

ARTICLE

Forensic aspects of hard coal sampling in criminal proceedings¹

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Abstract

Experience shows that effectively combating crime related to the hard coal mining is often a difficult task – from the investigation stage right through to the presentation of evidence. These difficulties may arise from various factors, including the specific nature of the offences and their connection with the technical aspects of mining operations, and in the case of offences relating to coal, also from the physicochemical properties of that raw material. Consequently, the effective conduct of criminal proceedings in this area often requires specialist knowledge. This article discusses one of the challenges – the issue of collecting coal samples from a lorry's trailer for the purposes of criminal proceedings. It was analysed in the light of the principles of criminal investigation tactics and the requirements of criminal procedure.

¹ This article is an English translation of the original Polish publication. The article is based on a doctoral dissertation entitled *Economic Crime in the Coal Industry: The Case of Polska Grupa Górnicza S.A. – Investigative and Legal Issues*, which was defended at the Jagiellonian University. The author drew primarily on excerpts from Chapter 3.4.2, *Determining the quality of coal as the material object of the offence*. The dissertation won first place in the 'doctoral theses' category in the 15th edition of the competition organised by the Head of the Internal Security Agency (ABW) for the best doctoral, master's or bachelor's thesis on national security in the context of intelligence, terrorist and economic threats.

Keywords hard coal mining, combating crime, investigative tactics, evidentiary difficulties, coal sampling

Introduction

In the literature, mining is described as the oldest form of human technological activity, with roots stretching back to prehistory. Historical and archaeological research indicates that mining was already taking place in what is now Poland during that era. Mining methods were initially used to extract flint and, over time, other raw materials, including iron ore². Over the centuries, other resources extracted in these territories included amber, salt, gold, silver, lead and copper ores, as well as lignite and hard coal. It is generally accepted that industrial-scale hard coal mining in the territory of present-day Poland began in the 18th century³.

Hard coal occurs in Poland in three coalfields – the Lower Silesian Coalfield, the Lublin Coalfield and the Upper Silesian Coalfield – although mining is currently carried out only in the latter two. In the literature, the view that hard coal mining played a significant role in Poland's development during the 20th century appears to be widely accepted. At the same time, it is noted that although the sector's role as a strategic component of the Polish economy is diminishing, it will remain important to the country's functioning and development over the coming decades. Despite coal's declining share in the national energy mix, Poland's hard coal reserves are still regarded as a stabilising factor for the country's energy security⁴.

From a theoretical perspective, legal scholarship on hard coal mining may address four key areas: (1) international law (e.g. whether mines constitute legitimate military targets); (2) administrative law (e.g. mining licences); (3) civil law (e.g. compensation for damage caused by mining operations); and (4) criminal

² P. Strzałkowski, *Zarys rozwoju technologii górnictwa podziemnego* (Eng. An overview of the development of underground mining technology), Gliwice 2011, p. 19.

³ *Ibid.*, pp. 20–30.

⁴ A. Kielerz, M. Porzerzyńska-Antonik, *Węgiel w energetyce zawodowej i ciepłownictwie – stan obecny i perspektywy* (Eng. Coal in energy generation and direct heating – current status and prospects), "Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi i Energią PAN" 2019, no. 108, p. 40, 42. <https://www.doi.org/10.24425/znigsme.2019.128676>; A. Rybak, *Rola i przyszłość węgla w zapewnieniu bezpieczeństwa energetycznego Polski* (Eng. Poland's energy security and coal position in the country's energy mix), Gliwice 2020, pp. 29–31, 157. See also: Ministry of State Assets, *Program dla sektora górnictwa węgla kamiennego w Polsce* (Eng. Programme for the hard coal mining sector in Poland) (version incorporating the 2022 amendments), <https://www.gov.pl/web/energia/programu-dla-sektora-gornictwa-węgla-kamiennego-w-polsce> [accessed: 1 VI 2024].

law and criminalistics (e.g. investigative approaches to offences committed against mining companies in connection with their business activities).

The paper focuses on the methodology for sampling hard coal from a lorry trailer for the purposes of criminal proceedings, following the apprehension in *flagrante delicto* of individuals suspected of involvement in fraud concerning the quality of the coal they were transporting. This issue falls within the broader field of criminalistics outlined above. In developing the proposed approach, specialist literature in the engineering sciences was reviewed, and the guidelines contained therein were adapted to the practical realities of criminal investigation and procedure.

Sampling hard coal from lorry trailers for investigative and evidentiary purposes in criminal proceedings

One of the criminal schemes affecting mining enterprises, known to law enforcement agencies, involves the removal from a mine of coal whose size grade or quality class differs from that specified in the sales documents (a form of quality fraud referred to in Polish police parlance as ‘jakościówka’ or ‘klasówka’). This scheme relies on price differences between coal products offered for sale (differing in size grade⁵ and/or quality class⁶) and on the difficulty of detecting, without appropriate equipment, discrepancies between the coal purchased and the coal actually transported by road or rail⁷. Those involved in this scheme may also take additional measures to conceal such discrepancies, complicating the detection of inconsistencies between

⁵ The basis for classifying hard coal into size grades is particle size (i.e. the size of individual coal lumps or particles). Depending on particle size, the following size grades are distinguished, among others: large lumps, cobbles, nuts, peas, fines and coal slurry. For further details, see: PN-82/G-97001 *Hard Coal. Size Grades*.

⁶ The classification of hard coal into classes is based on its calorific value, ash content, and sulphur content. For further details, see: PN-82/G-97003 *Hard Coal for energy purposes*. Individual coal classes are designated by a three-part symbol. For example, the designation ‘28/05/08’ indicates that the coal has a calorific value of 28 MJ/kg (28,000 kJ/kg), an ash content not exceeding 5%, and a sulphur content of 0.8%. A coal’s class has a direct impact on its market value: the higher the class, the higher its price. In Polish commercial practice, this classification is often simplified to the calorific value alone. It is worth noting that the common practice of referring to a batch of coal as ‘Class 24 coal’ is based on its calorific value. For example, coal with a calorific value of 24 MJ/kg is referred to as ‘Class 24 coal’.

⁷ As a rough guide, an articulated lorry with a tipper semi-trailer can typically carry around 24–27 tonnes of coal, depending on the vehicle’s specifications. A single coal wagon has a load capacity of around 55 tonnes, while a freight train often comprises around 25 coal wagons (giving a total capacity of approximately 1,375 tonnes).

the sales documents and the actual coal load (e.g. by concealing higher-quality coal beneath a layer of lower-quality coal). Distinguishing between coal quality classes without carrying out appropriate tests is essentially impossible. Consequently, coal with a higher market value than that stated in the sales documents and reflected in the price paid may be fraudulently transported out of the mine. The ‘better’ coal is then resold to third parties at prices reflecting its actual size grade or quality class, generating substantial profits for those operating the scheme.

In these circumstances, determining the quality of the coal involved in the scheme (i.e. the actual quality class or size grade of the coal transported out of the mine and, consequently, the value of the loss) is of key importance from an investigative perspective. From the perspective of crime detection and the process of proving facts in criminal proceedings⁸, this circumstance gives rise to a fundamental problem that may emerge in cases of this kind: how to collect, secure, and analyse a representative sample of the coal in question so that the results are scientifically reliable and comply with the requirements of criminal procedure

⁸ By ‘detection’, the author means, in accordance with the definition proposed by Tadeusz Hanausek, ‘the totality of activities (search, disclosure and ascertainment) undertaken by law enforcement authorities to uncover an incident classified as an offence at a given stage of the proceedings, and to obtain information enabling the formulation of a hypothesis concerning a person having a legally relevant causal relationship with that incident, followed by the establishment of the personal particulars of that person (...) and, as a result, securing that person and gathering preliminary material lending support to the hypothesis that the person perpetrated the act under investigation to a degree sufficient to justify the commencement of the evidentiary process’. See: T. Hanausek, *Zarys kryminalistycznej teorii wykrywania. Część I. Pojęcie i przedmiot wykrywania sprawców przestępstw* (Eng. An outline of the criminalistics theory of detection. Part I: The concept and scope of detection of offenders), Warszawa, 1978, p. 45. In turn, under Polish criminal procedure, the term ‘proving’ (i.e. the evidentiary process) should generally be understood as a continuation of activities initiated at the detection stage. However, evidentiary activities must also comply with the requirements of the applicable procedural legislation, including, among other things, prohibitions on the use of evidence. The literature rightly points out that ‘proving’ can be defined, in the broadest terms, as the substantiation of a hypothesis, most commonly the hypothesis that a particular person is the perpetrator of an offence. (...) The result of carrying out such activities is the accumulation of material of evidential value, that is, material which makes it possible, among other things, to substantiate assertions concerning the commission of a given offence and the circumstances surrounding it, the perpetrator’s modus operandi and motivation, and information concerning the perpetrator’. See: *Kryminalistyka. Przewodnik* (Eng. Criminalistics: A guide), D. Wilk (ed.), Toruń, 2013, p. 28.



Image 1. Selected hard coal size grades – illustrative photographs: lump coal (A), nut coal (B), pea coal (C), fine coal (D).

Source: author's own photographs (courtesy of PGG S.A.).

Samples of hard coal may be taken for the purposes of criminal proceedings in various circumstances. This article focuses on a single scenario, which the author considers particularly suitable for presenting the proposed sampling methodology: the apprehension in flagrante delicto of suspected offenders transporting coal by road from a hard coal mine before leaving the mine premises (e.g. an apprehension marking the culmination of an operational investigation)⁹. In such situations, the procedure known as ‘proceedings to the extent necessary’ may be used, provided that no investigation has yet been initiated in the case, pursuant to Article 308 § 1 of the Polish Code of Criminal Procedure¹⁰. This is because its essential prerequisite – namely, a justified risk that evidence of a criminal offence may be lost – is met. Taking coal samples in such circumstances forms part of an inspection (see Article 207 § 2 of the Polish Code of Criminal Procedure) and is therefore expressly permitted under Article 308 § 1 of the Polish Code of Criminal Procedure. An inspection involving the planned sampling of a given coal load may – like any other inspection – take the form of a ‘simple inspection’ (without an expert witness) or

⁹ Emphasis should be placed on the importance of collecting coal samples at an early stage. Sampling should take place either while the transport vehicle is still on the coal mine premises or immediately after it leaves the site. Where the transport route is subject to covert surveillance, sampling may also take place later, for as long as continuous surveillance of the cargo is maintained. If the coal is not sampled at a stage that makes it possible to demonstrate that the tested material is identical to the raw material issued as part of a specific transaction (i.e. without, among other things, the risk of it being mixed with coal of a different origin or substituted), the probative value of laboratory tests conducted on a sample collected at a later stage is diminished.

¹⁰ Act of 6 June 1997 – Code of Criminal Procedure.

a ‘complex inspection’¹¹ (with an expert witness¹²), although the presence of an expert witness seems generally unnecessary in the scenarios under consideration¹³. It is worth noting that, under current Polish legislation, no provision precludes the person in charge of the proceedings – whether an investigating officer or a prosecutor – from carrying out the sampling personally, without the assistance of an expert witness. However, the person in charge of the proceedings should refrain from sampling the coal themselves if they lack the relevant training in this area and should entrust this task to specialists appropriately trained in coal sampling¹⁴. Legal literature on the Polish legal system rightly emphasises the need to distinguish between specialist knowledge within the meaning of Article 193 § 1 of the Polish Code of Criminal Procedure (i.e. the knowledge of an expert witness) and the technical, operational knowledge required to carry out specific evidentiary procedures properly¹⁵. The case law of Polish courts rightly emphasises that, under the Polish Code of Criminal Procedure, a specialist essentially acts as an assistant to the procedural authority: the specialist’s skills and technical know-

¹¹ *Kryminalistyka. Przewodnik...*, p. 107.

¹² An analysis of the official lists of court-appointed expert witnesses of the Regional Courts in Katowice, Gliwice and Rybnik (as at 31 December 2023) raises doubts as to whether the expert witnesses listed under ‘mining’ (or similar designations) possess the requisite specialised knowledge relevant to coal sampling. This may be compared to a situation in legal scholarship: not every lawyer has specialised knowledge of international humanitarian law. Experience suggests that this is a relatively niche area of expertise among legal practitioners, particularly when compared with core areas such as criminal and civil procedure. Accordingly, when considering engaging an expert witness to assist with coal sampling, it would be advisable to establish in advance (e.g. by telephone) whether the expert witness also possesses specialised knowledge in this specific area. In such circumstances, consideration should also be given to appointing an ad hoc expert witness from among individuals conducting scientific research into hard coal processing, for example at the Central Mining Institute – National Research Institute (GIG-PIB) in Katowice.

¹³ The Polish courts have reached similar conclusions regarding scent identification evidence. See, for example, the judgment of the Polish Supreme Court of 5 XI 1999, ref. no. V KKN 440/99, LEX No. 38328.

¹⁴ Formally, no such requirement exists (Article 205 § 1 of the Polish Code of Criminal Procedure does not oblige the authority conducting the proceedings to seek the assistance of specialists). However, the collection of coal samples by individuals without appropriate training should be avoided, as it may cast doubt on the probative value of the laboratory test results obtained from such samples.

¹⁵ See, for example: J. Kasprzak, *Biegły i specjalista przed sądem – wybrane aspekty taktyczne* (Eng. Expert witnesses and specialists before the court – selected tactical aspects), Warszawa 2001, p. 15; *Kodeks postępowania karnego. Komentarz* (Eng. Code of Criminal Procedure. Commentary), J. Skorupka (ed.), Warszawa 2023, commentary on Article 205 of the Polish Code of Criminal Procedure; *Kodeks postępowania karnego. Tom II: Komentarz do art. 167–296* (Eng. Code of Criminal Procedure. Volume II: Commentary on Articles 167–296), R. A. Stefański, S. Zabłocki (eds.), Warszawa 2019, p. 627 et seq.

how enable tasks falling within the authority's own remit to be performed reliably and with due diligence¹⁶. An analysis of the nature of coal sampling leads, in turn, to the conclusion that it is, in principle, an essentially technical procedure comparable to collecting traces of blood using swabs for subsequent forensic examination or recovering and preserving fingerprints at a crime scene: just as an expert witness's primary role concerns DNA analysis or latent fingerprint examination rather than the physical recovery of evidence at a crime scene, their role in relation to a coal sample primarily concerns its laboratory analysis rather than the physical sampling itself. Accordingly, to ensure that the sampling process is reliable and produces forensically sound evidence, it is particularly important that the specialist carrying it out be well acquainted with standardised methodologies for manual hard coal sampling. Ideally, such a person should have both theoretical knowledge in this field (for example, acquired by completing the 'Course for samplers on applicable PN and ISO technical standards' organised by the Central Mining Institute – National Research Institute in Katowice¹⁷) and practical experience. For this reason, a standard forensic police technician does not appear to be the appropriate person to collect such samples. Thus, if the law enforcement unit handling an incident that requires coal sampling lacks personnel suitably trained in this regard, it should consider calling upon an external specialist on an ad hoc basis to perform these tasks at the scene of the inspection (Art. 15 § 3 in conjunction with Art. 205 § 1 of the Polish Code of Criminal Procedure), particularly during urgent proceedings under Art. 308 § 1 of the Polish Code of Criminal Procedure.

The remainder of this article sets out a proposed methodology for the manual collection, for investigative purposes, of hard coal samples transported by road. To begin with, as a guiding principle, it is worth recalling the apt observation made by Jutta Olszówka and Bronisław Paul:

(...) in the case of coal, which is a highly heterogeneous material characterised by a variety of physicochemical and petrographic properties, variations in particle size distribution, mineral matter content, and moisture content – the proper collection and preparation of samples is a difficult and demanding task. A sample taken from a specific batch of coal should, in terms of its properties [characteristics – note by K. L.], correspond to the average properties of the batch under test. A sample that does not represent the average

¹⁶ See: the judgment of the Supreme Court of 3 XI 2021, ref. no. V KK 460/20, LEX no. 3342210.

¹⁷ The course consists of six hours of lectures and costs PLN 890 (as at 31 December 2023). See: *Kurs dla próbobiorców w zakresie obowiązujących norm technicznych PN i ISO* (Eng. Course for sampling technicians on applicable PN and ISO technical standards), Central Mining Institute – Competence Development Center, <http://szkolenia.gig.eu/wydarzenie/kurs-dla-probobiorcow-w-zakresie-obowiazujacych-norm-technicznych-pn-i-iso/> [accessed: 31 XII 2023].

properties of the batch under test within the permissible margin of error yields incorrect results, leading to erroneous conclusions. Therefore, samples should be collected in accordance with certain rules and with great care, all the more so as sampling is generally carried out only once, with no possibility of repetition (...). The accuracy and representativeness of the samples collected depend on whether all the relevant operations have been performed in accordance with the methodology developed by Polish Standards, as well as on the conscientiousness, care, and qualifications of the personnel involved in sample collection and preparation¹⁸.

It is estimated that the sampling stage can account for as much as 80%¹⁹ of the total error²⁰ in an analysis. Coal sampling should therefore be carried out with the utmost care. Coal is considered one of the most difficult materials to sample, and obtaining a sample that perfectly represents the batch being tested is regarded as practically impossible. However, by strictly adhering to the sampling methodology developed in the engineering sciences, the risk of collecting unrepresentative samples can be minimised to an acceptable level²¹. In other words, the purpose of sampling is not to determine the parameters of a given batch precisely, but to estimate them reliably²² (determining the precise parameters of a given batch would be possible only after testing the whole batch – an approach that, in most cases, would be wholly impractical for technical and economic reasons).

A search of available databases conducted by the author²³ revealed no published methodology specifically addressing the collection and preservation of hard coal

¹⁸ J. Olszówka, B. Paul, *Zasady kontroli jakości węgla* (Eng. Principles of coal quality control), Katowice 1972, p. 68.

¹⁹ Z. Qian, *Coal sampling and analysis standards*, London 2014, p. 18, 46; M. Mastelarz, *Dlaczego kluczowym etapem analizy paliwa jest odpowiednie pobranie próbek?* (Eng. Why is proper sampling a crucial stage in fuel analysis?), Institute of Energy and Fuel Processing Technology, www.itpe.pl/blog/2021/09/08/dlaczego-kluczowym-etapem-analizy-paliwa-jest-odpowiednie-pobranie-probek/ [accessed: 31 XII 2023]. The website is currently unavailable (editor's note).

²⁰ Total error is defined as the sum of random and systematic errors arising at successive stages, from sampling, through sample preparation, to the final laboratory analysis. Even the results of the most meticulous sampling may be affected by errors at any of these stages. See: W. B. Membrey, *Coal sampling*, in: *The Coal Handbook. Volume 1: Towards Cleaner Coal Supply Chains*, D. Osborne (ed.), San Diego, 2023, p. 108; *Metodyka dokumentowania złóż kopalin stałych. Część III: Opróbowanie złóż kopalin* (Eng. Methodology for the documentation of solid mineral deposits. Part III: Sampling of mineral deposits), M. Nieć (ed.), Kraków, 2012, Table 7.1, p. 91.

²¹ Z. Qian, *Coal sampling...*, p. 18.

²² W. B. Membrey, *Coal sampling...*, p. 107.

²³ Searches were conducted using Google, Google Scholar, Google Books, and the EBSCO Discovery Service (accessed through the Jagiellonian Library). Search terms were applied in Polish, English, German, Russian, and Ukrainian.

samples for criminal proceedings from a forensic perspective. This is not surprising, given the highly specialised nature of this forensic application. It therefore seems reasonable to apply the general methodology for sampling hard coal developed in engineering, while taking into account the additional requirements arising from the specific nature of criminal proceedings.

The key documents governing the methodology for sampling hard coal in Poland are two Polish Standards²⁴: PN-ISO 18283:2008 *Hard coal and coke. Manual sampling*²⁵ and PN-G-04502:2014-11 *Hard coal and lignite. Sampling and preparation of samples for laboratory analysis. Basic methods*. It is recommended that these standards be adhered to, as the working procedures of accredited²⁶ analytical laboratories in Poland are aligned with them. These standards have been developed on the basis of the theory of statistical quality control, probability theory, and the theory of errors²⁷. From a practical standpoint, the second of these standards appears to be more relevant, as it elaborates on the first and sets out the recommended sampling methodology step by step for specific locations and means of transport, including conveyor belts, stockpiles, lorries and railway wagons²⁸.

An analysis of the above-mentioned standards in the light of general forensic principles makes it possible to formulate the following basic guidelines for the proper sampling of hard coal loaded onto lorries for investigative and evidentiary purposes²⁹:

²⁴ Polish Standards are documents adopted by consensus, setting out rules, guidelines, or characteristics relating to various types of activity or their results and aiming to achieve an optimal degree of order within a given field. The Polish Committee for Standardisation is responsible for their preparation. Individual standards are designated by the abbreviation 'PN', followed by a reference identifying the specific standard and the year of its introduction. See: *Co to jest PN?* (Eng. What Is PN?), Polish Committee for Standardisation, <http://www.pkn.pl/polskie-normy/informacje-o-pn/co-jest-pn> [accessed: 31 XII 2023]; *Act of 12 September 2002 on Standardisation*.

²⁵ This standard is a direct translation of the English-language international standard ISO 18283:2006. The current international version, ISO 18283:2022, was published in 2022. As at 31 December 2023, PN-ISO 18283:2008 had not been updated.

²⁶ The Polish Centre for Accreditation is the sole accreditation body in Poland. It operates pursuant to the *Act of 13 April 2016 on Conformity Assessment and Market Surveillance Systems*.

²⁷ J. Olszówka, B. Paul, *Zasady kontroli jakości...*, p. 69; W. B. Membrey, *Coal sampling...*, pp. 107–109.

²⁸ These standards are consistent with each other. For further details on the relationship between these standards, see: M. Mastelarz, *Polskie normy dotyczące ręcznego pobierania próbek węgla kamiennego* (Eng. Polish standards for the manual sampling of hard coal), Institute of Energy and Fuel Processing Technology, <https://itpe.pl/polskie-normy-dotyczace-recznego-pobierania-probek-węgla-kamiennego> [accessed: 31 XII 2023].

²⁹ The author of this article does not claim to provide a detailed account of the proper methodology for sampling hard coal, as doing so would require specialised technical knowledge. The author, a lawyer by training, takes the view that the aim of forensic training for lawyers is not to turn them into quasi-

- as a general rule, a vehicle held for inspection should be unloaded, and taking coal samples directly from a loaded vehicle should be avoided. The fundamental principle of sampling theory is that every particle in the batch being sampled is equally likely to be selected. In manual coal sampling, particularly when the coal is in a loaded lorry trailer, this assumption is difficult to fulfil in practice³⁰. This is because access to particles at the bottom of a load (e.g. 2 m deep) is severely restricted, making it unrealistic to expect them to have the same probability of being selected as particles closer to the surface. In such circumstances, the risk of obtaining a non-representative sample is further increased by particle segregation resulting from physical processes³¹, as well as by atmospheric influences during transport. To address this, sampling theory recommends unloading the vehicle and taking samples from the resulting stockpile. While this approach does not entirely eliminate the risk of obtaining a non-representative sample, it is expected to substantially mitigate this risk³². Furthermore, the fraudulent practices discussed in this article may involve intentionally concealing higher-quality coal beneath a layer of lower-quality coal. Unloading the vehicle inevitably results in at least partial mixing of these layers. It is also worth noting that under Section 105(1) of the Polish *Regulation of the Minister of Labour and Social Policy of 26 September 1997 on general health and safety at work regulations*, work carried out on a surface located at least 1 metre above ground level is formally classified as work at height. The height of a loaded semi-trailer or tipper body exceeds

doctors, quasi-chemists or quasi-physicists – a goal that would require thorough specialist education to minimise the risk of making pseudoscientific claims or relying on junk science. Rather, the aim is to build a bridge enabling legal practitioners (judges, prosecutors, advocates, attorneys-at-law and police officers) to engage in informed dialogue with expert witnesses in relevant fields, ask pertinent questions and critically assess the answers they receive. Such training should also enable them to carry out procedural activities in a manner that minimises the risk of irreparable errors. This latter aspect is particularly relevant to procedural authorities; advocates and attorneys-at-law, for their part, should be able to identify potential shortcomings in the way proceedings are conducted by those authorities and respond appropriately.

³⁰ The literature strongly recommends avoiding manual sampling. To minimise the risk of errors, including human error, mechanical coal sampling is preferable, ideally using an automatic sampler installed on a conveyor belt. However, mechanical sampling is impracticable in the situations discussed in this article, where the police must collect coal samples during an on-site inspection, often at short notice. See: Z. Qian, *Coal sampling...*, p. 29.

³¹ W. Wawrzynkiewicz, L. Róg, K. Hamala, *Dokładność pobierania próbek paliw stałych za pomocą urządzeń mechanicznych* (Eng. Accuracy of sampling solid fuels using mechanical devices), “Przegląd Górniczy” 2005, vol. 61, no. 11, p. 25.

³² PN-ISO 18283:2008, p. 35.

this threshold, meaning that taking coal samples directly from the vehicle would constitute work at height under the aforementioned provision and would require appropriate safety measures. If the unloading operations in question are carried out on the premises of a coal mine, the officer in charge of the inspection (or the prosecutor, if present) should, where possible, consult a representative of the mine regarding a suitable unloading site. The selected site should be a clear, paved and level surface that prevents the unloaded coal from mixing with the underlying ground. At this stage, it is recommended that photographic documentation be prepared showing the vehicle and its load prior to unloading, the selected unloading site before unloading begins, and the resulting coal stockpile. This documentation may prove important in subsequent court proceedings, for example, if the defence challenges the validity of the sampling procedure. Before unloading, the vehicle should be reweighed for verification purposes. Where possible, the verification weighing should be carried out on a different weighbridge from the one used for the initial weighing (since unloading is about to begin, this provides the last opportunity to verify the gross mass of the loaded vehicle in the same condition as when it was due to leave the mine site). Using a different weighbridge is intended to help guard against potential measurement errors caused by damage to the weighing equipment or tampering with the readings of the original weighbridge;

- on the coal stockpile formed by unloading the lorry, 32 sampling points should be evenly spaced, and a primary increment should be collected from each point. Where possible, the sampling points should be marked and photographed. Primary increments should be collected from holes dug vertically at the designated points, using a shovel or scoop with an opening at least three times as wide as the largest particle in the batch being sampled³³. It is important that the holes are of varying depths, but none should be less than 0.4 m deep. The minimum mass of an individual primary increment depends on the size of the largest coal particle in the batch being sampled. This mass (m) is calculated using the formula $m = 0.06 \times D$, where D is the size of the largest coal particle in the batch being sampled, expressed in millimetres. The size of the largest particle in the batch under test should be taken as the maximum particle size specified for the relevant coal size

³³ PN-ISO 18283:2008, p. 32. The nominal top size should be determined on the basis of the declared size grade, and if in doubt, it should be assumed to be slightly larger. The minimum sampler aperture width is 30 mm.

grade in accordance with PN-82/G-97001 *Hard Coal. Size Grades*. However, the mass of the primary increment must not be less than 0.5 kg³⁴ (Table 1).

Table 1. Minimum mass of the primary increment.

Size of the largest particle in the batch sampled (mm)	Minimum mass of the primary increment (kg)
200.0	12.0
125.0	7.5
80.0	4.8
50.0	3.0
31.5	1.9
20.0	1.2
10.0	0.6

Source: author's own elaboration based on: PN-G-04502:2014-11 *Hard coal and lignite. Sampling and preparation of samples for laboratory analysis. Basic methods*.

For example, if the batch being sampled is fine coal marketed by Polska Grupa Górnicza S.A. under the trade name GreenPal Miał Plus (a product with a particle size of 3–20 mm), each of the 32 primary increments should have a mass of at least 1.2 kg. It is worth emphasising that this is a minimum mass, not a maximum – all 32 primary increments should have the same mass or be as nearly equal in mass as practicable. Based on the author's observations in industrial practice, samplers do not generally weigh each primary increment precisely; instead, they estimate its mass, for example, by using its volume as a guide. When sampling is conducted for evidential purposes in criminal proceedings, however, it seems prudent to weigh at least one primary increment to check its previously estimated mass – if each primary increment is collected using the same shovel or scoop, the mass of one weighed increment provides a useful yet only approximate reference for estimating the mass of the remaining increments;

- the primary increments must then be combined to form what is known as the gross sample. In accordance with the methodology set out in the aforementioned Polish Standards, the gross sample undergoes further processing to yield a laboratory sample and, subsequently, an analytical

³⁴ PN-G-04502:2014-11, p. 11.

sample. Standard PN-G-04502:2014-11 specifies that the laboratory sample should be prepared, where possible, immediately after the gross sample has been taken³⁵. However, when sampling is conducted for the purposes discussed in this article, it seems reasonable for the inspection team to conclude its work at the scene once the gross sample has been obtained and then to forward the entire properly secured gross sample to a laboratory for further processing as an initial step in preparing an expert opinion. Such an approach reduces the risk of errors during the preparation of laboratory or analytical samples, including errors related to sample division and reduction³⁶. It hardly needs emphasising that avoiding such errors is particularly important, given that the material secured during the inspection may serve as crucial physical evidence in subsequent criminal proceedings. The proposed practice of ending the inspection team's work once the gross sample has been secured does not, in most cases, appear to impose any undue logistical burden on the law enforcement officers involved in the inspection. To illustrate, in the case of fine coal, the gross sample should weigh approximately 38.4 kg ($1.2 \text{ kg} \times 32 = 38.4 \text{ kg}$) – equivalent to roughly two bags of coal commonly sold in Poland – whereas in the case of pea coal, it should weigh approximately 60.8 kg ($1.9 \text{ kg} \times 32 = 60.8 \text{ kg}$), which corresponds to roughly three such bags³⁷. For coarse-grained coal grades (such as nut and cube sizes), this approach might be difficult to apply, as the gross sample would be considerably heavier – approximately 153.6 kg for nut coal and 384 kg for cube coal. In such cases, it seems advisable to lower the mass of the gross sample immediately after its preparation. The division can be carried out either using a specialised device (a Jones riffle splitter) or manually, by a process known as quartering. Quartering involves the following steps: (a) forming a cone by pouring the gross sample onto a flat surface, allowing the coal particles to flow evenly down its sides; (b) flattening the cone into a layer; (c) dividing the layer into four equal quarters; (d) combining two diagonally opposite quarters to form the divided sample; and (e) discarding the remaining two quarters. If necessary, the quartering procedure should be repeated until the desired sample mass

³⁵ Ibid.

³⁶ In accordance with PN-ISO 18283:2008, a strict terminological distinction is maintained between sample division (clause 3.24: the process in sample preparation whereby the sample is divided into representative, separate portions) and sample reduction (clause 3.26: the process in sample preparation whereby the particle size of the sample is reduced by crushing or grinding).

³⁷ The standard bag used for pre-packaged coal (e.g. Ekogroszek Karlik) sold by PGG S.A. has a capacity of 20 kg.

is obtained. However, the mechanical method remains the recommended technique for sample division, as it mitigates the risk of human error³⁸. In line with the guidance mentioned above, the inspection team should conclude its work on the sample after any necessary sample division has been carried out – that is, before reduction – and then transfer the secured sample to the laboratory for further processing. Nevertheless, if the person in charge of the inspection considers on-site reduction by crushing justified, the sample should be processed using a specialised device, such as a crusher, to obtain a top particle size of 3 mm³⁹. The mass of the sample obtained after reduction may be further divided in accordance with the procedures set out above, provided that the sample sent to the laboratory weighs at least 2 kg⁴⁰. At this stage of the inspection, consideration should also be given to conducting a sieve analysis, which appears to be essential in two situations: first, when there is reason to suspect that the coal removed from the mine is of a different size grade from that declared; and second, when no information is available about the size grade of the coal consignment under investigation (e.g. where the unlawful removal of coal from a mine has been detected and both its quality class and size grade need to be determined). The portion of the gross sample set aside during division may be used for sieve analysis, which involves passing the coal through sieves with different aperture sizes (e.g. 5 mm, 10 mm, 20 mm, 30 mm and 40 mm) to determine the sample's particle-size distribution⁴¹;

- the prepared sample should then be sealed in a plastic container or bag. If the moisture content is to be determined, as is essential when investigating suspected quality fraud, the sample must be placed in airtight packaging made of a corrosion-resistant material that does not alter the properties of the sample⁴². As part of the evidence packaging and labelling process, a label must be attached to the container or bag and include at least the following information: the date of sampling; the sampler's identity; the sample mass; the declared coal type and size grade; the mass of the consignment (e.g. the mass of the lorry cargo from which the sample was taken); and standard evidence-identification details such as the identity

³⁸ PN-G-04502:2014-11, pp. 12–13.

³⁹ Manual crushing of the sample using rammers is also permissible, although it is not recommended.

⁴⁰ PN-G-04502:2014-11, p. 13.

⁴¹ A separate Polish Standard – PN-ISO 1953:1999 *Hard coal. Size analysis by sieving* – is devoted to particle size analysis by sieving.

⁴² PN-G-04502:2014-11, pp. 13–14.

of the authority conducting the inspection, the subject and location of the inspection, the evidence reference number, and the signatures of both the sampler and the representative of the law enforcement unit conducting the proceedings⁴³.



Image 2. Hard coal sampling – illustrative photographs: collection of primary increments (A), quartering (B), nest of sieves for sieve analysis (C).

Source: author's own photographs (courtesy of PGG S.A.).

The collection and subsequent preservation of the coal sample should be described in detail in the inspection report. It is recommended that the steps taken during sampling be documented as comprehensively as possible to enable a court-appointed expert witness to verify, if necessary, whether the sampling procedure was carried out correctly. Given the importance and particular nature of the sampling procedure, it appears to be good practice to video-record the entire process (see Article 147 § 1 of the Polish Code of Criminal Procedure). If video-recording is not possible for technical reasons, at least photographic documentation of the sampling points should be provided. As a rule, this requires little effort but can significantly reduce the risk of subsequent allegations that the sampling was biased or improper and allow potential irregularities, including gross errors⁴⁴, to be identified at a later stage of criminal proceedings. Notwithstanding the above, care must be taken to ensure that the inspection report records the condition and appearance of the consignment prior to unloading (e.g. whether the coal was wet or whether water was leaking from the vehicle), the weather conditions during the inspection, and the appearance of the discharged material. These

⁴³ J. Kasprzak, *Oględziny osoby, miejsca i rzeczy* (Eng. Inspection of persons, places and objects), in: *System Prawa Karnego Procesowego. Tom VIII. Dowody. Cz. 4*, P. Hofmański (ed.), Warszawa 2019, p. 5154.

⁴⁴ A gross error occurs when there is a significant discrepancy between the measured value and the true value. Such errors are generally attributable to human factors, including insufficient operator proficiency or errors in recording results.

aspects can be described in detail after consulting the samplers, who should be familiar with the relevant specialist terminology; as Józef Gurgul rightly points out, this helps ensure that the report is clear⁴⁵, which is particularly important for an expert witness who may be called upon to give an opinion on the consignment and the sampling process itself at a later stage of the proceedings. In particular, the information in the inspection report may be useful to an expert witness assessing whether the properties of the consignment could have changed during transport (a question that has arisen in Polish investigative practice). Although this is mainly a concern when coal consignments are intercepted long after loading, similar allegations cannot be ruled out even when samples are collected shortly after loading, on the mine premises⁴⁶. In accordance with Article 205 § 3 of the Polish Code of Criminal Procedure, the inspection report must also include the personal details of those who collected the samples. If at least two people were involved in the sampling, it is recommended that the report also specify the role played by each person in the sampling process (e.g. X – collection of primary increments 1–16; Y – collection of primary increments 17–32; Z – holding the bag during sample packaging). As commentators observe, this information serves to identify individuals who, in the event of any doubts as to the proper conduct of the sampling procedure, may be interviewed as witnesses (see Article 205 § 3 of the Polish Code of Criminal Procedure)⁴⁷. It should be noted, however, that both scientific research and practical experience with human memory⁴⁸ suggest that those involved in

⁴⁵ J. Gurgul, *Instytucja specjalisty w procesie karnym* (Eng. The concept of the specialist in criminal proceedings), "Prokuratura i Prawo" 1998, no. 11–12, p. 121. It is also worth noting the sound view expressed by the Court of Appeal in Lublin in its judgment of 29 IX 1998 (ref. no. II AKa 142/97, LEX no. 37066) regarding the importance of proper evidence collection and preservation for the quality of a subsequent expert opinion. Although the court's reasoning in that case directly concerned forensic scent analysis, the same logic applies by analogy to the context examined herein.

⁴⁶ Findings of this nature require, in each case, a detailed analysis of, among other things, the coal transport route and the prevailing weather conditions during transit, and fall strictly within the remit of expert witnesses.

⁴⁷ *Kodeks postępowania karnego. Komentarz. Tom I: Art. 1–424* (Eng. Code of Criminal Procedure. Commentary. Volume I: Articles 1–424), D. Świecki (ed.), Warszawa 2024, p. 753.

⁴⁸ In general terms, errors in recollections of particular events tend to increase over time. Such errors are inherent to human perception and memory, both of which, as numerous studies demonstrate, become increasingly susceptible to distortion over time. As time passes, some details are forgotten, and the resulting gaps are often filled in or reinterpreted, almost automatically and unconsciously, by integrating 'old' memories with information acquired subsequently from the media, investigative or judicial authorities, and other post-event sources (the 'post-event information effect'), as well as with expectations or with what ultimately appears coherent, logical and rational to the individual. See: K. Leśniewski, M. Zubańska, *O rozpoznaniu przez świadka naocznego raz jeszcze. Studium przypadku niedoszłej pomyłki sądowej* (Eng. Eyewitness Identification: A Case Study of a Miscarriage of Justice

the sampling process are unlikely to recall the details of the procedure long after the event. Moreover, even when they claim to remember these details, their testimony should be treated with considerable caution. Investigative interviews with these individuals should therefore aim to establish, at a minimum, whether they were familiar with the correct sampling methodology, which, as already indicated, serves as a fundamental safeguard for the proper conduct of the procedure⁴⁹. At the same time, it should be emphasised that the current Polish legal framework provides no basis for treating a failure to follow the correct sampling methodology as automatically rendering the subsequent laboratory results inadmissible. Such irregularities may, however, diminish the reliability and probative value of the evidence, depending on their nature and seriousness. They should therefore be thoroughly assessed by the investigating or judicial authority in accordance with Article 7 of the Polish Code of Criminal Procedure, and their implications taken into account when evaluating the probative value of the final laboratory results. Against this background, seeking an expert opinion may be a worthwhile approach to determining whether the sampling procedure was carried out properly, clarifying the nature and scope of any departures from the methodology specified in the relevant standards, and assessing their potential impact on those results⁵⁰. In this regard, a useful analogy can be drawn with Polish case law on identification parades, where breaches of the identification procedure do not automatically render the resulting evidence inadmissible but may affect its probative value⁵¹. There is no convincing reason to treat coal sampling any differently.

Narrowly Averted), "Studia Prawnoustrojowe" 2022, no. 57, p. 386. <https://doi.org/10.31648/sp.7895>.

⁴⁹ It is crucial to establish – in so far as possible – whether these individuals were already familiar with the methodology in question at the time the samples were taken, rather than at the time of the interview. Indeed, it cannot be ruled out that a given individual may have undergone training in this area only after the samples were taken, but before being interviewed. During the interview, questions should therefore address, among other things, where, when and under what circumstances the witness acquired this knowledge.

⁵⁰ A similar expert opinion may be sought in the event of doubts concerning the proper storage of the collected samples or adherence to the correct methodology during laboratory testing. However, where there are justified doubts as to the reliability of the laboratory's work, priority should be given to conducting independent tests at another facility – provided, of course, that part of the evidential sample remains in a condition suitable for further testing.

⁵¹ For example, the Polish Supreme Court has stated that 'failure to fulfil all the conditions that should be met upon an identification parade does not necessarily lead to the exclusion of the evidential value of that procedural act'. See: the judgment of the Supreme Court of 18 VII 2013, ref. no. III KK 92/13, OSNKW 2013, no. 11, item 98, together with a commentary by J. Wójcikiewicz, *Glosa do wyroku Sądu Najwyższego z 9 lipca 2013 r., III KK 92/13* (Eng. Commentary on the Supreme Court's judgment of 9 VII 2013, III KK 92/13) [the date in the original title is incorrect; the judgment was delivered on 18 VII 2013 – note by K. L.], "Palestra" 2014, no. 3–4, pp. 204–208. See also: the judgment of the Court

The stages of coal sampling for investigative and evidentiary purposes are illustrated in Figure 1.

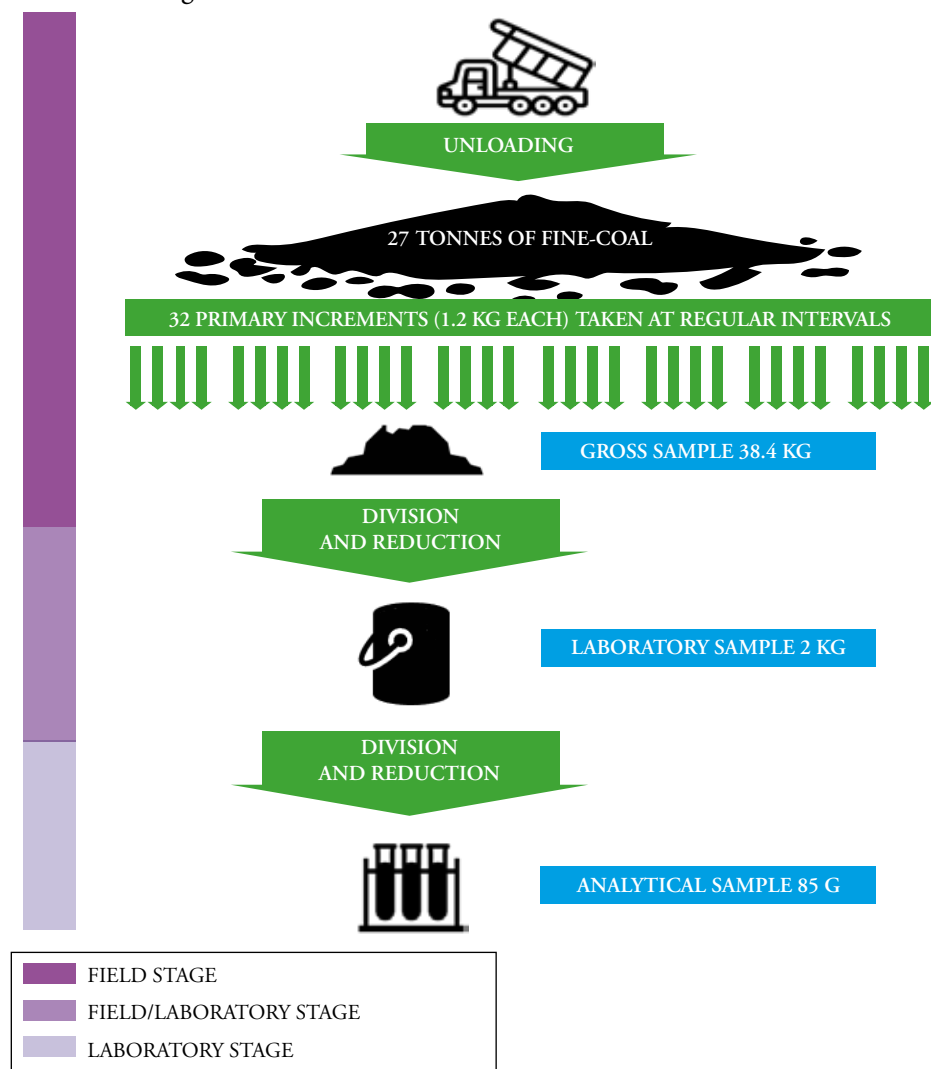


Figure 1. Stages of the coal quality testing process (the ‘field stage’ denotes the on-site inspection phase).

Source: author’s own elaboration.

of Appeal in Katowice of 26 X 2012, ref. no. II AKa 415/12, LEX no. 1285048, and the judgment of the Court of Appeal in Wrocław of 30 XII 2014, ref. no. II AKa 399/14, LEX no. 1657128.

As noted above, a properly collected and preserved coal sample should be submitted to the laboratory without undue delay so that the analyses requested by the investigating authority can be carried out. In cases involving suspected coal quality fraud, the key parameters to be determined are moisture content (W_t^r – total moisture content as received), ash content (A^r – ash content as received), sulphur content (S_t^r – total sulphur content as received), and calorific value (Q_i^r – net calorific value as received, a crucial parameter in the present context, although calculated using standard empirical formulae based on the other parameters)⁵². The examination of coal samples, including physicochemical analyses, undoubtedly falls within the scope of specialist knowledge and therefore requires an expert opinion pursuant to Article 193 § 1 of the Polish Code of Criminal Procedure. Given the need for specialist analytical equipment to carry out such examinations, an opinion should be sought from an appropriate scientific institute or specialist laboratory rather than an individual expert (see Article 193 § 2 of the Polish Code of Criminal Procedure). In selecting such an entity, priority should be given to those accredited by the Polish Centre for Accreditation to perform the relevant analyses⁵³, such as the Central Mining Institute – National Research Institute in

⁵² It is worth noting that the PN-G-04502:2014-11 standard assumes a sampling uncertainty for laboratory testing of up to $\pm 2\%$ (for ash content). This means that, for a specific batch of coal, the result of the ash content determination may fall within a range spanning 4 percentage points, owing solely to the natural heterogeneity of the raw material in question. According to test results from the Central Mining Institute – National Research Institute in Katowice known to the author, a one-percentage-point change in the ash content of thermal coal corresponds to approximately 300 kJ/kg in calorific value. Consequently, it can be assumed that the determined calorific value for a sample taken from a specific batch of coal may vary over a range spanning 1,200 kJ/kg. This circumstance has significant implications for the considerations set out in this article. Specifically, it means that the discrepancy between the coal class (calorific value) stated on the invoice and the value determined through laboratory testing of a sample taken from that batch must exceed the aforementioned range before any suspicion of quality fraud can reasonably be entertained. Therefore, it must be concluded that a difference on the order of, for instance, 900 kJ/kg (i.e. $< 1,000$ kJ/kg) should lead to the discontinuation of proceedings or a decision not to initiate them (see Article 5 § 2 of the Polish Code of Criminal Procedure). Conversely, where the difference is less than two classes (but greater than 1,000 kJ/kg, i.e. 1,001–2,000 kJ/kg), it is advisable to obtain a detailed expert opinion and to thoroughly analyse the remaining evidence on a case-by-case basis before making a final decision on how to proceed.

⁵³ See: D. Wilk, *Nowoczesne metody fizykochemii kryminalistycznej w procesie karnym. Zagadnienia wybrane* (Eng. Modern methods of forensic physical chemistry in criminal proceedings. Selected issues), Kraków 2018, pp. 212–213. See also: judgment of the Court of Appeal in Warsaw of 22 V 2023, ref. no. II AKa 92/23, LEX no. 3581607. The court rightly stated that ‘a specialist institution is one whose scope of activities includes the preparation of expert opinions, as confirmed by the relevant state authorities and subject to their ongoing supervision. This also allows private commercial entities to be classified as specialist institutions, provided that they have their own specialised staff whose

Katowice, the Institute of Energy and Fuel Processing Technology, and the Central Measurement and Research Laboratory in Jastrzębie-Zdrój.

Finally, it should be stressed that even the most meticulously conducted sampling of a particular coal shipment can yield evidence directly relating only to that specific shipment. As investigative practice shows, however, the criminal activity addressed in this article is generally not confined to a single incident but forms part of an ongoing pattern of conduct. Experience from previous investigations suggests that establishing criminal liability for conduct extending beyond the intercepted shipment requires considerable investigative effort, including the thorough and efficient securing of all potentially relevant commercial and transport documentation (such as consignment notes and invoices) and a careful analysis of the individual pieces of evidence, their interrelationships, and the inferences that may be drawn from them. A practical illustration of this analytical approach can be found in the written reasons for the judgment of the Regional Court in Gliwice, Rybnik Branch, dated 9 August 2016:

(...) Officially, during the period covered by the charges, the coal mine (...) offered fine coal in class '19', i.e. with a calorific value of between 19,000 and 19,999 kJ/kg. It did not offer fine coal in classes '22' and '23'; therefore, officially, it could neither produce nor sell such fine coal. From the testimony – deemed credible by the Court – of K. and Z. G., representatives of (...), it emerges that, as a result of supplying the company (...) with fine coal in energy classes '22' and '23' instead of fine coal with the parameters specified in the orders placed, (...) suffered a quantifiable loss, calculated as set out on page 9 of the written reasons for the judgment. The defendant was aware of the specifications that the fine coal, resold to (...) and subsequently sold by that company to individual combined heat and power plants, was required to meet⁵⁴. After all, it was the defendant who, on behalf of (...), entered into Agreement No. (...) dated 10 January 2003 concerning cooperation between the two entities (...). As indicated above, the specifications regarding the parameters of the coal to be supplied by (...) to specific combined heat and power plants were set out in the so-called 'detailed terms and conditions', in accordance with § 2 of the agreement. Therefore, in order to comply with these provisions, the defendant had to ensure that, on each occasion, the coal sold to (...) and subsequently resold to a specific combined heat and power plant met the parameters required by that particular end user. Normally,

competence has been confirmed by state authorities, conduct examinations in their own laboratories that have undergone a certification procedure, and the head of the unit has sufficient training in forensic science to designate a competent person to prepare an expert opinion.

⁵⁴ In this regard, it is worth noting that boilers used in the commercial power generation and district heating sectors are, as a rule, designed to operate with coal of specific quality parameters. Even if a boiler does not fail, burning coal that does not meet the parameters required for a given unit may result in a reduction in its efficiency.

in order to satisfy the requirements of a specific combined heat and power plant, and thus the provisions of those detailed terms, the defendant should have placed an order himself or instructed his subordinates to place an order with a mine that offered coal meeting the parameters required by the end user. The question arises as to why he failed to do so – why he did not seek out a mine offering such coal, but instead instructed that orders be placed with the (...) coal mine for coal with parameters far below those required by the individual plants, even though the mine did not officially offer coal meeting those specifications at the time. It is obvious that by purchasing thermal coal in class ‘19’ – which was of significantly lower quality than that required by the individual combined heat and power plants – he risked having the business relationship terminated by the other party. Why, then, did he instruct that orders be placed for class ‘19’ coal offered by the (...) coal mine? There can be only one answer. He must have known that by ordering coal in energy class ‘19’ he would receive coal of significantly higher quality that met the requirements set out in the detailed terms and conditions. What is more, by ordering class ‘19’ coal offered by the (...) mine, he paid the price set out in the price list for that class, despite actually receiving coal with substantially better parameters, for which a higher price would normally be payable. The fact that the defendant knew that, following the fulfilment of orders for coal with parameters 19/25/08, coal of significantly better quality would be loaded onto wagons at the (...) mine is, moreover, evident from his own statements, in which he admitted knowing that the fine coal ordered in class ‘19’ would in fact be of a higher class (...). Although the Court ultimately ruled out the addition of flotation concentrate to middlings in order to increase their calorific value in the case of the transactions covered by the indictment, the testimony of the aforementioned witnesses nevertheless supports the conclusion that orders were placed for class ‘19’ coal because it was known that the coal actually supplied by the (...) mine to (...) would have significantly better quality parameters than those specified in the orders. To ascertain exactly how much better the quality was, company employees were provided with sealed coal samples prepared for them at the mine, which they submitted for laboratory testing, as established above. The Court considered the defendant’s assertion that he knew the coal received would be of a higher class than that ordered because ‘such coal was sold to everyone’ to be absurd, reasoning that, had this been the case, the practice in question would have come to light much earlier⁵⁵.

A similar line of reasoning can be found in the written reasons for the judgment of the Court of Appeal in Katowice of 13 June 2013:

⁵⁵ Judgment of the Regional Court in Gliwice, Rybnik Branch, of 9 VIII 2016, ref. no. V K 12/15, LEX no. 2322408.

The main recipient of the coal supplied by the defendant was (...) Sp. z o.o., which in turn resold it to Przedsiębiorstwo (...) in K. In practice, the delivery of the fine coal ordered by the defendant involved the coal being loaded onto wagons and transported by rail directly from the mine to K. Meanwhile, successive business entities issued invoices documenting the sale of the coal, namely the (...) coal mine to A. C., the defendant to (...) Sp. z o.o., and the latter company to (...) in K. It was notable that the invoices received by the defendant stated the calorific value of the fine coal purchased (19–21 MJ/kg), but this information was absent from the invoices he issued to (...). Given the intended use of the fine coal, (...) was interested in purchasing fine coal with a higher calorific value, i.e. in the range of 23–25 MJ/kg. Coal with inferior parameters caused breakdowns in the heating system and failed to provide adequate heat. For this reason, the contract concluded between (...) Składy (...) in K. and (...) Sp. z o.o. specified the required calorific value of the coal to be supplied (the contract serves as evidence in this matter). When questioned during the proceedings, M. W., managing director of the limited liability company (...) Składy (...) in K., confirmed that his company was interested solely in purchasing coal with a higher calorific value. In turn, employees of the company (...), namely S. W. and S. B., testified that, in order to properly fulfil the contract with (...) in K., they were obliged to purchase fine coal with a calorific value of at least 23 MJ/kg. They also confirmed that, for this reason, they had agreed with their suppliers – including the company run by the defendant – on deliveries of coal with precisely these parameters. It therefore seems obvious that (...) Sp. z o.o. was not interested in purchasing coal with a calorific value of 19 MJ/kg or 21 MJ/kg. At the same time, it was undisputed in this case that a criminal scheme involving the fraudulent acquisition of fine coal had been organised at the (...) coal mine. A group of individuals from the mine's management (convicted by a final judgment) entered into an agreement with certain contractors. They allowed these contractors to place orders for lower-quality fine coal, for which they paid the price set out in the price list, but in exchange for a financial benefit, they supplied them with coal of higher quality (...). On the basis of all the facts set out above, the court of first instance drew conclusions whose logic cannot reasonably be disputed. Since A. C. could only resell coal with better parameters to his customers, that is precisely the sort of coal he should have received from the mine. Therefore, if he made deliveries to (...), he was contractually obliged to supply fine coal with a calorific value of at least 23 MJ/kg. Logic therefore dictates that this is precisely the coal he received from his supplier, despite placing formal orders and paying for coal with a calorific value of 19–21 MJ/kg. This was possible because he participated in the criminal scheme mentioned earlier. In reaching these findings, it was not necessary to establish that the samples taken for laboratory testing in K. had not been substituted, as the appellant had suggested. The results of these tests did not call into question the quality of the coal supplied, which only serves to further corroborate the other evidence incriminating the defendant. The situation would have been different had the laboratory tests indicated that the coal supplied by the defendant was of lower quality. In that case, it would have constituted significant evidence refuting the defendant's guilt,

but no such situation occurred during the period from 27 July 2005. This circumstance also explains the period specified in the indictment, which supports the conclusion that, from that date onwards, the defendant certainly supplied coal with higher parameters than those he himself had ordered from the mine (...). The arguments set out in the defence counsel's appeal are incapable of undermining this chain of circumstantial evidence, as it forms a coherent, tight, and logical whole, precluding any other version of events. Certainly, the assertions that the defendant was not present when the coal was loaded onto the wagons, that he did not receive the results of tests on samples of the coal from the mine's laboratory, and that he therefore could not have known what the mine ultimately sold, do not constitute such evidence⁵⁶.

The investigative approach reflected in the cited judgments is illustrated in Figure 2.

⁵⁶ Judgment of the Court of Appeal in Katowice of 13 VI 2013, ref. no. II AKa 150/13, LEX no. 1349896.

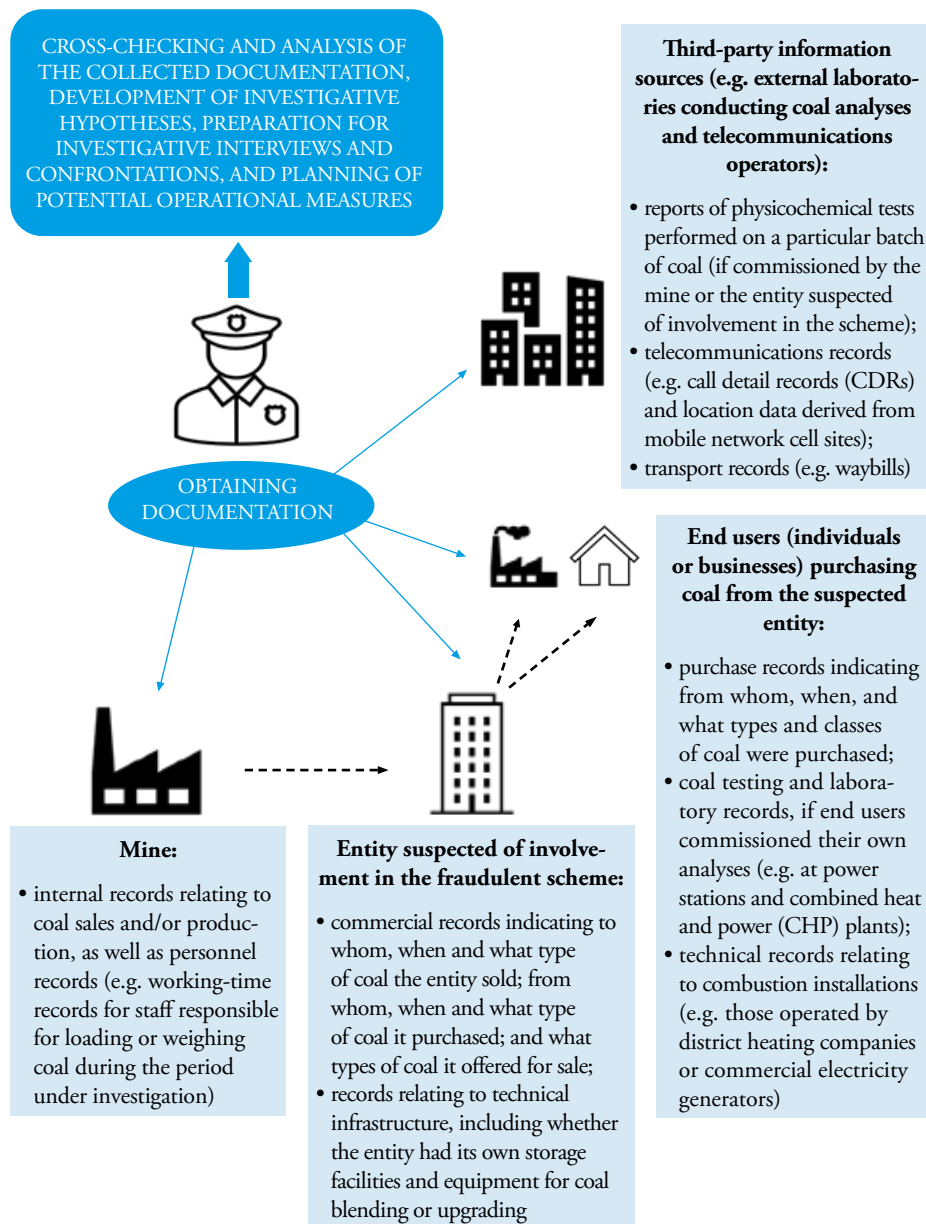


Figure 2. Schematic representation of selected investigative actions in cases of ‘qualitative’ fraud where the perpetrators were not caught in the act or where the detected incident is suspected to be part of a broader scheme. As a general rule, documentation held by the entity suspected of involvement in the fraudulent scheme should be secured pursuant to Articles 217 and 219–220 of the Polish Code of Criminal Procedure (i.e. a formal demand to surrender items, followed by a search). It is essential to secure, immediately after or

concurrently with these actions, the documentation held by the other entities indicated in Figure 2 in order to minimise the risk of collusion or evidence tampering. Documentation obtained from various sources should subsequently be subjected to cross-analysis, involving the comparison and verification of individual pieces of information against one another. The sequence of document collection shown above is illustrative only; the actual order should be adapted to the circumstances of each individual case.

Source: author's own elaboration.

Summary and conclusions

The effective investigation of offences against coal mining companies, including those directly related to hard coal, generally requires law enforcement practitioners to have a proper understanding of the specific characteristics of the mining industry. Such knowledge – which, in the terminology proposed by Tadeusz Hanausek⁵⁷, essentially amounts to an officer's sector-specific specialisation – is particularly useful both for identifying sources of information potentially relevant to a case and for handling them appropriately. Indeed, as Mariusz Kulicki, Violetta Kwiatkowska-Wójcikiewicz, and Leszek Stępka rightly point out: (...) *in order not to overlook a trace, to understand its significance, and to be able to draw evidential conclusions from traces, one must know what traces are generated by particular activities, where they may be found, what activities particular traces indicate, and what other*

⁵⁷ Hanausek wrote about the desirability of specialisation in detection processes, pointing out that the development of detection work must also take account of the need for such specialisation. He rightly emphasised that specialisation increases the effectiveness of the activities concerned. In his work, he identified the 'facility-based' criterion, which he described as involving '(...) the selective narrowing of detection activity to a specific facility or group of facilities serving a particular social function, e.g. factories or industrial plants. Since, in addition to the obvious territorial distinction (after all, the facility is located in a specific area), there is also a certain narrowing of the social environment associated with a given facility, this criterion greatly restricts detection activity (...). Given the size of the staff of investigative authorities (...), this criterion is not usually applied in routine investigative work within criminal investigation departments. It does, however, have a number of advantages and deserves closer attention.' In commenting on the above, it should be noted that the aim is not so much to specialise entire organisational units on a facility-specific basis as to specialise individual members of their staff. Hanausek also identified the sector-based criterion, which he described as follows: '(...) the application of the sector-based criterion within detection specialisation involves narrowing the detection process to a specific sphere of social activity, primarily manufacturing or services. It differs from the facility-based and territorial criteria in that specialisation is directed towards spheres of social activity that are substantively closely related and are situated either on an equal footing or in a relationship of hierarchical subordination.' See: T. Hanausek, *Zarys kryminalistycznej teorii wykrywania. Część II. Proces wykrywczy* (Eng. An outline of the criminalistics theory of detection. Part II: The detection process), Warszawa 1987, pp. 40–44).

*traces may accompany those already identified*⁵⁸. A proper understanding of these matters undoubtedly reduces the risk of errors or omissions during evidence-gathering activities. For example, improper sampling of an intercepted and seized consignment of coal during an inspection may render subsequent laboratory test results unreliable, and thus cast doubt on their probative value. Such knowledge also appears to be invaluable when assessing witness and suspect statements, identifying circumstances that warrant seeking an expert opinion, and determining the subject matter and scope of the examination to be commissioned⁵⁹. In view of the above, there is a clear case for ensuring that law enforcement units whose territorial jurisdiction encompasses hard coal mines are staffed with officers who possess at least a working understanding of the subject matter. Naturally, law enforcement personnel cannot be expected to possess the same level of technical expertise as experienced professionals in the mining industry or expert witnesses in the relevant field. Nevertheless, efforts should be made to ensure that the officer responsible for ‘mining-related matters’ has sufficient knowledge to work effectively with such specialists. This knowledge can be acquired, among other things, through practical experience or participation in specialised training courses. In the case of Poland, this does not appear to be an excessive demand, particularly given that PGG S.A. is the largest business enterprise in the Silesian Voivodeship by number of employees, and that its individual mines are key industrial facilities in the municipalities in which they are located⁶⁰.

⁵⁸ M. Kulicki, V. Kwiatkowska-Wójcikiewicz, L. Stępka, *Kryminalistyka. Wybrane zagadnienia teorii i praktyki śledczo-sądowej* (Eng. Criminalistics. Selected issues in the theory and practice of criminal investigation and judicial proceedings), Toruń, 2009, p. 365. In Kulicki et al.’s account, the term ‘trace’ (Polish: *ślad*) is understood broadly. It encompasses material objects, their location and characteristics, qualitative, quantitative, and spatial changes (including the absence of such changes), as well as energy and its manifestations, insofar as these are linked to an established event and may serve as a basis for inferences about the event and its perpetrator (see *ibid.*, pp. 360–361). On this understanding, traces may include accounting discrepancies, digital records, and procedural irregularities.

⁵⁹ As Tadeusz Widła rightly points out, ‘(...) the decision to seek expert evidence involves resolving a number of dilemmas, which can broadly be divided into two groups [this is likely an editorial error, and it should be assumed that Widła meant three groups – note by K. L.]: those concerning the justification for carrying out this procedure, those concerning the selection of the expert witness, and those concerning the conduct of this procedure’. See: T. Widła, *Aprioryczna ocena dowodu z opinii biegłych* (Eng. A priori assessment of expert evidence), in: *Nauka wobec prawdy sądowej: księga pamiątkowa ku czci profesora Zdzisława Kęgla*, R. Jaworski, M. Szostak (eds.), Wrocław 2005, p. 605.

⁶⁰ See: J. Frankowski, J. Mazurkiewicz, *Województwo śląskie w punkcie zwrotnym transformacji* (Eng. The Silesian Voivodeship at a turning point in the transformation), IBS Research Report 02/2020, Instytut Badań Strukturalnych, http://ibs.org.pl/app/uploads/2021/02/IBS_Research_Report_02_2020.pdf [accessed: 1 VIII 2024]. The doctoral dissertation on which this article is based

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deals specifically with criminal offences committed against PGG S.A. However, a similar pattern can also be observed in relation to mines owned by other entities, and consequently, similar conclusions can be drawn.

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