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DEVELOPING THE READINESS OF LOGISTICS OFFICERS TO CONTROL THE QUALITY OF FUEL AND LUBRICANTS IN THEIR PROFESSIONAL COMPETENCE SYSTEM

The role of knowledge about the physical and chemical properties of fuel and lubricants as a basic element of the professional competence of logistics officers has been scientifically substantiated. It has been proven that the effectiveness of decisions on the admission of fuel for use directly depends on the integration of theoretical knowledge with practical mastery of operational control methods. Based on an analysis of the functional duties of fuel and lubricant supply service specialists, it has been determined that a lack of understanding of the nature of fuel performance indicators creates risks for the reliability of equipment operation in special conditions.

Based on the results of the study, ways to modernise the content of educational and professional training programmes for logistics officers have been proposed by strengthening the practical component of fuel and lubricant quality control.

Keywords: *fuel and lubricants, physical and chemical properties, competencies, head of supply service, State Border Service of Ukraine.*

Statement of the problem. In the context of repelling armed aggression and intensifying the operational and combat activities of the units of the State Border Guard Service of Ukraine (SBGS), the reliability of logistical support has become critical. The quality of material resources is no longer purely an economic or commercial category, but has become a direct factor in combat readiness.

In particular, the quality characteristics of fuel and lubricants (FL) are decisive for the operational reliability of automotive and armoured vehicles, aviation and ships and boats. The use of substandard fuel is a direct source of non-combat losses, as it leads to the failure of power units at critical moments during the performance of tasks. At the same time, adequate material and food supplies guarantee the physical endurance and health of military personnel in extreme conditions.

Despite the fact that the requirements of the governing documents place responsibility for quality control of material resources supplied to the state border guard authorities (SBGA) on the heads of supply services, the practical implementation of this task faces a number of systemic contradictions.

Analysis of the problem revealed an organisational and technical contradiction between the regulatory requirements for the professional competence of logistics officers (in particular SKs24), which provide for mandatory control of the physical and chemical properties of material resources, and the objective absence of a stationary laboratory base or standardised methods of express control suitable for use in field conditions in state border guard units.

The second contradiction is of a qualification (competence) nature and consists in the inconsistency between the integral nature of the risks associated with the use of poor-quality material resources (threat to life due to poor-quality food, clothing and fuel) and the existing system of officer training, which is often highly specialised and does not provide a universal algorithm (toolkit) for the rapid assessment of the quality of the entire range of material resources in conditions of time constraints.

Analysis of recent research and publications. The professional competencies of the educational programme "Organisation of the Activities of the Logistics Units of the State Border Guard Service" were substantiated by researchers O. Ponomarenko and V. Sahan [1, 2]. Based on a detailed analysis of the professional activities of logistics officers, the study identified and substantiated six key areas of their work that are critical to ensuring the functioning of military units. These areas include: planning and organisation of military logistics;

work with material resources; operation of technical equipment and maintenance of rear facilities; housing and operational support and maintenance of barracks; quality control of materials and products; planning and control of personnel training in rear matters.

In article [3], the authors analysed the content of one of the academic disciplines and found that some key professional competencies of logistics officers were not fully developed. The main shortcoming is the insufficient number of practical classes, which are critically important for practical activities, in particular the maintenance, upkeep and repair of technical equipment of the supply service, and the determination of the physical and chemical properties of materials supplied. The researchers emphasise that these results indicate the need for further scientific research to develop methodological recommendations and create practical classes.

As a result of a comprehensive study conducted in 2019–2022 at the Bohdan Khmelnytsky National Academy of the State Border Guard Service of Ukraine, a methodology was developed for training future officers to provide logistical support in military units. In their work [4], the authors found that the effectiveness of training future officers to perform logistical functions in the State Border Guard Service of Ukraine is achieved through the integration of the proposed methodology and pedagogical conditions into the educational system of higher military educational institutions. Thus, this study confirms that improving the educational process is a key factor in improving the quality of professional training.

Polish researcher M. Matusza [5] proposes a list covering five key competencies necessary for effective professional activity, namely: educational, communicative, social, activity-based, and information-computer. In his opinion, a person cannot be an effective professional or master a particular profession without clearly formed competencies.

Interpreting these findings in the context of training rear and logistics officers, it can be argued that educational competence is critical for rapid adaptation to new types of equipment, changing standards (e.g., NATO) and updates to the regulatory framework. Communicative and social competencies are necessary for effective interaction with related units, civilian suppliers, and foreign partners, as well as for the successful organisation of subordinate personnel. Action competence (focus on results and practical application of knowledge) directly requires high-quality practical training, which correlates with the previously identified problem of insufficient relevant training. Information and computer competence is becoming the basis of modern logistics, requiring officers to have skills in working with electronic accounting systems, inventory management, and data analysis.

Thus, the results of M. Matush's research confirm the complex nature of professional requirements for logistics officers, which go beyond purely technical knowledge and include a wide range of universal and behavioural skills.

Another Polish scientist, V. Furmanek, considers a competent person to be someone who has the appropriate training for certain types of activities [6], while a professionally competent person is someone with the appropriate professional training [7].

The analysis of scientific works convincingly demonstrates that the efforts of most researchers [2, 3, 5, 6, 7] were focused on the theoretical justification and search for key professional competencies of logistics officers, as well as on identifying general methodological gaps in their training.

However, despite the high relevance of quality control over material resources, the issue of substantiating the methodology for forming professional competence (SKs24) in higher military educational institutions, which concerns the determination of the physical and chemical properties of fuel and lubricants, remains insufficiently researched and methodologically undeveloped.

Therefore, to date, no scientific research has been conducted that would offer a comprehensive methodology for the formation of this component of competence, which is critically important for practical activities. This determines the relevance and focus of our research.

The purpose of the article is to provide scientific justification for improving the content and methods of training future logistics officers based on an analysis of the relationship between knowledge of the physical and chemical properties of fuels and lubricants and the ability to make management decisions regarding their use.

Summary of the main material. In accordance with the general duties of the head of the supply service (HSS), which are defined by the Statute of the Internal Service of the Armed Forces of Ukraine [8], the HSS is obliged to: know the availability, condition, structure and rules of operation of material resources in his service; monitor the material resources of his service in the

units and subordinate warehouse, organise their proper operation (use) and ensure compliance with safety requirements. Article 96 [8] of the duties of the head of the fuel and lubricants supply service (NSZPMM) stipulates that the NSZPMM is responsible for the economical consumption of fuel, lubricants and special fluids and exercises control over them, as well as over the implementation of safety measures during their use, and is obliged to exercise control over the quality of fuel in accordance with current instructions and guidance documents.

At the same time, the following persons are responsible for preparing the tanks of machines (aircraft) and cisterns (tanks) of ships for filling with fuel (refuelling), as well as for the preservation and quality of fuel from the moment it is poured into the tanks of machines (aircraft) and cisterns (tanks) of ships: in the OODK DPSU for ground equipment – the unit commander; in aviation units – the aircraft aviation technician (mechanic); on ships – the commander of BC-5 [9].

However, high-quality implementation of these regulatory requirements, particularly with regard to quality control, economical consumption and safe operation rules, is impossible without a fundamental understanding of the nature of petroleum products, since "fuel quality" and "safety" are not abstract concepts, but a set of specific physical and chemical indicators (density, fractional composition, flash point, viscosity, etc.). It is these parameters that directly determine the operational characteristics of fuel, its susceptibility to loss and the level of fire hazard. Therefore, the ability of the NSZPMM to effectively perform its functional duties, as defined in [8, 9], is directly dependent on its level of competence in matters of the physical and chemical properties of fuel. It is also mandatory for the commander of this unit to ensure the quality of fuel and lubricants supplied to the OODK units from the detachment's warehouse [9].

The regulation of petroleum product quality control procedures in Ukraine is carried out in accordance with the relevant instructions on quality control of oil and petroleum products at enterprises and organisations in Ukraine [10], approved by a joint order of the relevant ministry. According to this document, future SZPMM specialists must clearly distinguish between the types of tests and the conditions for their conduct. In particular, the petroleum product quality monitoring system provides for the division of tests into acceptance, control, complete, arbitration and express tests [10].

For NSZPMM, it is critically important to be able to identify situations that require a specific type of inspection.

For example, acceptance tests are a routine procedure during fuel handling (acceptance before discharge or release before shipment) [10]. Control tests, on the other hand, have a wider scope of application: they are mandatory after internal warehouse operations (pumping), after discharge, and also as a monitoring tool during long-term storage (every 6–12 months depending on the type of fuel) or for testing samples from vehicles (within 24 hours) [10].

Particular attention should be paid to competence in prescribing complete tests, which are carried out in accordance with all technical requirements [10].

The head of the SZPMM must initiate them in cases of increased risk, namely:

– in case of discrepancies in the accompanying documentation (lack of a quality passport, discrepancies in seal numbers);

– in case of damage to the integrity of the container or locking devices;

– after the expiry of the warranty period for storage or fuel quality restoration procedures;

– during long-term storage of aviation fuels and petrol (more than one year).

Separately, it is necessary to highlight arbitration tests, which serve as a mechanism for resolving disputes between the supplier and the consumer, and express methods, which make it possible to carry out operational quality control of petroleum products [10].

Such a wide range of diagnostic procedures confirms the thesis that without in-depth knowledge of the physical and chemical properties of fuel, it is impossible to correctly select a sample, interpret the results of laboratory tests, or make a legitimate decision on the use of fuel for its intended purpose.

A logical extension of theoretical knowledge about the types of tests is the practical aspect – the actual process of sampling. For the head of the SZPMM, this is not just a mechanical action, but a strictly regulated algorithm defined by order [10] and DSTU [11], violation of which automatically invalidates the results of laboratory tests.

Competence in this matter begins with understanding the classification of samples (spot, aggregate, bottom) and the requirements for their volume. The officer must be aware that the minimum amount of fuel must be sufficient not only for current analysis, but also for possible arbitration proceedings (standard – not less

than 1 litre for light petroleum products and 0.5 litres for lubricants) [10].

The principle of "triple division" deserves special attention, as it is the foundation of legal protection during the acceptance or shipment of fuel. The head of the SZPMM must ensure that three equal parts of the aggregate sample are formed: the first is sent for testing, and the other two are sealed and stored as arbitration samples. It is these "reserve" samples that become the decisive argument in the event of disputes with the supplier.

Knowledge of physical processes is also necessary when working with fuel dispensers. The specialist must take into account the factor of fuel "stagnation" in the system: if the dispenser has not been in operation for more than 30 minutes, sampling without prior pumping (minimum 10 litres) will result in incorrect data that does not correspond to the actual quality of the fuel in the tank.

The final stage, which demonstrates the professional competence of the SZPMM officer, is the documentary support of fuel sampling. This involves:

1) drawing up reports in accordance with established forms;

2) compliance with packaging rules (use of glass containers, filling no more than 90% to compensate for thermal expansion);

3) compliance with requirements for the transport of dangerous goods.

Therefore, ignoring any of the above steps – from preparing the dishes to sealing the sample – negates the entire quality control process, rendering it meaningless.

Currently, the State Border Guard Service of Ukraine organises fuel quality control at the first and second fuel depots. The state border guard authorities limit fuel quality to several indicators: determining the density of petroleum products using petroleum densimeters and visually determining the presence of water and mechanical impurities. To establish other fuel quality indicators, additional laboratory equipment is required, which the SBGS does not have and which is not provided for in regulatory documents and the inventory list. At the same time, the requirements of Instruction [10] provide for a list of quality indicators that are determined during acceptance and control tests of fuel.

The first or second fuel depot receives, stores and issues fuel for the OODK, as well as delivers fuel by its own transport directly to the OODK locations, in accordance with the requirements of the Instructions for quality control of oil and oil products at enterprises and organisations in Ukraine [10].

Control over the application of tests makes it possible to: ensure the reliable operation of OODK equipment; maintain fuel quality during its movement through the departmental logistics network; comply with national standards for quality control of petroleum products.

In practice, this means that, in addition to checking the supplier's quality certificates, the first and second fuel depots must have the capacity and equipment to conduct (or arrange for the conduct of) the necessary tests specified in the instructions for quality control of oil and petroleum products at enterprises and organisations in Ukraine [10] for operational quality control of fuel at various stages of its circulation.

The Instructions on Motor Vehicle and Armoured Vehicle Support (ABTS) in the State Border Guard Service [12] stipulate that one of the main tasks of ABTS is to economise on the consumption of fuel and lubricants and special fluids. The readiness of a vehicle to perform its intended tasks is assessed, in particular, by refuelling it with fuel and lubricants and special fluids [12].

In the state border guard services, control over the quality of fuel and lubricants is entrusted to the deputy head of the rear [8] and the NSZPMM [8].

Compliance with the rules for the use and economical consumption of fuel and lubricants and special fluids in the OODK units is the responsibility of the deputy head of the unit for armament and equipment [8], the head of the motor vehicle and armoured vehicle support service [12], and the verification of the expediency of using fuel and lubricants in vehicles is entrusted to the head of the armoured vehicle service [8]. The senior technician (technician) of the unit, in accordance with the requirements [12], is obliged to monitor the consumption of fuel and lubricants.

As mentioned earlier, fuel control functions – from preparing fuel tanks (vehicles, aircraft), cisterns (tanks) of ships to refuelling, ensuring its quality and preservation after delivery – are assigned to the unit commander (OODK DPSU, ground equipment), aircraft technicians (mechanics) (aircraft units) and the commander of BC-5 (ships) [9].

The OODK bodies carry out the full cycle of fuel circulation: purchasing, receiving fuel from suppliers; accepting and draining fuel into their own warehouses/tanks; storing fuel in their tanks; transportation, delivery of fuel by specialised transport to ODC units; dispensing, refuelling,

issuing fuel through equipment refuelling points; consumption, operation of equipment using this fuel.

In view of this, the OODK must be able to control fuel by conducting tests, as specified in Appendix 1 to [10]. This is explained by several key factors, including fuel quality. For OODK bodies, where the reliability of equipment is vital to national security, fuel quality control is of paramount importance. Equipment failure due to poor-quality fuel can have serious consequences. The head of the SZPMM, department heads and persons responsible for materials are directly responsible for the quality of fuel that is received, stored and issued in the department. Compliance with the requirements set out in Appendix 1 to [10] makes it possible to objectively confirm this quality, identify potential problems in a timely manner and prevent their spread. The Instruction on Quality Control of Oil and Petroleum Products at Enterprises and Organisations of Ukraine [10] is a valid regulatory act that is mandatory for implementation in Ukraine. Although it may be geared towards commercial structures, its principles and control methods are universal and best ensure the preservation of fuel quality in any system of its circulation, including departmental structures.

For effective implementation of this control, it is advisable to:

– develop internal regulations (instructions) for fuel quality control in the State Border Guard Service, based on the requirements of Instruction [10];

– identify specific control points (e.g., during acceptance at the warehouse, before transportation to units, before dispensing at refuelling points);

– provide the SZPMM OODK with the necessary equipment for conducting rapid analyses or conclude an agreement with a certified laboratory to conduct a full range of tests in accordance with Appendix 1 to [10].

An analysis of the content of training for logistics officers shows that mastering methods of operational control of fuel and lubricants (in particular, using a TEP analyser or TVP-1ts thermostat) should be considered not as a purely technical skill, but as a basis for making management decisions in the dynamic conditions of combat operations. For example, the use of a small-sized analyzer of petroleum product quality indicators (such as the TEP analyzer) enables an officer to quickly determine the detonation resistance of gasoline or the cetane number of diesel fuel. From a scientific point of view, it is important not only to know the algorithm for working with the device, but also for the cadet to understand the correlation between the obtained indicator and the operational reliability of the engine. For example, a low cetane number detected during testing is a direct indicator of imminent engine wear, which in field conditions can lead to equipment failure at a critical moment.

Similarly, conducting a corrosion test on a copper plate (in accordance with DSTU) should be interpreted by the future officer as a method of predicting the durability of fuel equipment. Understanding the chemistry of the interaction between active sulfur compounds and metal allows specialists to make informed decisions about whether to approve or reject a batch of fuel received from a third-party supplier, even when there is no stationary laboratory available.

Achieving this goal requires a detailed study of the physical and chemical properties of fuels and lubricants in conjunction with methods for controlling them. One of the key stages of the study is the analysis of the instrument base (laboratory equipment) actually used at the first and second fuel depots. Systematisation of this data will make it possible to update the content of academic disciplines and bring the educational process closer to the real needs of the practical activities of supply units.

Therefore, to achieve this goal, we will list several key parameters of the physical and chemical properties of fuel and lubricants and the devices used to test them.

In the context of developing an officer's professional competence, mastering methods for assessing the corrosive aggressiveness of fuel and determining the colour of petroleum products (in particular, using a TEP analyser) is considered a tool for diagnosing the condition of the fuel infrastructure.

The copper plate test in the educational process should be interpreted not only as a technical manipulation, but as a method of monitoring the interaction between the fuel and metal tank systems. Understanding the physical and chemical nature of the colour change of the plate allows cadets to identify the accumulation of aggressive compounds during long-term storage of petroleum products and prevent the destruction of fuel equipment.

Similarly, the use of express analysers such as the TEP CU to monitor the optical characteristics (colour) of motor oils and diesel fuel allows future officers to quickly verify that the resource complies with the actual quality passport data. At the same

time, it is critically important to develop the skill of taking into account the instrumental error of the device (within ± 5%), which ensures the objectivity of management decisions regarding the admission of fuel and lubricants for use in field conditions.

The precision viscometric thermostat (TVP-1ts) is designed to ensure stable and highly accurate temperature of the liquid sample under study during viscosity measurement. The device works by creating a controlled environment: a viscometer with a fuel or oil sample is placed in a special thermostat bath, where the specified temperature is maintained throughout the test.

The use of this device is critically important, as the viscosity of petroleum products is extremely sensitive to temperature fluctuations. The thermostat provides precision accuracy (e.g., ± 0.01 °C), which makes it possible to avoid errors, since even a temperature deviation of 0.1 °C can lead to a significant distortion of the final result.

An important component of professional training is mastering the methodology of precision thermostatting when determining the viscosity of petroleum products (in particular, using the TVP-1ts thermostat). In scientific and practical terms, this requires future officers to understand the critical dependence of the rheological properties of petroleum products on temperature regimes.

The educational focus shifts from the technical process of maintaining temperature to analysing the impact of measurement errors on the operational reliability of equipment. Officers must be aware that even a minimal temperature deviation during testing (more than ± 0.1 °C) leads to a significant distortion of the viscosity indicator, which can result in the erroneous approval for use of fuels or oils that do not meet seasonal requirements. Therefore, working with precision equipment such as the TVP-1ts instils in cadets a sense of responsibility for the accuracy of instrumental control as a guarantee of preserving engine resources in extreme temperature conditions.

In the system of professional training of logistics officers, special attention should be paid to understanding the fractional composition of fuel as a key indicator of its operational suitability. The scientific and pedagogical approach involves developing cadets' ability to interpret the results of fractional distillation not simply as a set of temperature indicators, but as a basis for predicting the performance of equipment in different climatic and operating conditions [13].

In particular, the analysis of the starting fraction (up to 10% of the volume) in the training process should be considered through the prism of ensuring combat readiness in winter or preventing the formation of vapour locks in summer heat. An officer must be able to assess the risks of fuel supply stoppage depending on the intensity of evaporation of light fractions.

Understanding the importance of the working fraction (50% of the volume) is critical to ensuring the stable operation of a warmed-up engine and the acceleration dynamics of equipment, which directly affects the mobility of units.

Special emphasis in training should be placed on the destructive effect of end fractions (90% and above). Future specialists must be aware that the presence of heavy impurities leads to motor oil dilution, increased wear of parts and the formation of carbon deposits. Therefore, an officer's ability to identify fraction composition inconsistencies in a timely manner using control measures is key to preserving engine life and preventing equipment failure during operations.

Mastering methods for assessing the low-temperature characteristics of fuel (using the UTF-70 and UTZ-60M complexes) is of particular importance in the training of logistics officers. In an educational context, studying the processes of paraffin crystallisation and the loss of fluidity of petroleum products is considered a fundamental basis for strategic planning of logistics operations in winter.

Cadets should interpret cold filter testing (UTF-70) as modelling critical fuel system operating conditions. Understanding the physicochemical nature of the filterability limit temperature allows future specialists not only to state the indicator, but also to professionally predict the risks of filter element blockage, which is a guarantee of uninterrupted operation of equipment [14].

Comprehensive analysis using the UTZ-60M device (determination of cloud point and pour point) develops future officers' skills in a differentiated approach to fuel classification (grades "L" and "Z"). The ability of a specialist to analyse these parameters is crucial for making informed management decisions regarding the safe storage, pumping and approval of fuel for use in low temperatures, which directly affects the survivability of units in combat conditions.

In the context of ensuring technological safety and accident-free operation of equipment, an important place in the training of officers is given to the study of methods for determining the flash point of oils (using an open crucible apparatus).

The scientific and methodological approach to studying this indicator involves developing cadets' ability to identify hidden risks. In particular, flash point is considered not only as a fire safety parameter during transportation, but also as a diagnostic marker of oil purity. Future officers must understand that a decrease in flash point is a direct indicator of fuel entering the lubrication system, which in combat conditions leads to inevitable engine failure. Therefore, mastering the open crucible test method enables specialists to carry out preventive control of the technical condition of machines and ensure high survivability of the unit.

In the professional training system, special attention should be paid to the differentiation of methods for assessing the fire hazard of combustible materials, in particular using the TVZ-1M device (closed crucible method).

The educational focus in studying this method shifts to the ability of future officers to simulate the conditions of fuel use in enclosed spaces (fuel tanks, cisterns). Understanding that in a sealed environment, the concentration of combustible vapours reaches a critical level at significantly lower temperatures is the basis for forming a culture of safety. Officers must interpret the flash point in a closed crucible as a fundamental criterion for regulating transportation and storage conditions, which is particularly critical in aviation logistics and when working with equipment in special conditions. Therefore, knowledge of the physical and chemical differences between closed and open crucible methods forms an analytical approach to assessing the risks of emergencies for specialists.

In the process of preparing future officers for the operation of modern high-tech equipment, it is crucial to master methods for the rapid assessment of the detonation stability of petrol (in particular, using the OKM-2 rapid analyser) [15, 16].

The scientific and methodological focus in the study of this area is shifting from the technical characteristics of the dielectric method to the development of cadets' ability to quickly verify fuel under time constraints. Understanding the physicochemical correlation between the electrophysical parameters of fuel and its octane number allows officers to reasonably interpret the results of analysis using research and motor methods.

Training in the use of such rapid methods develops the ability of logistics specialists to make independent decisions during incoming fuel quality control. This minimises the unit's dependence on stationary laboratory equipment and makes it possible to prevent detonation damage to engines in critical situations, which is an important component of maintaining the combat readiness of equipment.

Conclusions

The article provides a scientific justification for improving the training of logistics officers based on integrating knowledge about the physical and chemical properties of fuels and lubricants into their professional competence. The study identified the following main directions and methods for adjusting the content of training.

1. Conceptual change in the focus of training: transition from the reproductive assimilation of the technical characteristics of fuels and lubricants to the formation of the analytical abilities of officers. Knowledge of physical and chemical indicators (viscosity, fractional composition, flash point, etc.) should be considered not as independent values, but as indicators for making management decisions regarding the admission of equipment to operation.

2. Modernisation of the practical component: reorientation of the content of training programmes towards the priority mastery of express methods and mobile control means (such as TEP analysers, OKM-2, UTF-70 devices, TVP-1ts). This ensures that officers are prepared to perform their duties independently in the absence of a stationary laboratory base.

3. Introduction of situational modelling techniques (case methods): replacing traditional descriptions of devices with practical tasks that simulate real combat conditions. Cadets must not only record the results of laboratory tests (e.g., corrosion on a copper plate), but also justify their predictions regarding the survivability of fuel equipment in specific conditions.

4. Implementation of interdisciplinary integration: combining the content of the disciplines "Chemistry", "Technical Support", and "Fire Safety". This makes it possible to form a comprehensive system of professional knowledge, where the physical and chemical properties of a product directly correlate with the resource of weapons and the safety of personnel.

Prospects for further research in this area lie in the development of specific situational tasks to assess the level of professional readiness of logistics officers to control the quality of fuels and lubricants in field conditions.

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ФОРМУВАННЯ ГОТОВНОСТІ ОФІЦЕРІВ ТИЛУ ДО КОНТРОЛЮ ЯКОСТІ ПАЛЬНО-МАСТИЛЬНИХ МАТЕРІАЛІВ У СИСТЕМІ ЇХНЬОЇ ФАХОВОЇ КОМПЕТЕНТНОСТІ

Обґрунтовано значущість фізико-хімічних та експлуатаційних властивостей пально-мастильних матеріалів у формуванні фахової компетентності офіцерів тилу органів охорони державного кордону. Акцентовано увагу на тому, що якість пально-мастильних матеріалів є критичним чинником бойової готовності та безаварійної експлуатації техніки, а тому їхній контроль вимагає від офіцерів не лише знання нормативних документів, а й володіння практичними навичками відбору проб, застосування лабораторних методів та експрес-аналізу. На основі аналізу вимог статутів Збройних Сил України та керівних документів Державної прикордонної служби України визначено суперечності між нормативним характером підготовки та реальними потребами підрозділів, які діють в умовах бойової обстановки, де немає стаціонарної лабораторної бази. Детально розглянуто види випробувань пально-мастильних матеріалів, порядок їхнього застосування і залежність між фізико-хімічними параметрами (в'язкість, фракційний склад, температура спалаху, температура застигання тощо) та експлуатаційною надійністю техніки. Описано приладову базу складів пального – УТФ-70, УТЗ-60М, ТВП-1ц, октанометри та обладнання для визначення температури спалаху, що дає змогу здійснювати кваліфікований контроль показників якості. Доведено, що здатність офіцера приймати рішення щодо допуску пального до використання безпосередньо залежить від сформованості компетентності СКс24, що містить володіння методами контролю фізико-хімічних властивостей.

Обґрунтовано необхідність модернізації змісту освітньо-професійної програми «Організація діяльності тилових підрозділів ДПСУ» шляхом інтеграції практично орієнтованих модулів, які моделюють реальні умови бойової експлуатації техніки. Сформульовано напрями подальших досліджень: створення мобільного лабораторного комплекту, цифровізація контролю якості пально-мастильних матеріалів та розроблення кейс-методів для майбутніх офіцерів.

Перспективу подальших досліджень автори вбачають у необхідності розроблення і вдосконалення навчально-методичного забезпечення освітньо-професійних програм підготовки офіцерів-логістів та програм професійної підготовки молодших фахівців служби забезпечення пально-мастильними матеріалами.

Ключові слова: *пально-мастильні матеріали, фізико-хімічні властивості, компетентності, начальник служби забезпечення, Державна прикордонна служба України.*

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