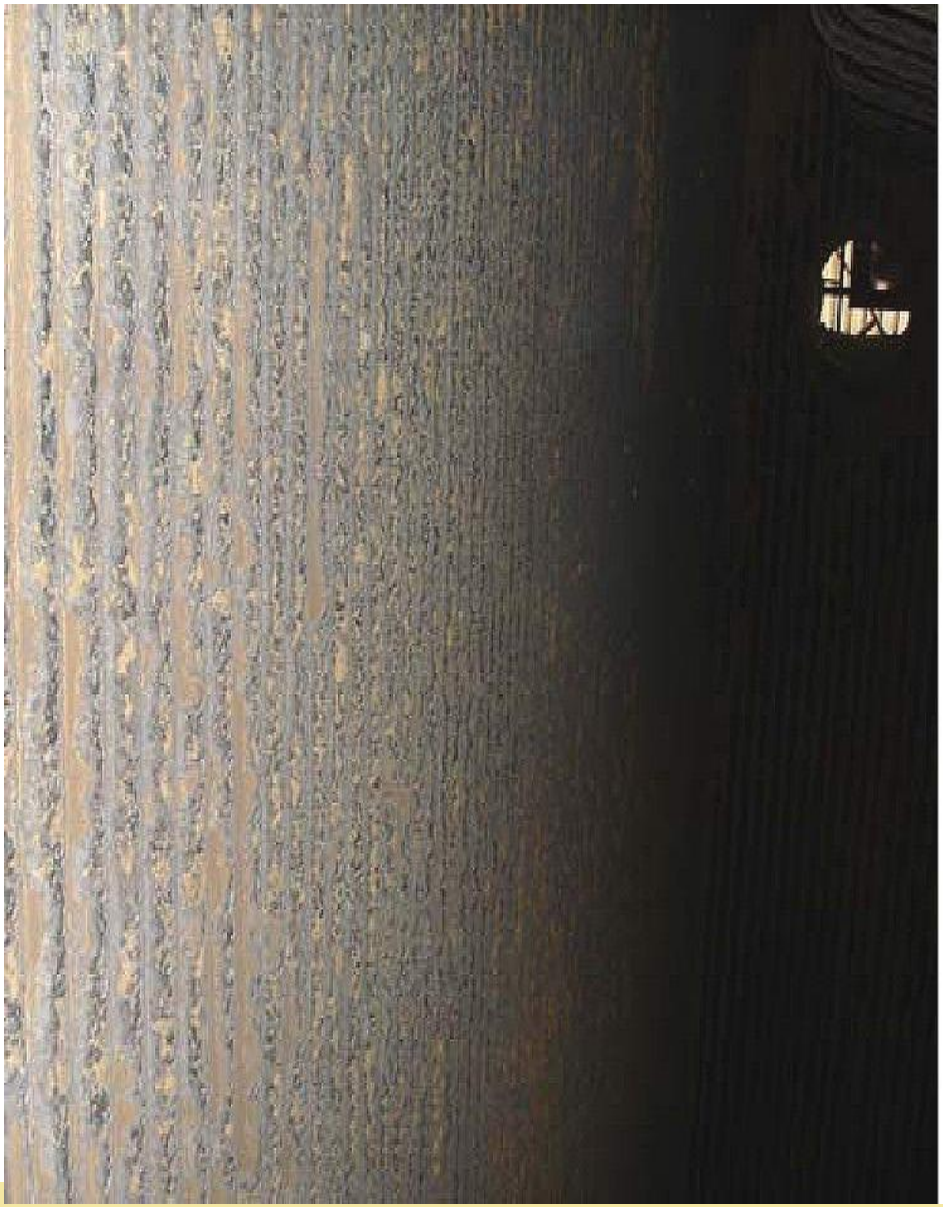


it seems that on the heat exchanger surface was burn all the sulfur.

Since there are no traces of sulfur compounds in the boiler

Previously, all surfaces were covered with yellow-green patina.

difference - heat exchanger surface without and with TRGA



The resume

Total difference of two last tables 0.0737-0.0707 = 3 kg = 4.07 %.
This figure above a possible mistake of measurements that is illustrated by schedules of measurements.
(The specific charge of black oil (kg) on 1 ton of steam)

For commercial accounts - madness of this figure is necessary to reducing : on 1 %, on mistakes, discrepancies and not linearity of work of system

We accept confidently economy of fuel at a level of 3 %,
Every day on this boiler burn about 200 tons of black oil
So the minimal economy of fuel :
= In day = 6 tons of black oil
= In a month = 180 tons of black oil
= For 10 months (the minimal term of work of a boiler in a year) = 1 800 tons.

If the price of black oil is 400 dollars / ton – the economic effect, for one year of operation is 720 000 dollars.

If to use more viscous black oil the economy will tend to increase.

next example: Work 2 identical boilers FOSTER WEELER type within 2 months. One with activator TRGA, other without one.
Fuel comes from a single tank. Fuel – black oil suspension with carbon powder
«In January, the specific consumption of fuel in the boiler without activator TRGA was 67.586 kg / t and the end of March already 74.139 kg / t. "»
Why? look at the photo below.


www.afuelsystems.com


www.afuelsystems.com


www.afuelsystems.com


www.afuelsystems.com

CERTIFIKAT

Notranja proizvodna preverjanja z nadzorom končne presoje skladna s členom 3.2 in Prilogo I (Modul A1) po Direktivi 97/23/ES

Internal manufacturing checks with monitoring of the final assessment in according to article 3.2 and Anex I, (Module A1) according to Directive 97/23/EC

Št. certifikata : IZV-PED-A1-06-810-11-01
Certificate No.:

Institut za varilstvo d.o.o. kot priglašen organ potrjuje ustreznost postopkov izvedenih s strani proizvajalca tlačnega sklopa, v obsegu določil priloge III, modul A1 in člena 3.2 direktive o tlačni opremi 97/23/ES. Proizvajalcu je odobreno označevanje tlačne opreme z našo identifikacijsko številko 2042, v okviru področja veljavnosti.

Institut za varilstvo, d.o.o. as a notified body confirms herewith the adequacy of the procedures carried out by the manufacturer of pressure equipment within the provisions of Annex III, ModuleA1 and article 3.2 Pressure Equipment Directive 97/23/EC. The manufacturer is authorized to provide his pressure equipment manufactured within the scope of the examination with our indentification number 2042

Proizvajalec : **BIMONT d.o.o., Senčna ulica 19, SI-6310 Izola,**
Manufacturer:

Naslov proizvodnega obrata : **BIMONT d.o.o., Senčna ulica 19, SI-6310 Izola,**
Production site :

Področje veljavnosti : **Tlačni cevovod TRGA-3G**
Scope of examination No.: **tip: -03, -04, -05, -08, -10, -15, -20, -50**

Št. načrta : **TRGA-3G - 03,04,05; TRGA-3G - 08,10; TRGA-3G - 15**
Drawing No.: **TRGA-3G - 20; TRGA-3G – 50**

Poročilo št.: **P1277-A1-06-810-1101**
Test report No.:

Odobritev velja pod pogojem, da se izvajajo nadzorne presoje, preskusi in verifikacije s strani Instituta za varilstvo d.o.o., glede na zahteve določene v medsebojni pogodbi

The approval is valid provided that surveillance audits, tests and verifications are performed by Institut za varilstvo d.o.o. in accordance with the requirements stated in the mutual contract.

notified body 2042 INSTITUT ZA VARILSTVO

Andrej Smonkar IWI-C
Priglašen organ za tlačno opremo št. 2042
Notified Body, No 2042

Ljubljana, 20.06.2011
Place, date.:

INSTITUT ZA VARILSTVO
Welding Institute

Institut za varilstvo d.o.o., Ptujska ulica 19, SI-1000 Ljubljana,
tel.:+386 1 280 94 00, fax:+386 1 280 94 22, www.i-var.si
Obr. Št. / Form Nr. DP-500/06

notified body

3.2.6

РЕГІСТР СУДНОПЛАВСТВА УКРАЇНИ
SHIPPING REGISTER OF UKRAINE

№ СВД-107-3-13-11

ДОБРОВІЛЬНА СЕРТИФІКАЦІЯ
FACULTATIVE CERTIFICATION

СВІДОЦТВО ПРО ВІДПОВІДНОСТЬ
CERTIFICATE OF CONFORMANCE

Виготовлювач ПП Рубан А.В.
Manufactures PE Ruban A.V.

Адреса Україна, м. Черкаси, вул. Гоголя 405
Address Ukraine, s.Cherkasy, Gogolya str., 405

Виріб (назва, марка) TRGA-3A-04
Product (name, model) TRGA-3A-04

Тип (~~серійний номер*~~) гомогенізатор
Type (~~serial number*~~) homogenizer

Заявник (назва, адреса) ПП Рубан А.В., Україна, м. Черкаси, вул. Гоголя 405
Declarant (name, address) PE Ruban A.V., Ukraine, s.Cherkasy, Gogolya str., 405

Місце встановлення (назва, ~~адреса~~)* ГП Маріупольський МТП
Seating (name, ~~address~~)* port Mariupol

Акт огляду № 107-3 -329-10 від 21.12.2010 р.
Supervision Report No. dated on

На підставі огляду і проведених випробувань посвідчується, що вищезгаданий виріб задовольняє вимогам:
This is to certify that on the basis of the survey and tests carried out the above mentioned product complies with:

Глави 13 ч. XIII Правил класифікації та будівництва морських суден.
Requirement of 13 part VIII Rules for Classification and Construction of Sea-Going Ships

Галузь застосування / ~~обмеження~~* здобуття паливної емульсії для суднових котельних, дизельних установок і установок турбінного типа
Application / ~~Limitations~~* receipt of fuel emulsion for ship boiler rooms, diesel settings and settings of turbine type

* Непотрібне закреслити / Delete as appropriate

Republic Ukraine
master of engineering

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