TITLE: Development of a method for calculating fire and oil spills parameters

JOURNAL/CONFERENCE: AIP Conference Proceedings 2216, 070004 (2020) Published Online: 01 April 2020

AUTHORS: Azat A. Sharafutdinov,Fanil Sh. Khafizov, Ildar F. Khafizov,Anton V. Krasnov,Aidar V. Akhmethafizov,Veronika I. Zakirova,Amina N. Khafizova

At each stage of the production, storage, and transportation of petroleum products, environmental, industrial, and safety of the natural environment is the ultimate aim of the project. The paper revolves around the concept of development of modern methods of monitoring fires and accidental oil and petroleum products spills. There is an integration of the special software into a single emergency response system. It is done to ensure quick response of fire and rescue teams to prevent loss of life and property. The sensing is done through a comprehensive approach of problem solving, detection and prediction of the oil pollution which is based on the joint analysis of heterogeneous data obtained by unmanned aerial vehicles. This is due to the unmanned aerial vehicles having an advantage over manned systems in situations where efficiency and quick response time is required. Microwave radiometer sensor, radar, laser radar, infrared and ultraviolet spectrometers are widely used in this project.

TITLE: Identification of Key Factors of Fire Risk of Oil Depot Based on Fuzzy Clustering Algorithm

JOURNAL/CONFERENCE: ASME 2019 Pressure Vessels & Piping Conference,2019

AUTHORS: Shuyi Xie, Shaohua Dong, Guangyu Zhang

The demand for oil is rising as the country's economy develops quickly. China has developed a number of oil depots recently, with the largest having a capacity of up to tens of millions of cubic metres, in order to fulfill the country's rising energy demand. The risk of fire in the oil depot region has significantly grown as the tank capacity of the storage tank area has increased due to the combustible and explosive character of the stored medium. The national oil depot has benefited from the expansion of the oil depot and the construction of large-scale oil storage tanks, but these developments have also had many disastrous side effects.The fuzzy C-means method and fuzzy maximum support tree clustering algorithm are introduced based on the created oil depot fire risk index system for identifying the key factors. Two fuzzy clustering mathematical methods allow for the ide ntification of important elements in the created index syste m.First, the indicators in the oil depot fire risk index system a re evaluated using the expert scoring method, and the impor tant degree assessment matrix of oil depot fire risk compone nts is created using a fuzzy analysis of expert comments. The major components of the oil depot fire risk are then determined by grouping the different risk indicators using the

fuzzy C-means method (FCM) and fuzzy clustering tree technique. The correctness of the recognition findings is guaranteed through comparison analysis and cross-validation of the two fuzzy clustering approach outcomes. Finally, it is discovered that emergency rescue capability and passive fire prevention capability are crucial elements that need to be taken into consideration in the oil depot fire risk index. This is done using an oil depot as a case study. The fuzzy clustering technique utilised in this study can digitise experts' subjective feedback, lessening the impact of subjective human elements. Additionally, the accuracy of the clustering results is ensuredby employing two fuzzy clustering methods to examine and confirm the primary causes of the oil depot fire risk. In order to decrease the chance of a fire occurring in the oil depot and assure the safety of the oil depot's operation, managers may be able to foresee high-risk elements advance by identifying important factors in the fire risk prevention and control process of the oil depot..

TITLE: Probability Analysis and Prevention of Offshore Oil and Gas Accidents: Fire as a Cause and a Consequence

JOURNAL/CONFERENCE: Fire, MDPI, Volume 4, Issue 4, 2021

AUTHORS: Dejan Brki´c and Pavel Praks

Although major offshore oil and gas mishaps caused by failures during the drilling and extraction of hydrocarbons are relatively uncommon, the effects can be disastrous in terms of human casualties and environmental harm. Therefore, the largest major offshore oil and gas mishaps, those with more than 10 fatalities or with a large environmental damage, are examined in this article to acquire insight into their prevention. Fire is given particular focus both as a source and an effect. The impact of relevant safety-related technological and legislative upgrades and modifications that have been made in response to these accidents are assessed. The American prescriptive method and the European goal-oriented approach are the two main approaches to safety that are compared. The statistical analysis of failure probability examines the primary causes of accidents, and the precise confidence intervals for the estimated probabilities are determined. There is no statistically significant difference between the parameters that were examined and characterise the primary causes of offshore oil and gas accidents, according to the results of the statistical test based on precise confidence intervals. It can be determined that there is no indication of a difference between the categories of the primary causes of accidents based on the small but carefully selected sample of 24 of the largest incidents.

TITLE: Nanostructures Management Technology to Reduce the Fire Risk in the Oil and Gas Industry

JOURNAL/CONFERENCE: Journal of applied engineering science, paper number: 19(2021)1,766, 84-91

AUTHORS: Aleksei V. Ivanov,Farid A. Dali ,Grigoriy K. Ivakhnyuk,Igor L. Skripnick,Marina A. Simonova,Denis V. Shikhalev

There is a higher risk of fire in oil and gas operations. When oil is produced, processed, transported, and stored, there is a great likelihood that huge flames will start and spread. There is a considerable likelihood that there will be significant fires when oil is being produced, processed, transported, and stored. The effectiveness of fire prevention and extinguishing systems must be increased, which calls for the development of new materials based on nanotechnology principles. The methods of functionalization and interaction of clusters of the base liquid and multilayer carbon nanotubes, methods for stabilising nanofluids, and methods for changing the thermophysical, rheological, and electrostatic properties of substances and materials on their basis are the foundation of the technology for controlling the properties and performance characteristics of nanofluids based on liquid hydrocarbons and water. With the help of the suggested technology, it will be possible to develop nanomaterials based on various emergency situational development ascenarios and use them to lower the danger of fire in oil and gas facilities.