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THE POSSIBLE CAUSES OF OIL SPILL IN OIL REFINERIES (IN THE EXAMPLE OF HEYDAR  
ALIYEV OIL REFINERY) AND ITS SUPERVISION WITH MODERN REMOTE SENSING METHODS

**Abstract**

**Introduction** There're different methods to detect oil slicks in the water ecosystem, however, there's few research on monitoring the oil transportation operations and detecting oil spills (OS) in terrestrial areas on time to prevent possible financial and environmental damages. Spill incidents happen due to third-party damage, corrosion, material defects, human-error, or natural events. Since the area of some oil refineries is big, it's difficult to monitor all operations without the application of up-to-date technologies. Therefore, this paper aims to investigate possible effective remote sensing (RS) technologies, especially Unmanned Aerial Vehicle (UAV) to use on detecting OS on the terrestrial areas, mainly in Heydar Aliyev Oil Refinery (HAOR), in Azerbaijan. Established on July 29, 1953, HAOR produces different types of oil products are produced, and includes high technological process units.

**Methodology** Currently, inspections in HAOR are carried out by foot or car, which increase operational cost, time, and human error. However, an effective OS detection requires accurate and rapid data to prevent possible damages. Despite some obstacles, RS methods (optic and microwave sensors) depending on the purpose have a huge potential to detect OS and minimize possible effects without physical contact. Sometimes, real-time such as high-sensitivity devices are also used however due to damages, incomplete and inaccurate information they are ineffective.

UAV platforms are generally divided into two main designs: rotary-wing and fixed-wing UAVs which both have advantages and disadvantages in terms of weight, size, battery capacity, topography, weather, lack of regulation and standards, etc. Therefore, before selecting the method and sensors, the following information must be considered:

- Needed information - Flight distance - Route condition - Legislation - Platform - Sensor - Payload capacity - Data processing - Battery efficiency

**Results and discussions** Considering that the area of HAOR is large and different type of oil products are transferred internally and externally on a daily basis, to save time, increase efficiency and reduce human-error factor, it is recommended to plan the supervision for three options: UAVs for short, medium and long-distance inspections.

**Conclusion** To protect the environment and prevent financial loss and possible explosions, using proper UAVs and conducting regular research to increase inspection effectiveness, as well as having OS response equipment in the area will decrease the severity of the risk.