Analyzing the recipe of gasoline brand Premium-95, corresponding to modern Euro-5 requirements for gasoline quality, it was found that it does not seem possible to produce this brand of gasoline without application of MTBE, and its minimum content is 6 % wt.

It could be concluded that the module of automatic chromatography data systematization in conjunction with the program «Compounding» allows precise counting of streams hydrocarbon composition and detonation characteristics of gasoline. Also it helps to correspond the changes of feedstock composition, to vary blending recipes of trade gasoline and to recommend optimal involvement of different-composited feedstock into the blending process.

Precision of the developed recipes provides economy of expensive components, and allows getting essential economic benefit for the refineries by reducing the quality for trade products.

References

1. Kravtsov A.V., Ivanchina E.D., Smyshlyaeva Yu.A. Matematicheskoe modelirovanie protsessa kompaundirovanya tovarnykh benzinov s uchetom reaktsionnoy sposobnosti komponentov smesi [Mathematical modeling of trade gasolines blend process considering the reactivity of mixture components]. Bulletin of the Tomsk Polytechnic University, 2009. – Vol. 314. – No. 3. – pp. 81 – 85.
2. Modelirovanie processa prigotovleniya tovarnykh benzinov na osnove ucheta reaktsionnogo vzaimodeystviya uglevodorodov syrya s vysokooktanovymi dobavkami [Modeling the trade gasolines blending process on the basis of reactivity of hydrocarbon feedstock with high-octane additives] Kirgina M.V., Ivanchina E.D., Dolganov I.M., Smyshlyaeva Yu.A., Kravtsov A.V., Fan Fu. Neftepererabotka i neftehimija. Nauchno-tehnicheskie dostizhenija i peredovoj opyt, 2012. – No. 4. – pp. 3 – 8.

PARAFFIN-BASE OIL TRANSPORTATION USING POUR-POINT DEPRESSANTS

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Nowadays the extraction of high-paraffin crude oil with the high content of paraffinic hydrocarbons increases. While being extracted, transported and stored, deterioration of the rheological properties of high-paraffin crude oil is observed. This leads to increase of equipment deterioration, additional material expenses and problems with environmental conditions. Down-the-hole treatment is promising method of asphalt–resin–paraffin (ARP) sediments control. Usage of pour-point depressants prevents wax depositions and also improves the rheological properties of crude oil. Efficiency determination of pour-point depressants is based on high-wax oil from Maiskoye field.

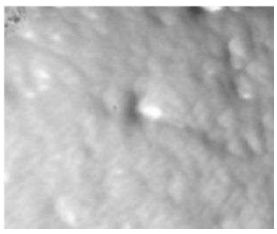

Fig. 1 Original oil sample

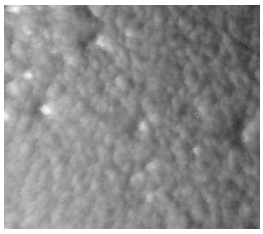

Fig. 2 Oil sample with "DMN" depressant

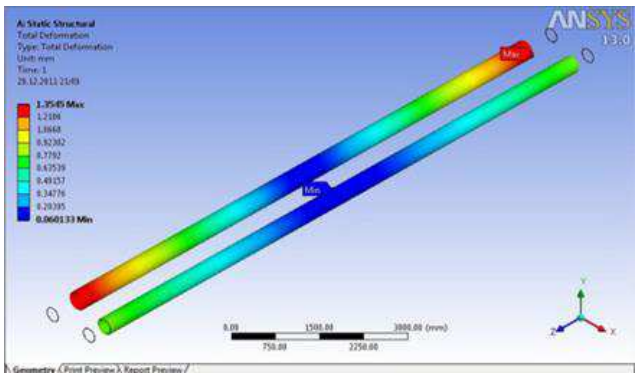

Fig. 3 Deformation distribution of pipeline under original and modified pressure

By analyzing the pictures of residual oil structures we can see that oil sample with pour-point depressant "DMN" has more dispersed composition(Fig.1. and Fig.2.). Measurements of the rheological properties were made by rotational viscosimeter "BROOKFIELD LVDV-III Ultra". To evaluate the influence of depressant on stressed-deformed state of pipeline we used modelling in engineering simulation software ANSYS, that was based on the data gained by "Neftehimtehnologii" company during testing of pour-point depressant "DMN-2005" in pipeline section of Severo-

Gubkinskoe field (date of testing: 2005, May)[1].

Oil properties: pour point- +10 °C, oil n-paraffin content- 12 %, paraffin melting temperature + 50 °C, oil asphaltene content - 2 %. Characteristics of simulated pipeline: line diameter- 273 mm, wall thickness – 8 mm, steel type -09G2S, original line pressure (no added "DMN-2005")- 4,56 megapascal, modified line pressure (added "DMN-2005", concentration- 200 gram per ton), length – 12 meters.

Modelling using ANSYS software gave us the visual representation of simulation results of deformations under original and modified pressure (Fig. 3).

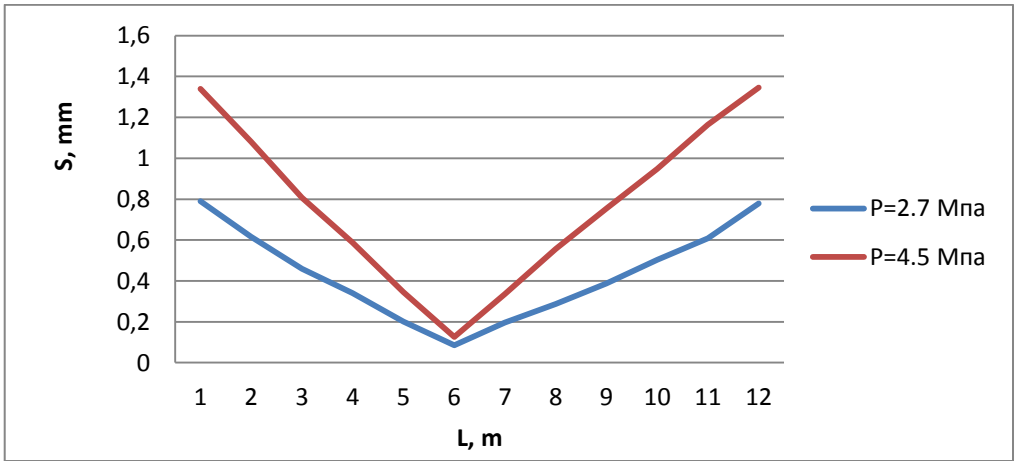

Fig. 4 Deformation (S) distribution along the length (L) of pipeline

Analysing the gained data we can see that pressure decline (from 4.56 MPa to 2.7 MPa) resulted in deformation decline (0.7 mm) (Fig. 4).

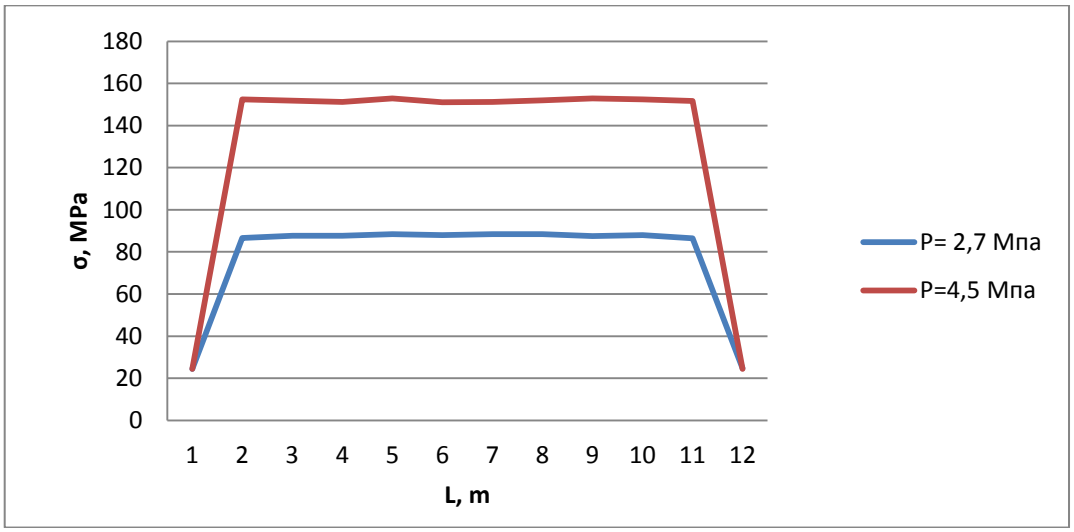

Fig. 5 Equivalent stress (σ) distribution along the length (L) of pipeline

Also after simulating the equivalent stress of pipeline, stress decline is observed (from 150 MPa to 85 MPa) (Fig. 5).

Pressure decline in pipeline is a result of pour-point depressant ability to dewax paraffin deposits on inner wall (pipeline cross-sectional area increases) and decrease dynamic viscosity of crude oil.

References

1. Бурков П.В. Исследование напряженно-деформированного состояния участка магистрального нефтепровода "Александровское – Анжеро-судженск" методом конечных элементов // Вестник КузГТУ. – 2013. – № 4. – С. 22 - 26.