

Waste shipment into mines – Recovery or disposal?

I. Introduction

With emails dated 13 February 2017 and 13 July 2017 the Dutch Ministry for Infrastructure and Environment informed the German Federal Ministry for Environment and the competent waste authorities of the federal states that the transboundary shipment of hazardous wastes in order to place it in aboveground or underground mines is classified as a measure of disposal. Hence, for notifications of Dutch companies it should be stated that the transport is for the purpose of disposal. Otherwise no approval would be given. Some German authorities as well as the Federal Ministry for Environment answered that they do not share this point of view. A filling could also be a measure of recovery. Precondition is that the wastes suit the determined purpose in a structural and functional manner and the recovery is harmless for the environment. This would regularly be the case when filling underground hollow spaces in disused mines, the so called underground stowage. However, the Dutch Ministry has a different view. The French authority responsible for transboundary waste shipments (PNTTD Pôle National des Transferts Transfrontaliers de Déchets) has also questioned the classification of underground stowage as recovery in an email of 17 January 2018 addressed to German authorities.

The Dutch and French authorities refer to a judgement of the ECJ of 28 June 2016 issued in the case C 147/15. There the Court of Justice states with regard to the filling of a quarry with non-mineral waste that such a measure can only be regarded as recovery if „on the one hand, it is established that the backfilling of the quarry in question would have taken place even if such waste had not been available and, accordingly, other materials would have had to be used“ and if „in the light of the most recent state of scientific and technical knowledge, the waste used is suitable for that purpose“.¹ The Court of Justice believes „that non-inert wastes and hazardous wastes are not suitable for redevelopment/restoration and filling-in work, or for construction purposes. Thus, using non-inert or hazardous waste in such a manner may not be regarded as a recovery operation.“²

Below it will be investigated if this decision can actually be applied – as the Dutch and French authorities believe – to transboundary shipment of wastes into German mines, and if a classification of underground stowage as a measure of disposal is justified. If this would be affirmed the competent authorities of dispatch could apply the grounds for objection of Article 11 of the Regulation (EG) No 1013/2006³ (called VVA below) and the principles of self-sufficiency and proximity in waste disposal could be argued against a requested shipment according to which the wastes have to be disposed of closer to where they are produced within the country of dispatch. However, if the underground stowage is regarded as recovery this is not possible.

II. Underground stowage

Underground stowage with wastes not originating from mining is a common and recognized method of waste management. This includes the filling of underground cavities that originate from mining activities for deposits of natural resources.⁴ On the one hand this is done for reasons of operational and mine safety, on the other hand in order to limit the effects on landscape and the impact of mining on the environment. The underground stowage especially serves to support the

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¹ ECJ, Judgement of 28 July 2016, Case C-147/15 (Edilizia Mastrodonato), AbfallR 2016, 260, Par. 43, 45.

² ECJ (Fn. 1), Par. 47.

³ Regulation (EG) No 1013/2006 on waste shipment of 14 June 2006, ABl. L 190 p. 1, last amended by Regulation (EU) No 2015/2002 of 10 November 2015, ABl. L 294 p. 1.

⁴ For individual filling technologies see *Öko-Institut e.V., Obertägige Verwertung immobilisierter Abfälle versus Versatz von Abfällen in Bergwerken – Vergleichende ökologische Bewertung unter besonderer Berücksichtigung der Langzeitsicherheit*, 17 March 2004, No 2.1.2.; *Länderausschuss Bergbau (LAB), Technische Regeln für den Einsatz von Abfällen als Versatz*, status: 17 October 2006, No 2.1.

mine and thus to prevent ground subsidence and break-in, as well as internally the restoration of mine safety, the improvement of the underground ventilation and/or the sealing against the penetration of water.⁵ The geological conditions of the individual case establish if a filling is necessary.

For the so-called obligation for underground stowage, whereas wastes are applied due to an order by the mining authority to produce filling material or directly as filling material, the mine operator has to provide so-called main operating plans that are checked and approved by the responsible mining authority. They dictate that in general there has to be a suitability test carried out before accepting waste of new suppliers. Principally any waste or any formula for production of a filling material requires an individual approval. Here, apart from specific exclusion criteria (e.g. flammable wastes), the physical suitability (e.g. strength values) as well as the compliance with approval values (e.g. contents of contaminants) of the wastes applied for underground stowage or filling materials are tested under consideration of the receiving rock. This happens during an experts' report on mining suitability as well as an assessment of waste law compliance, geomechanics and work hygiene.⁶

1. Requirements to the applied wastes

The use of wastes for the production of underground stowage material or directly as underground stowage material requires that three conditions are met: firstly, building physics, secondly labour safety or health protection and thirdly environmental compatibility.

Requirements with regard to building physics result from the fact that the filling has the essential task to prevent dangers resulting from the mining activities. There is a focus on the stabilization of the mine workings (or certain parts of a mine working). This results in certain requirements for the mechanical (building physical) characteristics of the wastes or the filling material.⁷ Especially a certain compressive strength is essential for the supporting function. In underground stowage mines therefore mainly mineral wastes are used, such as filter dusts, fly ash and other waste from flue gas cleaning of power plants and waste incineration plants, but also grate and boiler ash, pyrolysis wastes, contaminated construction waste and excavated earth, blasting abrasive residues and used foundry sand.⁸ The wastes originate partly from Germany and partly from other European countries.

Requirements on labour safety or health protection when handling wastes used for the production of filling material or directly used as filling material result from occupational safety acts. Dealing with hazardous materials the regulations of the GefStoffV⁹ apply in addition. Namely, according to § 1, paragraph 4, sentence 2 they do not apply in companies that are subject to the BBergG¹⁰, as long as respective legal regulations exist there or in regulations that exist on the basis of legislative decrees enacted due to the BBergG. However, § 7, paragraph 1 GesBergV¹¹ therefore orders the general validity of GefStoffV.¹²

⁵ Cf. *Öko-Institut* (Fn. 4), No 2.1.; *LAB* (Fn. 4), No 2.

⁶ Further details at *Öko-Institut* (Fn. 4), No 2.1.1.3.

⁷ Further at *Öko-Institut* (Fn. 4), No 2.1.1.2.; *LAB* (Fn. 4), No 4.1.

⁸ Cf. Government draft of Filling Regulation, BT-Drs. 14/9579, p. 17.

⁹ Ordinance on Hazardous Substances of 26 November 2010, BGBl. I p. 1643, 1644, last amended by Art. 148 of the law of 29 March 2017, BGBl. I p. 626.

¹⁰ Federal Mining Act of 13 August 1980, BGBl. I p. 1310, last amended by Art. 2, paragraph 4 of the law of 20 July 2017, BGBl. I p. 2808.

¹¹ Health Protection-Mining Regulation of 31 June 1991, BGBl. I p. 1751, last amended by Art. 2 of the regulation of 18 October 2017, BGBl. I p. 3584.

¹² The former special regulations in § 4 GesBergV on activities with hazardous wastes, including the generalized contact ban with carcinogenic, mutagenic, harmful to human fertility and toxic hazardous substances as well as the obligation for general permission for other hazardous substances were abolished by Art. 1 of the Regulation to Change the Health Protection-Mining Regulation as well as further legal mine and labour protection regulations of 18 October 2017, BGBl. I p. 3584, and instead fundamentally the general law on hazardous substances was applied. Thereby a general approval of hazardous substances was renounced and thus the companies and authorities were relieved from unnecessary bureaucracy.

For reasons of environmental protection, in the German Stowage Ordinance¹³ further requirements to the used wastes are laid down, especially with regard to the maximum content of contaminants. This substantiates the requirement for orderly and harmless recovery according to § 7, paragraph 3 Recycling Law (KrWG)¹⁴. The legal requirements for mining and hazardous materials stated above remain unaffected by this according to § 4, paragraph 5 Stowage Ordinance. For all underground stowage mines the criteria for solid material stated in Annex 2 Table 1a of the Stowage Ordinance are valid according to § 4, paragraph 1, sentence 1. However, for the threshold values for solids and eluate stated in Tables 1 and 2 it is differentiated between the underground stowage in salt and potash mines with provided long-term proof of safety and the underground stowage in other mines. The threshold values have to be met by such mines that do underground stowage not in rock salt or that did not provide a long-term safety proof (cf. § 4, paragraph 3 Stowage Ordinance). Whereas for operations in rock salt a limitation of the pollutant potential of the wastes is not necessary if a long-term proof of safety has been provided for the responsible authority, proving the permanent isolation of the wastes from the biosphere (§ 4 Stowage Ordinance, so-called complete inclusion). These regulations usually ensure the protection of the ground and pit water as well as the surface waters against hazardous pollutions.¹⁵

2. Preparatory treatment

Apart from building-physical properties, the requirements for labour and health protection and the environmental criteria, the applied wastes also have to meet the standards of conveying relevant for the respective mine. Potentially the wastes have to be treated. For example dusty, liquid or filter cake-type wastes are processed by adding additives (e.g. cement, FGD gypsum) in order to convey them later underground, either filled in big bags or as loose bulk material.¹⁶ If the supplied wastes contain metals they have to be sorted out, according to § 3 Stowage Ordinance, during the preparatory treatment.

An appropriate waste treatment is regularly carried out in a plant which has a permit based on the pollution protection directive and is either operated at the site of the underground stowage mine or at another location. These are plants according to No 8.10 or 8.11 of the annex of the fourth Federal Pollution Control Ordinance (BlmSchV)¹⁷ that have to be approved as such by the responsible immission protection authorities.

III. Classification as recovery or disposal

According to Art. 2 No 6 VVA the term „recovery“ indicates the recovery according to Art. 1 (1)(f) of the directive 2006/12/EG¹⁸. Since this directive was repealed by Art. 41 of the directive 2008/98/EG¹⁹ (below AbfRL) and references of the repealed directive can be understood as references to the new directive, the reference in the VVA is to be considered as reference to the new directive, namely to Art. 3 No 15 AbfRL.

¹³ Ordinance on Underground Waste Stowage (Stowage Ordinance) of 24 June 2002, BGBl. I p. 2833, last amended by Art. 5, section 25 of the law of 24 February 2012, BGBl. I p. 212.

¹⁴ Closed Cycle Economy Act of 24 February 2012, BGBl. I p. 212, last amended by Art. 2 Section 9 of the law of 20 July 2017, BGBl. I p. 2808.

¹⁵ Government draft (Fn. 8), p. 18, 20.

¹⁶ Cf. also *European Integrated Pollution Prevention and Control Bureau (EIPPCB) at the European Commission's Joint Research Centre, Best Available Techniques (BAT), Reference Document for Waste Treatment, Final Draft (October 2017)*, p. 439 ff. Partially bulk materials can also be used for underground stowage. Bulk materials are materials that arise in large quantities and admit an open handling above and under ground due to their relatively low potential of hazardous substances, e.g. construction waste, foundry sand, waste incineration slags and contaminated soils. The use of such materials requires an appropriate technical equipment to allow acceptance, discharge, mine shaft and transport underground.

¹⁷ Fourth Regulation for Implementation of the Federal Immission Protection Act (Regulation on plants requiring approval) in the version of the announcement of 31 May 2017, BGBl. I p. 1440.

¹⁸ Directive 2006/12/EG of 05 April 2006 on wastes, ABl. L 114 p. 9.

¹⁹ Directive 2008/98/EG of 19 November 2008 on wastes, ABl. L 312 p. 3, last amended by Regulation (EU) 2017/997 of 08 June 2017, ABl. L 150 p. 1.

According to it „recovery“ is „any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations“. Amongst others, the annex includes the recovery process R5.²⁰ Hereupon the ECJ has referred to in connection with underground stowage measures.²¹ At that time it related to „recovery / reclamation of other inorganic substances“. However, today in the German version of AbfRL it is described as „recycling / reclamation of other inorganic substances“. Due to the definition of recycling in Art. 3 No 17 AbfRL, that explicitly excludes the term backfilling, thus the process description should not be immediately applicable to underground stowage. However, a comparable, not explicitly stated process of recovery analogue to R5 is conceivable, the more so as the Annexes I and II of AbfRL are not exhaustive, so there can be further processes that are not explicitly stated.²² For filter dusts or ashes/slags from incineration plants the recovery process R11 also comes into question („use of wastes obtained from any of the operations listed in R1 to R10“).

In contrast, „disposal“ means „any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations“ (Art. 3 No 19 AbfRL in connection with Art. 2 No 4 VVA). Amongst others, this annex states the disposal process „D12 permanent storage (e.g. emplacement of containers in a mine, etc.)“.²³

In its ASA judgment of 27 February 2002 the ECJ stated with regard to the European regulation on waste shipment at that time that any treatment of wastes has to be classified as disposal or recovery in order to apply the different regulations for the respective approval procedures. The determination of regulations valid for waste shipment especially requires that any treatment of waste falling within its scope of application must be classifiable either as disposal or recovery of waste.²⁴ Thereby the bringing in of wastes into a disused mine is not necessarily a disposal. In fact, it has to be judged according to the individual case to determine if it is a disposal or a recovery operation. „Such a deposit constitutes a recovery if its principal objective is that the wastes serve a useful purpose in replacing other materials which would have had to be used for that purpose“.²⁵

The ECJ supported this by the decision of 27 February 2003. In the underlying process the Dutch Ministry for Environment claimed that the use of fly ash from sewage sludge incineration for the purpose of producing concrete mortar to fill gears in left-open potash mines in order to strengthen the resistance of the ground in these mines and thus prevent possible damages through ground subsidence would be a disposal operation. The principal objective would be the disposal of the ashes by underground filling. Regarding this the ECJ clarified: „In contrast to what the Netherlands Government maintains, the answer to that question can be clearly deduced from the judgment in ASA. It is evident from paragraphs 65 to 71 of that judgment that the deposit of slag and ashes in a disused mine constitutes an operation which may fall within the scope of the recovery operation referred to in R5 of Annex IIB to the waste directive. It is also clear that confirmation of such a classification in a given case requires an assessment as to whether the principal objective of the planned tipping is that the waste should serve a useful purpose in replacing other materials which would have had to be used for that purpose.“²⁶

²⁰ These regulations are also valid for national waste management measures; § 3 Section 23 and Annex 2 of KrWG.

²¹ Resolution of 27 February 2003, verb. Case C-307/00 to C-311/00 (Oliehandel Koeweit et al.), Slg. 2003, I-1821, par. 86; Judgement of 27 February 2002, Case C-6/00 (Abfall Service AG - ASA), Slg. 2002, I-1961, Par. 65.

²² Like this also *EU Commission*, Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste, June 2012, No 1.4.5. However, in such cases the question arises what has to be listed in the notification form in case of transboundary waste shipment. The statement of a comparable called process seems useful.

²³ Even these specifications apply according to the German Closed Cycle Economy Act; § 3 Section 26 and Annex 1 of KrWG.

²⁴ ECJ, Judgement of 27 February 2002 (Fn. 21), Par. 62.

²⁵ ECJ, Judgement of 27 February 2002 (Fn. 21), Par. 71.

²⁶ ECJ, Resolution of 27 February 2003 (Fn. 21), Par. 85 f.

Also in its judgment of 28 July 2016 the ECJ confirmed the principles and stated: „*It follows that the main objective of the recovery operation must be the conservation of natural resources*“.²⁷ In order to verify this, it can be asked if the operation in question would have been realized with other materials if wastes were not available. This could be assumed if the recipient would pay money for the wastes.²⁸

These requirements are regularly met in case of mining law-based ordered and approved underground stowage. Without the used wastes the support of the rock and thus the avoidance of ground subsidence and sinkholes would have to be ensured otherwise, i.e. with other materials. Hereto the German government stated that from an economic point of view the benefit results from the application of the wastes itself and from the related savings for the underground stowage material which would have been otherwise to be procured, and not only from the remuneration received for the waste treatment.²⁹

Thereby the suitability of the wastes, as required by the EJC, is also given. Underground stowage does not have the goal to fill the cavities with any desired material but to support the layers of rock above and thus prevent mining damages aboveground. This purpose of structural safety cannot be met by the sole volume of waste.³⁰ In fact, the applied wastes must have a certain physical quality for construction especially the necessary pressure resistance for its supporting function and have to meet further requirements (top II.1). Even mixing wastes with other materials that only leads to increasing the volume of the underground stowage material does not have the result that the underground stowage of the mixture is a process of waste recovery, even when the mixture still has a sufficient pressure resistance for mining protection measures and / or the admixture facilitates the transport of the underground stowage material to the place of deposit.³¹ Whereas a certain underground stowage material is produced with a certain formula in order to reach the required supporting effect and the applied waste undertakes a necessary structural-physical property within the formula, the principle objective of the operation targets a use of the specific (bringing in) properties of the waste for mining technical and/or mining safety purposes. Then the waste fulfils a useful task since it replaces other materials that would otherwise have to be used for this purpose. As a result, natural raw material sources are preserved. It is an „*other recovery*“ within the meaning of Art. 4 (1) (d) AbfRL.³² This is also valid if a waste is not directly applied as an underground stowage material, but is undergoing a pre-treatment process to produce underground stowage materials.³³

The ECJ denies with reference to recital 19 of the AbfRL the classification of an activity as a recovery operation if this classification would not do justice to the actual environmental impact of the operation, which would be the case if the respective waste is unsuitable for the intended use or is not approved for it since it would be significantly more harmful to the environment than using other materials.³⁴

When using hazardous wastes for underground stowage this is different though. Firstly, the use of the wastes does not take place in aboveground pits without protective measures for the groundwater but in underground cavities. On the other hand, wastes to produce underground stowage

²⁷ ECJ (Fn. 1), Par. 38 ff.

²⁸ ECJ (Fn. 1), Par. 43 f.; cf. also Opinion of Advocate *General Jacobs*, 15 November 2001, Case C-6/00 (ASA), Slg. 2002, I-1961, Par. 86, and of 26 September 2002, Case C-458/00 (Commission/Luxembourg), Slg. 2003, I-1553, Par. 42.

²⁹ Government draft (Fn. 8), p. 17.

³⁰ BVerwG, Judgement of 14 April 2000, 4 C 13/98, NVwZ 2000, 1057 (1058).

³¹ BVerwG (Fn. 30); OVG Lüneburg, resolution of 14 July 2000, 7 M 2005/99, NVwZ-RR 2001, 19 f.

³² In German law § 6 Section 1 No 4 KrWG. The Federal Government saw this likewise and stated: „*Such processes, that energetic recovery or underground stowage belong to, are basically to be classified as subordinate recovery options according to waste hierarchy of § 6*“; draft law of 30 March 2011, BR-Drs. 216/11, p. 177.

³³ Fundamentally the legal nature of a pre-treatment is determined by its goal. Can it be clearly attributed to a subsequent recovery process it is also to be classified as a measure of recovery. Further *Kropp*, in: v.Lersner/Wendenburg/Rüdiger/Kropp, *Recht der Abfall- und Kreislaufwirtschaft*, § 3 KrWG, Par. 180 ff.

³⁴ ECJ (Fn. 1), Par. 47 f. The BVerwG also denies the required effect of substitution for recovery when using unsuitable wastes, it however explicitly clarifies that the assessment of the environmental effects (proper and harmless recovery or disposal commensurate with the public good) is a question independent of it and that it can only be answered after the classification of the measure as recovery or disposal; BVerwG, Resolution of 26 July 2016, 7 B 28.15, AbfallR 2016, 252 (254 f.).

material as well as direct underground stowage material can only be applied when meeting the requirements for an environmentally compatible recovery regulated in the German Filling Regulation. They ensure the protection of ground and mine water as well as surface waters against harmful pollution (top II.1).

IV. Conclusion

The ECJ judgement of 28 July 2016 is not transferable to the underground stowage with suitable wastes ordered or approved by mine authorities. In fact, the underground stowage is to be classified as recovery operation. For transboundary waste shipments the competent authority can only raise objections according to Art. 12 VVA but not according to Art. 11 VVA, which is applicable for disposal operations.

The situation is different when using mine cavities for permanent storage of hazardous wastes. This affects disused mine sections that are not filled with suitable wastes under the legal regime of mining but that are approved under the legal regime of waste management by planning permission decision according to § 35 KrWG as underground storage site (UTD) within the meaning of Art. 2 (f) of Landfill Directive 1999/31/EG³⁵ and § 2 No 10 Landfill Regulation³⁶ for the underground disposal of problematic wastes. Those wastes are mostly hazardous wastes, e.g. residues of tempering salts containing cyanide, nitrite or nitrate, electroplating residues, dehydrated sediments from electroplating, rinsing and burnishing baths, filter residues from sewage purification, broken fluorescent tubes, mercurial wastes, solids containing PCB, capacitors and transformers.³⁷ They will be removed from the economic cycle and thus disposed of (D12 operation). Thereby in the same mine certain mine areas under waste law can be approved as underground storage site for waste disposal while in other cavities a mine law ordered and approved underground stowage with suitable wastes and thus a waste recovery takes place.

It should also be differentiated between underground stowage of mines and filling of aboveground pits (e.g. clay, lava and sand pits). E.g. when filling a sand pit - that has, according to the pursued renaturation concept, no respective legal obligation - with wastes that the mine operator only accepted with additional payments from the waste producer, the required useful purpose for a recovery operation is missing. In such cases the measure would not be carried out when the wastes are not available; the filling would have to be classified as disposal and would in principle require plan approval.³⁸ However, if a filling is necessary, e.g. to lift the height of the surface for the purpose of reutilization, and hereto normally the volume of raw materials such as sand or gravel would be used, the use of the volume of suitable non-hazardous wastes can be regarded as recovery.³⁹ In that sense the Commission – within its circular economy package⁴⁰ - also suggested a new definition of the term „backfilling“ in the AbfRL and referred it to such recovery operations in which suitable waste is used for the reclamation purposes in excavated areas or for engineering purposes in landscaping or in construction, instead of other non-waste materials which would otherwise have been used for that purpose.⁴¹ Due to a proposal of the Council⁴² the term's definition in the so-called trilogue procedure between Commission, Council and Parliament

³⁵ Directive 1999/31/EG of the Council of 26 April 1999 on landfills, ABl. L 182 p. 1, last amended by regulation 2011/97/EU of 05 December 2011, ABl. L 328 p. 49. After that an underground storage site is a plant for permanent storage of wastes in a deep underground cavity like a salt or potash mine.

³⁶ Landfill Directive of 27 April 2009, BGBl. I p. 900, last amended by Art. 2 of the regulation of 27 September 2017, BGBl. I p. 3465.

³⁷ Government draft (Fn. 8), p. 17.

³⁸ BVerwG, Resolution of 12 January 2010, 7 B 34.09, AbfallR 2010, 256 (Ls.).

³⁹ Cf. BVerwG, Judgement of 14 April 2005, 7 C 26/03, NVwZ 2005, 954 ff.; Judgement of 14 April 2000, 4 C 13/98, NVwZ 2000, 1057 f.; Judgement of 26 May 1994, 7 C 14/93, NVwZ 1994, 897 f.; *Attendorn*, AbfallR 2005, 215 ff.; *Dazert*, AbfallR 2005, 223 ff.; *Klages*, AbfallR 2003, 145.

⁴⁰ Commission Communication of 02 December 2015 to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the loop – An EU Action plan for a closed cycle economy, COM(2015) 614 final.

⁴¹ See Art. 1 No 2 (f) of the proposal of 02 December 2015 for a directive of the European Parliament and the Council to change the Directive 2008/98/EG on wastes, COM(2015) 595 final, new definition „filling“ in Art. 3 No 17b AbfRL.

⁴² See change 93 in dossier of 14 March 2017, 2015/0275 (COD).

was limited to the respective use of non-hazardous wastes.⁴³ The judgement of the ECJ of 28 July 2016 was thus taken into account. At the same time the future definition has the consequence that „*backfilling*“ means only appropriate measures aboveground but not the underground stowage. The conditions under which the filling of subsurface pits is environmentally compatible in the individual case are another question.⁴⁴

⁴³ Cf. Amendment 18 (recital 6b), Amendment 93 (Art. 3 No 17b) and Amendment 230 (footnote to the processes R3 and R5) of the proposal of the Council Presidency of 11 December 2017, 2015/0275 (COD).

⁴⁴ Thereto BVerwG, resolution of 28 June 2010, 7 B 16.10, NVwZ-RR 2010, 838 f.; cf. also resolution of 12 January 2010, 7 B 34.09, AbfallR 2010, 256 (Ls.); Judgement of 14 April 2005, 7 C 26/03, NVwZ 2005, 954 ff.; *Dippel*, AbfallR 2010, 132 ff.; *Bertram*, AbfallR 2009, 297 ff.; *same*, AbfallR 2007, 37 ff.; *Versteyl/Jacobj*, AbfallR 2008, 247 ff.; *Attendorn*, AbfallR 2007, 167 ff.