# Chemical laboratory support for Customs: Vegetable oils added to diesel fuel—a case study

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## Abstract

In June 2015, the *WCO News* published an article about the role played by customs laboratories around the world. It focused on the evolution of laboratories in the last two centuries and explains why this role is scarcely known by citizens and the scientific community.

One year later, in June 2016, during the Dutch European Union (EU) Presidency, Amsterdam held the 6th Seminar of European Customs Chemists, *Sharing knowledge beyond borders*.

This paper provides a brief overview of customs laboratories, and then describes one of the most notable frauds discussed during the seminar due to its significant fiscal impact on many EU countries, and because it relates to several aspects of customs activity, such as economic security, policy, science and law. The case study concerns the mineral oil sector and is an example of a cross-border crime that can be detected by Customs when they have the scientific support provided by customs laboratories experienced in classification, counterfeiting activities and the investigation of fraud.

## WCO highlights the customs laboratories' role

In June 2015, *WCO News* published an article about the role played by customs laboratories around the world. It focused on the evolution of laboratories in the last two centuries and explained the reasons why this role is scarcely known by citizens and the scientific community (Suay-Matallana, 2015).

Customs administrations are required, among other things, to control internationally traded goods in order to ascertain their origin, quantity, quality and value. While origin, value and quantity can be verified through document review and visual examination, often the only way to check the quality of goods is through chemical analysis. Let's consider, for example, the historical organoleptic investigations performed on food through our senses of taste and smell. In this regard, chemical analysis has existed for several thousands of years, as have trade, customs and tax authorities.

Century by century, world trade has matured enormously, particularly in relation to the variety of goods being traded, as demonstrated by the comprehensive chapters, headings and subheadings of the Harmonized System (HS), as reflected in the subheadings of the integrated Tariff of the European Union (TARIC). In almost every commodities sector, chemists are able to offer unique and strategic support, which is harmonised by specific and rigorous analytical standard methods.

In this regard, heading 2710, 'Petroleum oils and oils obtained from bituminous...', represents a clear example. Here, only through the application of specific physical-chemical standard methods, it is possible to differentiate between the different HS subheadings—and hence TARIC subheadings—that vary significantly in terms of their commercial values and applications.

Part of the mission of custom laboratories is also to detect illegal imports of narcotics and any substance for which may have the capability of 'dual use'; for example, chemicals which could be used as either drugs precursors or medicine, or reagents that could be adapted as chemical weapons.

The evolution of the role of customs laboratories is continuing, as demonstrated by the request for them to assist in combatting terrorism (which was discussed during the recent Seminar of European Customs Chemists held in Amsterdam in June 2016).

As a further confirmation of the importance of customs laboratories, it is observed that 'emerging' economies are now racing to put their best resources into delivering modern and well-equipped facilities. They are supported by the WCO, which assists them by organising workshops, projects of cooperation and technical assistance.

It is interesting to observe how on the one hand, by supporting the work of customs and tax authorities, customs laboratories help to protect society but, on the other hand, these laboratories are still scarcely known by the general public and the scientific community. Suay-Matallana (2015) suggests a possible reason for this. Historians of science have extensively studied the contributions from, and the work of, many relevant scientists from different ages and, more recently, they have also considered scientific spaces, such as hospitals and academic and municipal laboratories. However, customs laboratories have scarcely been studied. The possible reasons are that:

- until recently, customs laboratories were inaccessible to students or the general public
- the total number of chemists (and other experts) working in customs laboratories is smaller than in other chemistry sites, such as universities or industry
- laboratories are usually located in different places and within different government departments, such as customs houses, port authorities or treasury offices.

This dispersion of original sources and archival material makes it more difficult for scholars of the history of science to locate documentary sources (including about prominent characters that have worked in such laboratories). Suay-Matallara (2015) also reported some historical anecdotes about customs chemists to demonstrate this point.

Another noteworthy point is that the experience acquired by customs chemists over time is unique. In addition to strengthening their chemical/analytical background with the opportunity to apply their knowledge in different commodities sectors, they also develop knowledge of customs and fiscal proceedings.

## Vegetable oil added to diesel fuel—a case study

The EU has been living in one of the most challenging times of its history from a range of perspectives, including an economic one. Generally, when a state suffers economically, it becomes easier for criminal organisations to operate, developing parallel black markets in the strategic fiscal sectors, such as tobacco, alcohol and energy products (Baloun & Scheinost, 2012; von Lampe, 2012).

Regarding energy products, petroleum products represent one of the most attractive forms of merchandise for fraudsters, usually because of their economic value, distribution network and physical nature (liquid).

European central and eastern states, such as the Czech Republic, Hungary, Slovakia and Poland, still have memories of the massive tax losses of 1990 due to untaxed heating oil sold as highly taxed car fuel (Baloun & Scheinost, 2012). That occurred because, in these countries, a different consumer tax had been imposed on visually similar products, such as light fuel oil (low tax rate) and diesel oil (high tax rate). Today, the EU has adopted different measures to combat this kind of phenomenon. One of the most

recent and important ones is the introduction of the Excise Movement and Control System (EMCS), a computerised system for monitoring the movement of excise goods under duty suspension in the EU. It records, in real time, the movement of alcohol, tobacco and energy products for which excise duties have still to be paid (Decision 1152/2003/EC).

Despite this, customs and financial police operations (World Customs Organization, 2015, 2016; Mobili & Parente, 2014; Di Benedetto, 2016; Pasqualetto, 2015; Pubants, 2016) highlight that automotive diesel fuel continues to be the most attractive product to fraudsters because of its high commercial value. Once again, eastern Europe is a critical source of fraud in the mineral oil sector that now touches the majority of the EU (Semerád, 2012).

In the current example, the goal of the fraudster is to produce and transport a product declared as lubricating oil into the EU. However, it is composed mostly of mineral oil and a relatively small percentage of vegetable oils. Often in these cases, the mineral oil itself is a mix of base oil and gas oil. By changing the percentages of the different parts (vegetable, base and gas oils), the resulting mixtures display a physical property that borders between diesel fuel and lubricating oil. This makes them difficult to detect by conventional methods.

This particular fraud was one of the main issues discussed during the 6th Seminar of European Customs Chemists during the sessions *Going mobile* and *Collecting excise, combating fraud and counterfeit.*

Over the last five years this product has quickly spread to almost all EU countries. Five years ago, at the beginning of the introduction of this product in the EU, authorities generally detected it as a result of controls on trucks transporting 'oil'. Cubitainers were located under the tarpaulin in circumstances that raised suspicion, such as situations where safe transport conditions and documentation were absent. Months later, the fraudulent products were found during routine checks in legal petrol stations and were transported in the EU accompanied by fraudulent BTI (Binding Tariff Information) and SAD (Single Administrative Document).

The ability to combat this fraud requires technical knowledge of TARIC, its explanatory notes and of chemistry, and this is the role of the customs laboratories. So, let us briefly examine the mission of customs laboratories using an example in the mineral oil sector.

In order to classify a product for customs and fiscal purposes, customs laboratories ascertain its specific characteristics described in the TARIC by applying methods prescribed in international standards. For example, a product declared as 'gas oil' must have specific percentages in volume of distillation recovery at 250°C and at 350°C, and the sulphur content has to be in a specific range. The presence of biodiesel also needs to be evaluated because a 'gas oil' could be classified in the EU as CN 27101943-46-47 (according to the sulphur content) if it does not contain biodiesel, but CN 27102011-15-17-19 (according to the sulphur content) if it does contain biodiesel.

In addition, EU customs laboratories usually have the responsibility of checking commercial and environmental parameters. Focusing on 'gas oil' as an example, these parameters for diesel are defined by the Standard EN 590. This standard is published by the European Committee for Standardization and describes the physical properties that all automotive diesel fuel must meet if it is to be sold in the EU and several other European countries. Examples of properties are density, viscosity, flash point and cetane number.

**The lubricating oil issue in Europe.** In order to understand the development of the fraud it is important to underline the fact that that there is a gap in the anti-smuggling web set by the EU concerning the mineral oil sector. Automotive diesel fuels, like light fuel oils, are monitored in the EU through the European Commission's Excise Movement and Control System (EMCS), while 'lubricating oils' can be moved in the EU without being monitored by EMCS because it is not subject to excise tax in the EU and only a few states apply national taxation on these products.

**The fraud.** Evaders produce and move, or import, a product declared as lubricating oil (e.g. *anti-stick & anti-corrosion oil* or *protective oil*) into the EU also using false documents. It circulates in the black market before entering the mainstream network, where it is sold as expensive automotive diesel fuel. However, it contains a majority of 'gas oil' which bypasses the official standard methods employed in the customs laboratories.

The consequence is a massive tax loss in terms of excise and value added tax (VAT).

The financial police involved in these international operations have estimated that each EU country loses hundreds of millions of euros from this new diesel swindle (World Customs Organization, 2015, 2016; Mobili & Parente, 2014; Di Benedetto, 2016; Pasqualetto, 2015; Pubants, 2016).

The intelligence sources and the technical knowledge of these criminals is balanced by the scientific knowledge of the customs chemists that are moving beyond the TARIC methods, setting new specific methods, in order to detect such fraud. That is one of the conclusions that came from the 6th Seminar of the European Customs Chemists, where chemists from a variety of EU countries, exchanged their technical approaches in the fight against such situations.

In conclusion, fraud involving vegetable oil added to diesel fuel represents an interesting case study for the following reasons:

1. This fraud spread throughout the EU because 'lubricating oil' is not monitored by EMCS, so it represents a gap in the anti-smuggling web set by the EU.
2. TARIC defines 'lubricating oil' (CN codes 27101971 to 27101999) as *heavy oil* which also contains 'fuel oil' and 'gas oil'. However, there are too few technical parameters and it is simply thought of as 'different' from 'fuel/gas oil'. The residual definition of lubricating oil should therefore be updated.
3. The possibility to describe the mixtures of mineral oils with triglycerides (vegetable oils) through one or more new CN codes should be evaluated. According to the *Official Journal of the European Union,* Council Directive 2003/96/EC of 27 October 2003, we are describing two kinds of energy products: mineral oil and vegetable oil.
4. From the customs laboratories' points of view, this fraud underlines not only the need for faster recognition of emerging fraudulent trends, but also the strategic importance of updating existing standard control methods, as well as the development of new official methodologies.

The participants at the seminar in Amsterdam agreed that this fraud has already been modified in the past year. Some laboratories in the EU are finding other organic compounds in these fraudulent products, rather than vegetable oils. These organic compounds come from industrial processes and show the same chemical functional groups as vegetables oil triglycerides. Consequently they are likely to present customs with the same problems as the products that have already been encountered.

This last point also highlights the ability of criminal networks with a knowledge of industrial chemistry to identify ways of circumventing TARIC, and therefore how important it is to combat the evaders with government-sponsored chemical experts.

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## References


Baloun, V., & Scheinost, M. (2002). Economy and crime in a transition society—the Czech Republic's case. In P. C. van Duyne, K. von Lampe, & N. Passas (Eds.), *Upperworld and underworld in cross-border crime.* Nijmegen: Wolf Legal Publisher (pp. 43–59).

Di Benedetto, G. (2016). Trani, lubricant sold as diesel: 19 arrests in the blitz against tax evasion. *Bari.* Retrieved from http://bari.repubblica.it/cronaca/2016/05/02/news/bari138889545/?ref=search

European Commission. (2016). 6th Seminar of European Customs Chemists, 22–24 June 2016, Amsterdam, Netherland. Retrieved from http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/customs/customs_controls/custom_laboratories/group_ecl/netherlands_en.pdf

European Commission. (2017a). *Binding tariff information*. Retrieved from http://ec.europa.eu/taxation_customs/business/calculation-customs-duties/what-is-common-customs-tariff/binding-tariff-information-bti_en

European Commission (2017b). *The single administrative document (SAD)*. Retrieved from http://ec.europa.eu/taxation_customs/business/customs-procedures/general-overview/single-administrative-document-sad_en

European Union (2003). Decision No 1152/2003/EC of the European Parliament and of the Council of 16 June 2003 on computerizing the movement and surveillance of excisable products. *Official Journal of the European Union.* L. 152, 5–8. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003D1152&from=EN

Mobili, M., & Parente, G. (2014). Tablets, invoices made in China & Co: how does fraud change for not paying tax. *Italia.* Retrieved from http://www.ilsole24ore.com/art/notizie/2014-02-12/lotta-evasioneil-gasolio-viene-est-evitare-accise—191326.shtml?uuid=ABpPcBw&nmll=2707#navigation

Pasqualetto, A. (2015). *Fueling gas is boom Indagano 17 Procure, 1800 denounced*. Retrieved from http://www.corriere.it/cronache/15_ottobre_01/contrabbando-gasolio-boom-indagano-17-procure-1800-denunciati-b8bde238-6865-11e5-8caa-10c7357f56e4.shtml?refresh_ce-cp

Pubants, F. (2016). *International lubrication oil band in Grimmen flown.* Retrieved from http://www.ostsee-zeitung.de/Nachrichten/MV-aktuell/Internationale-Schmieroel-Bande-in-Grimmen-aufgeflogen

Semerád, P. (2012). Value added tax evasion and excise duty fraud on fuel market in the Czech Republic. *Acta Universitatis Agriculture et Silviculturae Mendelianae Brunensis 60,* 335–340.

Suay-Matallana, I. (2015). Customs laboratories, chemistry and excise: An historical introduction. *WCO News*. *77*, 34–36. Retrieved from http://www.academia.edu/12871267/Customs_Laboratories_chemistry_and_excise_an_historical_introduction

von Lampe, K. (2002). 'The trafficking in untaxed cigarettes in Germany: A case study of the social embeddedness of illegal markets'. In C. van Duyne, K. von Lampe, & N. Passas (Eds.), *Upperworld and underworld in cross-border crime* (pp. 141-161). Nijmegen: Wolf Legal Publishers.

World Customs Organization. (2015). *Illicit Trade Report 2014*. Retrieved from http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/activities-and-programmes/illicit-trade-report/itr-2014-en.pdf?la=en

World Customs Organization. (2016). *Illicit Trade Report 2015*. Retrieved from https://illicittrade.com/reports/downloads/OMD_ITR_Complete_LR_2016_12_04.pdf

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Dr Vito Daniele graduated in chemistry with honours at the University of Bari in 1997 with an experimental thesis in analytical chemistry. A chemist at the Italian Customs Laboratory of Bari, he deals with the analysis of narcotic drugs and mineral oils for tariff classification, excise duties and antifraud activities for private persons and institutions. He is responsible for the storage and disposal of chemical laboratory wastes; supervisor of the maintenance of the scientific instruments; and a member of the following national working groups: 'Biodiesel in Diesel', 'Determination of drugs', 'Analytical methods for determination of fiscal denaturings in mineral oil', 'Error in analytical measure', 'Purchase of scientific instruments'. He is interested in the evaluation and development of new analytical methods.

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