Stream Tracer™ – Energy-Efficient Operation of Oil Wells

June 2020

Difficulties with Oil Wells

Resources

Heavy crude oil

790 billion tons – **1** trillion tons

Low and medium viscosity oil

5-6 times less

Problems

- **30%** of oil wells have complications
- **40%** of these problems are paraffin-wax and asphaltene precipitates inside tubing, production string and flow lines

$150 000

Causes of Oil Production Difficulties

- Shorter repair intervals
- Increased workload during well repairs
- Well downtime – reduced production
- Reduced service life of expensive equipment
- Increased costs for managing complications

Deterioration of the well's economic performance

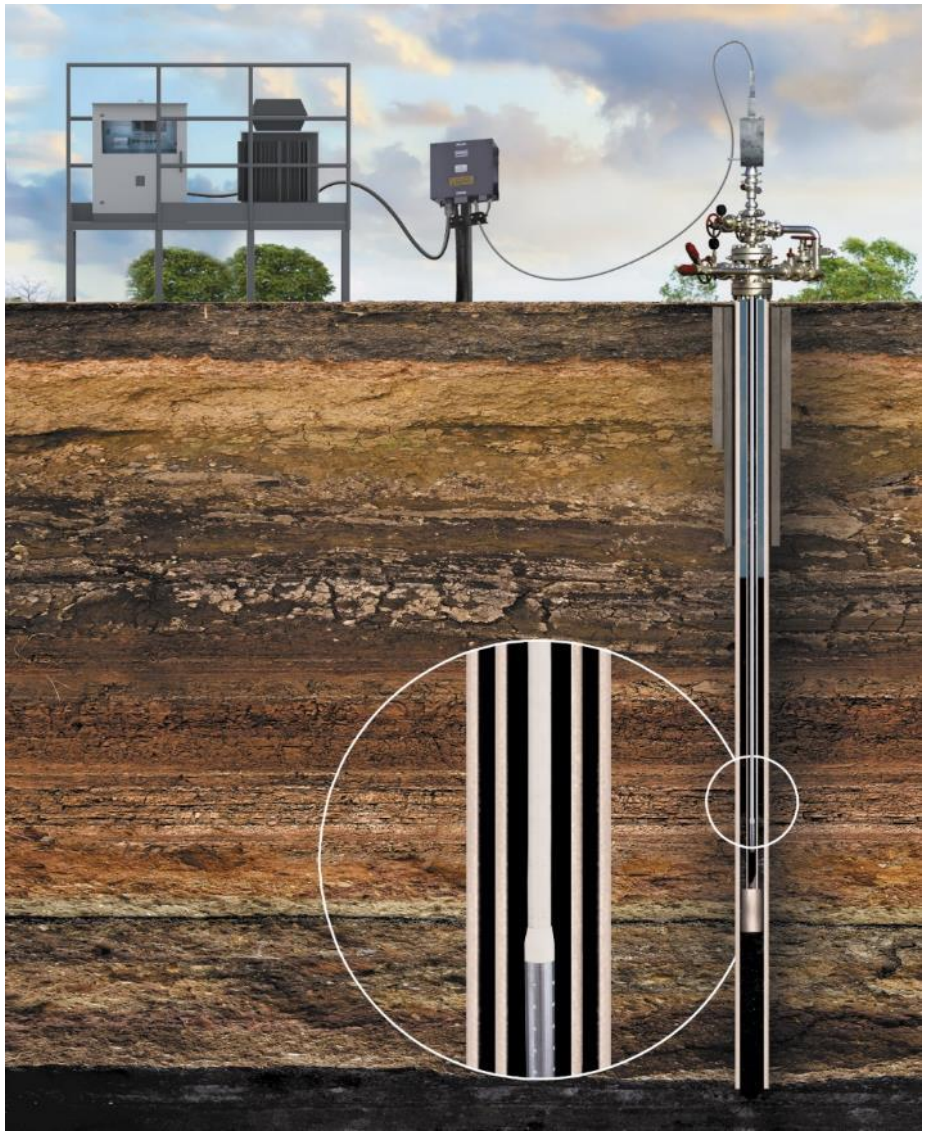
Innovative Solution – Stream Tracer™

In 2015 SST Group developed **Stream Tracer™** — an integrated solution for preventing wax deposition in oil wells.

We designed a smart heater with zones of high and low power to adjust the power output along the depth of the well to compensate the heat loss of the fluid in the precise zones, where it is required.

INTERNATIONAL PATENT

Distributed induction-resistive heater is the main element of the system

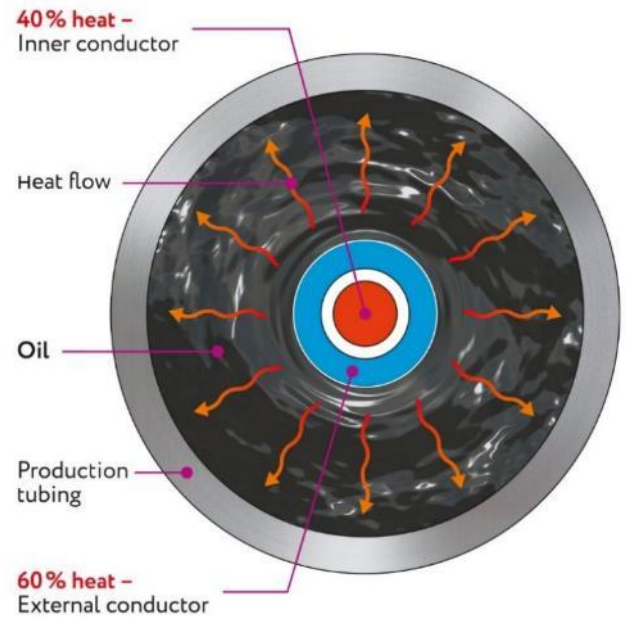


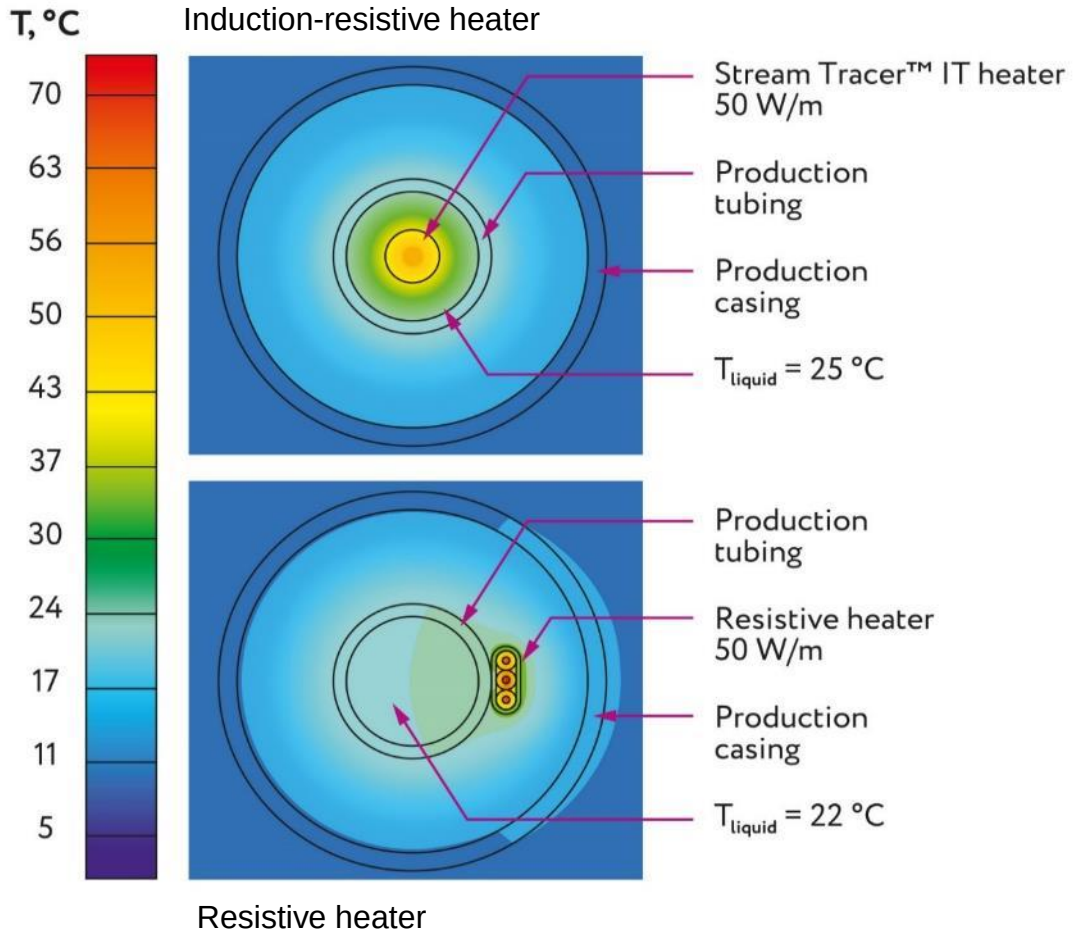
Innovative Solution – Stream Tracer™

Advantages:

- Improved heat distribution
- Absence of overheating zones
- Reduced heat load
- Increased service life

Cross section of oil well tubing with a heater placed inside

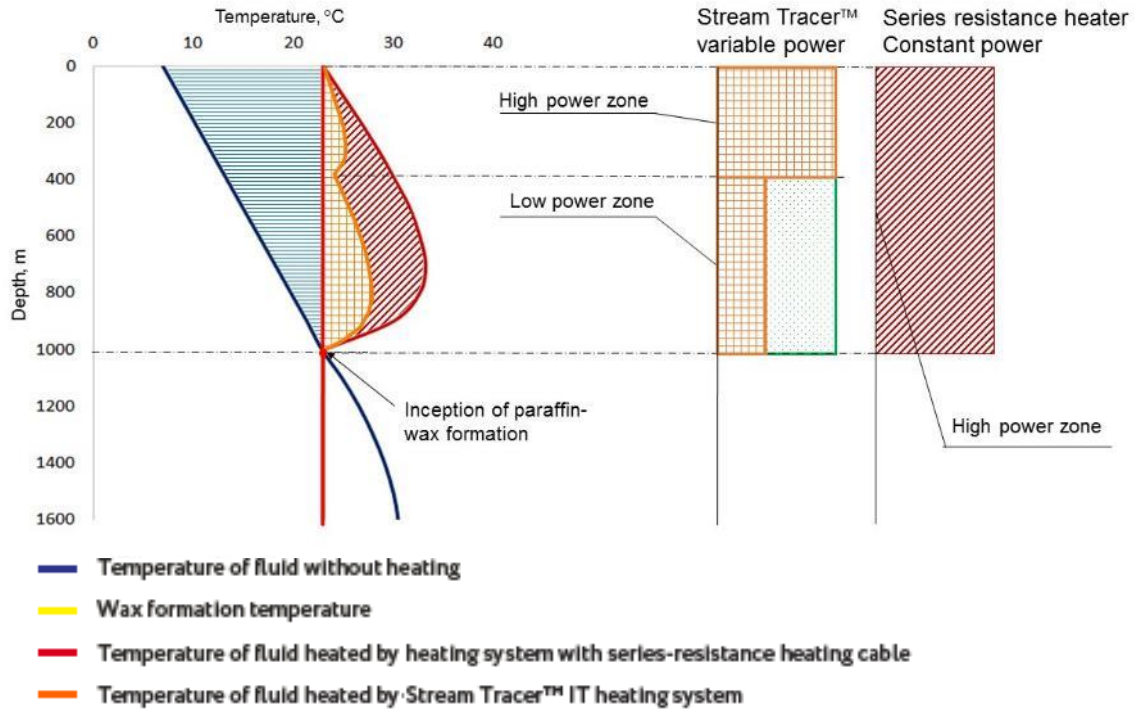




Technological Advantages of Stream Tracer™

High and low power zones allow to:

- optimize the heat distribution under the conditions of a particular well;
- choose the optimal cable length;
- reduce the level of fluid overheating;
- improve viscosity of the extracted liquid.



Energy consumption reduced by up to 50%*

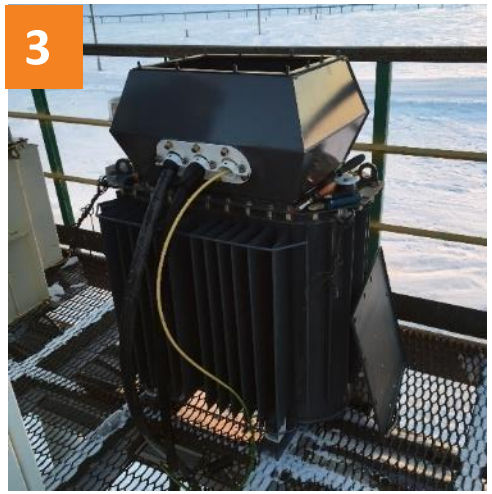
*compared to power consumption of systems based on series-resistance heating cables

Stream Tracer™ Components

The system contains:

1. Distributed induction-resistive heater
2. Power and control system
3. Special transformer
4. Related equipment: heater suspension and locking system, temperature sensors, junction box, etc.
5. Optional: special winch, sheaves

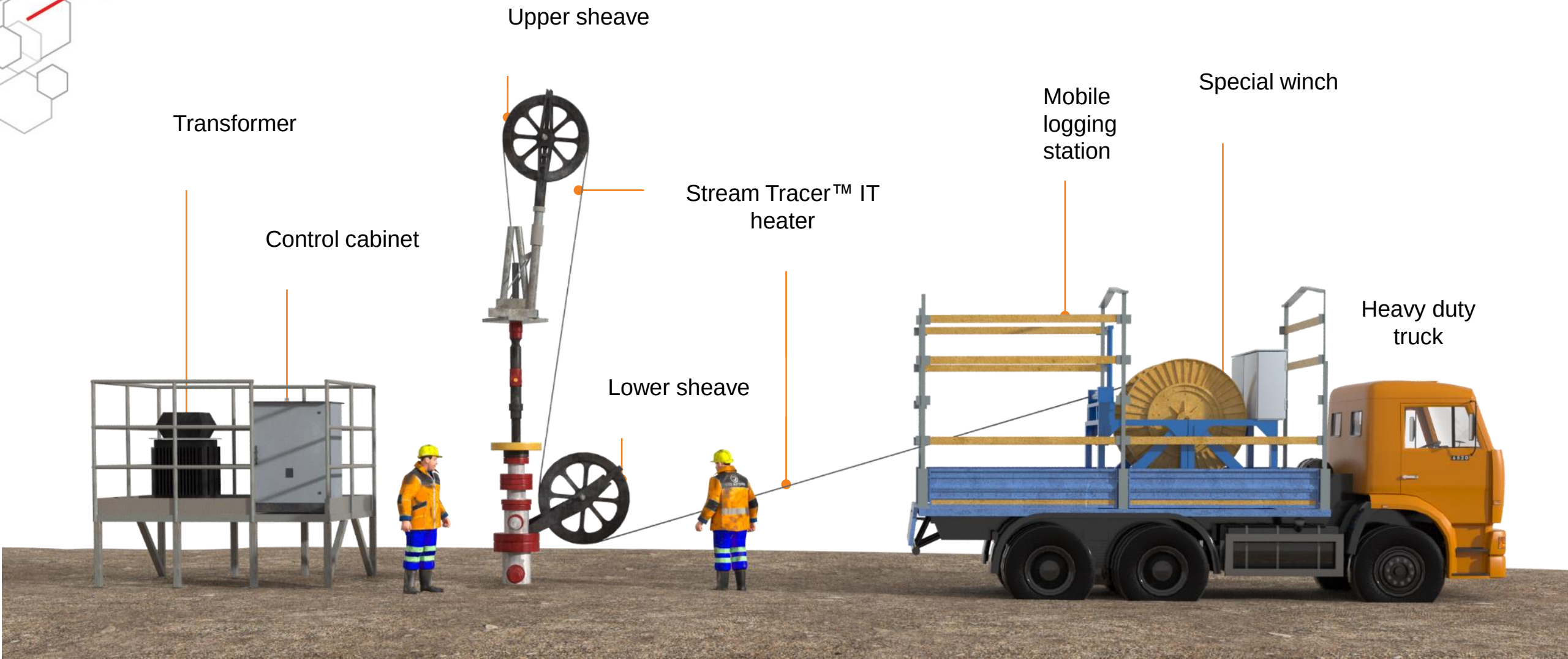
Complete set of components ready for installation



Installation and Commissioning

- We perform all the installation works ourselves – no need for an installers team on the customer's side
- Minimum installation time
- Commissioning by a highly qualified team
- In-house service
- Support of well commissioning
- Training of personnel to work with the electric heating system

Functional Diagram of Equipment Placement During Stream Tracer™ System Installation



Stream Tracer™ Performance Field Tests in LUKOIL-Perm

Oil well parameters:

- liquid flow rate: 14.1 cubic meter / day
- oil flow rate: 8.4 tons / day
- volume of produced gas: 113.9 cubic meter / day
- dynamic level: 872 meter
- wellhead pressure: 3.3 kg / square centimeter

Results:

- increase in the temperature of the extracted liquid from 7°C to +22.5 °C (at the mouth);
- reduced energy consumption by 47% compared to constant power cable heating systems;
- no well work stoppages due to the formation of asphaltene precipitates.

Economic Performance Indicators

ЛУКОЙЛ-ПЕРМЬ

УТВЕРЖДАЮ:
Первый заместитель Генерального директора –
Главный инженер ООО «ЛУКОЙЛ-ПЕРМЬ»
_____ И.И. Мазеин
«7» 09 2016 г.

АКТ ОБ ОКОНЧАНИИ ОПЫТНО-ПРОМЫШЛЕННЫХ ИСПЫТАНИЙ
Комплектной Установки Индуктивно-Резистивного Электрообогрева Промысловой (КУИРЭП)
На Казаковском нефтяном месторождении

Место проведения испытаний:
ООО «ЛУКОЙЛ-ПЕРМЬ», ЦДНГ-1, Казаковское месторождение

Время проведения испытаний согласно утвержденной программы:
Февраль-август 2016года

Объект испытаний:
КУИРЭП предназначена для управления нагревом и защиты нагревательного кабеля, расположенного в лифтовых трубах (НКТ) нефтяных и газовых скважин с применением энергоэффективных технологий в конструкции нагревательного элемента.
Состав объектов испытаний:
Объект: (Скважина № 426, куст 7);
Станция управления: ШУ-07574-0001;
Силовой трансформатор: ОМПНГ-66/0,4-УХЛ 1, 0,4/0,4 кВ, 1/1-0;
Нагревательный кабель: ИРКГ-45/30-300-700-20, длина 1020 метров;
Шлюз Устьевой Кабельный: ШУК-60-900

Цель проведения испытаний:
Определение функциональных возможностей КУИРЭП при эксплуатации нефтяных

Ток (I) - 140 А,
Напряжение (U) - 280 В,
Температура 1 (устье) - +7 С
Температура 2 (кабель) - +70 С,

Режимные параметры работы скважины:
Скважина эксплуатируется механизированным способом, ЭОВНБ5-30, НКТ 73мм-1500м.
Температура насыщения парафинами скважинной жидкости подтверждена лабораторными анализами и составляет –20,5 С.

The payback period of the system is 6-8 months

ЛУКОЙЛ-ПЕРМЬ

Выводы по результатам испытаний:

Параметр эффективности по программе ОПИ	Результат
Отсутствие отказов оборудования в срок проведения ОПИ, по причинам, связанным с конструктивной недоработкой оборудования	выполнено
Отсутствие отказов по причинам гидратообразования, выпадения АСПО на поверхности ГНО	выполнено
100% отказ от проведения регламентных работ	выполнено
Работоспособность оборудования в течение срока испытания, отсутствие сбоев в работе линии и станции управления, устьевого оборудования	выполнено
Обеспечение контроля параметров работы	выполнено
Экономия энергозатрат не менее 20% в сравнении с аналогичными установками электрообогрева: фактически составила (по сравнению с установкой-аналогом) 47%	Средневзвешенное/среднесуточное потребление электроэнергии – 23,83 кВт/ 572 кВт*ч. (скважина № 426 с установкой КУИРЭП)
	Средневзвешенное/среднесуточное потребление электроэнергии – 44,38 кВт/ 1076 кВт*ч. (скважина № 603 с установкой Энергия-1: аналог)

Заместитель начальника Управления добычи нефти и газа – начальник отдела добычи нефти — Жуланов А.В.
Ведущий инженер отдела добычи нефти — Красноборов Д.Н.
Заместитель начальника ЦДНГ №1 — Ягодкин В.М.
Технолог по регламентным работам ЦДНГ №1 — Змеев С.Н.
Главный инженер ООО «Электрообогревстрой» — А.М. Дикун

Energy savings in comparison with similar electric heating installations amounted to 47%

Stream Tracer™ Performance Field Tests in JC RUSVIETPETRO

Before using Stream Tracer™

Well number/parameter	№1	№2	№3	№4
The temperature of the fluid at the wellhead, °C	7	15	10	27,5
Paraffin content, %	6,4	8,9	8	5
Liquid flow rate, m3/day	44	92	25	61
Oil flow rate, m3 / day	43,8	50,6	24,5	18,3
ARPDs	scrapers, technical water			
Dynamic level, m	204	1211	2173	1932
Gas factor, m3 / t	48	48	50	38

After using Stream Tracer™

Well number/parameter	№1	№2	№3	№4
The temperature of the fluid at the wellhead, °C	35,7	41	40,9	39
Heater power, kW	51,5	27,9	69,7	44,6
ARPDs	no	no	no	no

Results:

- increasing the temperature of the fluid at the mouth;
- no failures of deep pumping equipment due to the formation of asphaltene precipitates;
- exclusion of routine work on dewaxing wells.

Stream Tracer™: Business Benefits

- Production costs reduced by 50%
- Fewer emergency repairs
- Reduced equipment downtime
- Better field performance
- Quick and easy implementation
- Eco-friendly
- Automatic operation
- Easily transportable

Stable and trouble-free operation of the well without asphaltene precipitates

Next Steps

To get a technical and commercial offer, please, fill out the questionnaire for your well

You can ask any questions about **Stream Tracer™**, get advice on design, delivery and installation or send a request by form:
https://stream-tracer.com/contacts

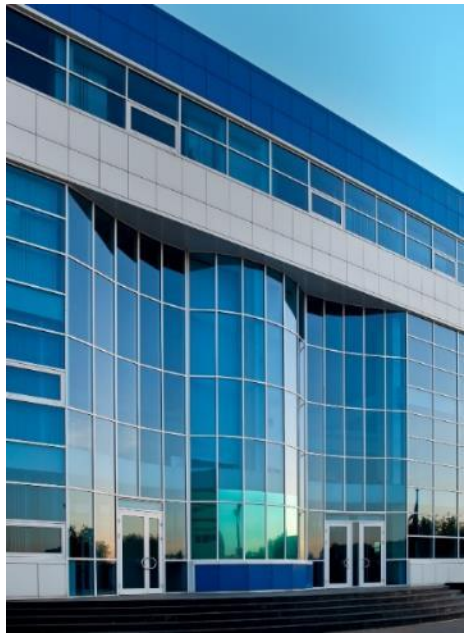
Our office in Switzerland: Rue Galilée 6 1400 Yverdon-les-Bains

You can read about the product, download the brochure, or leave a request by clicking on the links :
https://stream-tracer.com/documents/

About Us

SST Group is a leading engineering company that specializes in the design, supply and installation of complex solutions in the field of electric cable heating, thermal insulation and electrical engineering:

- TOP-3 global manufacturer of electric heating systems*
- Full production cycle of self-regulating cables, control cabinets, industrial automation, electronic equipment
- Own production of all types of electric heating cables
- One of the world's four manufacturers of induction electric heating systems for extended pipelines
- Global center of expertise with 30 years of experience in implementing international projects



*According to *Global Electric Heating Cable Industry Market Research Report, QYResearch 2019*

Year of foundation **1991**

1500 employees

4 plants in Moscow Region

45 000 $м^2$
production facilities

13 800 000
heating systems

1 500 000 км
heating cables

20 000
implemented projects of industrial and infrastucture heating

Advantages of Working with Us

1. Integrated engineering with a single point of responsibility
2. Production of all components of heat tracing systems
3. Own R&D-center and testing facility accredited by IEC/IEEE
4. Accreditation with world's major international EPC-contractors and operators
5. International certificates and international team of professionals

Our Clients


TOTAL


Petrofac


Technip


WorleyParsons
resources & energy


Dragon Oil


Mitsui Chemicals


ОТКРЫТОЕ АКЦИОНЕРНОЕ ОБЩЕСТВО
СНГ
СУРГУТНЕФТЕГАЗ


فوباك هورايزون
الفجيرة المحدودة
Vopak Horizon
Fujairah Limited


GAZPROM


ROSNEFT


LUKOIL
OIL COMPANY


TRANSNEFT


SIBUR


ERIELL


TNG


NOVATEK


TATNEFT


ALLIANCE
OIL COMPANY


ILIM


ALROSA

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