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## **APPLICATION OF LOSS RATES FOR PETROLEUM PRODUCTS DUE TO NATURAL WASTAGE IN CUSTOMS PROCEDURES**

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Due to its geographical location Latvia has always been a noteworthy transit country. Liquid petroleum products are transported through the country on a regular basis mainly by rail or pipelines. The customs authorities should be aware of the main principles of estimation of loss to prevent avoidance of duty payment in case of unauthorized loss during customs transit procedures, therefore this study more focus on correct implementation of loss of petroleum products.

The authors of the research have designed design an algorithm how customs authorities accept loss of petroleum products due to natural wastage. The customs authorities in Latvia should introduce a uniform practice regarding loss rates. Namely, for the quantities missing wherever it can be shown that the loss observed result solely from the nature of the goods, no customs debt shall be deemed to be incurred. The customs authorities have the rights to consult independent experts to determine whether losses have occurred due to the nature of goods. If it cannot be proved by an independent expert, customs authority shall only apply the standard rate of loss.

**Keywords:** Loss, natural wastage, petroleum products, customs procedures

### **1. Introduction**

Latvia is a typical transit country. Liquid petroleum products are transported through the country on a regular basis mainly by rail or pipelines. It is important to understand and correctly apply loss rates that occur due to natural wastage and also prevent any negligence or manipulation, such as theft. Natural wastage of products depends on physical and chemical characteristic of petroleum products. The customs authorities should be aware of the main principles of estimation of loss to prevent avoidance of duty payment in case of unauthorized loss during customs transit procedures, therefore this study more focus on correct implementation of loss but not on losses itself.

Therefore the main problem is that currently customs legislation in Latvia does not establish standard procedure how to implement loss rates for petroleum products.

The aim of the research is design an algorithm how customs authorities shall accept loss of petroleum products due to natural wastage.

The objectives of the research are:

- 1) overview of literature and regulations;
- 2) analyse experience of other countries, including the regulations about estimation of loss of petroleum products due to natural wastage and its application in customs administration,
- 3) analyse typical losses in practice by observation data and measurements on loss of petroleum products during receiving, loading, storage and transit using currently available technologies.

As research methodology was used qualitative analysis of scientific researches and regulations, interviews of government officials and business representatives, as well as quantitative data analysis of results from observations and measurements on loss of petroleum products during different stage of transportation and storage.

### **2. Overview of literature, regulations and practical experience in some countries**

Losses may be caused by different factors: physical and chemical characteristics of the products, method of loading and unloading product, operations to transport the carrier to a loading terminal, characteristics of transportation equipment and others factors (Ministry of Fuel and Energy, 1998; Pellegrino *et al.*, 2004; Bhatia and Dinwoodie, 2004; Brooke and Crookes, 2007; Ramazanov, 2008; Hernández *et al.*, 2016).

These factors at different proportions may affect the total loss. Usually these factors can be evaluated after having significant practical experience in the field of transportation and storage of specific products. It is considered that the main losses are usually caused by evaporation. Special methods have been developed to estimate losses caused by evaporation under various circumstances. However, methods of calculation usually include some parameters that are hard or impossible to estimate. Therefore, the results cannot be viewed as absolute (Ministry of Fuel and Energy, 1998; Pellegrino *et al.*, 2004; Bhatia and Dinwoodie, 2004; Brooke and Crookes 2007; Ramazanov, 2008, Hernández *et al.*, 2016).

The overall loss of petroleum products due to natural wastage is affected by the following factors:

- losses occur during loading, transit, ballasting and unloading rail tank cars, tank vehicles and marine vessels, as well as transportation of products via pipelines;
- loading, breathing, working, storage and unloading losses;
- losses that occur through sealing of technological equipment, as well as maintenance and repair work of technological equipment (Ministry of Fuel and Energy, 1998, Pellegrino *et al.*, 2004; Bhatia and Dinwoodie, 2004; Brooke and Crookes, 2007; Ramazanov, 2008; Hernández *et al.*, 2016).

Article 124 of the REGULATION (EU) No 952/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 October 2013 laying down the Union Customs Code (hereinafter - UCC) provides that no customs debt on importation shall be deemed to be incurred in respect of specific goods where the disappearance of the goods or the non-fulfilment of obligations arising from the customs legislation results from the total destruction or irretrievable loss of those goods as a result of the actual nature of the goods or unforeseeable circumstances or force majeure, or as a consequence of instruction by the customs authorities. For the purpose of this point, goods shall be considered as irretrievably lost when they have been rendered unusable by any person. The provisions in force pertaining to standard rates for irretrievable loss due to the nature of goods shall apply where the person concerned fails to show that the real loss exceeds that calculated by applying the standard rate for the goods in question (EU 2013).

UCC makes distinctions between losses that result solely from the nature of the goods or are due to other reasons, for instance, theft, etc. The customs authorities may waive the obligation for the person concerned to show that the goods were irretrievably lost for reasons inherent in their nature where they are satisfied that there is no other explanation for the loss.

The national provisions in force in the Member States concerning standard rates for irretrievable loss due to the nature of the goods themselves shall be applied where the person concerned fails to show that the real loss exceeds that calculated by application of the standard rate for the goods in question.

It is clear from these provisions that the total missing quantity of the respective product can be exempt from the customs debt provided that such loss is duly established to the satisfaction of the customs authorities that the loss has resulted solely from the nature of the goods. However, if it cannot be established for the whole missing quantity, standard loss rates due to the nature of the goods shall be applied.

Therefore, it should analyse what is implied by ‘standard rates for irretrievable loss due to the nature of the goods themselves’. It does not mean that the standard rates for irretrievable loss are applied automatically if the actual loss has not been proved. Each case has to be analysed on an individual basis and the customs authorities should accept only the actual losses and not the maximum standard rate.

Latvia together with Lithuania, Estonia, Russia and other countries where the broad-gauge railway (1520 mm) was originally built have joined the Agreement on International Goods Transport by Rail (hereinafter- Railway Agreement). According to the Article 24, Paragraph 1 of the Railway Agreement, railway administrations are not liable for loss of cargo mass, irrespective of the distance that cargo has been transported, if loss occurs due to the nature of the goods. Railway administrations are not liable for loss of cargo mass up to 2% loss of mass – for liquid products; products that have to be transported in their liquid or fresh state, as well as wet cargo. Thereby, the standard rate for loss established in the Railway Agreement also refers to petroleum products- 2% from the total mass for liquid or fresh products, as well as wet cargo. In principle the same rules are also included in the regulations of railway of the 1450 mm gauge or the Convention concerning International Carriage by Rail (COTIF) (CIT 2006).

The customs authorities of the Netherlands treat usually that irretrievable loss results from the nature of the goods. Evaporation is characteristic for liquids, such as petroleum products. However,

relevant documentation has to be presented to prove that irretrievable loss has resulted from the nature of the goods and not from manipulation (abuse) on the part of a person or a company. Other losses that can be accepted are: insignificant measuring equipment errors, differences due to rounding, also, discrepancies due to the fact that pipes, storage tanks that cannot be emptied completely, difficulty to identify the contents of the pipe. For example, products of lower viscosity (e.g. heavy fuel oil) stick to the walls of the tank or pipe and cause loss of the volume. These insignificant losses are irretrievable. Concerning those insignificant losses, it is impossible to identify the exact mass of the loss and the reason for loss. The law in the Netherlands does not establish a standard rate for irretrievable loss. Rates for loss that are being applied in the Netherlands are mainly based on practical observations. In practice 0,2-0,3% are the most common rates of loss applied. 0,3% rate of loss for petroleum products is considered to be a standard rate in business deals (Belastingdienst, 2013).

If an inspection discloses any discrepancies between actual goods and information in customs declarations, the customs authorities have to make a record describing the good and any discrepancies found in Lithuania. Resolution No. 909 on "Standards for Loss of Mass for Rail Cargo due to Natural Wastage" issued by the Lithuanian Government on 10 September 2008 contains specific provisions regarding losses for goods that are transported by rail on domestic routes. According to the resolution, countries that are the Contracting Parties of the Railway Agreement have to apply standard rates for loss (due to natural wastage) for rail cargo according to the provisions of the Railway Agreement (Lietuvos Respublikas Muitine, 2013).

In Estonia there are no standard rates of loss established in the field of customs. However, the standards on movement of excise goods may be applied when needed. Overall, losses that can be proved and explained can be exempt from customs duties in Estonia. Economic operators have to provide an explanation regarding the loss and exemption is applied if the customs authority finds the explanation satisfying. The customs authority may ask experts with specific competence on a subject to participate in investigation. In practice all losses that can be proved may be exempt from customs debt (EMTA, 2013).

### 3. Methodology

Storage is only a part of the whole business process; therefore, losses that occur throughout the whole business process have to be considered. In the field of customs, the main function of terminals is to transit goods. Namely, the goods that have been received (delivered, placed, stored) are stored only for a certain period of time with a purpose of unloading them from the terminals into various means of transportation and dispatching the goods.

Therefore, the losses that occur in terminals used for customs purposes can be defined as flow-through losses. To calculate the total loss that occurs in customs terminals the following formula (1) can be applied:

$$L_t = L_u + L_s + L_x + L_d \quad (1)$$

where:

$L_t$  – the total losses in customs terminals or flow-through losses;

$L_u$  – losses that occur when product is received (unloading the vehicle);

$L_s$  - storage losses;

$L_x$  - product handling, processing, reloading, change in the density (by mixing products of heterogeneous quality), losses that occur during tank repair and other technical manipulations;

$L_d$ - losses occurring during the process of delivery (loading into a vehicle)

At the same time one has to take into account possible measurement errors when determining losses. Measurement errors have to be taken into account in the process of loading, unloading, determining the volume of liquids inside the tanks, errors of measurement tools, tank calibration errors, as well as other corrections/ adjustments e.g. for volume, temperature, etc.

Besides calculation, it is very important that the whole process of implementation is unified and clear. The authors have designed an algorithm to illustrate how Article 124 of the UCC could be implemented (See Figure 1). The goal of this algorithm is to create a single standard, how customs authorities should act in cases when products are with discrepancies.

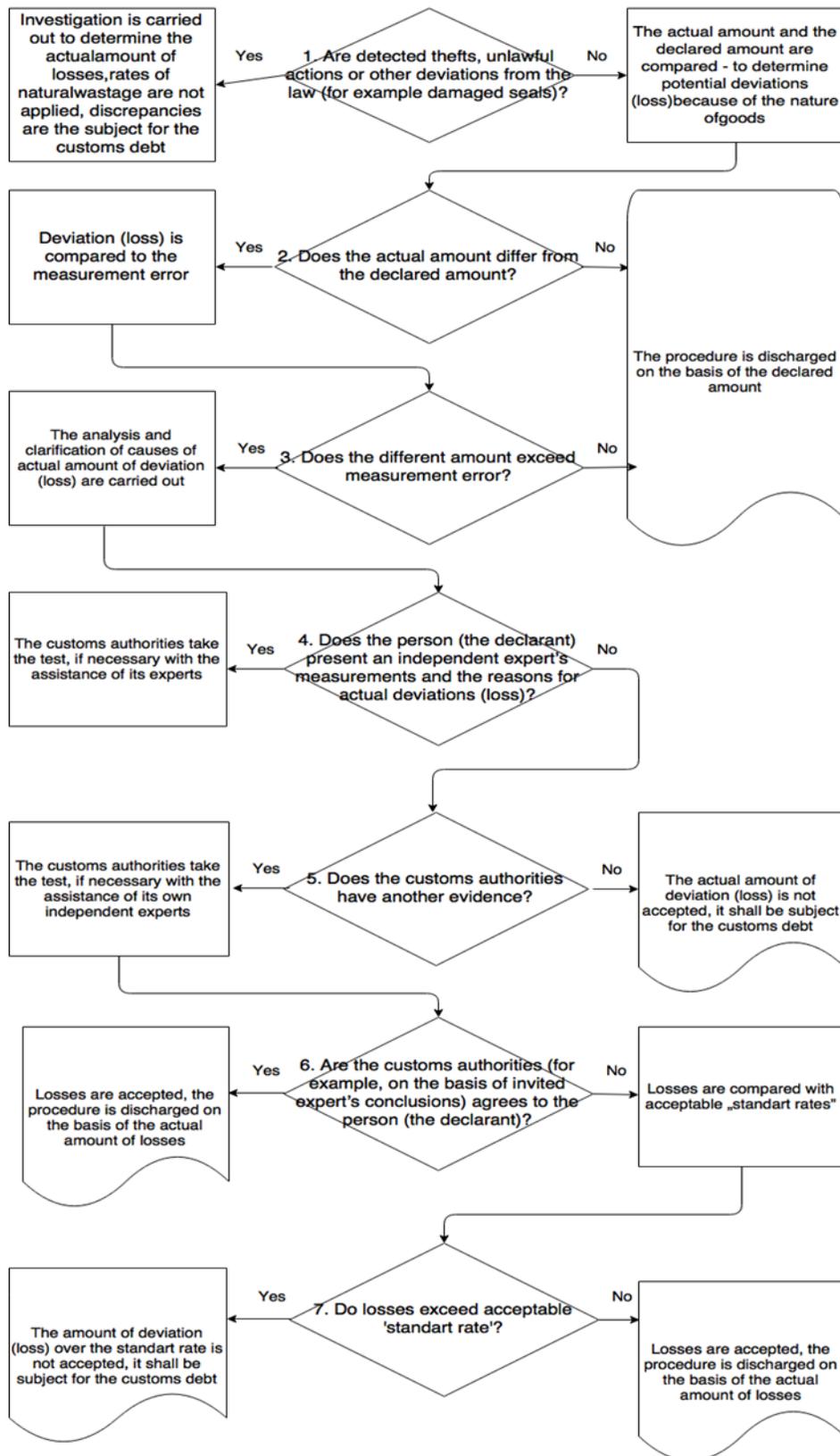


Figure 1. Algorithm for implementation of Article 124 of the Union Customs Code

## 4. Results

Handling, transportation and storage of liquids (including petroleum products) includes a variety of activities. Each activity may cause loss due to evaporation of the liquid or technical reasons. Also, it is believed that handling and storage of liquids may cause leakage, however, the most significant losses occur through evaporation when transition from the liquid phase to gas phase takes place.

When receiving petroleum products for transit, terminals often rely on the accompanying documents, given that seals are not damaged during transportation. This practice reduces the total cost of transit services, as well as time spent unloading. Another reason is that a carrier only acknowledges the loss that has occurred if a seal has been damaged.

This procedure creates the following discrepancies:

- 1) up to 0.5 % error in determining the amount indicated by the dispatcher (possible scale error);
- 2) losses due to the nature of goods occurring during transportation may differ for different products;
- 3) losses may occur in the storage process because of the difference in density of different products received in the same reservoir, as well as losses resulting from the nature of goods. Possible discrepancies in weight up to 0.4 %;
- 4) during the process of loading petroleum products into tankers services of independent inspectors are often used. The inspectors may document the weight of the good as measured on the tanker, where the acceptable difference between the measurement performed on the shore and on the board of the vessel may vary up to 0.3 %. Loading terminals, however, often use the measurements conducted on shore for issuing documents.

Data from observation can be used to estimate total average losses. The observation was performed in two different warehouses during the period from 1 May 2013 till 19 June 2013. The authors use formula 1 to calculate maximal losses from flow-through amount. Calculation results to 0.4% tolerance for loss of petrol, but 0.3% for loss of gas oil.

## 5. Discussions

Information received from authorized economic operators indicates that customs authorities in Latvia only apply the rates for loss within certain limits as defined by legislative acts. In practice the customs authorities do not identify whether or not the losses have occurred due to the nature of the goods. Business representatives also indicate that there have been discussions with customs authorities on interpretation of the concept 'the nature of the goods'. When the customs authorities in Latvia apply a loss rate, it is not clear whether and how the customs authorities accept and treat measurement errors, namely, what are the standards/norms to be used by authorized economic operators (declarants) and customs authorities. It is not possible to measure the quantity of liquids with great precision, as there will always be a physical measurement error.

Authorized economic operators have indicated that the customs authorities in Latvia do not allow to exceed the standard rate of loss established in the national legislation, even when the person concerned could prove that the quantities missing result solely from the nature of goods (according to the Article 124 UCC).

Also, there are no regulations and interpretations available in Latvia on how the person concerned could show that the missing quantities result solely from the nature of the goods (such as presenting explanations, certificates, declarations, or any other documents; also what the deadlines for presenting the information are, what the procedure is). If the real loss exceeds that calculated by application of the standard rate for the goods in question, the person concerned (carrier) is liable for paying customs debt.

Theft is an exception; theft does not result from the nature of the goods; therefore, the abovementioned provisions cannot be applied. In cases when there is evidence of abnormal events, such as damaged rail tank cars, representatives from the customs authority and the carrier must make a record of the circumstances that result in the loss and take the process forward according to the administrative procedure.

To reduce evaporation of petroleum products (mainly petrol), storage tanks used for petroleum products are equipped with pontoon- type floating roofs that float on the surface of the stored liquid. Equipping tanks with pontoon-type roofs helps to reduce the evaporative loss of the stored liquid by decreasing the vapour and compensating fluctuations of the vapour pressure of petroleum products caused by temperatures of the external environment. By using high-quality solutions for pontoon-type roofs storage loss for petroleum products (mainly petrol) can be reduced by 80-90% in comparison to the loss

that would occur from storing the product in cylindrical above-ground tanks with a stationary roof (Tavakoli and Baktash, 2012; Zhang *et al.*, 2013).

Due to the physical properties of goods, as well as different approaches used by different countries to determine the mass of petroleum products, there are almost always some discrepancies found between the weight specified in documentation and the actual weight of the received or stored good. The discrepancies occur for the following reasons: calibration errors of different containers (tankers, rail tank cars, reservoirs), errors in measuring the weight (including flow-through), losses resulting from the nature of petroleum products (evaporation), errors in measurement devices when determining filling degree/level, errors in measurement devices when determining temperature of the product, errors in measurement devices when determining product density, errors in density conversion table, contact of the residue left in the tank with other products. Each error affects the final result and can lead to product shortages or surpluses (Ministry of Fuel and Energy, 1998; Ministry of Transportation, 2002; Milidiú *et al.*, 2003; Gary *et al.*, 2007; Speight, 2015).

Anyway, each case involving losses has to be analysed individually. No customs debt shall be deemed to be incurred for quantities missing wherever it can be shown that the losses observed result solely from the nature of the goods and not from any negligence or manipulation.

## 6. Conclusions

By simplifying inventory methods for petroleum products in terminals and allowing application of standard rate of losses for flow-through petroleum products (instead of making inventories at each stage and both in summer and winter), administrative burden for businesses can be reduced. Currently the administrative burden is significant because of the fact that businesses have to provide calculations on the differences in product volumes at each stage. This could also help to decrease costs.

The customs authorities in Latvia should introduce a uniform practice regarding loss rates and could consider the possibility to use the algorithm developed by the authors of the research. Namely, for the quantities missing wherever it can be shown that the losses observed result solely from the nature of the goods, no customs debt shall be deemed to be incurred. The customs authorities have the rights to consult independent experts to determine whether losses have occurred due to the nature of goods. If it cannot be proved by an independent expert, customs authority shall only apply the standard rate of loss..

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