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### PETROCHEMICAL



# OAO LUKOIL'S Petrochemical complex

ZAO LUKOIL-Neftehim was created in 1997 to effectively manage LUKOIL's petrochemical assets. The new structure was established to improve business performance in the sector, decrease unilateral dependence of OAO LUKOIL upon the fuel markets and increase the volume of high-value-added products. Today LUKOIL supplies its petrochemical production facilities with hydrocarbon raw stock, while LIKOIL-Neftehim provides the Company's enterprises with phenol, polyethylene and other products used in oil production and refining.

LUKOIL-Neftehim Group owns the largest production enterprises in Russia and Eastern Europe and is a recognized leader in numerous specialized areas. The Company supplies chemical products to a significant portion of the Russian market and exports it to over 50 countries. LUKOIL's petrochemical complex is the leading national producer of ethylene, benzene, propylene, phenol and polyethylene today.

The overall volume of commercial output of OAO LUKOIL's petrochemical companies in 2007 reached 2,041 ths tn. All of the companies are effectively adopting modern technologies and using the best practices and high professional expertise. As a result, all of the Company's facilities produce high-quality petrochemical products on a solid and stable basis.

The structure of LUKOIL-Neftehim includes:

- ZAO LUKOIL-NEFTEHIM (MOSCOW) the Group's managing company;
- OOO STAVROLEN

(Budennovsk, Stavropol Territory) – the largest producer of high density polyethylene, and, starting from 2007 – the largest producer of modern polypropylene grade;

#### OOO SARATOVORGSINTEZ

(Saratov) – the sole acrylonitrile producer in Russia and the largest one in Eastern Europe;

- OOO KARPATNEFTEHIM (Kalush, Ivano-Frankovsk Region, Ukraine) – the largest national petrochemical company, polyethylene and vinyl chloride producer;
- 000 VARS

(Ventspils, Latvia) – specializes in storage and transshipment of liquid chemical products from railway transport to sea transport.

Since March 2007 LUKOIL-Neftehim and OAO SIBUR Holding control POLIEF, the largest Russian polyether complex.

### **000 STAVROLEN**

000 STAVROLEN IS A CITY-FORMING COMPANY IN BUDENNOVSK (STAVROPOL TERRITORY). IT CURRENTLY EMPLOYS OVER 3,000 PEOPLE. The company is one of the major national high density polyethylene producers.

THE MAIN PRODUCTS OF THE COMPANY INCLUDE PROPYLENE, BUTYLENE-BUTADIENE FRACTION, BENZENE, VINYL ACETATE, AND, STARTING 2007 ALSO POLYPROPYLENE. THIS UP-TO-DATE PETROCHEMICAL COMPLEX IS ONE OF THE MOST HIGHLY TECHNOLOGICAL AND DYNAMI-CALLY DEVELOPING COMPANIES IN THE INDUSTRY. STAVROLEN HAS A GOST QUALITY MANAGEMENT SYSTEM IN PLACE. THE PRODUCTION PROCESS IS BASED ON IMPLEMENTING NEW TECHNOLOGIES, AND THE EQUIPMENT COMPLIES WITH THE MOST RIGID QUALITY, ENERGY EFFICIENCY AND ENVIRONMENTAL SAFETY REQUIREMENTS FOR PRODUCTS. STAVROLEN IS CONTINUOUSLY WORKING ON EXPANDING ITS PRODUCT MIX IN ORDER TO SATISFY THE CONSUMER'S DEMAND.



#### HIGHLIGHTS IN OAO STAVROLEN'S HISTORY:

**JANUARY 1981.** Stavropolpolymer plastic plant was put into operation. The plant's key facilities were a pyrolysis unit and a low pressure polyethylene production line. The first products were manufactured.

**1987.** Commissioning of the USSR's largest vinyl acetate production facility. The first millionth ton of polyethylene was produced.

**1991–1992.** Reconstruction and upgrading of the pyrolysis and polyethylene production facilities to increase ethylene output to 350 ths tn/year, and that of polyethylene to 300 ths tn/year.

**1992–1997.** It was a difficult time for the enterprise resulting from political instability in the area. As compared to 1990 the refining volumes decreased by 8 times. Therefore the overall time of the refinery's operation in 1997 was only 50 days.

**1998.** LUKOIL-Neftekhim purchased OAO Stavropolpolimer. After the refinery's reconstruction, OOO Stavrolen was established. Large-scale repair work, increase in circulating assets, uninterrupted supplies of raw stock and development of social and charity programs.

**1998-2000.** Consistent growth of production output and production efficiency. Over 250 ths tn of polyethylene was produced in 2000.

**2001–2003.** The three millionth ton of polyethylene was produced. Stavrolen became a prize-winner of the All-Russian contest '1,000 Russian Enterprises of the Twenty-First Century'. The Company became prize-winner in the '100 Best Russian Products' contest for a number of years. It was awarded the 'Silk Road' prize for the high quality and competitive products exported abroad, a prize awarded by the Panel of the Russian Chamber for Trade and Commerce for its substantial contribution into development of Stavropol Territory economy.



**2004.** Certificates of conformity of OOO Stavrolen's quality management system with the requirements of ISO 9001:2000 (GOST R ISO 9001-2001), issued by SGS Swiss certification corporation and Russian certification corporation.

**2005.** The refinery once again became a prize-winner in the '100 Best Russian Products' contest for its propylene products. Construction of the 120 ths tn/year polypropylene production facilities was resumed. As a result of application of the technologies developed by DOW Chemical (US), the new enterprise was able to offer the largest possible product mix.

**2006.** For its rigorous compliance with the state standards and regulations, the refinery was awarded a 'Golden Standard' prize and once again became a prize-winner in the '100 Best Russian Products' contest.

**2007.** Commissioning of the polypropylene unit with the designed capacity of 120 thstn/year. The economic impact from this new unit is expected at 130 mln USD. The overall volume of Stavrolen's marketable products in 2007 totaled 753 ths tn.



## **000 SARATOVORGSINTEZ**

000 SARATOVORGSINTEZ IS RUSSIA'S ONLY PRODUCER OF ACRYLONITRILE. THE REFINERY IS ONE OF FOUR EUROPE'S TOP ENTERPRISES IN TERMS OF PRODUCTION OF THE AFORE-MENTIONED PRODUCTS. THE ENTERPRISE CURRENTLY EMPLOYS 3,900 PEOPLE. THE REFINERY'S PRODUCTS ARE USED AS RAW MATERIALS FOR FURTHER SYNTHESIS OF PLASTIC, PLEXIGLASS, UNVULCANIZED RUBBER AND HAS FOUND APPLICATION IN MEDICINE, LIGHT INDUSTRY, AGRI-CULTURE AND CONSTRUCTION INDUSTRY.

Saratovorgsintez produces acrylic fiber and tourniquet and is the national leader in terms of methyl methacrylate and acetone cyanohydrin production. The enterprise accumulates 50% of Russia's methyl methacrylate production capacity. It is the only Russian producer of acrylic fiber consumption of which in the Russian market in 2006 totaled 20 ths tn, out of which 12 tn was produced by OOO Saratovorgsintez.

In 2007 the enterprise completed construction of its sodium cyanide unit with the capacity of 15 ths tn/year; the unit was put into operation in the first quarter of 2008. Sodium cyanide production is based on DuPont technology which is known for its reliability and safety. Sodium cyanide is used in gold-mining to remove noble metals from ore rock. The existing Russian mining industry's demand which is 20 ths tn/year is almost fully satisfied through imports. The economic impact of operating the new unit is estimated to be 20 mln USD.

#### HIGHLIGHTS IN 000 SARATOVORGSINTEZ' HISTORY:

**1957.** Establishment of Nitron refinery which specialized in production of synthetic ethanol, i.e. raw stock for synthetic rubber production.

**1960–1970.** Large-scale upgrading of the refinery, introduction of new equipment and construction of new process units. As a result, the enterprise became one of the country's leading chemical plants and produced acrylonitrile, synthetic nitron fiber, phenol, acetone, methyl methacrylate and acetic acid.

**Early 90s - mid 90s.** A dramatic reduction in the plant's output. In 1997 the enterprise produced its key types of products in the volumes which constituted only 15-30% of its designed capacity and in 1998 the plant operated only 20 days, in other words, did not operate at all.

**May 1999.** Nitron plant passed into ownership of OOO Saratovorgsintez. It took four months of repair work and investments to bring the enterprise back to its operating mode: in October 1999 the plant started to operate again.

**2001-2002.** The average utilization of the plant's capacity made up 95% and phenol-acetone and methyl methacrylate facilities were fully loaded. Saratovorgsintez became a prize-winner in the '100 Best Russian Products' contest and was awarded a prize of Chimexpo show for the quality of acryloni-trile produced.

**2005.** It was for the first time since 1978 that the plant had produced 150 ths tn of acrylonitrile. The ceremony of laying the first stone of the future sodium cyanide unit took place.

**2006.** Construction of the sodium cyanide unit is underway. Contract signed with ZAO GRASIS for delivery of a membrane nitrogen unit.

**2007.** The overall volume of Saratovorgsintez' products totaled 274 ths tn.







## **000 KARPATNEFTEKHIM**

000 KARPATNEFTEKHIM IS A HIGHLY DEVELOPED COMPLEX IN KALUSH (IVANO-FRANKOVSK OBLAST, UKRAINE) THAT EMPLOYS ABOUT 7,000 PEOPLE. THE COMPANY IS ONE OF THE LARGEST UKRAINIAN PRODUCERS OF CHEMICAL AND PETROCHEMICAL PRODUCTS (CHLORINE, SODIUM HYPO-CHLORITE, AND PROPYLENE), THE ONLY PRODUCER OF ETH-YLENE, BENZENE AND HIGH DENSITY POLYETHYLENE, AND THE LEADER IN TERMS OF SALES OF CAUSTIC SODA.

#### HIGHLIGHTS IN 000 karpatneftekhim's history:

**1965.** The first production complex of Kalush integrated chemical plant was brought into operation.

**1973–1975.** Production of chlorine, caustic soda, and monomer vinyl chloride. The integrated plant was renamed Khlorvinil production association.

**1980.** Khlorvinil production association was awarded its first international prize 'Golden Mercury' for its successful exports.



**1991–1996.** After its reconstruction the plant became one of Europe's largest vinyl chloride producers.

**1998**. The output of low-pressure polyethylene reached 100 ths tn/year.

**2000.** ZAO LUKOR was registered. Top priority repair-andrenewal operations followed by commencement of production of olefins (ethylene and propylene), polyethylene and monomer vinyl chloride.

**2001–2002.** Poliolefin plant was commissioned after its workover and chlorvinyl production began. It was for the first time in 10 years Poliolefin's performance in terms of pyrolysis feedstock processing was at its highest. The resultant output totaled 73 ths tn.

**2003–2004.** LUKOR was awarded the International Platinum Quality Star. The enterprise signed an agreement with Linde (Germany) that provided for construction of a C4/C5 hydrogenation unit at Poliolefin plant. LUKOR and LUKOIL Chemical establish OOO Karpatneftekhim.

**2005.** Construction and commissioning of the C4/C5 hydrogenation unit with the capacity of 90.7 ths tn/year. LUKOIL-Neftekhim and UHDE GmbH (Germany) entered into an agreement on construction of a chlorine and caustic soda unit and signed a memorandum of understanding with regard to construction of a suspension polyvinylchloride production unit.

2006. The ceremony of laying the first stone of the new chlorine and caustic soda plant with the capacity of 200 ths tn/ year (caustic). The plant will also use membrane technology.
2007. The overall volume of OOO Karpatneftekhim's marketable products totaled 629 ths tn.



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### PROSPECTS OF FURTHER DEVELOPMENT

LUKOIL-NEFTEKHIM PLANS TO ACTIVELY DEVELOP ITS SUBSIDIARIES, COMPLETE THE PROJECTS THAT ARE BEING IMPLEMENTED AND IMPLEMENT NEW ONES.

**Stavrolen** plans to install a new polyethylene compounding line equipped with up-to-date equipment produced by Kobe Steel (Japan) which is to considerably improve the quality of its polyethylene grades that are in conformity with the global standards. Project investments will come to around 18.3 mln USD. In 2013 Stavrolen plans to start production of ethylene and its derivatives from the raw stock supplied from the Caspian fields. It also plans to start production of ethylene, polyethylene and ethylene glycols with their volumes making up 600, 450 and 200 ths th/year respectively.

**Karpatneftekhim** intends to build a 300 ths tn/year unit for the product in demand, i.e. suspension polyvinylchloride, made from poorly marketable monomer vinyl chloride, which is to improve the enterprise's economic performance. The unit is to be commissioned in the third quarter of 2009.

The Company also intends to construct a membrane electrolysis unit (HiK-2) using a cutting-edge technology which would increase the annual capacity to 200 ths tn of caustic soda and enable it to produce caustic and chlorine in compliance with the global quality standards.

Regular upgrade of its production facilities makes it possible for LUKOIL-Neftekhim to produce competitive high quality products fully compliant with the global standards.

