ENMAX®
Technology (Shanghai) Company, Ltd.
恩曼技术（上海）有限公司

Corrosion
Prevention&
Removal
Systems

ENMAX CPRS® SYSTEMS

Best Solution to Paraffin, Scale and Corrosion Problems…

Enmax Technology (Shanghai) Company, Ltd

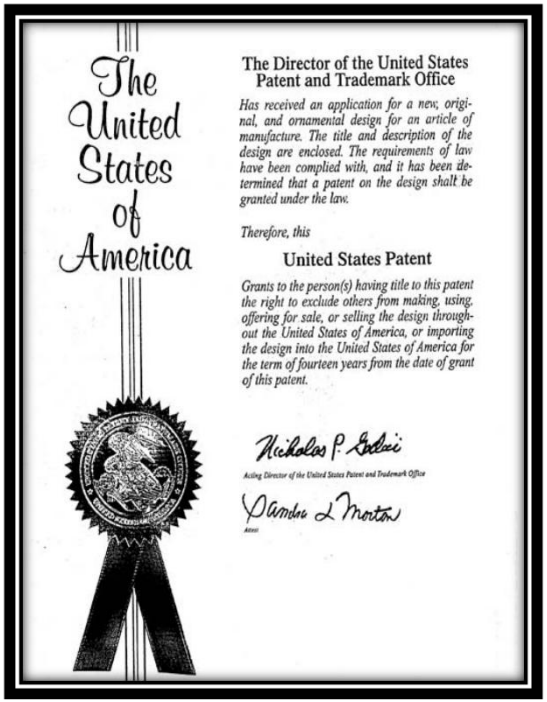
- Based in Waigaoqiao Free Trade Zone, Pudong, Shanghai, China
- ISO9001:2008 certified
- Five Categories and a completed series of CPRS products

- Mainly dedicated for oilfield services, since the company start till now, to find a best solution for Paraffin, asphaltene in oil production, scale and corrosion in production water and injection water systems

What is CPRS®?

- Enmax CPRS, Corrosion Prevention and Removal Systems, is the state of art solution to Paraffin, Asphaltenes, Scale, and Corrosion
- The systems design, material composition and metallurgical processing have been patented and proven in the USA, Canada, Mexico , China and other countries in preventing and removing Corrosion, Scale, Paraffin, Asphaltenes

Patented Product/USA Patents



The United States of America

The Director of the United States Patent and Trademark Office

Has received an application for a new, original, and ornamental design for an article of manufacture. The title and description of the design are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the design shall be granted under the law.

Therefore, this

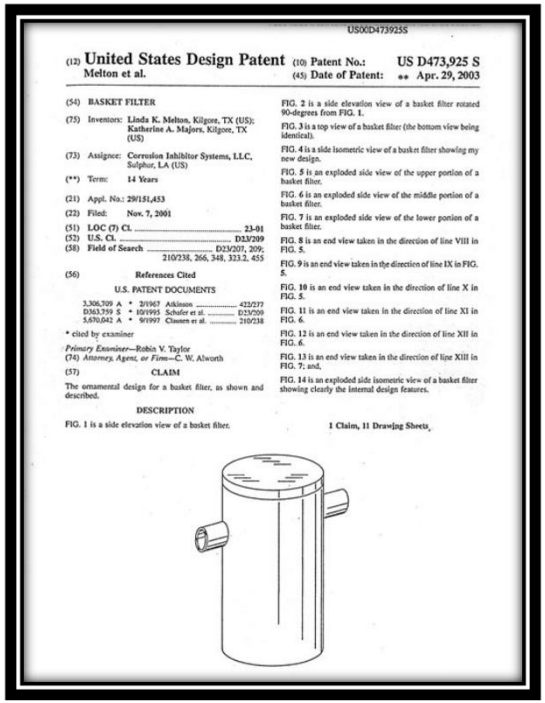
United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the design throughout the United States of America, or importing the design into the United States of America for the term of fourteen years from the date of grant of this patent.

Nicholas P. Godici

Acting Director of the United States Patent and Trademark Office

Attest



US0D473925S

(12) **United States Design Patent** (10) Patent No.: US D473,925 S
Melton et al. (45) Date of Patent: ** Apr. 29, 2003

(54) BASKET FILTER

(75) Inventors: Linda K. Melton, Kilgore, TX (US); Katherine A. Majors, Kilgore, TX (US)

(73) Assignee: Corrosion Inhibitor Systems, LLC, Sulphur, LA (US)

(**) Term: 14 Years

(21) Appl. No.: 29/151,453

(22) Filed: Nov. 7, 2001

(51) LOC (7) Cl. 23-01

(52) U.S. Cl. D23/209

(58) Field of Search D23/207, 209; 210/238, 266, 348, 323.2, 455

(56) References Cited

U.S. PATENT DOCUMENTS

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D363,759 S * 10/1995 Schafer et al. D23/209
5,670,042 A * 9/1997 Clausen et al. 210/238

* cited by examiner

Primary Examiner—Robin V. Taylor
(74) *Attorney, Agent, or Firm*—C. W. Alworth

(57) CLAIM

The ornamental design for a basket filter, as shown and described.

DESCRIPTION

FIG. 1 is a side elevation view of a basket filter.

FIG. 2 is a side elevation view of a basket filter rotated 90-degrees from FIG. 1.

FIG. 3 is a top view of a basket filter (the bottom view being identical).

FIG. 4 is a side isometric view of a basket filter showing my new design.

FIG. 5 is an exploded side view of the upper portion of a basket filter.

FIG. 6 is an exploded side view of the middle portion of a basket filter.

FIG. 7 is an exploded side view of the lower portion of a basket filter.

FIG. 8 is an end view taken in the direction of line VIII in FIG. 5.

FIG. 9 is an end view taken in the direction of line IX in FIG. 5.

FIG. 10 is an end view taken in the direction of line X in FIG. 5.

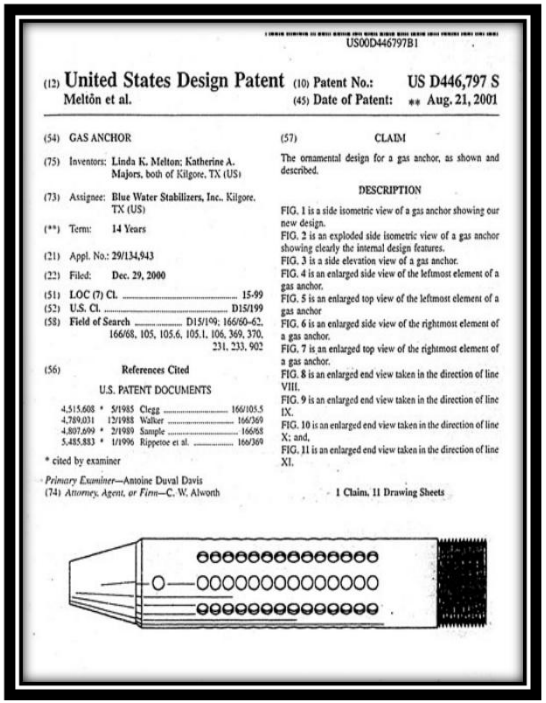
FIG. 11 is an end view taken in the direction of line XI in FIG. 6.

FIG. 12 is an end view taken in the direction of line XII in FIG. 6.

FIG. 13 is an end view taken in the direction of line XIII in FIG. 7; and,

FIG. 14 is an exploded side isometric view of a basket filter showing clearly the internal design features.

1 Claim, 11 Drawing Sheets



US0D446797B1

(12) **United States Design Patent** (10) Patent No.: US D446,797 S
Melton et al. (45) Date of Patent: ** Aug. 21, 2001

(54) GAS ANCHOR

(75) Inventors: Linda K. Melton; Katherine A. Majors, both of Kilgore, TX (US)

(73) Assignee: Blue Water Stabilizers, Inc., Kilgore, TX (US)

(**) Term: 14 Years

(21) Appl. No.: 29/134,943

(22) Filed: Dec. 29, 2000

(51) LOC (7) Cl. 15-99

(52) U.S. Cl. D15/199

(58) Field of Search D15/109; 166/60-62, 166/68, 105, 105.6, 105.1, 106, 369, 370, 231, 233, 902

(56) References Cited

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* cited by examiner

Primary Examiner—Antoine Duval Davis
(74) *Attorney, Agent, or Firm*—C. W. Alworth

(57) CLAIM

The ornamental design for a gas anchor, as shown and described.

DESCRIPTION

FIG. 1 is a side isometric view of a gas anchor showing our new design.

FIG. 2 is an exploded side isometric view of a gas anchor showing clearly the internal design features.

FIG. 3 is a side elevation view of a gas anchor.

FIG. 4 is an enlarged side view of the leftmost element of a gas anchor.

FIG. 5 is an enlarged top view of the leftmost element of a gas anchor

FIG. 6 is an enlarged side view of the rightmost element of a gas anchor.

FIG. 7 is an enlarged top view of the rightmost element of a gas anchor.

FIG. 8 is an enlarged end view taken in the direction of line VIII.

FIG. 9 is an enlarged end view taken in the direction of line IX.

FIG. 10 is an enlarged end view taken in the direction of line X; and,

FIG. 11 is an enlarged end view taken in the direction of line XI.

1 Claim, 11 Drawing Sheets

Patented Product/China

实用新型专利证书

实用新型专利证书

Registered Trade Mark

第 7324976 号

商标注册证

ENMAX

核定使用商品(第 11 类)

加热用锅炉；加热装置用锅炉管道（管）；热交换器（非机器部件）；蒸汽锅炉（非机器部件）；盲管（蒸馏、加热或冷却装置的部件）；加热泵；暖气锅炉给水设备；排水管道设备；进水装置（截止）

注 册 人 恩曼自动化技术（上海）有限公司

注册地址 上海市浦东新区外高桥保税区富特北路 288 号 2 号楼 4 层东 401 部位

注册有效期限 自公元 2010 年 11 月 28 日 至 2020 年 11 月 27

局长签发 李建昌

第 5601140 号

商标注册证

CPRS

核定服务项目(第 37 类)

清洗烟囱；锅炉清垢与修理；供暖设备的安装和修理；排灌设备的安装和修理；空调设备的安装与修理；车辆防锈处理；防锈（截止）

注 册 人 恩曼自动化技术(上海)有限公司

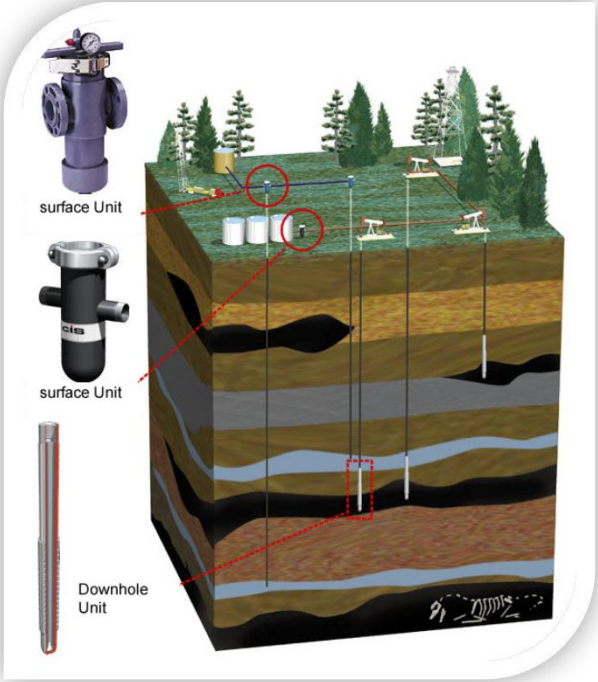
注册地址 上海市外高桥保税区富特北路 288 号 2 号楼 4 层东 401

注册有效期限 自公元 2009 年 12 月 14 日 至 2019 年 12 月 13

局长签发 李建昌

Field Proved and Well Recognized Products

Types and Functions



- COMPLETE SERIES
  - Downhole Units
  - Surface Units
- ONE TOOL, MULTI-FUNCTIONS
  - Paraffin, Asphaltenes, scale and corrosion Prevention
  - Paraffin, Asphaltene, scale and corrosion removal
  - CO2, H2S separation from the liquid
  - Bacteria, Algae removal and water quality improvement

CPRS® Downhole Units

- Bar Style : To be used for 2-3/8", 2-7/8", 3-1/2" production tubing, a 1.66" bar, with a flowrate of 90GPM
- Disk Style : To be used for 2-3/8", 2-7/8", 3-1/2", a string of 10 discs.
- Full flowrate processing of the wellbore liquid
- Housed with a short standard API production tubing joint.

CPRS® Surface Units

Canister Style

Inline Style with
Fixed Diameter

Inline Style with
Variable Diameter

CPRS® Surface Units

- Size Range: 1" to 24"
- Standard Pressure ratings: 2.5 MPa-25 MPa, higher pressure units can be built per the customer requests
- Housing Material: Carbon Steel, Stainless Steel, depending on the applications and customer requests
- The units will come with companion flanges, and bolts
- To be used for both oilfield production wells and water injection wells

How CPRS® works?

- The Enmax CPRS® is comprised of nine dissimilar metals such as Copper, Zinc and Nickel, etc., which forms a special catalyst when placed in contact with fluids
- The metals act as a special catalyst to enable a change in the electrostatic potential of the fluids, inhibiting the binding forces between particles in the fluids
- Suspending solids and inhibiting the formation of scales, paraffin, Asphaltenes and corrosion.
- The metals are non-sacrificing during the reaction process

Paraffin

- A white, odorless, tasteless, waxy solid, with a typical melting point between about 46 and 68 °C (115 and 154 °F)
- A mixture of hydrocarbon molecules containing between 20 and 40 carbon atoms.
- The hydrocarbon $C_{31}H_{64}$ is a typical component of paraffin
- A very useful material in daily life and industrial application

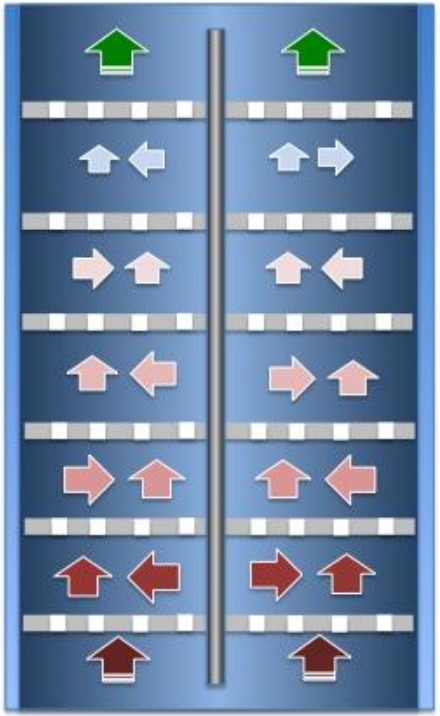
Paraffin

- Paraffin is a waxy material found in the majority of the world's crude oil.
- When the crude oil is in the formation and kept at formation temperatures, paraffin stays as a liquid and does not pose much problem.
- As the paraffin moves up along the wellbore with crude oil, temperature drops, the paraffin starts to solidify.
- Once paraffin starts to harden or fall out of suspension, it must be treated or considerable production decreases and other related problems will result.

Asphaltene

- Asphaltenes consist primarily of carbon, hydrogen, nitrogen, oxygen, and sulfur, as well as other chemical elements, a very complicated material
- Asphaltenes are are found in crude oil, along with resins, aromatic hydrocarbons, and saturates
- Asphaltenes are present within micelles in crude oil
- Once the protective micelle has been removed, asphaltenes will stick to each other, and build up on the tubing string or downhole equipment

CPRS, Paraffin and Asphaltene

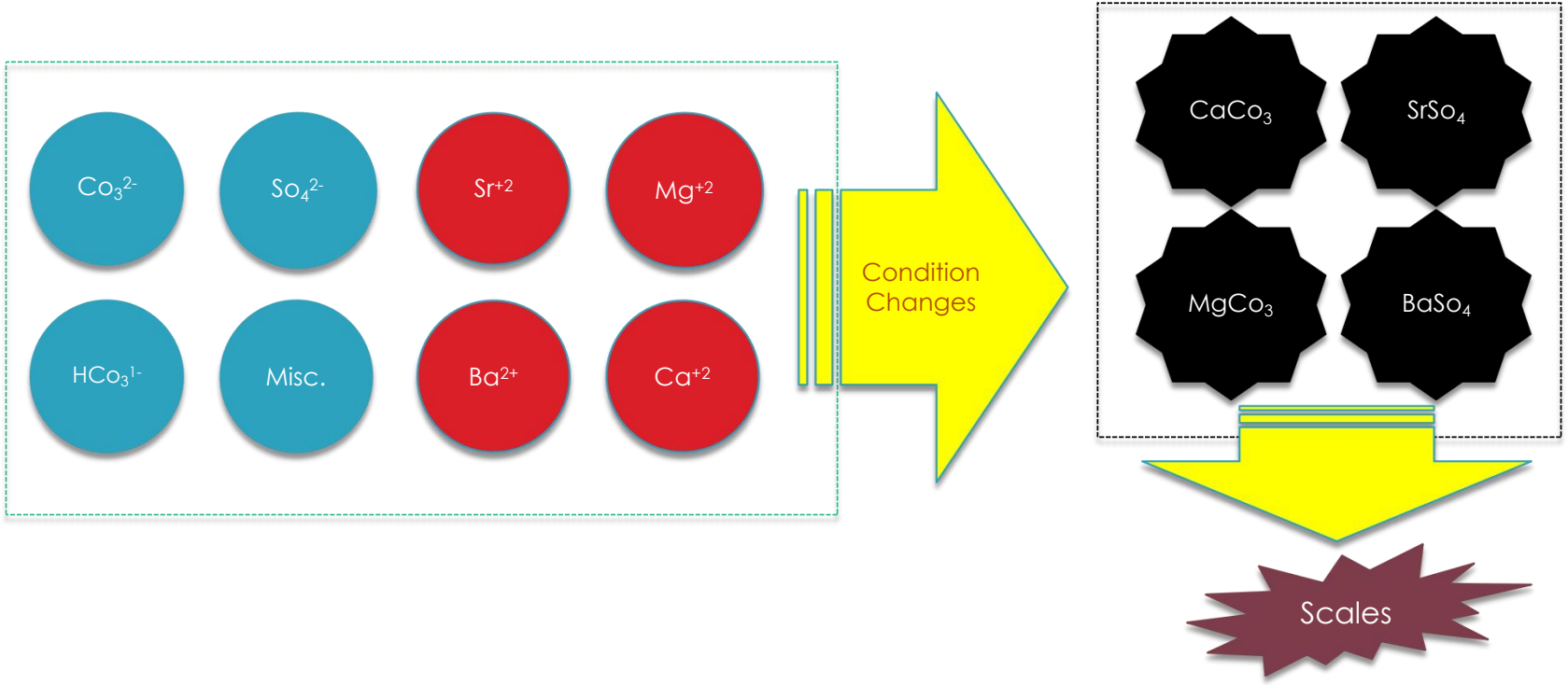


- During the well production, crude oil, together with paraffin, asphaltenes, and resins, etc. will pass through the CPRS disc holes by pressure, causing streams or jets of flow to bombard at the disc surfaces
- CPRS energy will keep the paraffin, asphaltenes, resins to maintain the original micelle stable condition or even more stable
- The whole treating process not only prevents the paraffin and asphaltene buildup, but also breaks up the long chain hydrocarbon molecules, making the oil "slicker".
- Field installations proved
  - Significant pour point reduction for cold climate production
  - Reduced viscosity of heavy oil and Increased fluid mobility
  - Improved well pressure without the use of heat, steam, drag reducers or chemicals

Oilfield Scales

- A mineral deposit deposited in the tubing string, the gravel pack, the perforations or the formation.
- Typical oilfield scales include calcium carbonate, calcium sulfate, barium sulfate, strontium sulfate, iron sulfide, iron oxides, iron carbonate, etc.
- Scale deposition occurs when water is disturbed by pressure and temperature changes, dissolved gases or incompatibility between mixing waters.
- Scale deposits are the most common and most troublesome damage problems in the oil field and can occur in both production and injection wells. Scale creates a significant restriction, or even a plug, in the production tubing.
- All waters used in well operations can be potential sources of scale, including water used in waterflood operations and filtrate from completion, workover or treating fluids.

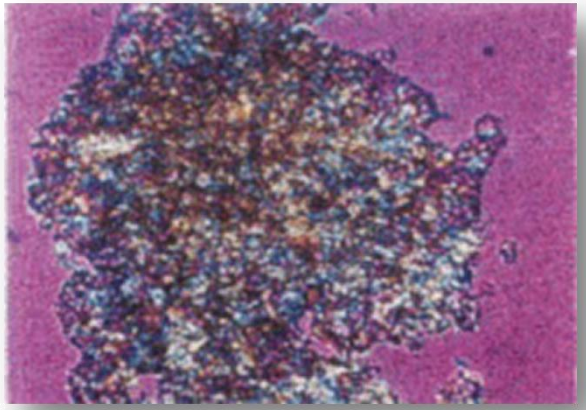
Oilfield Scales Forming and Deposition



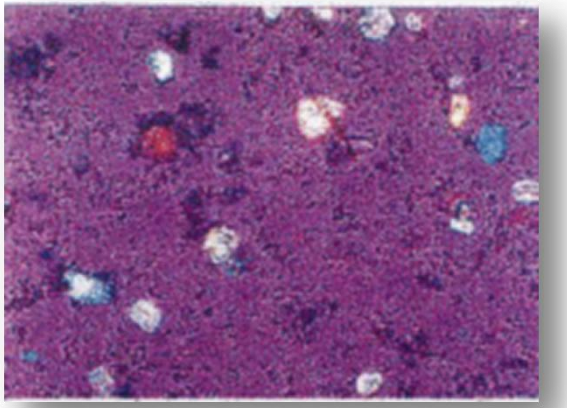
CPRS and Oilfield Scales

- When water flows through the CPRS discs and contact the disc surfaces
  - Water will be polarized, keep the metal ions and acid radicals as ion status and no chemical binding, no salt will be resulted in
  - The water will break down the structure of the existing deposited scales and flush it away

Microscopic Test of Water Sample



Treated Water



Untreated Water

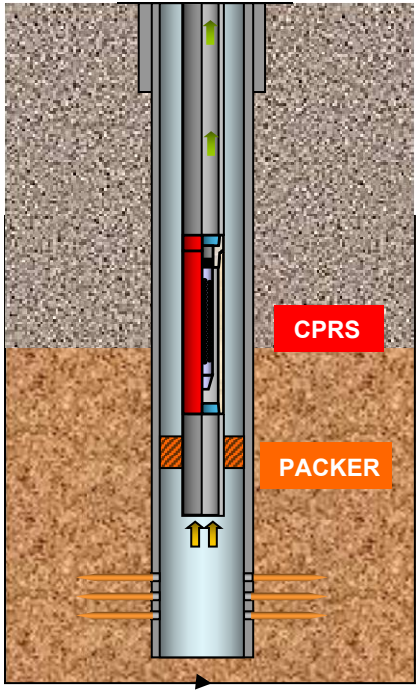
Why CPRS® Should Be Used?

- Prevention and removal of the buildup of paraffin, Scale and Corrosion
- Non-magnetic, non-electrical, and no chemicals required, environmental friendly
- Good for high pressure and temperature operations and not affected by magnetic fields and other factors
- Reduced downtime and replacement cost
- Reduced chemicals cost
- Reduced hot oil treatments
- Reduced bottom sludge setting in tank batteries
- Increased equipment efficiency and life
- Easy installation and almost maintenance free

Where Can CPRS® Be Used in the Oilfield?

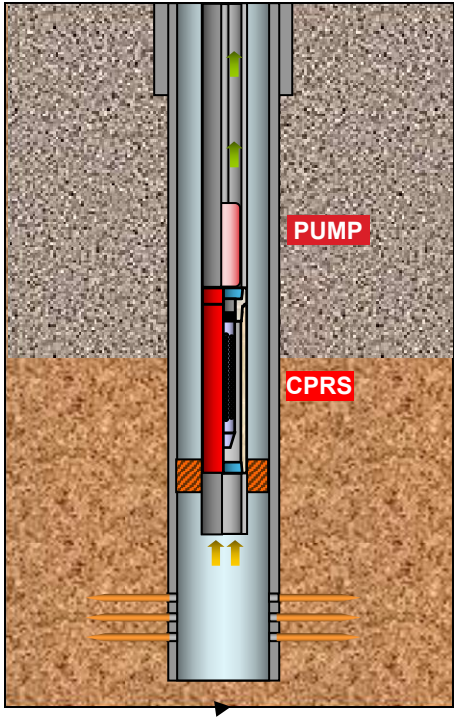
- DOWNHOLE APPLICATIONS
  - Flowing wells
  - Pumping wells
  - Gas lifting wells
  - Water injection wells
- SURFACE APPLICATIONS
  - Oil and natural gas production facilities
  - Crude oil and natural gas transportation lines
  - Water injection flow lines
  - Produced water treatment systems
  - Crude oil storage tanks

Applications @ Flowing Wells



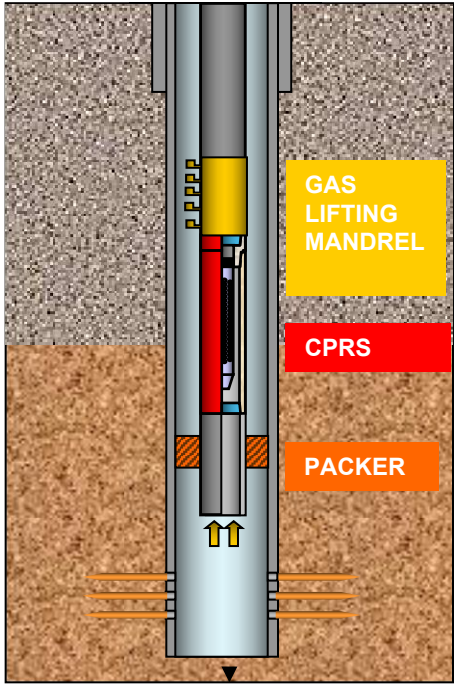
- To be installed at the bottom of the production string @ designed well depth
- The tubing joint style unit installation is the same way as making a single joint connection
- The bar style unit can be run in and out of the wellbore with wireline unit and to be positioned at the seating nipple inside the production string
- The crude oil will enter the CPRS unit first before going up to the surface
- CPRS downhole unit will prevent the new buildup of paraffin onto the surface of the production string and also the wellhead facilities
- CPRS downhole unit also will be able to remove the existing paraffin buildups if there is any

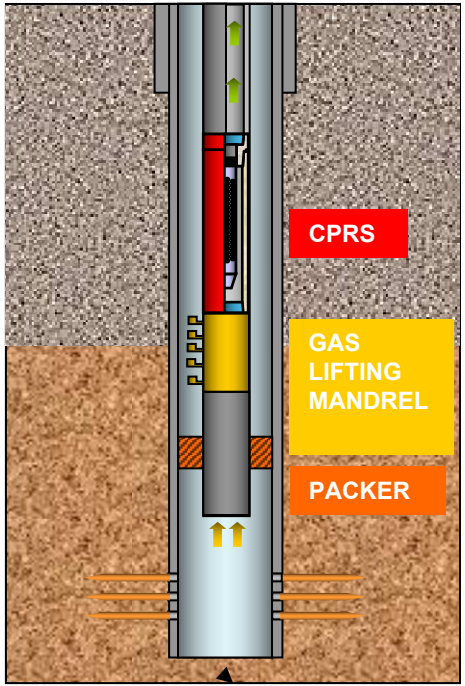
Applications @ Rod Pumping Wells



- It is recommended to be installed at the bottom of the pumping unit, a couple of joints below the pump, which can prevent any paraffin or scale buildups at the surface of the production string, also, inside the pump itself
- Tubing joint style unit is recommended for rod pumping wells, and the unit can be run in and out the well together with the pumping unit
- A couple of Chinese downhole pump suppliers, working with Enmax Shanghai, employed CPRS downhole unit as an integral part of the pumps and marketed them as “Scale Free” or “Paraffin Free” pumps.

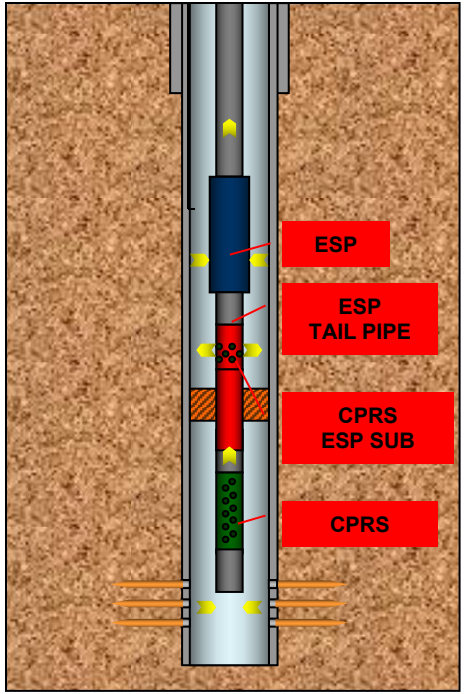
Applications @ Gas Lifting Wells





- CPRS downhole unit can be installed either at the top of gas lifting mandrel or at the bottom of the gas lifting mandrel depending on the production requirement
- Tubing joint style unit is to be recommended for gas lifting well installation

Applications @ ESP Wells



- CPRS downhole unit to be installed at the bottom of ESP pump unit, a couple of joints apart
- A ESP sub to be installed upper above CPRS unit and down the pumping unit
- Oil flows through CPRS unit and out of the ESP sub perforated holes, before entering into ESP

Applications @ Production Flowlines

PRODUCING WELL

CPRS SURFACE UNIT

SEPARATOR

Applications @ Production Battery

GAS

OIL TANK

WATER TANK

CPRS

OIL FLOWLINE

WATER FLOWLINE

Applications @ Water Injection

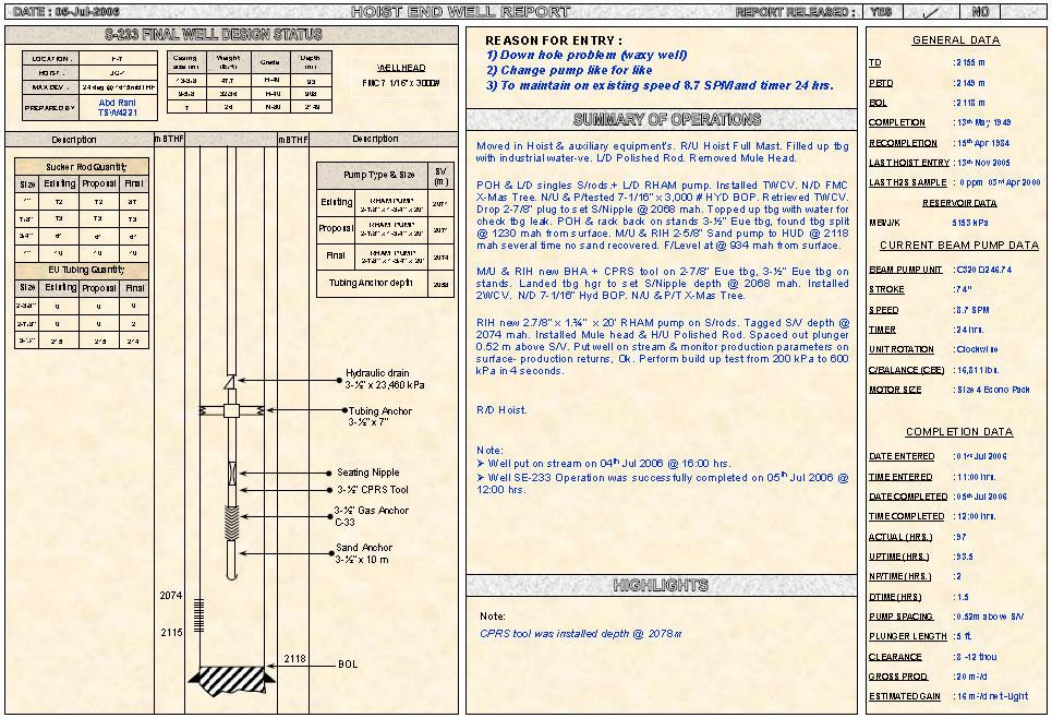
WATER SOURCE

CPRS

WATER
INJECTION PUMP

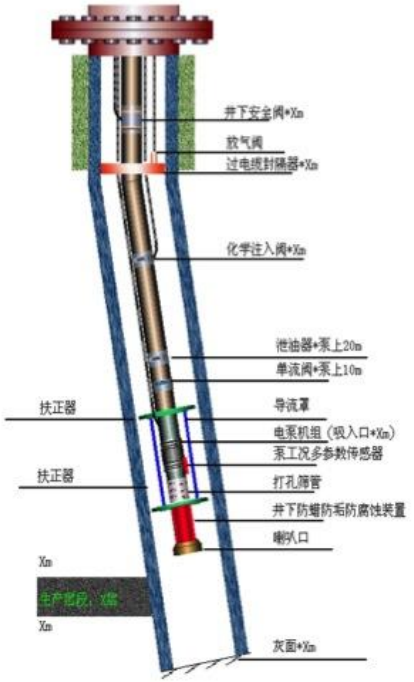
WATER
INJECTION WELL

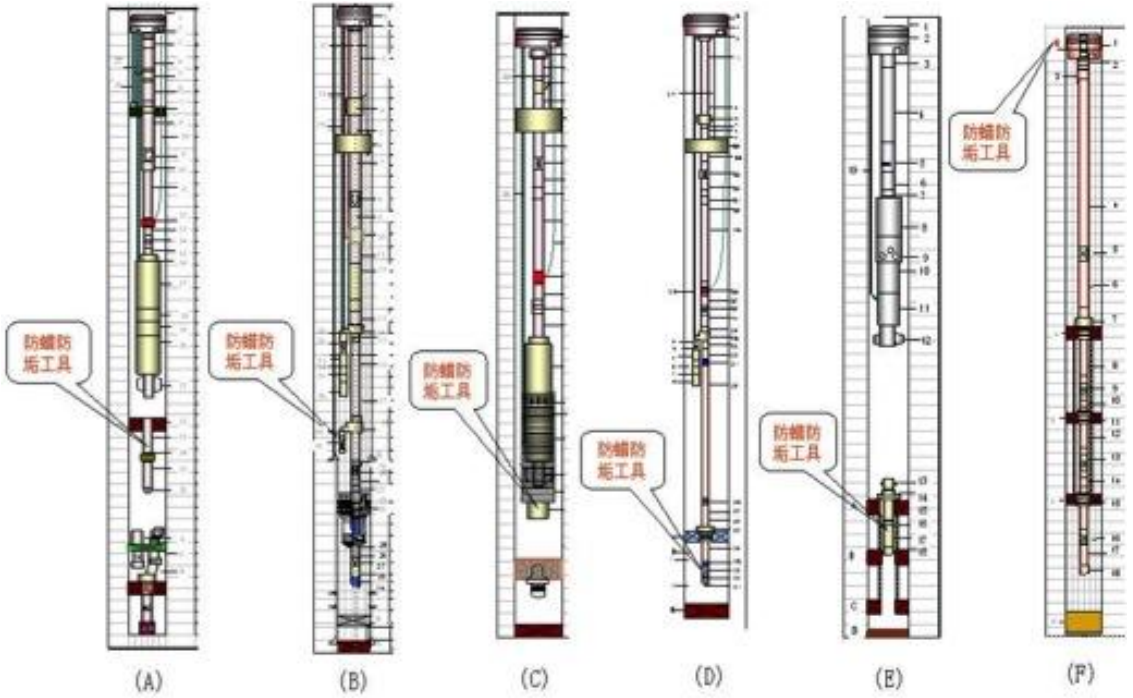
Applications @ Shell Brunei/Rod Pump Well



- Well S-233
- Well depth, 2118 Meters
- Suck Rod Pump
- Perforated from 2074-2115 Meters
- 3-1/2" EUE Production Tubing
- Installation for paraffin Prevention
- 3-1/2" CPRS depth@2078 Meters

Applications @ CNOOC & Jilin Oilfield/ESP Wells



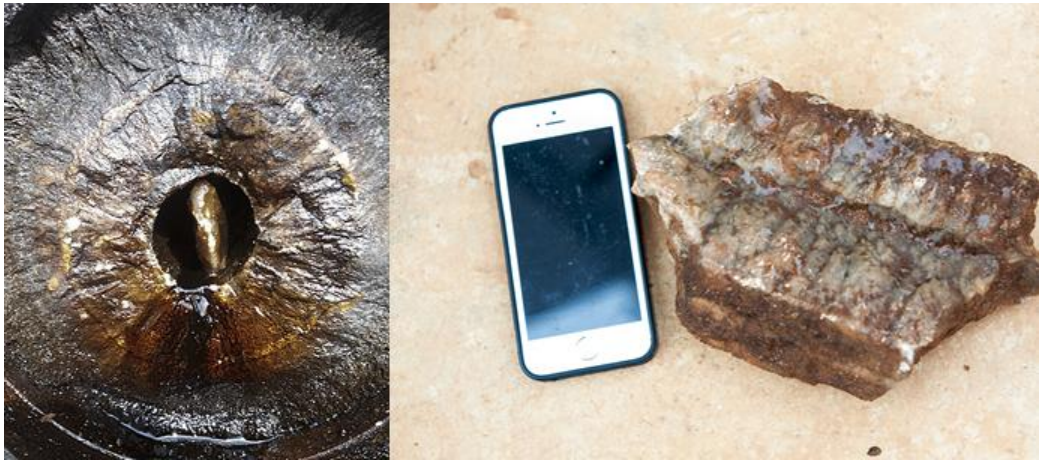


Applications @ A Typical Surface Unit Installation@ GNPOC

GNPOC NEEM OILFIELD

GNPOC NEEM OILFIELD IS LOCATED AT THE SOUTH BORDER OF THE REPUBLIC OF SUDAN, WHERE THE OIL PRODUCTION HAS BEEN BURDENED BY SERIOUS PARAFFIN AND SCALE PROBLEMS.

GNPOC NEEM OILFIELD



GNPOC WAS USING CHEMICALS TO INHIBIT THE SCALE AND PARAFFIN AND USING ACIDS TO CLEAN THE FLOWLINE AND OIL WELLS. IN SPITE OF THESE TREATMENTS, THE SCALE STILL PLUGS OFF THE FLOWLINE AFTER 2-3 MONTHS.

CPRS TO SOLVE THE PROBLEMS

- TWO 6”X8” ENMAX CPRS SURFACE UNITS WERE PURCHASED TO FIGHT THE SCALE AND PARAFFIN PROBLEMS.
- INSTALLATION OF CPRS SURFACE UNITS WAS STARTED ON MAY 20, 2014.
- A SHORT MEETING WAS AT THE WELL SITE WAS CALLED TO DISCUSS THE INSTALLATION.

SLECTION OF THE INSTALLATION POSITION

- THE CPRS SURFACE UNIT WAS LOCATED 2-3 METERS AWAY FROM THE CHRISTMAS TREE ON THE FLOWLINE IN FRONT OF THE CHEMICAL ADDING POINT.

PREPARATION BEFORE THE INSTALLATION

- MOVE THE CRUDE OIL TRANSPORTATION TRUCK AND FIRE FIGHTING TRUCK TO THE LOCATION (TO LOAD THE CRUDE OIL INSIDE THE FLOWLINE AND PREPARE FOR ANY FIRE SITUATION).

PREPARATION BEFORE THE INSTALLATION

- BLEED OFF ANY PRESSURED GAS INSIDE THE FLOWLINE.
- DRAIN ALL THE CRUDE OIL INSIDE THE FLOWLINE AND LOAD ONTO THE TRANSPORTATION TRUCK.

PREPARATION BEFORE THE INSTALLATION

AFTER THE INSTALLATION POSITION IS DECIDED, REMOVE THE INSULATION MATERIALS OUT OF FLOWLINE.

PREPARE THE CPRS SURFACE UNITS

FLOWLINE CUTTING

WELDING

A WELL DONE JOB, SO EASY!

Who are using CPRS® in Oil Industry?

GNPOC

PEMEX

ExxonMobil

How Well CPRS® Can do?

- 98% or so success ratio achieved during last 11 years among all the cases for paraffin, scale and corrosion prevention and removal
- Thousands of installations done in the oil fields, petrochemical plants, chemical plants, steel mills, electric power plants, and other industries
- Hundreds application case study reports from the customer supported
- Customers gave it a nick name "magic tool"
- Shell Expert called it ""A significant breakthrough in de-waxing operations"

Case #1: Shell Nigeria/Paraffin/Downhole CPRS

- Location: IMO River-59T, Nigeria
- Operator: Shell Oil Nigeria
- Before the installation:
  - The potential production rate: 4000 BOPD and serious paraffin problems
  - The production rate was less than1000BOPD
  - The well has not produced for more than 2 months at single stretch
  - A number of remedial actions were not successful
  - Traditional chemical treatment required a pump at wellhead and brought up disposal and environmental challenges

Case #1: Shell Nigeria/Paraffin/Downhole CPRS

We're winning the war on wax

pplication of cutting edge chnology in the business is continued with the ployment of a new de-axing system in Eastern erations which pushed up l production to high levels.

Silver Hawg, a wax inhibition tool s installed downhole in Imo River-T, where wax problems (deposits paraffins and other solids) stunted production at less than 1,000 bar-s of oil per day (bopd.) It freed up wax and enabled the well to rease production to 3,800bopd.

nior Production Technologist Chiji nwuzurike called it "a significant eakthrough in de-waxing opera-ns in our wells."

Like the average water pipe that ts clogged up with scales and bris, pipelines fall victim to solidi-ation which reduces and some-es completely blocks the flow of ds. The problem was particularly te at Imo River-59T, which since completion in 1999, had not pro-ced for more than two months at a gle stretch. The well had a poten-l of 4000 bopd at the time it was lled.

Chiji explained: "We examined and implemented a number of reme-dial actions which were marginally successful. The traditional treatment of wax using chemicals to disperse the paraffins will require installing a pump at the wellhead and the chemi-cals would bring up disposal and environmental challenges.

"Besides, the installed equipment left at the well head might be van-dalised or stolen."

The Silver Hawg option was most attractive in terms of simplicity and cost. An alloy composed of dissimilar metals, Silver Hawg stops the forma-tion of scale deposits by changing the physical properties of crude oil and preventing bonding.

It is installed downhole where the oil passes through it before getting to the flowline.

At Imo River-59T, Silver Hawg was deployed last November on a "no-cure no-pay basis", and a few days after, it proved its efficacy in de-waxing. The well produced for 90 days non-stop.

Chiji said: "To further help in the de-waxing operation, we had replaced the steel flowline with Glass Reinforced Epoxy (GRE); a special pipe that stops the internals of the pipeline from losing heat so that

We're waxing stronger in the war on wax: Chiji Onwuzurike

paraffin does not form."

This amount translates to over 50% in cost savings, when com-pared to the cost of procuring chemi-cals and equipment to de-wax wells conventionally.

The plan is to install the device in 15 wells where wax problems have hindered oil production.

- OBJ After the installation:
  - De-waxing efficacy was proved a few days after
  - The production rate increased to 3800BOPD
  - The well produced for 90 days non-stop
  - Over 50% in cost savings in comparison with traditional treatments
  - 15 systems were to installed after the success
  - Senior Production Technologist Mr. Chiji Onwuzurike call it "a significant breakthrough in de-waxing operations in our wells".

Case #2: CNOOC Bohai/Scale/Downhole CPRS

- Location: Well No.:SZ36-1-J10, SZ36-1Platform
- Operator: CNOOC Bohai Oil Company
- Before installation:
  - Production started on Dec. 14, 1997 with ESP. The oil production was stabilized above 100 m3/d after acidizing in 1998.
  - Since mid April, 2005, EPS failed frequently due to scale buildup
  - A magnetic scale tool was run into the well, but it did not work, failed in a short time, less than 3 months
  - It was concluded that such a frequent pump inspection and repair was mainly caused by the downhole scale buildup, which resulted pump failure and reduced production.

Case #2: CNOOC Bohai/Scale/Downhole CPRS

渤海石油采油工程技术服务公司
BOHAI OIL PRODUCTION TECHNOLOGY & SERVICE COMPA

SZ36-1 垢样分析报告

Scale Analysis Report For SZ36-1

取样日期：2006 年 6 月 13 日
Sampling date

编号：014
Number

分析日期：2006 年 6 月 14-28 日
Analysis date

取送样人：刘振国
Taken by

记录编号：BOPTSC-JL-TE040-A/O

样品名称	分析方法	分析项目	分析结果	
J10 井 02109#泵垢样	X 射线衍射法	结构分析	$Ba_{0.75}Sr_{0.25}SO_4$ (39-1469) Barite Sr-rich	98%
			杂质 Impurity	2%
	扫描电镜能谱仪测定法	元素分析	主要元素：Ba,S,Sr	
			次要及微量元素：Fe,Ca	
备注	本实验结果仅与收到的样品有关			

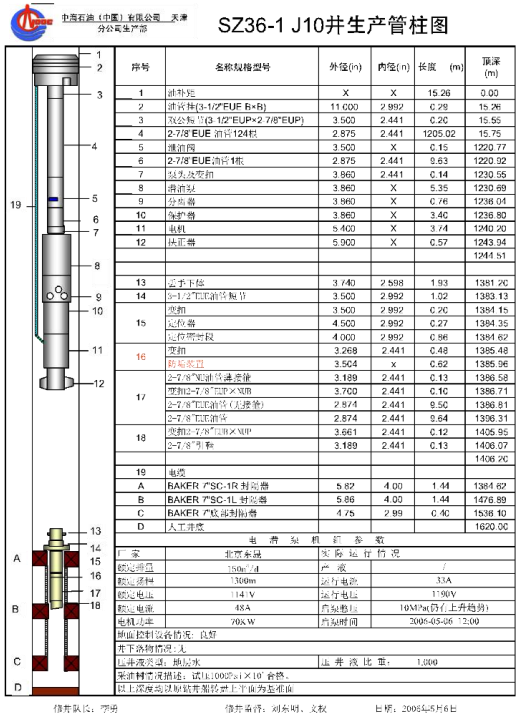
分析人：
Analyzed by

审核：
Checked by

分析单位：渤海石油采油工程技术服务公司
技术部油气水分析实验室
Analyzed by: Bohai Oil Production & Technological Service Company
Oil / Gas / Water Processing Laboratory of Technology Department

- Scale analysis indicated that the main composition of scale is $Ba_{0.75}Sr_{0.25}SO_4$, up to 98%
- Barium(Ba) and Strontium (Sr) scale, which is the most difficult scale to deal with

Case #2: CNOOC Bohai/Scale/Downhole CPRS



中海石油（中国）有限公司 天津分公司生产部

SZ36-1 J10井生产管柱图

序号	名称规格型号	外径(in)	内径(in)	长度 (m)	顶深 (m)
1	油补完	X	X	15.26	0.00
2	油管挂(3-1/2"EUE 8rd)	11.000	2.992	0.29	15.26
3	双公短节(3-1/2"EUP×2 7/8"EUP)	3.500	2.441	0.20	15.55
4	2-7/8" EUE 油管124根	2.875	2.441	1205.02	15.75
5	单流阀	3.500	X	0.15	1220.77
6	2-7/8"EUE油管1根	2.875	2.441	9.63	1220.92
7	旋转放空阀	3.860	2.441	0.14	1230.55
8	循油短	3.860	X	5.35	1230.69
9	分离器	3.860	X	0.76	1238.04
10	保护器	3.860	X	3.40	1238.80
11	电机	5.400	X	3.74	1240.20
12	扶正器	5.900	X	0.57	1243.94
					1244.51
13	盲手下丝	3.740	2.598	1.93	1381.20
14	3-1/2"EUE油管短节	3.500	2.992	1.02	1383.13
15	变扣	3.500	2.992	0.20	1384.15
	定位器	4.500	2.992	0.27	1384.35
	定位带节段	4.000	2.992	0.86	1384.62
16	变扣	3.268	2.441	0.48	1385.48
	防砂装置	3.504	x	0.62	1385.96
17	2-7/8"EUE油管单流接箍	3.189	2.441	0.13	1386.58
	变扣2-7/8"EUP×NU	3.700	2.441	0.10	1386.71
	2-7/8"EUE油管(无接箍)	2.874	2.441	9.50	1386.81
	2-7/8"EUE油管	2.874	2.441	9.64	1396.31
18	变扣2-7/8"EUP×NU	3.661	2.441	0.12	1406.95
	2-7/8"节箍	3.189	2.441	0.13	1406.07
					1406.20
19	电缆				
A	BAKER PSC-1R封隔器	5.82	4.00	1.44	1384.62
B	BAKER PSC-1L封隔器	5.86	4.00	1.44	1476.89
C	BAKER PBR密封筒	4.75	2.99	0.40	1536.10
D	人工井底				1620.00

电潜泵机组参数

厂家	非常系统	实际运行情况	
额定排量	150m³/d	产液	/
额定扬程	1300m	运行电流	33A
额定电压	1140V	运行电压	1190V
额定电流	48A	套压/油压	10MPa(防石上井趾券)
电机功率	70kW	启动时间	2006-05-06 12:00

地面控制室设备情况：良好

井下异物情况：无

注井液类型：地层水　　注 井 液 比 重：　1.000

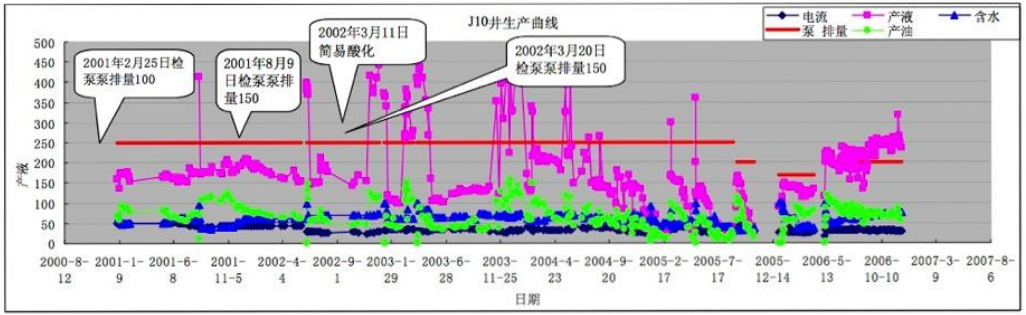
采油树示意描述：试压30MPa×10' 套管。

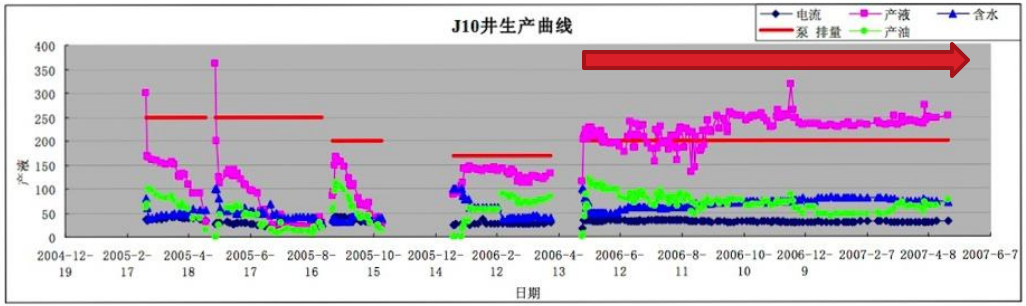
以上深度均以原钻井船转盘面为基准面

修井队长：李明　　修井监督：刘东明、文权　　日期：2006年5月6日

- After the installation
  - The ESP was repaired on May 4, 2006, and a Enmax CPRS downhole unit was run into the well with the ESP.
  - After the installation of Enmax CPRS downhole tool, Enmax Shanghai was advised that the production had been stabilized at 250 m3/d, with a crude production of 80 m3/d, and no more EPS failure because of scale buildups
  - Till the report date, Oct. 16th, 2008, continuous production for 892 days, no breakdown
  - Within 892 days, EPS repair related cost saving > 7,700,000 RMB, Oil production increase >16,500.000 RMB
  - This downhole CPRS unit is still working in this well today

Case #2: CNOOC Bohai/Scale/Downhole CPRS





Case #2: CNOOC Bohai/Scale/Downhole CPRS

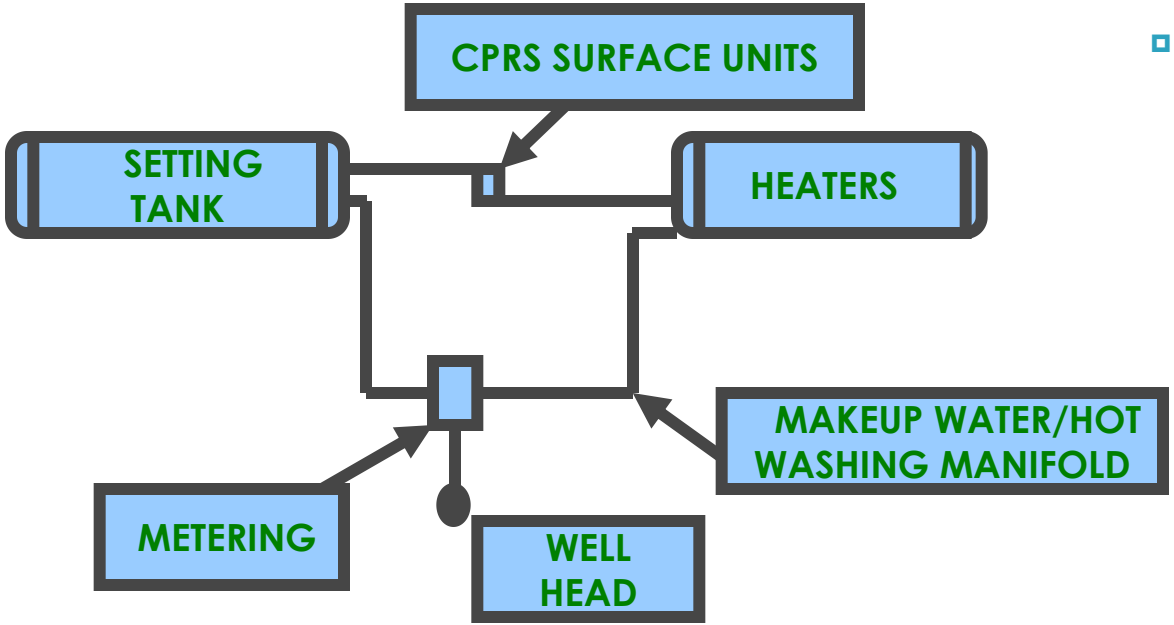
Case #3: CNPC Daqing/Scale/Surface CPRS

- Daqing Oilfield, located in northern part of the country, the largest oilfield in CNPC and China
- Stimulations, as water flooding, polymer flooding, etc., result in heavy scale problems
- Many CPRS installations done in Daqing during previous years
- This installation was done on on Jan. 5, 2006 Transfer station #201 in Daqing #1 Production Company, the largest production company in Daqing

Case #3: CNPC Daqing/Scale/Surface CPRS

- A six month test was done on Enmax CPRS surface for polymer fluid scale prevention and removal evaluation
- The scale thickness in the heaters was about 20 mm
- Four surface units were installed at the inlets of four heaters
- Chemicals was stopped on March 17.
- The system was inspected scale status on June 14, 2006, and the tubes of No. 2 heater were pulled out for inspection.

Case #3: CNPC Daqing/Scale/Surface CPRS



- Inspection locations:
  - Heater inlet
  - Heater tubes
  - Metering valve

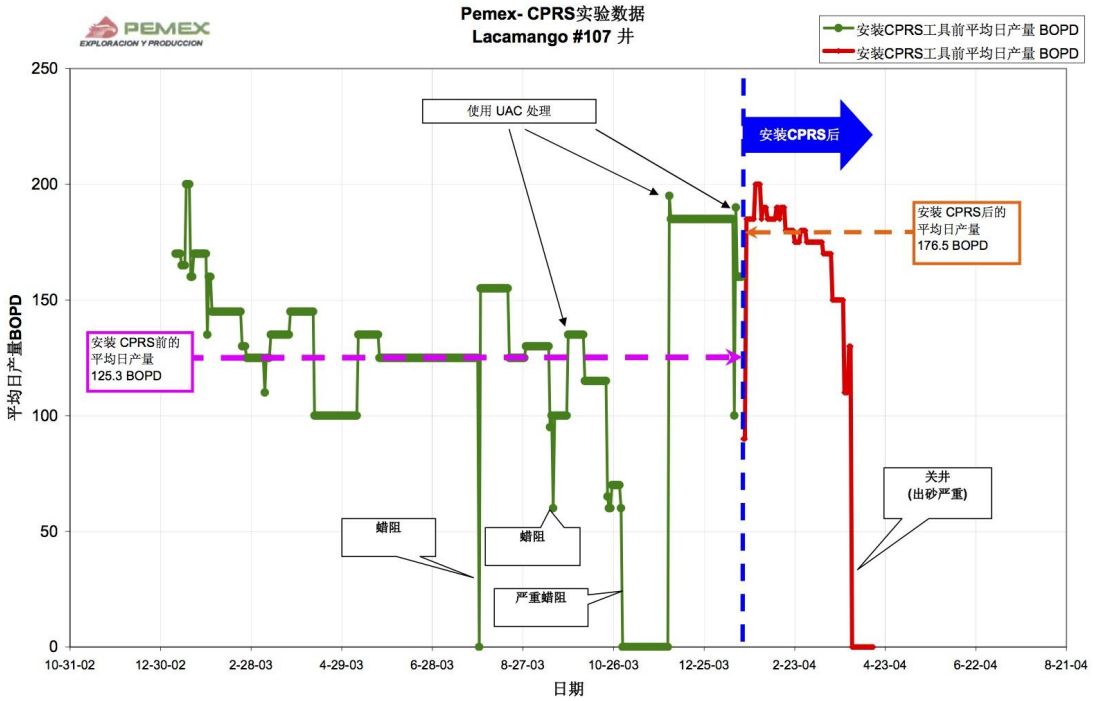
Case #3: CNPC Daqing/Scale/Surface CPRS

Location	Before Installation		7 Months After		9 Months After		7 months removal	9 months removal
Heater inlet	4 mm	Very hard	0	Crispy	0	No	4 mm	
Heater tubes	7 mm	Very hard	2.5	Crispy	1	Crispy soft	4.5 mm	6 mm
Metering valve	7 mm	Very hard	1.5	Crispy	0		5.5 mm	

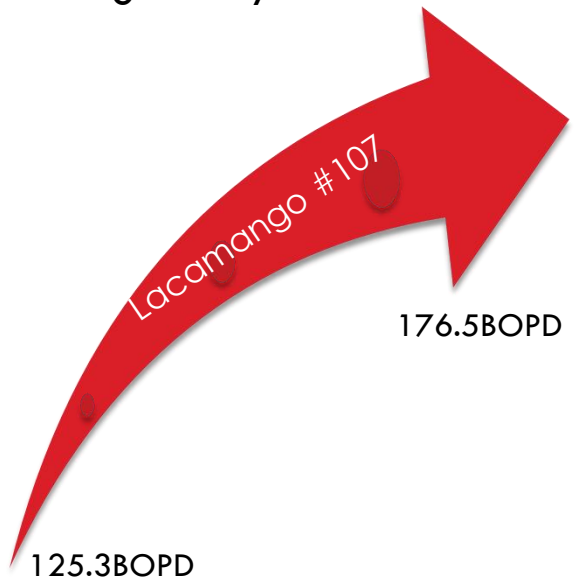
- Before the installation, the scale thickness at the outlet was 25mm hard scale, it was reduced to 0.8 mm when inspected on June 20, 2006, and reduced to 0.4 mm on Sept. 23, 2006.
- Before the installation, the scale thickness at the inlet was 4mm, there was no more scale on June 20 and Sept 23, 2006 for inspection.

Case #3: CNPC Daqing/Scale/Surface CPRS

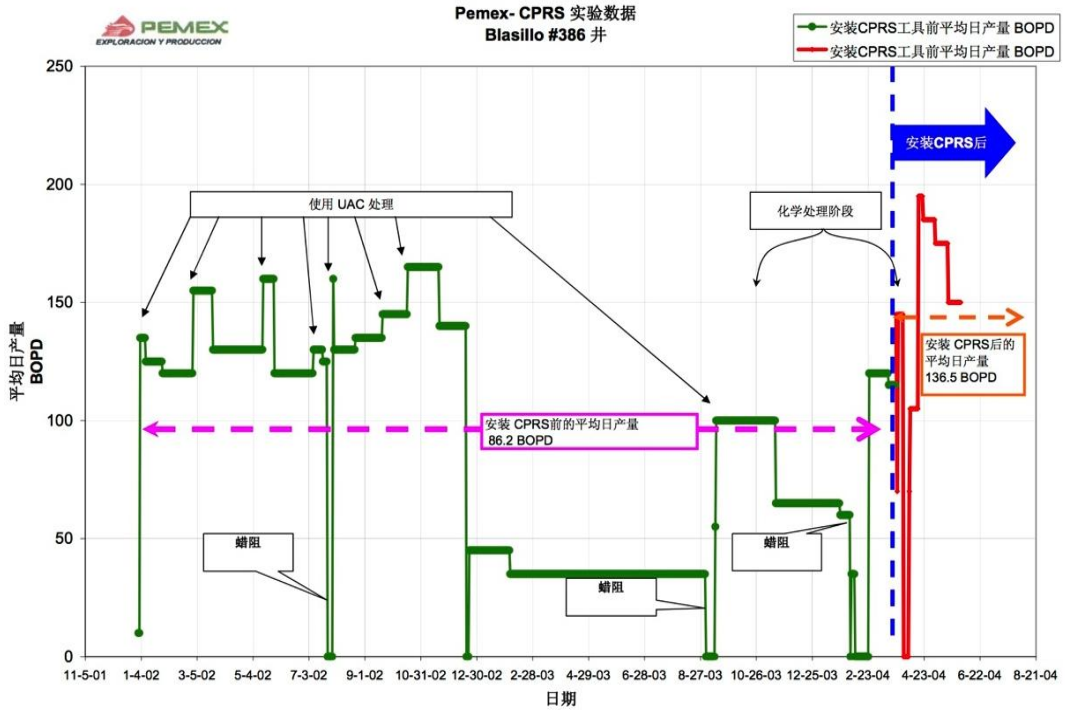
Case #4: PEMEX/Paraffin/Downhole CPRS



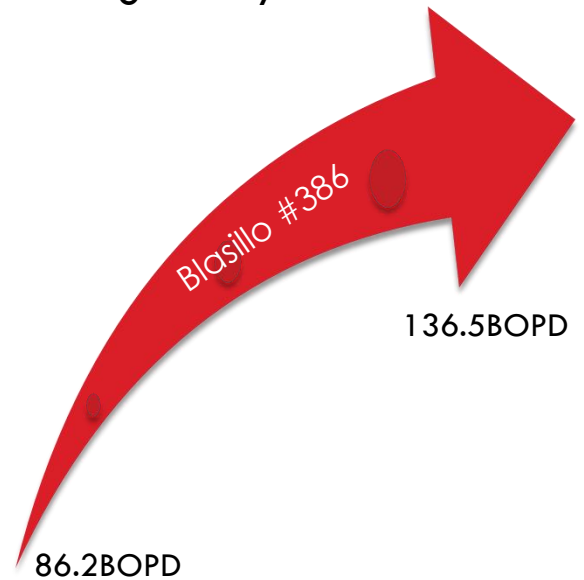
Average Daily Production rate



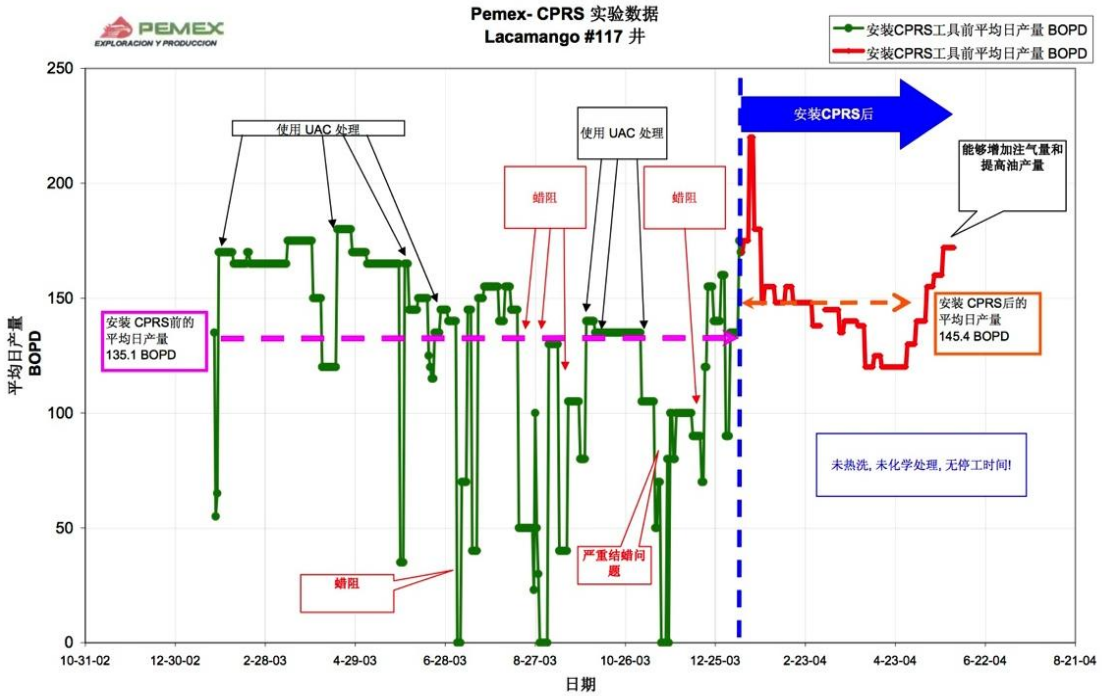
Case #4: PEMEX/Paraffin/Downhole CPRS



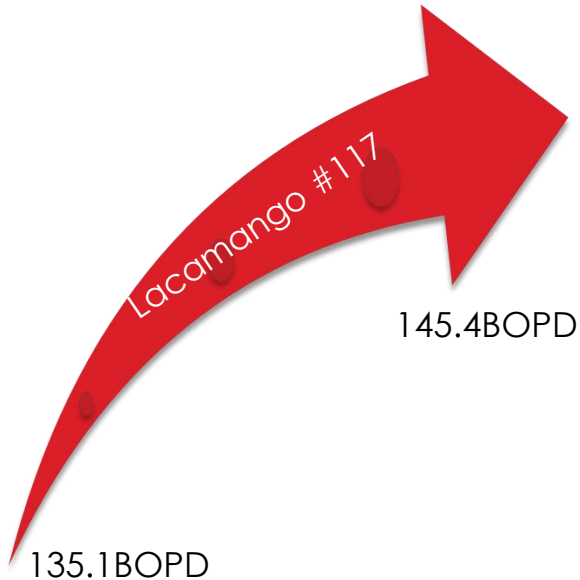
Average Daily Production rate



Case #4: PEMEX/Paraffin/Downhole CPRS



Average Daily Production rate



Case #5: CNPC Liaohe/Heavy Crude/Downhole CPRS

Case #5: CNPC Liaohe/Heavy Crude/Downhole CPRS

- Liaohe Oilfield, located in northern part of China, the third largest oil field in china
- More than 60% of the production is heavy, high viscosity and high pour point (up to 67 deg. C) crude
- High asphaltene and colloid (gel) content

Case #5: CNPC Liaohe/Heavy Crude/Downhole CPRS

AN 20-23 WELL

- Before t installation
  - This well produced at 23 M^3 / day, 5.7 M^3 / day of crude oil
  - 75% of water, 37-38.5% of paraffin, 12-15% of gel, with pour point temperature of 54 deg C, one of the typical heavy oil wells.
  - Electric heating system was used to heat the crude to 90 deg C for the crude to flow.
- After the installation
  - A CPRS downhole unit was installed on Feb. 05, 2005, no electric heating for the first three months, and three month after, one electric heating every ten days.

H75 WELL

This well was treated with hot oil on a basis of a time per month. After the CPRS installation, the well have been producing for 425 days without treatment.

Case #5: CNPC Liaohe/Heavy Crude/Downhole CPRS

H75-4-4 WELL

This well is a high asphaltene crude oil well, 24 hr heating was used to keep the flow. After the CPRS was installed, no more production tubing heating was required, which reduced the extremely expensive heating cost by electricity.

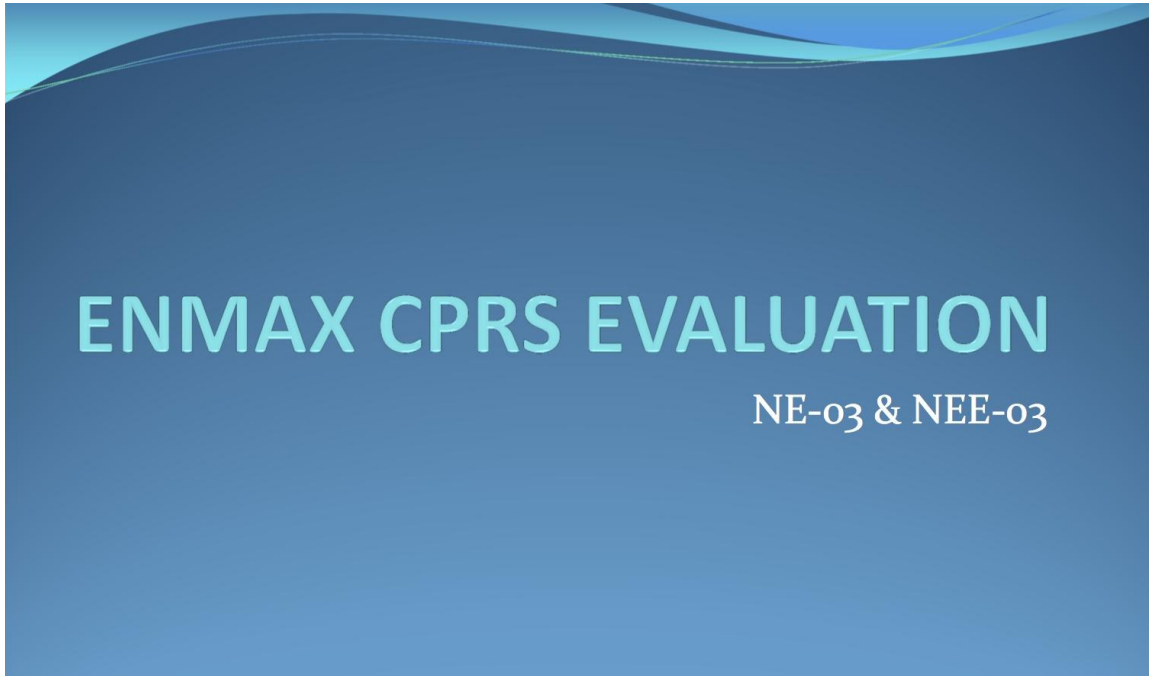
N74-14-14 WELL

This well required a hot oil treatment every two months; however, it has been producing for 520 days so far successfully after the CPRS installation.

Q31-49 WELL

This well was treated with hot oil, and then a CPRS unit was installed for replacement. 168 days after the installation, the pumping rod was broken, it was noticed there was no paraffin and no any other deposits on the pumping rod and pump when the downhole string was pulled out of the hole. The same CPRS unit was run into the well with downhole string, and has been producing 110 days so far without any problems.

Case #6: GNPOC/Scale/Surface CPRS



- Location: GNPOC NE-03 & NEE03
- Trial Period: May 20th to August 20th , 2014
- CPRS Units: two sets of 6"x 8" surface units, one for each
- Report Date: September 3rd 2014

Case #6: GNPOC/Scale/Surface CPRS

- NE-3 & NEE-3 f low lines frequently chocked due to scale deposition
- Scale inhibitor injected by 20 L/D for each
- Even with scale inhibitor injection scale continued deposition
- Flow line acid cleaning carried out frequently

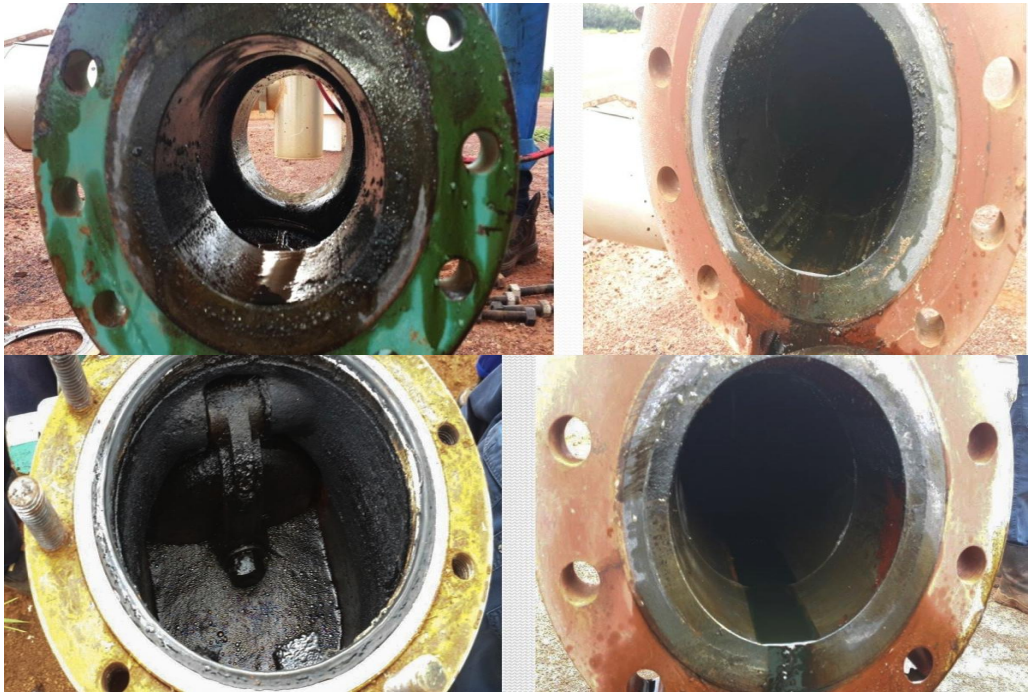
Case #6: GNPOC/Scale/Surface CPRS

Case #6: GNPOC/Scale/Surface CPRS

- NE-3& NEE-3 ENMAX CPRS installed on 20/05/14
- Scale injection stopped after ENMAX installed as requested by vendor
- NE-3 &NEE-3 Parameters after ENMAX installed steady

Well Name	THP	FLP
NE-03	450	400
NEE-03	490	410

Case #6: GNPOC/Scale/Surface CPRS

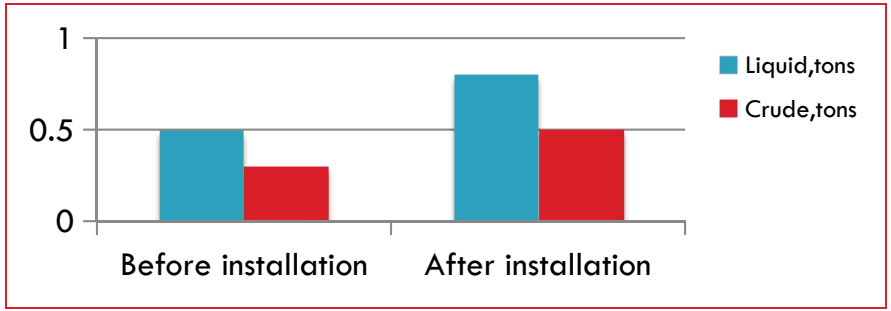


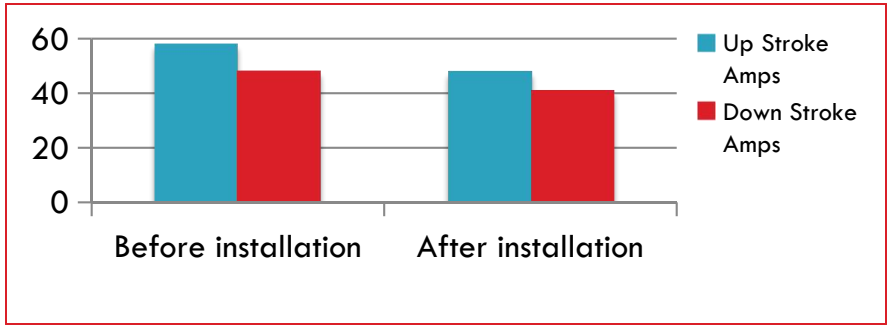
- NE-3 tripped on 8/8/14 due to PS activated and FLP reached 500 psi
- NE-3 f low line inspected by remove NRV near well head and NRV at OGM-5 found clear no scale
- NE-3 test line and production line totally blocked at OGM-5
- NE-3 test line and production line cut and fabricated another one

Case #6: GNPOC/Scale/Surface CPRS

- NE-3 started back on 18/8/14 and well parameters steady THP 240 and FLP 220 psi
- From NE-3 flow line inspection confirmed OGM-5 production and test header blockage 90%
- Due to blockage of OGM-5 NEE-3 parameters high

Case #7: Sinopec Zhongyuan Oilfield/Paraffin & Scale





- Well#: Q2-12
- Operator: No.6 Production Company
- Downhole issues: Paraffin & Scale
- Before the installation
  - Daily Production: 0.6 tons of Liquid, 0.3 tons of crude
  - Up stroke Amps: 58; Down stroke Amps: 48
  - Hot oil treatment frequency: 32 days
- After the installation
  - Daily Production: 0.8 tons of Liquid, 0.5 tons of crude
  - Up stroke Amps: 48; Down stroke Amps: 41
  - Hot oil treatment frequency: before the report date, continuous operation for 540 days

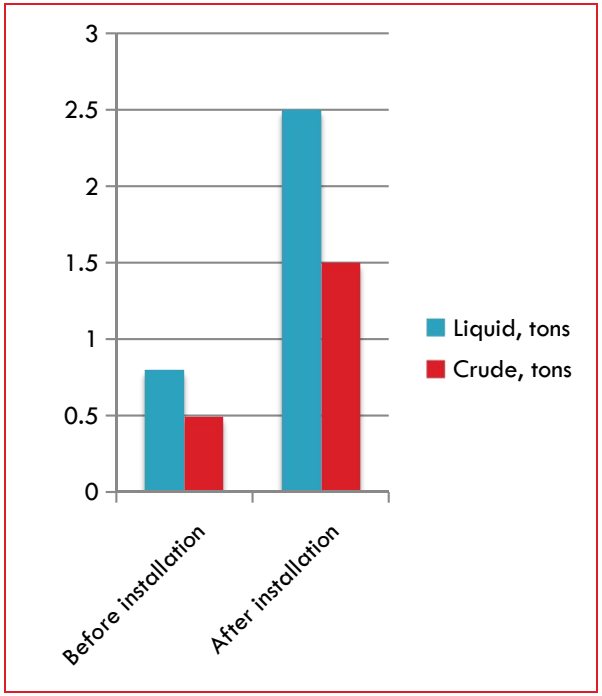
Case #7: Sinopec Zhongyuan Oilfield/Paraffin & Scale

- Well#: Xinhe 16
- Operator: No.6 Production Company
- Downhole issues: Scale & Corrosion

Before the installation

- Daily Production: 1.3 tons of Liquid, 1.2 tons of crude
- Heavy scale and corrosion on tubing string & pump
- Averaged at a pump repair every 45 days, three times of pump failure within six months

Case #7: Sinopec Zhongyuan Oilfield/Paraffin & Scale



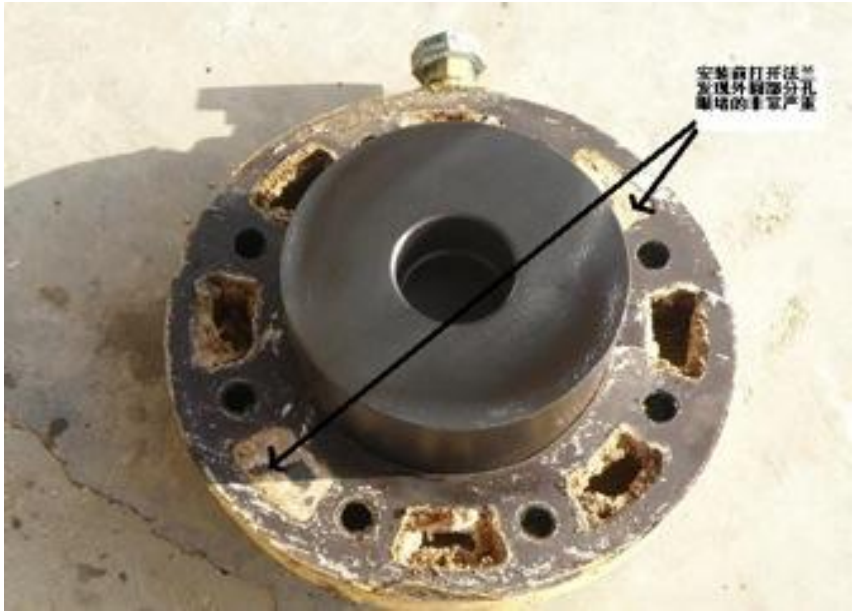
One Year after the installation

- Daily Production: 2.5 tons of Liquid, 1.5 tons of crude
- No new scale buildups on tubing string and the pump
- No pump repair job within 370 days

Case #8: Sinopec Zhongyuan Oilfield Natural Gas Station

- Location: Weiqi-1& Weiqi-11 Natural Gas Gathering Station, 5 Natural Gas Compressors & 3 Heat exchangers
- Operator: Zhongyuan No.3 Production Company
- Main issue: high hardness cooling water, and serious Scale problems and the system can be plugged off in one year

Case #8: Sinopec Zhongyuan Oilfield Natural Gas Station



Before the installation

Case #8: Sinopec Zhongyuan Oilfield Natural Gas Station

One year after the installation

Case #8: Sinopec Zhongyuan Oilfield Natural Gas Station

- Two CPRS surface units installed Weiqi-1& Weiqi-11 Natural Gas Gathering Station, one for each station
- No scale buildup on the cylinder cap, heat exchanger tube bundles
- No maintenance for one year
- 65000 RMB saving on high pressure jet clean cost every year
- Stable discharging temperature

One year after the installation

Case #9: Shell Brunei/Paraffin & Scale

- More than 50 CPRS units purchased during last ten years
- 130 wells to be installed with CPRS units during next three years

Case #10: KOC/Downhole and Surface CPRS

Thanks and contact us

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