Corrosion monitoring system of pipeline transportation

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Abstract: Monitoring the corrosion state of trunk pipelines is an urgent task. Transneft pays great attention to monitoring the corrosion condition of its pipelines. The targets of corrosion monitoring system of pipeline transportation are: evaluating corrosion protection efficiency, investigating operation capability of cathodic protection equipment, investigating protective coatings quality. Developed external corrosion monitoring system of Transneft pipelines allows reaching the following objectives:

- to define methods and monitoring periodicity according to real corrosion risk factors of a pipeline
- to evaluate corrosion defects, real corrosion rate and periodicity of maintenance.

Internal corrosion monitoring system of Transneft pipelines allows reaching the following:

- to identify factors influencing internal corrosion rate.
- to select inhibitors for fluids with different aggressivity.
- to select inhibitors'concentration for proper internal corrosion protection with minimal expenses.

Keywords: corrosion monitoring system; investigation, protective coatings.

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In the Transneft system corrosion monitoring includes:

- Exploitation measurements (2 times/year)
- Periodical measurements (high corrosion risk areas once in 5 years; increased corrosion risk areas once in 10 years)

At that the following procedures are performed:

- Evaluation of protection level on control-measuring instruments
- Evaluation of operation capability of cathodic protection equipment
- Evaluation of coatings quality by closed-interval potential survey method

It must be emphasized that selection of control methods depends on real factors of pipeline corrosion and is determined by a number of test methods.

To define the priority regions of Corrosion monitoring corrosion rate was evaluated using gravimetric coupons that were buried in the following areas:

- Sections of low cathodic protection quality
- Increased corrosion risk areas
- Stray current sections
- Defect sections according to pig inspection results

Consequent weighing of gravimetric coupons enabled us to determine corrosion rate and factors that influence corrosion.

Comparison analysis of pig inspection and corrosion monitoring allows determining factors, which influence pipeline corrosion rate. They are:

- Metal loss
- High corrosion rate
- Incomplete cathodic protection
- Coating defects
- Aggressive soil

External corrosion monitoring system implies both field measurements and lab testing. Field measurements are performed at sample collection stations as shown on the picture.

Lab testing consists of benchmark tests, chemical analysis of corrosive components and choosing and testing inhibitors and coatings.

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For effective external corrosion protection the inhibitor selecting procedure was successfully developed. The procedure consists of:

- Lab testing
- Benchmark testing
- Infield pipeline testing

In conclusion, I would like to emphasize that developed external corrosion monitoring system allows reaching the following objectives:

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