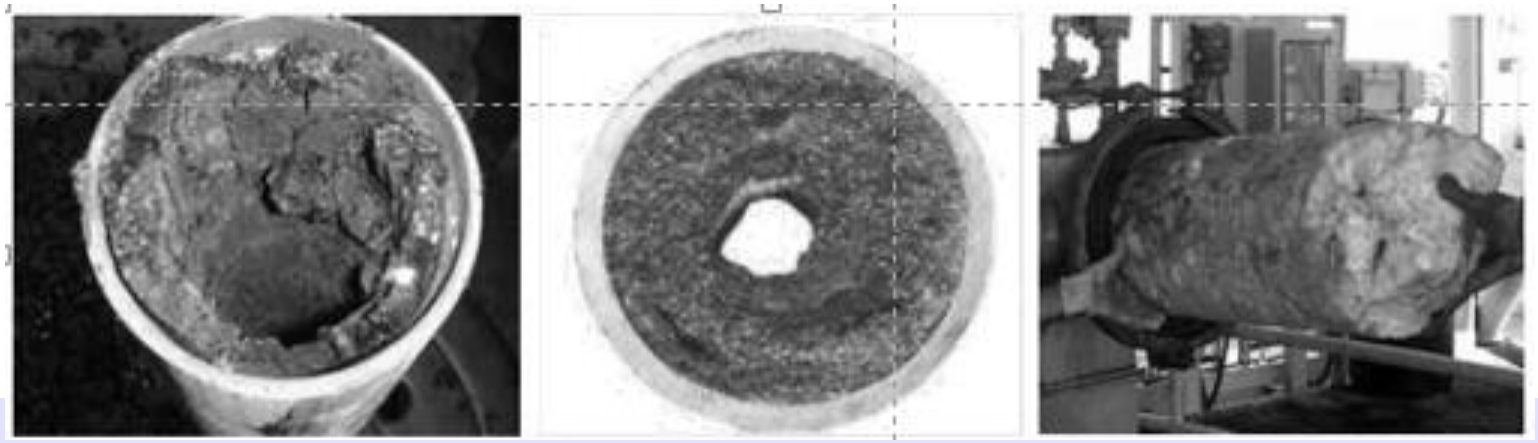
EMDP (electromagnetic deposit preventer):

The lowest cost to overcome the greatest challenge

Introduction

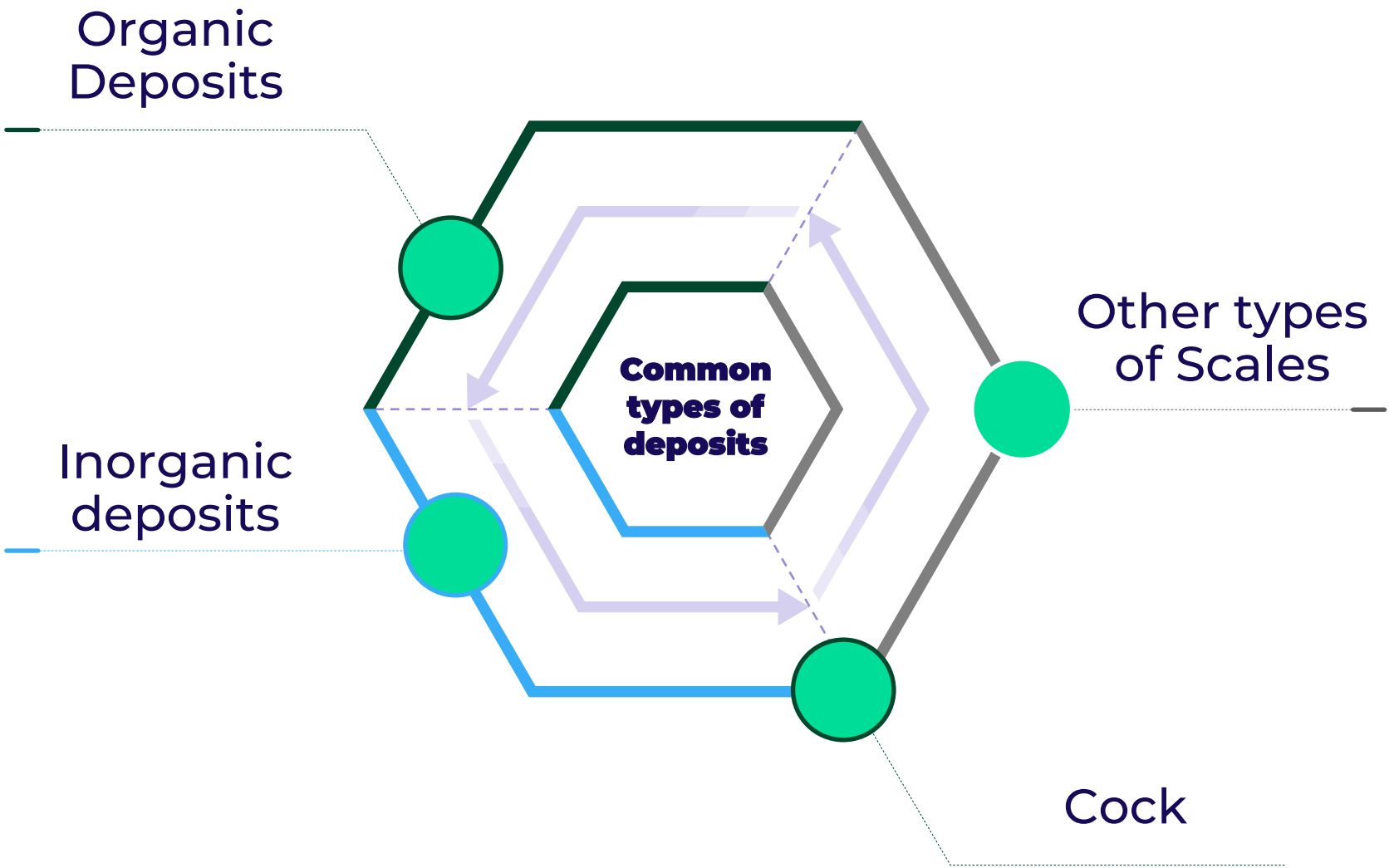
The accumulation of solid deposits (e.g., wax, inorganic scales, organic deposits, scales, and cokes) inside pipelines leads to restricted or blocked fluid flow.

Temperature changes, pressure fluctuations, chemical reactions, and corrosion are the most common causes of plugging in pipelines



Inorganic coke Organic and scale

Common deposits in the Pipeline



Pipeline plugging problems

Deposits Problems are:

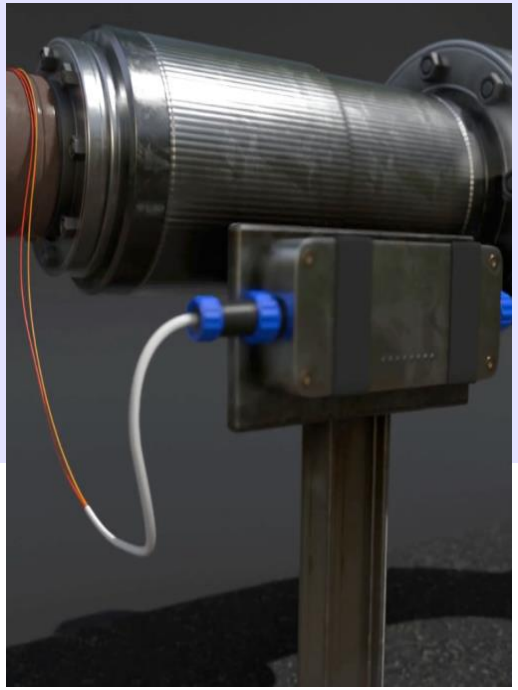
Operational Disruptions:
Reduced flow efficiency, unplanned shutdowns, and increased maintenance efforts

Economic Impact:
High remediation costs, lost production, and delayed deliveries.

Safety & Environmental Risks:
Potential pipeline ruptures, spills, and hazardous working conditions

About Technology

EMDP 1st generation



Solar EMDP

EMDP

In EMDP advanced electromagnetic protection method, we leverage the science of "van der Waals" forces and molecular polarization to prevent unwanted adhesion of organic and inorganic deposits within pipelines. This method disrupts weak adhesive bonds caused by electrostatic forces, eliminating the buildup of impurities. By running electromagnetic waves through the pipeline, we break down these bonds, allowing for the easy removal of contaminants. Our technology ensures efficient, cost-effective, and corrosion-free pipeline operation.

Why EMDP technology?

Our products are proven to reduce outage time in production

We save money on critical operations

We reduce costs toward traditional mechanical and chemical cleaning

6 **We have over 2 years of asphaltene removal experience**

Mechanism

- **Hydration effect**

EMF is able to accelerate the crystallization of sparingly soluble diamagnetic salts of weak acids such as carbonates and phosphates. The mechanisms involve changing the orientation of the proton spin, thereby disturbing hydration effects by hindering the transfer of the proton to a water molecule.

- **Magnetohydrodynamic phenomena**

This only exists when both the treated fluid flows and the EMF are present, such as in dynamic treatment conditions. Lorentz force can stimulate all charged species in the electrolyte solution/ dispersion traversing the EMF, including the surface charge, ions in the electrical double layer near charged surfaces, and free ions in the solution.

- **Destroys weak adhesive forces**

EMF which is being transmitted through a pipeline, destroys weak adhesive forces that contribute to sticking unwanted deposits to the pipeline wall. The device automatically tunes parameters of EMF (intensity, waveform and frequency) that provides an effective exposure to the system as long as the pipeline/tube/casing is presented by a continuous piece and can reach up to 5 km in both sides from the installation place.

Technical aspects

- Since the system is designed to transmit electricity, a conductive pipe (steel or ...) is required.

- Since our technology has no technological limitations "the only company and technology that solves the issue of both organic and mineral deposits".

- This technology uses a signal at a frequency of up to 50 kHz, which does not affect the signal of the monitoring devices.

DATASHEET

Parameter	Specification
Frequency Range	Up to 50 kHz (non-interfering with monitoring devices)
Power Consumption	2-5 watts
Operating Voltage	110-240V AC, 50/60 Hz
Material Compatibility	Conductive pipelines (steel, etc.)
Temperature Range	-40°C to +85°C (operational)
Humidity Range	5% to 95% non-condensing
Protection Rating	IP65 (dust-tight and protected against water jets)
EMC Standards	IEC 61000-6-2/6-4, CISPR 11, EN 55032/55035, FCC Part 15
Explosion Safety	GOST 30852.0-2002, TR CU 012/2011
Certification Validity	EMC Certificate No. EMDP-EMC-2020-011 (valid until March 14, 2030)
Effective range of the device	5 km

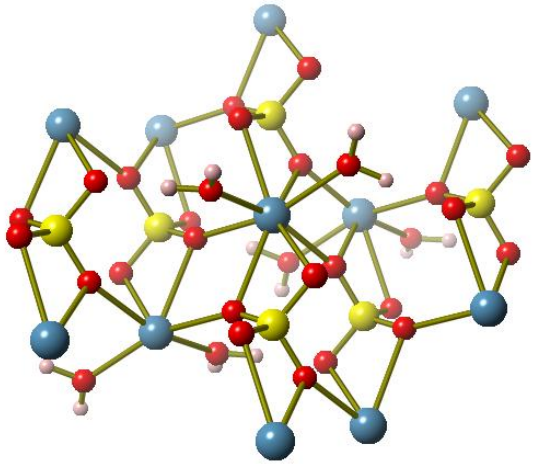
Advantages

- Maintain peak performance
- Decrease in operational cost
- Reduces production interruptions
- Only draws 5 watts
- Zero downtime
- Powered by electric network
- Minimizes the use of chemicals
- Quick installation

Applications

Types of Deposits Controlled

- Organic deposits
- Scale
- Inorganic deposits
- Cock
- Calcium
- Salt
- Iron Oxide



Application Areas

- Boilers
- Flow lines
- Transfer Lines
- Production Units
- Heat Exchangers
- Refineries

Industrial Goals

- Preventing the deposition of organic components and inorganic components in the surface of the transmission pipeline and surface facilities
- Preventing pipeline plugging caused by coke in refinery and petrochemical systems
- Preventing scale formation in pipelines

Case study

OIL REFINERY **IN MIDDLE EAST**

OBJECT: Pipeline
TASK: Reduce use of chemicals for removal of deposits and reduce maintenance costs
EXECUTION: One device was installed on the heater line for 24 months.
CHALLENGE:
- Asphaltene and wax deposits in the pipeline and heat exchanger tank
- Cleanings using chemicals every month

CASE STUDIES: REFINERY
RESULTS:
- During 24-month test period no cleanings were required.

Case study

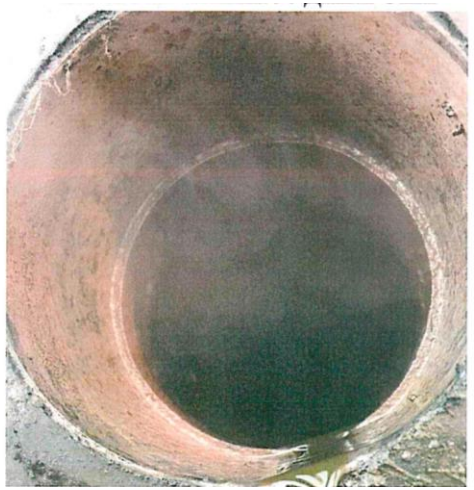
RUSSIA: MAJOR OIL COMPANY

OBJECT: Online oil heater
TASK: Reduce acid treatment
EXECUTION: One device was installed at online oil heater for 4 months.
RESULTS:

- Online oil heaters were treated with HCL once a year in order to remove deposits from the internal cavity of the coils

CASE STUDIES: OIL HEATERS / RUSSIA

- HCL treatment reduced to once every 2 years
- Danger of acid use reduced
- Life of equipment was extended significantly
- Payback period of the installed device was 4 months.

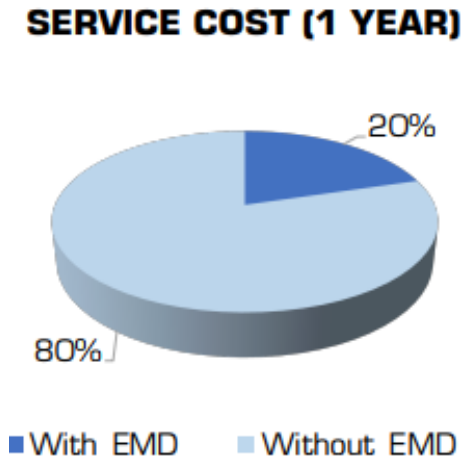


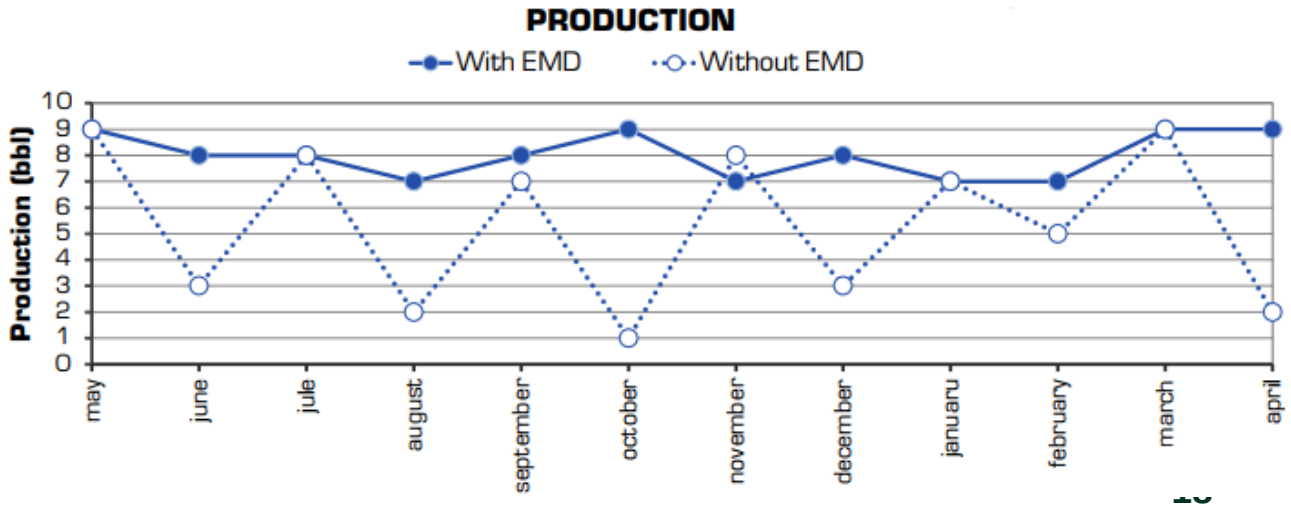
Case study

OKLAHOMA: Oil **WELL**

OBJECT: Oil Well
CHALLENGE:
- The well was blocked by deposits every month

TASK: Increase period between cleanings
EXECUTION: One device was installed at the wellhead for 7 months.
RESULTS:
- After the installation of the device and during the 7 months of operation the well no longer had deposits and did not get blocked
- Production increased by 30÷40%





Case study

KAZAKHSTAN: 10 OIL WELLS

OBJECT: 10 Oil Wells

CHALLENGE:

- Significant ARPD buildup compromised oil production
- Hot oil cleanings were needed every 1-2 months.

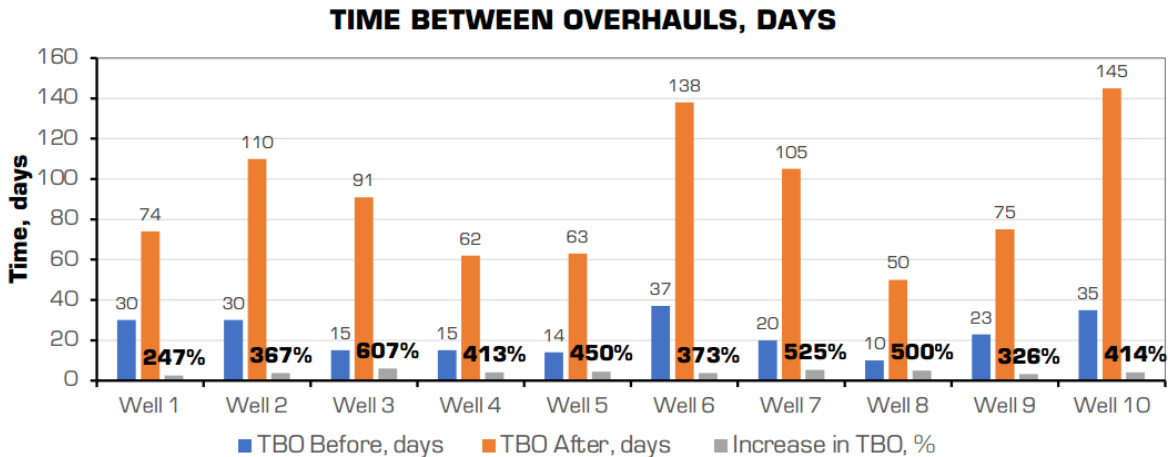
TASK: Increase period between cleanings

EXECUTION: One device per well was installed at the wellhead for

2÷7 months period.

RESULTS:

- An average period between cleanings increased by 400%



Track record

- **Applications:**
- Cooling oil coil (oil processing facility)
- Heat exchanger (oil refinery)
- Surface pipeline

- **Above 90%** success rate
- **4X** average increase in lifespan
- **4500m.** Deepest deployment to date

Company Name	Qty of devices, ea.	Increase in lifespan, %
Mangyshlak Munay/ Kazakhstan	10	500%
KazakshOil Aktobe/ Kazakhstan	5	400%
Private Operator/ Russia	9	500%
GazpromNeft/ Russia	1	1000%
Abilin/ Texac	1	1000%
Shrz refinery/ Iran	1	500%
Rosneft/ Russia	2	Ongoing
TOTAL	**29**	

Track record

Company Name	Region	Period of Installation	Qty of devices, ea.	Type of deposit	Increase, %	Comment
Private Operator	Russia	2013÷2014	9	Paraffins	500%	Increase in lifespan
Kazakh Oil Aktobe	Kazakhstan	2017÷2018	5	Paraffins	400%	Increase in lifespan
Mangyshlak Munai	Kazakhstan	2018	10	Paraffins + Salts	500%	Increase in lifespan
Governmental company	Russia	2018÷2019	1	Paraffins	1000%	Increase in lifespan
Abilin	Texas, US	2019	1	Paraffins	37%	Increase in oil production
Shiraz refinery	Iran	2023	1	Coke + Salts	500%	Increase in lifespan
Government company	Russia	2023	1	Paraffins	400%	Increase in lifespan
United World Energy Corporation	Luisiana, US	2024	1	Paraffins	40%	Increase in oil production
Governmental company	Russia	2023 – 2024	3	Salt (Carbonate)	500%	Increase in lifespan
Government company	Algeria	2024 – 2025	4	Salt (Carbonate) Paraffins	–	Ongoing
Mckean	Texas, US	2025	1	Paraffins	600%+	Ongoing

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