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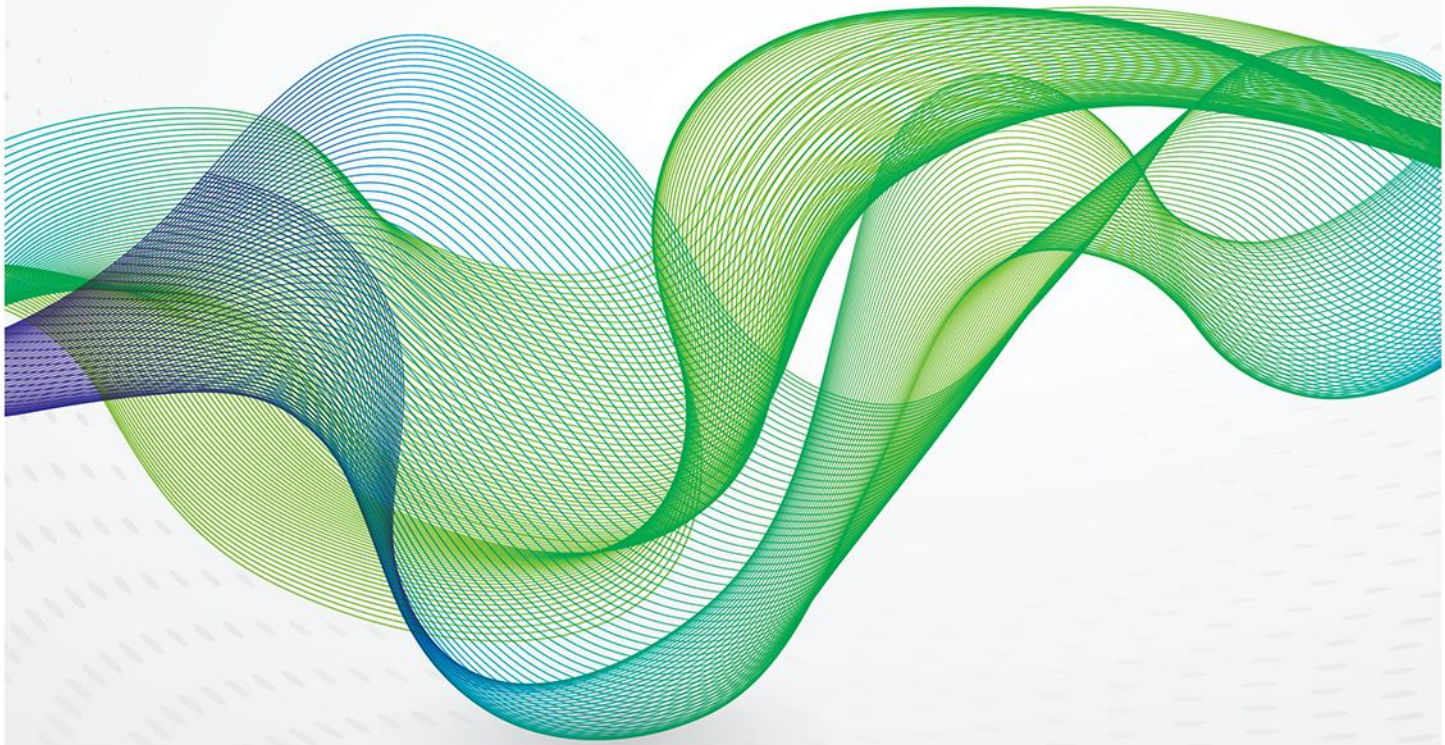
The Druzhba Pipeline Crisis: The Lessons for Russia and for Europe



OXFORD ENERGY COMMENT

Vitaly Yermakov
Senior Visiting Research Fellow, OIES

Crude oil flows resume; capacity restricted

Between 19 April and the beginning of June 2019, deliveries of crude oil to refineries in Central and Eastern Europe via the Druzhba pipeline were interrupted due to the contamination of crude oil in the system with organic chlorides.[1] The European part of Druzhba, the extension of the Russian oil pipeline network operated by state-owned Transneft, supplies crude to Belarus (Mozyr refinery) and then forks into the Northern branch that feeds refineries in Poland (Plock and Gdansk) and Germany (Schwedt and Leuna), and the Southern branch which supplies crude to Hungary (Duna), Slovakia (Bratislava), and the Czech Republic (Litvinov and Kralupy). These facilities have a combined refining capacity of over 1.8 million barrels per day.

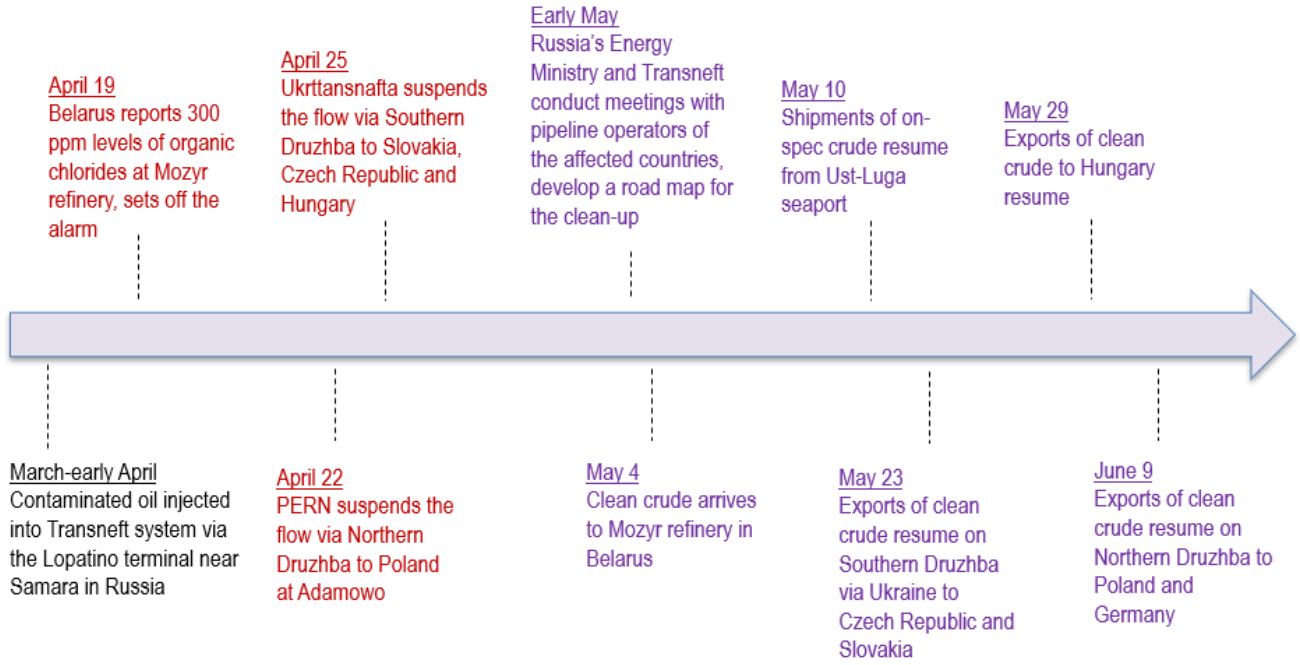
As of 10 June 2019, clean oil deliveries via Druzhba have resumed to all receiving countries (Figure 1). The capacity, however, remains restricted along several key sections of the pipeline system due to the need to use some of the pipeline's strings as temporary storage for the tainted crude. In Belarus, deliveries of crude oil to the Mozyr refinery have been resumed, but the Naftan refinery near Polotsk has been undersupplied because the pipeline section leading from Unecha on the Russia-Belarus border to Polotsk holds contaminated crude. In the Druzhba section from Mozyr to Adamowo in Poland, two pipeline strings out of three have started to deliver clean crude to the refineries, while one holds contaminated crude.

According to Transneft, deliveries via Druzhba during the period January–May 2019 fell by 4.4 million tonnes year-on-year, but the overall export of Russian oil grew by 2.9 million tonnes in the same period. Exports from sea terminals were up by 6.5 million tonnes year-on-year.[2]

The worst of the crisis is over, but according to material from the Transneft meeting with investors and analysts held on 11 June, the return to pre-crisis levels of throughput would only happen in two to three months.[3] Transneft head Nikolay Tokarev said a week earlier that the complete clean-up of the system would require six to eight months by way of gradually diluting the tainted volumes with clean crude to arrive at the normative specification for organic chlorides.[4]

[1] See Yermakov V. "The Domino Effect: contaminated oil in the Druzhba oil pipeline – implications of the incident for Russia and for Europe", *Oxford Energy Comment*, May 2019, www.oxfordenergy.org/publications/domino-effect-contaminated-oil-druzhba-oil-pipeline-implications-incident-russia-europe/.
[2] www.transneft.ru/news/view/id/21831/.
[3] www.transneft.ru/news/view/id/21971.
[4] www.transneft.ru/news/view/id/21831/.

Figure 1: Timeline of events (March–June 2019)



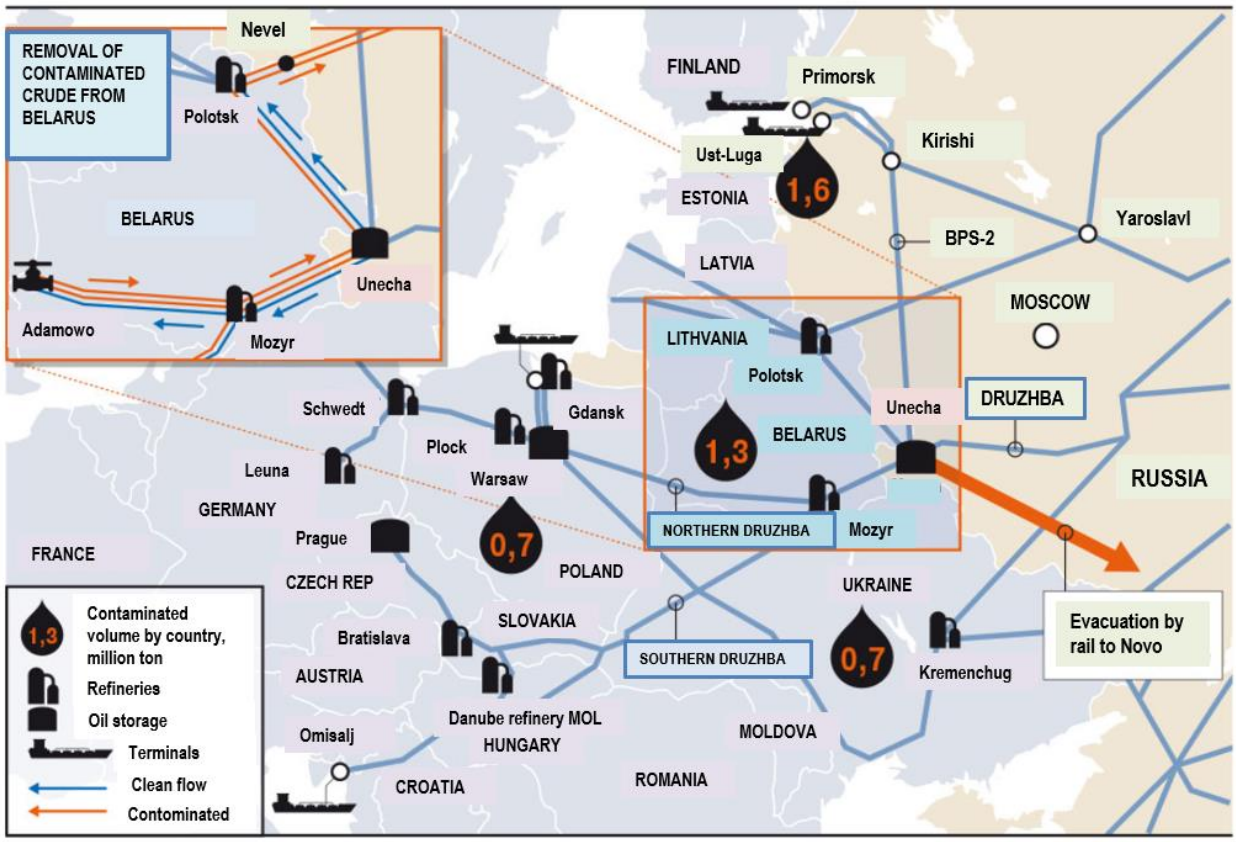
Note: ppm = parts per million.
Source: Author, based on reports by Transneft and Russia's Energy Ministry.

The big clean-up

There is no easy way to remove chlorides from crude oil. Instead, the contaminated oil can be gradually diluted with 'clean' crude to reach the required specification levels. In order to bring clean crude, the flow in the pipeline must be restored. But to do that the 'bad' crude must first be removed from the system and stored at tank farms. Where this is not possible, it has to remain in the sections of the pipeline that can be used as temporary storage.[5] Different sections of the Druzhba pipeline required different solutions for the clean-up, depending on the ease of arranging on-spec oil flow and the availability of storage tanks (Figure 2).

[5] The Druzhba pipeline system has two or three parallel pipeline strings at its different sections running in the same corridor.

Figure 2: Contaminated crude in the Druzhba system and its clean-up



Source: Kommersant.

BPS-2. The BPS-2 pipeline, the northbound spur of Druzhba that bypasses Belarus, was also affected by chloride contamination. Oil supplied via BPS-2 is delivered to the Russian Baltic seaport of Ust-Luga and loaded onto tankers. According to the schedule published by Argus, the loading of tankers at Ust-Luga was non-stop during April, one tanker per day, a total of 30 for the whole month, most of them 100,000-tonne vessels. Total oil exports in the month of April from Ust-Luga amounted to 3 million tonnes, according to Argus data. Russia's business daily *Kommersant* estimated the total amount of contaminated crude shipped from Ust-Luga in April–May at 1.6 million tonnes, based on interviews with Transneft officials.[6] From a technical point of view, the cleaning up of BPS-2 was straightforward, owing to the opportunity to load contaminated crude onto oil tankers at Ust-Luga and thus completely remove the contaminated volumes from the system. Between 19 April (when the crisis unfolded) and 10 May (when crude quality at Ust-Luga was brought back to normal) at least 21 cargoes of off-spec crude with varying levels of organic chlorides (from 150 ppm to 80 ppm and then progressively declining) were shipped from Ust-Luga. It is likely, however, that contaminated oil was also in the tankers that were shipped before 19 April. Argus reported that about 20 seaborne cargos holding about 1.4 million tonnes have been rejected by buyers due to contamination and have been moored as temporary floating storage. Some tankers reloaded their off-spec crude onto larger carriers that could go to China and South Korea.

Belarus sections. Cleaning up the pipelines in Belarus was the most difficult part of the operation because both Northern and Southern branches of the Druzhba pipeline had been shut down. In Belarus the Northern branch goes from Mozyr to Adamowo at the Belarus-Poland border and then on to refineries in Poland and Germany. It has three pipeline strings running in the same corridor. Polish pipeline operator PERN suspended the flow to Poland on 22 April. The only option was to push the

[6] www.kommersant.ru/doc/3984166?from=main_1.

contaminated crude back to Russia. At the same time it was necessary to ensure some crude supply for Belarusian refineries. The key difficulty was the limitation on tank farm capacity that could be used to store the contaminated volumes. The section from Unecha to the Mozyr refinery was cleaned first by putting the contaminated volumes into storage tanks at the refinery and at Unecha rail station. Rail cars were employed to evacuate contaminated oil from Unecha and take it to the port of Novorossiysk on Russia's Black Sea coast for subsequent dilution. Once one string of the pipeline from Unecha to Mozyr was cleaned up and the flow of on-spec crude towards the refinery resumed, the oil tanks at the refinery were cleaned, which in turn allowed cleaning of the section from Mozyr to Adamowo to start. One string of the pipeline was delivering clean crude to Adamowo, which it was then used to push contaminated crude from two other strings from Adamowo back to Unecha. This was the most difficult part of the process and lasted for almost six weeks.

Southern Druzhba. Dealing with tainted crude in the southern leg of the system was similar to the procedures described above, but much easier to implement due to cooperation between Belarus and Ukraine and the availability of empty storage facilities in Ukraine. For the Ukrainian petroleum pipeline operator, Ukrtransnafta, the crisis presented an opportunity for additional earnings.[7]

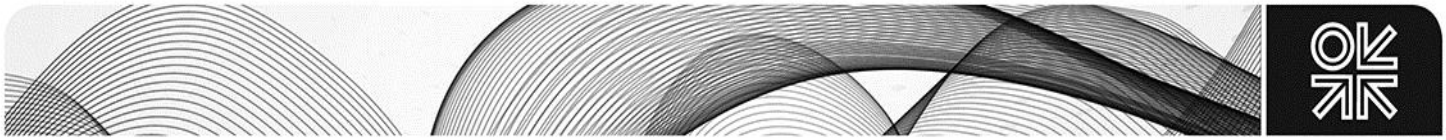
The issue of compensation

The technical cleaning up of the system may prove to be the easy part. Dealing with the commercial repercussions might prove to be much more challenging. The complication comes from the dispute over determining the amount of contaminated crude and the fact that Transneft does not have direct contractual relationships with crude buyers. Transneft recognized its fault in allowing the contaminated crude to enter its system and has offered the affected parties an out-of-court settlement and compensation (yet to be calculated and agreed). If, however, the parties fail to agree and instead decide to go to court, the legal process and the payment of compensation may drag on for years, owing to the long chain of redress claims from several parties and the possibility to appeal against court decisions at each stage of this process.

Vice president of Transneft Sergey Andronov, in his interview with *Kommersant* on 30 May, gave a rare account of the company's position with regard to the Druzhba incident. According to Andronov, the total volume of contaminated crude delivered to 'Far Abroad' (excluding tainted oil in Belarus, which is traditionally referred to as 'Near Abroad') amounted to about 3 million tonnes.[8] Of these, about 1.6 million tonnes were shipped from the port of Ust-Luga as cargos on oil tankers, 0.7 million tonnes were destined for the refineries along the Southern Druzhba in Hungary, the Czech Republic and Slovakia (these were instead put in temporary storage, mostly at tank farms in Ukraine), and about 0.7 million tonnes were delivered via Northern Druzhba to Adamowo for refineries in Poland and Germany.[9] For these delivered volumes, Transneft is going to offer the buyers an out-of-court settlement and compensation. No details were given regarding the amounts of compensation, but Transneft suggested that the payments would cover the costs associated with marketing the tainted crude (for storage and dilution to the required specifications), but not the opportunity cost for the refineries for the lower runs resulting from possible supply reduction.

The compensation also depends on the particularities of the export points. For the oil cargos shipped from Ust-Luga, traders who bought the crude would need to find customers – large refiners with storage capacity and a willingness to invest in diluting the tainted crude. The discounts sought by potential buyers prepared to undertake these operations have been reported at $10–20/bbl to benchmark North Sea Dated. The losses incurred by the Russian exporters within the logistical value chain to offload the

[7] https://kosatka.media/en/category/neft/news/ukrtransnafta-i-transneft-obsudili-kompensaciyu-rashodov-za-vytesnenie-nekondicionnoy-nefti.
[8] www.kommersant.ru/doc/3983602?from=doc_vrez.
[9] Andronov stated that according to the title transfer protocols, the total of 690,500 tonnes of contaminated crude was delivered to Poland at Adamowo before PERN suspended the flow. Polish sources gave much higher numbers for contaminated volumes, about 1.3 million tonnes.



'bad' crude will be ultimately passed on to Transneft for compensation. It is quite likely that the oil might be reloaded onto larger vessels and sent to Asia for dilution.

Additionally, about 1.3 million tonnes of contaminated crude from the Belarusian sections of the Druzhba system are being pushed back to Russia. This process has been ongoing since April, but has not been number one priority due to the necessity first to resume the supply of clean crude to all European clients. As of 11 June, according to Belneftekhim, the Belarusian state petroleum conglomerate, 760,000 tonnes of contaminated crude – or 58% of the total amount – still remain in Belarus.[10] Russia has resumed supplies of on-spec crude to the Mozyr refinery, but supplies to the Naftan refinery near Polotsk remain constrained. Apparently, the contracts between the refineries in Belarus and the Russian suppliers do not contain firm monthly schedules for deliveries, but merely outline the total annual volumes that Belarus would receive. Thus, if Russia manages to catch up with deliveries of 'clean' crude to Belarus in place of the removed volumes during the remainder of the year, it should end up paying relatively small compensation to Belarus, mostly for the damage to the equipment at the Mozyr refinery.

A stress-test for the European oil supply system

One of the main lessons from the incident – the first on such a scale in the Druzhba pipeline's 50-year history of oil deliveries to Europe and Transneft's 27 years as operator of the Russian pipeline network – is that the European oil supply system proved to be resilient to a disruption in one of its largest sources of supply. The usage of crude oil that refineries usually hold for emergencies and the timely discharge of strategic petroleum reserves by some countries ensured that the refineries continued to work, and the final European customers were not affected by the interruption. In large part, the resilience of the system is testimony to the operational effectiveness of the European technical infrastructure and policies aimed at building and maintaining emergency stocks.

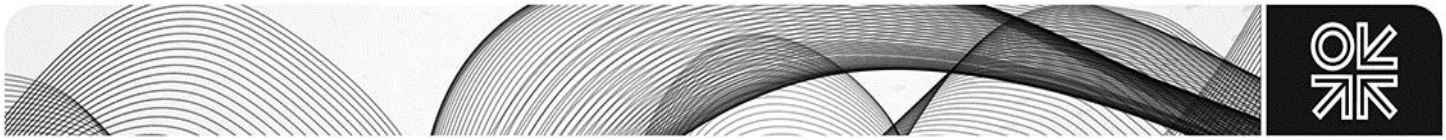
Hard lessons for Russia

The criminal investigation of the incident has led to the arrest of eight people to date, including four employees of Transneft Druzhba, the Samara subsidiary responsible for this section of the pipeline. Two more people have fled abroad and international search warrants for them have been issued. According to the investigation (which is continuing), the injection of the crude contaminated with chlorides into the oil tanks at a small private crude oil collection point in the Samara region was performed in order to 'compensate' for the theft of on-spec crude from the oil storage tanks there, which had been going on for months. The scale of the contamination suggests massive theft. The contaminated crude was then delivered to a larger collection point controlled by Transneft at Lopatino and ended up in the Druzhba pipeline. At the same time, it was reported that the paperwork for the period 8–19 April, including the results of the tests for quality on the crude oil at Transneft's entry point, were 'in good order', suggesting that no actual tests were performed and the papers were simply rubber-stamped. Two of the four arrested Transneft employees were the managers who put their signatures on the acts of acceptance with forged test results, and the other two were working at the Transneft oil collection station from where the contaminated crude was injected into the pipeline.

The crisis exposed important weak links in the Russian system of control over the quality of produced crude oil and over the system of crude oil quality checks at Transneft. These are as follows:

- **The use of organic chlorides to enhance oil recovery (EOR) in Russia.** The substance that 'poisoned' the crude oil in the Druzhba pipeline was identified as dichlorethane, a powerful solvent. It is used to enhance oil recovery by some oil producers, especially for crude with high paraffin content, which is quite common in the fields operated by Bashneft in the Volga region (Bashneft is now part of Rosneft). The practice of using organic chlorides for EOR was quite widespread in the old oil-producing province of Volga-Urals at the end of 1990s. But the rising content of organic chlorides in the crude mix that was supplied to domestic refineries resulted

[10] www.belneftekhim.by/press/news/a3f11c348b60de2a.html.



in corrosion and damage to the refining equipment.[11] After several major incidents, the use of organic chlorides to enhance oil recovery in Russia was banned in 2001.[12] In 2012, however, this earlier regulation was repealed,[13] and the use of organic chlorides for EOR resumed. At the same time, the state standard allowed 10 ppm concentration of organic chlorides in crude oil. Articles in industry journals suggested that refining equipment was again experiencing damage from chlorides in oil (one article published in 2015 in the journal *Khimisheskaya Technika* raised alarm over the rising chloride content in Russian refineries' crude diet and gave examples of the resulting damage at the Yaroslavl and Moscow refineries that occurred in 2014).[14]

- The criminals who injected tainted crude into the Transneft system apparently had access to off-spec crude with high concentrations of dichlorethane, possibly the 'leftovers' stored by some producers as non-marketable product.[15] Now, after the Druzhba incident, the process of using organic chlorides for EOR in Russia should be better controlled, if not banned altogether. Also, controls over proper utilization of the contaminated crude after EOR should be introduced.
- **Chaotic ownership of the network of oil collection points: Should Transneft control them all?** The contamination of the pipeline system started at a small crude oil collection and metering point (*uzel ucheta nefti* or UUN in Russian) that belongs to a private company. The management of this company is now under arrest. There are 303 UUNs in Russia, of which 237 deliver crude oil to the oil pipeline system.[16] In this latter category only 85 larger UUNs with greater oil tank storage capacities belong to Transneft, while 152 belong to private operators. Soon after the incident Transneft introduced tough and more frequent crude quality checks at all its UUNs. In particular, Transneft started performing tests for organic chloride content daily instead of once every ten days, as is required by the current Russian regulations. At the same time, Transneft said that it could not make the private operators of UUNs follow suit and does not have the legal right to inspect these private facilities.
- The incident highlighted the risk of procedural violations, negligence and direct forgery of documents at UUNs, but it is noteworthy that in the case of the Druzhba contamination both the small private UUN in the Samara region and the larger collection point at Lopatino that belongs to Transneft have been accused of wrongdoing. As a solution to the potential problem Transneft head Nikolay Tokarev has already proposed that his company takes control of all private UUNs.[17] The additional cost of properly organizing chemical laboratories at the UUNs and the cost of higher-frequency testing would be likely to end up inflating the regulated tariffs for petroleum transport and result in cost inflation for Russian oil companies. The irony of the situation is that Transneft is probably going to come out of the crisis with greater powers and leverage.
- **The system of risk management and control at Transneft.** In Transneft's latest available annual report (for 2017), more than six pages describe the system of risk management employed by the company and the procedures it implements at managerial and board levels to control these risks.[18] But among the main risks that Transneft management tracks and assesses – including fiscal, exchange rate, terrorism, change of state regulation, and power

[11] At high temperatures (above 200°C) during the process of hydrotreatment of crude, chlorides start a chemical reaction with hydrogen and form hydrochloric acid, which severely corrodes metal.
[12] Russia's Ministry of Energy Order #294 of October 2001.
[13] Russia's Ministry of Energy Order #218 of 5 May 2012. It is noteworthy that this order was signed by the outgoing Energy Minister Sergey Shmatko one week prior to his departure, and some commentators suggested that lobbying by some interested party was involved.
[14] https://chemtech.ru/analiz-problem-svjazannyh-s-obrazovaniem-otlozhenij-v-processah-pererabotki-nefti-i-rostom-korrozionnogo-iznosa-oborudovanija-na-npz/.
[15] Pure dichlorethane sold in the market as chemical solvent is ten times more expensive than crude oil, so it would make no sense to replace the earlier stolen crude with it.
[16] Most others serve the oil transport logistics chains for crude oil moved by rail and river.
[17] www.rbc.ru/business/06/06/2019/5cf8f7d19a79473d53321fe6.
[18] Transneft Annual Report, 2017, www.transneft.ru/u/section_file/32761/20180911_book_eng.pdf.

supply outages – the risk related to crude oil quality is manifestly absent. Transneft has a detailed administrative procedure on tracking the risks that are out of its control, but does not even mention the risk that it could and should control – the risk to the quality of the crude oil that it transports and is contractually responsible for. As a result, the Transneft management and board of directors spend a tremendous amount of time looking at the risks they have no way to influence, but none focusing on what has turned out to be the greatest risk to Transneft's finances and reputation: the failure of its quality controls at the operational level and the injection of contaminated crude into the system.

Conclusion

While the worst of the crisis is over, it is by no means the end of the story. There is little doubt that in the aftermath of the incident European refineries and policy makers will focus on security of supply issues, including options to diversify away from Russian crude. The issue of compensation for the oil contamination in the Druzhba system may become highly contentious. Any changes to Russia's domestic oil pipeline regulation along the lines of greater control and more checks may increase costs for Russian oil producers at a time when their low-cost legacy is already expiring. It is not the beginning of the end, but merely the end of the beginning. OIES will continue to monitor and report on this important incident.