Veolia to Supply Wastewater Treatment Plant at Saudi Aramco Jazan Refinery

Veolia Water Technologies has been chosen by contractor Tecnicas Reunidas to engineer and procure a wastewater treatment plant for the Jazan Refinery and Terminal in Saudi Arabia. Jazan Refinery and Terminal, wholly-owned and operated by Saudi Aramco, is a new refinery and terminal in the Kingdom’s southwest with an expected capacity to process 400,000 bpd of Arabian Heavy and Arabian Medium crude once commissioned in 2017.

The Jazan complex will feature a power plant with a total capacity of 4,000 MW. Veolia will engineer and procure a wastewater treatment facility for the power plant, which will feature biological treatment, oily water treatment and metal removal treatment. The facility will be commissioned in 2017.

The 1,000 m³/h biological treatment package will include state-of-the-art Veolia proprietary technologies such as AnoxKaldnes™ Moving Bed Biofilm Reactor (MBBR), Actiflo® and Multiflo™ high-rate clarifiers and Hydrotech™ Discfilters. Oily water treatment will be achieved by combining two Veolia technologies developed specifically for the Oil & Gas market: the MPP TiPSS Tilted Plate Interceptor (TPI) and the Whittier Power Clean® technology, which is a nutshell filter media, designed for effective removal of oil and suspended solids. Finally, Multiflo and various chemicals will be used in the third treatment step to remove metals. The deoiling and metal removal treatment steps will both have a capacity of 550 m³/h.

Saudi Aramco is the state-owned oil company of the Kingdom of Saudi Arabia and a fully integrated, global petroleum and chemicals enterprise. Vincent Caillaud, CEO of Veolia Water Technologies Oil & Gas, said: “Veolia is privileged to have a long-standing relationship with Saudi Aramco, built on our strong local presence and technological excellence. We are very happy to have been chosen by and to collaborate with Tecnicas Reunidas on this major project which will help meet the Kingdom’s energy demand and also export high-value fuels to international markets.”
Veolia’s Water Treatment Module Selected for Woodside FPSO

Experience in Saudi Arabia

With operations in Saudi Arabia for more than 30 years, Veolia operates city water management, waste and cooling urban network services. In 2008 in particular, the Group won a contract with National Water Company (NWC) to improve the overall performance of the water and wastewater services used by nearly 6 million people in the Saudi capital, Riyadh. This project greatly improved the drinking water network performance, connected more than 100,000 households to the sewerage system, and improved customer management.

Particularly involved in desalination projects in the Kingdom, Veolia also supports numerous industrial customers, especially in the oil, gas and mining sectors, to help them improve their environmental performance. Veolia has worked on several projects for Saudi Aramco, including a desalination plant which supplies the Sadara petrochemical complex built by Dow Chemical and Saudi Aramco in Jubail City. Veolia’s specialized subsidiary SIDEM, present in Saudi Arabia since 1979, has also built the desalination plant for the city of Al Khobar in the Eastern Province, near the Arabo-Persian Gulf. In 2010, Sidem had already built in Jubail City one of the largest and most efficient desalination plants in the world. This 800,000 m³ per day capacity plant uses Veolia’s multiple-effect distillation (MED) process, which consumes three times less energy than rival processes.

Veolia Water Technologies has been awarded a multi-million dollar contract by Aibel Singapore on behalf of Woodside Petroleum Ltd. for the supply of the Customized Water Flood (CWF) water treatment system on the Ngujima-Yin Floating Production Storage and Offloading (FPSO) facility that will operate in Woodside’s Greater Enfield Area Development fields, offshore northwest Australia. This is the first award to Veolia from Aibel Singapore and Woodside and also the first use of sulphate removal in Australia.

The Ngujima-Yin FPSO is a 332-meter double hulled tanker built in 2000 and converted into an offshore production facility to produce oil from the Vincent oil field. Once separated from gas and water, crude oil extracted from the reservoir is exported from the FPSO onto trading tankers.

The award is for the design, equipment procurement and supply, and construction as a single lift integrated process module, incorporating coarse filtration, ultrafiltration (UF) pretreatment, sulphate removal process (SRP), vacuum deaeration, dual fuel turbine driven water injection pump, electrical switchgear and transformers, and plant control room. The system water injection capacity is 12,720 m³/day (80,000 BWPD), with a turndown capacity to 8,745 m³/day (55,000 BWPD).

The heart of the system is the specialized SRP membrane process that is designed to remove sulphates and other divalent hardness ions from injection water used in enhanced oil recovery water flood operations. The removal of these ions reduces the tendency of barium sulphate and strontium sulphate scale to form in the reservoir and flowlines, plus prevent well souring by controlling sulphate-reducing bacteria.

Veolia is the world leader in the supply of offshore sea water injection treatment packages. The company has an impressive reference list in upstream water treatment applications and will utilize this unique experience in the project management and engineering of the Greater Enfield CWF module.
Veolia’s HPD® Evaporation and Multiflo™ Softening Chosen for Dow Pittsburg Facility

The Dow Chemical Company has awarded Veolia Water Technologies a contract for a total overhaul of the process water treatment plant at Dow’s Pittsburg Operations facility in California. The technologies chosen were Veolia’s proprietary Multiflo™ for softening and HPD® MVR Evaporators.

Dow has been investigating the replacement of an existing process water treatment system at its Pittsburg facility as the current system has come to the end of its life cycle.

The first stage of this new Veolia system is the Multiflo™ process. This is a high rate chemical softening technology which features a modular multi-stage softening design that reduces installation costs. It is also more resistant to process upsets than a conventional reactor or clarifier system.

The feed to the process water treatment system exhibits seasonal variations in flow and composition. The plant has existing tankage to provide buffer capacity to moderate variations in softener feed flow. In order to accommodate the specified flow variation, two HPD® Evaporators were proposed, each with the capacity to accommodate 50% of the maximum design flow rate. These two evaporators used after the softening process use a Mechanical Vapor Recompression (MVR) configuration.

These HPD® MVR Evaporators enable a high quality recovered water stream to be produced and utilized as makeup water for the upstream processing facility on site. This is especially important to Dow due to the location of the plant.

Veolia Water Technologies, Inc. CEO, Klaus Andersen, explained: “California’s water scarcity means water restrictions are quite common for many industrial operations. The solution that Veolia put forth will reduce the overall amount of water used by the facility and thus reduce its environmental impact. Long term, it will also be more economical for Dow.”

About Dow

Dow (NYSE: DOW) combines the power of science and technology to passionately innovate what is essential to human progress. The Company is driving innovations that extract value from material, polymer, chemical and biological science to help address many of the world’s most challenging problems such as the need for clean water, clean energy generation and conservation, and increasing agricultural productivity. Dow’s integrated, market-driven, industry-leading portfolio of specialty chemical, advanced materials, agrosciences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 180 countries and in high-growth sectors such as packaging, electronics, water, coatings and agriculture. In 2015, Dow had annual sales of nearly $49 billion and employed approximately 49,500 people worldwide. The Company’s more than 6,000 product families are manufactured at 179 sites in 35 countries across the globe.

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New Wastewater System Enables World-Class Water Quality and Production Cost Reduction

The Petron Bataan Refinery (PBR) is the largest integrated crude oil refinery and petrochemicals complex in the Philippines. Located in Limay, on the southeastern side of Bataan, PBR processes crude oil into a full range of petroleum products including gasoline, diesel, liquefied petroleum gas (LPG), jet fuel and kerosene. PBR also produces petrochemical feedstock, benzene, toluene, mixed xylene and propylene.

PBR wanted to expand production to process 180,000 bpd of crude oil while changing its feedstock from Arab Light to less costly heavy and sour crudes. The process changes required a new wastewater treatment plant to handle the new effluent characteristics that would result from these changes. Daelim Industrial Co. Ltd. contracted Veolia to provide the water treatment facilities for the refinery as part of its expansion project known as RMP-2.

Veolia Water Technologies developed a compact process to meet the needs of the Bataan Refinery while minimizing the cost without affecting the performance of the plant and complying with the stringent water quality standards for discharge into Manila Bay. In this compact plant, Veolia’s proprietary technologies included Tilted Plate Interceptors for free oil separation, an AnoxKaldnes™ BAS (biological activated sludge) system and Hydrotech™ discfilters for final treatment before discharge. The gravity flow design of the 700 m³/h system will ensure availability and save energy throughout the life of the plant.

**How It Works**

The wastewater treatment plant consists of primary, secondary and tertiary treatments: The primary treatment is to adjust pH and remove oil/suspended solids contents. The secondary treatment removes the organic pollutants by using the AnoxKaldnes™ BAS (biological activated sludge) system. Tertiary treatment consists of the Hydrotech™ discfilters and UV disinfection systems. The treated effluent is routed directly to Manila Bay.

Excess bio-sludge and oily sludge cakes generated from wastewater treatment plant are disposed in a landfill after further treatment by a third-party contractor. All gaseous wastes (overhead of oily systems) are treated in a volatile organic compound (VOC) system that treats 5,000 Nm³/h, and a deodorization package is provided to treat potential odors from the sludge treatment processes.

**Additional Benefits**

The plant also provides a number of additional benefits to the refinery, including:

- The Veolia design enables the waste oil recovery at high quality, with more than 70% oil content in the recovered oil.
- All primary treatment equipment is fully covered, prohibiting any VOC emissions into the atmosphere and thus increasing operator safety at the plant.
- The treated water meets stringent international standards for discharge into the environment. COD is consistently reduced from 4,600 ppm to <60 ppm, oil from 1,300 ppm to <0.5 ppm, and phenol from 190 ppm to <0.05 ppm.

**The End Result**

Veolia provided to Petron a plant that fully meets stringent international standards of the water treatment industry. It is a user-friendly and easy-to-operate plant with reliable performance and multiple mitigation paths to accommodate influent variation and off-specification refinery production.