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ENVIRONMENTAL SAFETY DURING THE EXTRACTION, TRANSPORTATION, AND STORAGE OF PETROLEUM PRODUCTS

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Extracting, transporting, and storing petroleum products present major environmental challenges needing robust safety protocols. Transportation accidents can involve pipelines, railways, and roads [1]. Pipeline ruptures are particularly concerning, causing significant soil contamination as spilled oil penetrates deeply, forming persistent pollution 'lenses'. These lenses hinder vegetation growth for years and are difficult to remediate. Therefore, effective sealing and integrity management of oil collection and transport systems are crucial to prevent environmental damage.

Multiple proactive measures are essential for preventing pipeline accidents. This includes constructing pipelines with advanced, high-strength materials, reinforcing existing structures, and addressing corrosion risks through strategies like pre-transport oil desalination to remove salts, applying robust internal and external protective coatings and tapes, and implementing electrochemical protection systems, which are especially critical near electrified railways due to stray soil currents. Additionally, developing systems to mitigate electrostatic discharge risks from high-velocity fluid flow, which can cause further corrosion or ignition [2], is important. Finally, operational integrity is enhanced by installing automatic shut-off valves for rapid breach containment and deploying wear sensors to detect pipe degradation early, thus helping to preempt failures.

Certain areas pose higher risks for pipeline failures, notably marshy soils and river crossings. Proximity to electrified railways (especially DC lines) significantly increases corrosion risk due to strong stray currents.

If spills occur despite preventive measures, prompt localization and cleanup are vital. Initial steps involve pumping out recoverable oil using

specialized equipment to minimize further soil penetration. Subsequent actions focus on soil remediation. One technique involves placing and detonating explosive charges within the contaminated soil; this process helps break down petroleum products, improves soil physico-chemical properties, and facilitates natural vegetation recovery. A second remediation method uses a network of controlled, sequential explosions across the contaminated surface to manage and treat the pollution effectively, allowing for parameter optimization during the process.

Petroleum storage facilities – including refineries, terminals, depots, gas stations, and airfields – are another significant source of soil contamination [3]. Spills in these areas can lead to long-term pollution, often requiring years for full soil recovery even with immediate remediation efforts. To mitigate this risk, particularly at oil terminals, the use of anti-filtration barriers (containment liners) is highly recommended to protect the underlying soil.

Polymer geomembranes, especially those made from High-Density Polyethylene (HDPE), are highly effective materials for these barriers. Their key advantages include practical impermeability, high resistance to chemical attack from petroleum products, and rigorous standardization of material quality, installation, and welding procedures. Properly installed geomembranes in tank farm foundations can effectively prevent soil contamination during accidental spills.

Furthermore, the extensive use of transport vehicles (road, rail, air, marine) and engine-driven equipment within the oil and gas industry contributes significantly to pollution. These sources release exhaust gases into the atmosphere and cause water and soil contamination through fuel and lubricant spills.

In conclusion, the oil and gas sector exerts considerable pressure on the environment. Given the potential severity of accidents involving petroleum products, prioritizing and implementing comprehensive preventive measures at pipelines and storage terminals is essential for enhancing environmental safety and minimizing ecological damage.

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PROBLEM OF INDUSTRIAL INJURIES IN UKRAINE

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Abstract. The relevance of this work is due to the high level of industrial injuries and the low standard of living indicators in Ukraine compared to the industrialized countries of the European Union. Therefore, the issue of the survival of victims of accidents and occupational diseases is particularly important. This paper collects statistical data from open information sources, based on which some indicators of social protection for victims of accidents and occupational diseases in the workplace are calculated. The dynamics of changes in the number of accidents and occupational diseases in Ukraine from 2007 to 2023 are analyzed. Based on the analysis of the results, the socio-economic consequences of reforms in social protection for work-related victims are determined, and measures to reduce the injury rate at enterprises under the conditions of hostilities, population migration, etc., are proposed.

Keywords: accidents, occupational diseases, industrial injuries, state insurance.

Introduction. Considering the problem of industrial injuries, it should be noted that in Ukraine the probability of accidents and occupational diseases is 5-8 times higher than in other industrialized countries of the European Union [1]. Despite the systemic decline in production, over the period 2018-2023, more than 4.7 thousand industrial injuries were recorded annually from accidents and acute occupational diseases or poisonings, for which acts were drawn up in the form H-1/P [2, 3, 4]. As a result of fatal industrial injuries, families lose breadwinners. In 2021, due to Covid-19, the total number of victims exceeded 12 thousand. More than 2 thousand employees annually receive occupational diseases [2]. Payments to victims reach significant amounts worldwide. According to the International Labour Organization (ILO), the economic costs associated with accidents amount to 1% of the