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THE ESTABLISHMENT AND PILOT OF HSE STANDARD STATION CONSTRUCTION IN PETROLEUM ENTERPRISES[1]

Wang Yongwei[1], *Kang Xuejuan*[1], *Pan Chen*[2]. (1. *PetroChina Dagang Petrochemical Company*, *Tianjin*, 300208; 2. *PetroChina Qinghai Oilfield Company*, *Xi'an*, *Shaanxi*, 710016)

Abstract: In the culture of health, safety and environmental system, HSE standard station construction is a relatively new concept in petroleum industry. It standardizes various production management processes based on the existing production system and establishes standard procedures of all the management and technical requirements according to their own needs so as to enhance safety and optimize production efficiency. This paper shows the role of this new safety culture by presenting the specific work and achievements of the HSE standard station construction process.

Key words: Oil production; HSE; Standard station; Safety culture

HSE MANAGEMENT OF LIQUID AMMONIA IN A DESALTED WATER STATION[5]

Fang Jinxiang. (*SINOPEC Yizheng Chemical Fiber Limited Liability Company*, *Yizheng*, *Jiangsu*, 211900)

Abstract: Liquid ammonia is of explosive, toxic and harmful characteristics. Accidents may occur in the process of storage and use of liquid ammonia, which may erode the equipment, pollute the environment and endanger people's health. With the enhancement of safety and environmental protection awareness, analysis on the nature of liquid ammonia, degree of hazard, management regulations and standards is made at a desalted water station. Storage room for liquid ammonia is improved several times. Corresponding safety facilities are set including monitoring, ventilation and sunscreen, fire and explosion protection, lightning protection and anti-static and protective cofferdam and so on. Safety management of ammonia cylinder is standardized. These measures help the enterprise achieve effective control and eliminate safety hazards, which is worthy of reference for many enterprises.

Key words: Desalted water station; Liquid ammonia; Ammonia cylinder; HSE

BRIEF DISCUSSION ON THE APPLICATION FOR WORK PERMIT FOR NEW CONSTRUCTION[10]

Wang Xiao, *Zhang Zhaohui*, *Zhang Xiaofang*, *Chen Liang*. (*PetroChina First Construction Corporation*, *Luoyang*, *Henan*, 471023)

Abstract: China National Petroleum Corporation promotes the management system of work permit vigorously inside the group company. This paper analyzes the application process and the role of commonly used work permit for new units. It expounds that some work permits for new units become formalistic or are taken as the commencement report of work tasks. The paper proposes to amend the systems related to work permit and make work permits become the real protective umbrella for construction personnel.

Key words: New construction; Work permit; Necessity

APPLICATION OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM INPETROLEUM LOGGING INDUSTRY[12]

Li Yanjun. (*CNPC Logging Co., Ltd.*, *Renqiu*, *Hebei*, 062550)

Abstract: Petroleum logging is an important part in oil industry. It plays the role of "eyes" for oil exploration. Petroleum logging uses various physical principles and obtains all kinds of petroleum geology and engineering data from measuring various physical parameters (porosity, radioactivity and electrical conductivity) of layer of earth through such methods as down hole instrument, ground instruments and collection and analysis software. This provides various kinds of raw data for completion and development of oil fields. In petroleum logging industry, the staff may usually contact all kinds of poisonous and harmful substances and this may cause harm to the physical and mental health of the staff. This paper analyzes the advanced management systems of occupational health and safety at home and abroad, which provides reference for the occupational health management of petroleum logging industry.

Key words: Petroleum logging; Occupational health and safety management system/OHSMS; Application

DISCUSSION ON THE PRACTICE OF IMPLEMENTINGTHE "THREE BASIC TASKS" IN STATED-OWNED MANUFACTURING ENTERPRISES[14]

Xu Jinbao. (*SINOCHEM International Corporation*, *Shanghai*, 200126)

Abstract: The "Three basic tasks" are the "cherished traditions" and "ballast" in petrochemical industry. How to ensure the intrinsic safety in production and ensure the standardization, normalization and efficiency in work process? There is much misunderstanding and wrong understanding in the "Three basic tasks" work in some enterprises. This paper expounds the key points and ideas of the "Three basic tasks" work from seven aspects. It makes the implementation idea clear that the emphasis is in the grassroots unit; the key lies in the leadership and the core is in different jobs. Then strengthening the basic construction and basic work is considered to be the focus of work; improving the employees´basic quality is taken as the main line of work; trying to build a long-acting mechanism for the "Three basic tasks" work is taken as the goal. Keeping pace with the times, new meanings are constantly added to the "Three basic tasks" work which is transformed into the carrier and means for all the work carried out currently.

Key words: The "Three basic tasks" work; Grass-root construction; Basic work; Training of basic skills

APPLICATION OF HAZOP IN HYDROGENATION CRACKING UNIT[17]

Chang Bo. (*SINOPEC Guangzhou Company*, *Guangzhou*, *Guangdong*, 510000)

Abstract: In order to reduce the operation risk of hydrocracking unit and identify the potential safety risks of the unit, the company organized relevant professional and technical personnel to make hazard and operability (HAZOP) analysis according to the situation of the unit. Sinopec HSE risk matrix method is applied. The consequences of the accident severity and frequency of accidents grade is used to calculate the accident risk level in the risk matrix. This paper makes a comprehensive analysis on hydrocracking unit system of Guangzhou petrochemical company. It makes a detailed analysis on the deviation, causes, consequences and protection measures involved in the nodes. Then the paper puts forward the corresponding rectification suggestions.
Key words: HAZOP; Hydrogenation cracking unit; Operation risk; Rectification suggestions

DIFFICULTIES IN THE OVERHAUL OF LIQUID SULFUR TANK AND THE COUNTERMEASURES [22]

Luo Xinjie, Yang Yuhai, Lu Bo, Wang Xi, Zhang Shoujun. (*SINOPEC Guangyuan Natural Gas Purification Co., Ltd., Guangyuan, Sichuan*, 628415)

Abstract: A corrosion perforation was found on the top of the liquid sulfur tank after dismantling the top insulation layer in certain Natural Gas Purification Plant during routine inspection. Since the liquid sulfur tank is a key device in purification plant which plays the role of production and regulation in liquid sulfur storage and molding, disastrous consequences will occur once spontaneous combustion of ferrous sulfide is triggered by the expanding of the corrosion if air enters the tank. After investigation and research, it was confirmed that the corrosion was caused by leakage from ventilation breather acting with hydrogen sulfide. Emergency shutdown overhaul was carried out with liquid sulfur tank taken as the rectification item of major safety risks according to corresponding regulations. This paper introduces the difficulties during the shutdown overhaul such as the confirmation of process conditions, quality control and safety supervision. Meanwhile, it puts forward relevant solutions to the difficulties and summarizes the typical practice during the overhaul process.
Key words: Liquid sulfur tank; Overhaul difficulties; Corrosion; Measures

FAILURE ANALYSIS OF CAVITATION IN SEWAGE LIFTING SYSTEM AND THE IMPROVEMENT MEASURES [25]

Wan Shiguang, Yu Ying. (*PetroChina Jinxi Petrochemical Company, Huludao, Liaoning*, 125001)

Abstract: The Sewage Treatment Plant of Jinxi Petrochemical Industries Co. adopted a vertical pipeline centrifugal pump in the sewage lifting system. Due to the long-period operation of the pump, there's serious cavitation in this pump. Based on the occurring principles of cavitation, this paper analyzes the causes for the cavitation failure of sewage lifting system which include the change of pump structure, the high vaporization pressure of the oily wastewater and the dirty medium as well as the poor anti-corrosion and wear-resistance performance of the pump body and impeller materials. The paper then presents the corresponding improvement measures.
Key words: Sewage lifting system; Cavitation failure; Cavitation allowance

SAFETY DESIGN OF LOW-PRESSURE STORAGE TANK FOR LIGHT SUMP OIL [27]

Zhang Pengfei, Li Hongyan, Jiang Hao. (*China Petroleum Engineering & Construction Corporation, Qingdao, Shandong*, 266071)

Abstract: Nowadays, light sump oil from various units in the refinery is mostly piped to the low-pressure storage tank via light sump oil pipe. However, light sump oil is of extensive origins, complex ingredients and varied properties, so the low-pressure storage tank needs to be at higher level of safety and reliability. This paper elaborates the safety design of low-pressure storage tank for light sump oil from three aspects involving special treatment of the foundation of low-pressure storage tank for light sump oil, safe drainage system on the top of the tank and tank shell insulation. It makes detailed analysis on the working principles and their functions of corresponding safety measures. And the conclusions can be of help to the safety design of low-pressure storage tanks.
Key words: Light sump oil; Low-pressure storage tank; Drainage system; Safety design

APPLICATION OF CFD NUMERICAL SIMULATION OF FIRE AND EXPLOSION IN LNG TERMINALS [29]

Liu Xuhong[1], *Zhang Xiangfeng*[1], *Song Xiansheng*[2], *Li Donghua*[1]. (1. *CNOOC Shandong Chemical Engineering Co., Ltd., Jinan, Shandong*, 250101; 2. *Lloyd's Register Consulting (Beijing) Ltd., Shanghai*, 200001)

Abstract: The general 2-dimensional QRA software has certain limitations in LNG fire and explosion consequence simulation due to the complicated leakage and diffusion phenomenon of LNG. Taking certain domestic terminal as example, this paper introduces the application of 3-dimensional CFD software in LNG terminal which simulate more realistically and intuitively the main hazards and effects of fire and explosion accidents existing in different areas of the terminal. And the simulation results are used to guide the engineering design.
Key words: Numerical simulation; Computational fluid dynamics/CFD; Liquefied natural gas/LNG; Fire explosion; LNG terminal

EVALUATION ON THE SAFETY AND RELIABILITY OF LIGHTNING PROTECTION EQUIPMENT AND FACILITIES FOR VEHICLE SCALES AT THE LOADING AND UNLOADING STATION FOR LIQUID HYDROCARBON [33]

Ma Dongfeng, Ge Hongjun. (*PetroChina Daqing Refining & Petrochemical Company, Daqing, Heilongjiang*, 163411)

Abstract: Vehicle electronic scales are important measuring instruments at the loading and unloading stations for liquid hydrocarbon. *Technical Code for Protection against*

Lightning of Building Electrical Information System (GB 50343-2012) and *Design Code for Protection of Structures against Lighting* (GB 50007-2010) are implemented strictly for the safety in lightning protection. This paper summarizes the typical lightning protection measures for vehicle scales. Taking lighting as the research object, the paper discusses two methods for the evaluation of safety and reliability of natural lightning and evaluation by use of environmental lighting damage factors.

Key words: Loading and unloading station for liquid hydrocarbon; Vehicle scales; Lightning protection safety; Evaluation on safety and reliability

RESEARCH PROGRESS OF ENVIRONMENT-FRIENDLY SCALING-CORROSION INHIBITOR IN CHINA[36]

Liu Lei. (*SINOPEC Engineering Incorporation*, *Beijing*, 100101)

Abstract: Phosphate-based chemicals cause water eutrophication when used in circulating cooling water system. However, phosphorus-free polymers such as polycarboxylate-based chemicals are also found to be unfriendly to the environment due to their poor biodegradability. With increasingly stringent discharge standards for water pollutants, the development of phosphorus-free and nitrogen-free water treatment chemicals with favorable biodegradability has become one of the development directions for water treatment industry. This paper introduces the studies on scaling-corrosion inhibiting performance of polyepoxysuccinic acid (PESA) and polyaspartic acid (PASP), their derivatives, and composite formulations, as well as other chemicals with good biodegradability in China. Suggestions on future development of green scaling-corrosion inhibitors are also put forward.

Key words: Circulating water treatment; Scaling-corrosion inhibitors; Environment-friendly; Biodegradability; Polyepoxysuccinic acid; Polyaspartic acid

STUDY ON IMPROVING THE TEST ACCURACY OFCOD_{CR} WITH HIGH CHLORINE CONCENTRATION[41]

Bu Hongqing. (*SINOPEC Tianjin Company*, *Tianjin*, 300271)

Abstract: To keep up with the trend of ultraclean discharge, the supervision on waste water discharge specifications is increasingly strict and the requirements on measurement of COD_{Cr} which is a very important specification of waste water are becoming higher. Chlorine concentration in waste water is relatively higher due to modification of de-sulfur and de-nitration in thermal power plant. The measurement of high chlorine COD_{Cr} is not accurate. Only thermal power plant involves such test in Tianjin Branch and there is no existing experience from other departments for reference. This paper adopts the method to analyze the factors that affect the test accuracy and summarize the test results. Then it finds out the method for accurate measurement of high chlorine COD_{Cr}.

Key words: Ultraclean discharge; Chemical oxygen demand/ COD; High chlorine COD_{Cr}

DISCUSSION ON THE SUPPLEMENTARY WASTEWATER REUSE TECHNOLOGY IN PLANT OPTIMIZATION[44]

Yuan Liang, *Zhang Po.* (*Lanzhou Lubricant Blending Plant of PetroChina Company Limited*, *Lanzhou*, *Gansu*, 730060)

Abstract: With the rapid development of China's economy in recent decades, the national strength has increased by leaps and bounds. Along with the development of economy, pollution from industrial emissions and vehicle exhaust to the environment is becoming more and more serious. There are serious impacts of air pollution and wastewater discharge from some industrial towns and densely populated cities on people's production and lives. Therefore, the state's environmental protection requirements are getting higher and higher. And enterprises violating the requirements of the national environmental protection are strictly supervised. The clay unit operates with large water consumption and this is an important restrictive factor to affect the economic operation of the unit. Through process optimization, the supplementary rotary liquid wastewater is reused for the pre-filling rotary liquid and this can reduce water consumption by 50% in advance. This measure helps to save water resources, reduce product costs and bring certain economic benefits. Meanwhile, it helps to reduce emissions and lower the environmental pressure of the plant.

Key words: Supplementary rotary liquid; Plant optimization; Wastewater reuse

PRACTICE OF CONTROLLING VOC EMISSIONS THROUGH APPLICATION OF LDAR TECHNOLOGY[47]

Zhao Zhifei, *Huang Yan*, *Hu Yufang*, *Li Meimei.* (*PetroChina North China Petrochemical Company*, *Renqiu*, *Hebei*, 062552)

Abstract: VOC is common pollutants in refining enterprises and the precursor that forms PM2.5 and photochemical smog. It is also one of the important reasons that trigger haze. According to the requirements of relevant national policy, VOC emissions must be controlled in refining enterprises. LDAR technology is to test all components possible for leakage and carry out long-term detection. If there is leakage beyond the specified range, the leakage parts will be repaired. As the first company to implement VOC comprehensive management and control in PetroChina, the overall VOC emission source screening was completed; LDAR model was established and the comprehensive management and control platform was constructed. The first leak detection and repair work was done. After treatment, VOC emissions from the sealing points dropped substantially. This plays a positive role in promoting the environmental protection work of the companies.

Key words: Volatile organic compounds/ VOC; Leak detection and repair/ LDAR; VOC management and control platform; Emission reduction

STUDY ON SAVING PROPANE EMISSIONS IN BIMODAL POLYETHYLENE PLANT[50]

Huang Gang. (*SINOPEC Shanghai Petrochemical Co., Ltd., Shanghai*, 200540)

Abstract: This paper analyzes the propane emissions from the bimodal polyethylene plant (4PE) in SINOPEC Shanghai Petrochemical Co., Ltd. and presents the atmospheric environment problems caused by those propane emissions and uncompleted combusted gas. According to the features of the bimodal polyethylene production process, this paper makes a detailed analysis on propane emission points in the production process and also puts forward some measures to optimize the process to control these emission points. By carrying out some technical transformation and technical measures, the total amount of propane emission from the bimodal polyethylene plant (4PE) can be reduced. The paper compares the amount of propane emission before and after taking the technical measures. Good effects can be obtained in saving propane emission and reducing environmental pollution.

Key words: Bimodal PE; Propane; Discharge; Save

APPLICATION OF HIGH EFFICIENT BIOLOGICAL TREATMENT TECHNOLOGY IN TREATMENT OF ALKALINE WASTEWATER[54]

Wang Guodong[1], *Tang Guojian*[2]. (1. *SINOPEC Tianjin Company*, *Tianjin*, 300270; 2. *Littoral Chemical (Tianjin) Co., Ltd.*, *Tianjin*, 300270)

Abstract: In the refining process of oil and ethylene, alkali washing process is usually used to remove the sulfide in the products. In the process of alkali washing, various alkali dregs and wastewater with high-concentration sulfide and organic matters hard to degrade will be produced. The efficient biological technology is adopted to treat refinery alkali dregs with high salt and high COD and alkali dregs hard to degrade. The removal rate of COD in ethylene alkali dregs can reach 90%. The removal rate of sulfide and volatile phenol is nearly 100%. During the load lifting in start-up period and accident state recovery period, high dilution is conducive to stabilizing water quality and decreasing the inhibition of toxic substances. It is also good to system startup and recovery. During the stable operation of the system, dilution can be reduced gradually. The settling performance of high efficient biological sludge with high salt is good. There are advanced microorganisms such as bell insects in the sludge.

Key words: High efficient biological treatment; Refinery alkali dregs; Ethylene alkali dregs; High salt

APPLICATION OF THE 3-CANISTER REGENERATIVE CATALYTIC OXIDIZER (RCD) TECHNOLOGY IN THE TREATMENT OF DRY WASTE GAS FROM THE PRODUCTION OF STYRENE-BUTADIENE RUBBER[62]

Zhang Tong, *Cheng Feilong*, *Wang Tong*. (*PetroChina Lanzhou Petrochemical Company*, *Lanzhou*, *Gansu*, 730060)

Abstract: Aiming at the characteristics of high flow rate of dry waste gas and high concentration of pollutants from the styrene-butadiene rubber plant, it is found out that the 3-canister catalytic oxidation technology (RCO) is more suitable for treating dry waste gas from the production of styrene-butadiene rubber after technology analysis and comparison. By analyzing the operation mechanism of the 3-canister RCO reactor and factors affecting the operation performance, the optimal process control parameters are determined to ensure the stable, efficient, energy-efficient running under standard requirement. After implementing RCO reactor, the styrene content in dry waste gas was decreased to below 30 mg/m^3 and non-methane content to below 20 mg/m^3. This meets the emission limits of styrene and non-methane compound stipulated in *Emission standard of pollutants for petroleum chemistry industry* and it helps to achieve the goal of clean production.

Key words: Regenerative catalytic oxidation combustion device/RCO; Volatile organic compound/ VOC; Waste gas from the production of styrene-butadiene rubber; Styrene

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