Two Years of Experience with New German Regulations for MBT Plants: View of an MBT Operator

Andreas Warnstedt*, Joachim Dach, Günter Müller***

* Rhein-Lahn-Kreis Abfallwirtschaft, Bad Ems

** Björnsen Beratende Ingenieure GmbH, Koblenz

Neue nationale Vorgaben für MBA:
Erfahrungen der ersten zwei Jahre aus Sicht eines Anlagenbetreibers

Abstract

1st June, 2005 signified a milestone for the waste management of the Federal Republic of Germany. New national regulations set new challenges in particular for operators of MBT plants. In this context the past two years were marked by the appearance of facility- and process-engineering difficulties and coping. These experiences are shown exemplarily for the MBT plant Singhofen, also waste storage parameters and exhaust air parameters are mentioned. The use of cleaned leakage water as a process water reduces the energy consumption in the leakage water disposal and contributes to a reduction of water pollution.

Keywords

AbfAblV, 30. BImSchV, respiration coefficient, DOC Eluate, MBT, RTO, water balance.

1 Introduction

On 1 June 2005, the Waste Storage Ordinance (Abfallablagerungsverordnung, AbfAblV) as part of the Separate Act (Artikelverordnung) has come into effect and has initiated an important change in German waste management. Another part, the 30th Federal Immission Control Ordinance (30th BImSchV) was in force from 1 March 2006 on at the latest, the date fixed for existing landfills. Both standards signify a milestone, especially for the biological-mechanical treatment of residual waste as part of a material flow specific waste treatment. This required the modification of existing landfills and the construction of new ones. The introduction of the two regulations meant considerable changes for new and existing mechanical-biological treatment plants. Before the Waste Storage Ordinance and the 30th BImSchV came into effect, it was pointed out in specialized literature that it would take a year to take the MBTs from experimental status to normal operation. The example MBT Singhofen shall illustrate the experiences made in the first two years of operation seen from the perspective of a plant operator. To do so, a short historical overview of the MBT Singhofen will be given, followed by several problems that arose and how they were eliminated. Not only plant- and process-related aspects will be taken into consideration, but also the success of composting and exhaust gas cleaning and the corresponding energy flows. An additional insight into analytical considerations shall be given by looking at correlations. A description of the individual content of the new legal framework will not be given here.

2 Installation and Commissioning

Between the publication of the ordinance and its effective date, plant operators had about four years of time to implement the legal instructions. After municipal decision-making, planning and the approval process, the individual lots were put out to tender in autumn 2004/2005. The ambitious goal of putting the plant into operation after six month of construction time was fulfilled.

A problem which arose, was the approval of the sheltered biological post processing. According to the 30th BImSchV, waste treatment plants have to be completely encapsulated. In compliance with Section 16 of the 30th BImSchV, the housing is not mandatory when the waste intended for biological post processing has a respiration activity of under 20 mgO_2/gDM and it is otherwise guaranteed through operational measures that enough provisions have been made against harmful influences of the environment (BMU, 2001). In the case of the MBT Singhofen, the biological post processing was roofed and equipped with a suction aeration. Due to possible leakages of diffuse air, the load limit values defined in the 30th BImSchV were reduced in the operating approval. Furthermore, examinations into whether it is possible to optimize the biological post processing will have to be done within two years after launch, which will have to be presented to the approval authorities.

3 Experience and Optimization

3.1 Plant-related

3.1.1 Mechanical Treatment

In the existing Mechanical Treatment as first step of the MBT, apart from the exhaust gas technology especially the shredding process was modified. To do so, a Terminator 5000 (firm Komptech) was installed as shredding aggregate. It was installed directly above the conveyor belt which is followed by a steep elevating conveyor belt for the feeding of the screen drum. The spacing between the shredding shaft and the counter rake is adjustable which allows an adjustment of the shredding degree without much effort. This is insofar advantageous as the amount of the high calorific fraction and thus the compliance with the limit values for calorific value and TOC in the solids can easily be influenced. When the shredding mechanism is increasingly worn out, the shredding quality can easily be maintained by adjusting the spacing allowing a better exploitation of the shredding mechanism.

The exhaust gas collection was modified so that the high contaminated air coming from the discharge points, the screen drum, the homogenization drum etc. are collected separately and passed on directly to the exhaust gas treatment. The less polluted hall air is led through a dust filter and reused as process air in intensive composting. Shredder, elevating conveyor belt and exhaust gas duct have proved reliable in operation with domestic waste and largely insusceptible for failures.

Also the 200 m-long encapsulated conveyor belt for the transport of mechanically treated material into intensive composting worked largely trouble-free. The above-mentioned air transport ducts are also connected to this conveyor bridge. Concerns about a quick corroding of the galvanized steal plate pipes were not confirmed.

By installing a second magnetic separator in the fine-grain flow, it was possible to gain a greater output of reusable ferrous metals.

3.1.2 Intensive composting

For the intensive composting, an existing composting plant with rotting boxes was altered and enlarged. When this composting plant had still been in use, it was possible to treat domestic waste and thus make precious experiences in advance for the present operation.

After finishing the exhaust gas cleaning system, the intensive composting (IC) was ready to be launched. This was the starting signal for the test run. Because of the short lead time, it was strictly required that the intensive composting worked under full load complying with the storage requirements. Even if the usual plant-related optimization had to be done, the performance of the intensive composting fulfilled the expectations.

Apart from corrosions which had to be expected to a certain extent regarding the treated media, the rotting box technology in connection with simple wheel loader loading proved to be very robust and flexible. The installed plant technology in the intensive composting is all in all appropriate for meeting the new legal requirements.

To minimise corrosions, the installation of an air conditioning system with extensive aeration of the concerned parts of the hall and a preceding drying of the control air as preventive measure is being discussed.

3.1.3 Biological post processing

The biological post processing unit of the MBT Singhofen was built on an old landfill section which used to be used for waste storage. Thanks to a flexible roof construction in connection with an appropriate substructure, the biological post processing proved to be settlement resistant and free of emissions.

The suction aeration of the biological post processing areas worked as expected. What proved to be sensitive was asphalt as underground. Against all expectations, temperatures of sometimes above 70°C occurred in the biological post processing windrows. In the contact area between rotting material and underground, these temperatures caused a softening of the asphalt which can lead to damages of the underground during the shifting process by wheel loader (peeling of the covering layer, indentations and notches in the asphalt). To minimize those damages, the windrow temperature is being monitored and optimized by modified aeration and irrigation.

To avoid a drying up of the rotting material, an irrigation duct with separate outlets for each rotting field was installed. The outlets are equipped with mobile irrigation devices (spray pipes) which can be activated if required. As moisturizer especially cleaned landfill leachate from the in-house leachate cleaning system or surface water is used.

The exhaust gas originating in biological post processing is led over an about 700 m-long underground HDPE duct DA 600 with condensate separator at the lowest point to the biological post processing. The exhaust gas cools down during the transport by 15 – 20°C and can be reused as process air in intensive composting. This allows to minimize the amount of air which is used in the framework of waste management.

3.1.4 Exhaust gas cleaning

3.1.4.1 Clogging of the honeycombs

When planning the plant, the plant operator expected a low-maintenance exhaust gas cleaning system. Originally, it was expected that it would be sufficient to switch off the system once or twice for reasons of maintenance and cleaning. This expectation held by the plant constructor proved to be false after only a few weeks. Already after 6 weeks of operation, the cleaning performance of the RTO strongly decreased so that one RTO was opened to look for the reasons of this deterioration. Indeed, the honeycombs beneath the combustion chamber were clogged with silica compounds resulting in the destruction of several honeycombs. It quickly turned out that also other MBT-plant operators had the same problem. As no way has yet been found to avoid these sediments, the only possibility to reduce them and to minimize the related consequences, is a regular cleaning (in this case all 5 – 6 weeks). Thanks to an installed redundancy of the two RTO lines, the cleaning proceeds without availability deficits of the exhaust gas cleaning.

To be able to handle the clogging of the honeycombs and thus reach an optimization of the energy consumption, it is now important to find the optimal cleaning interval. At present, the cleaning interval is at 6 weeks. These cleaning intervals are extended step by step till an optimum is reached between cleaning effort and tolerable energy consumption. The experiences made after introducing this regular cleaning show that the operation could be efficiently stabilised. First observations have shown that the pollution is lowest when the intensive composting is run with less wet waste. But this is when the biological activity of the material is lowest which is counterproductive in respect of biodegradation.

Apart from the composition of the exhaust gas from the rotting process, another possible reason for the clogging of the honeycombs might be the disintegration of the inner insulation of the combustion chamber because of the high temperatures (up to about 850°C). As a reaction, the whole inner insulation was removed and replaced by a more appropriate material.

3.1.4.2 Corrosion

Problems with corrosion can also be found in the exhaust gas cleaning. However, they exceed the expected extent. Here it is especially the waste gas side of the RTO which is concerned. In the ventilator and in the subsequent conduit to the RTO as well as in the waste gas canal (within the RTO), corrosion has caused leakages which had to be repaired. Nevertheless, problems with corrosion on the scrubbed gas side, like they have been criticized by other MBT-plant operators, have not yet been detected to such an extent in the MBT-plant Singhofen. It is assumed that the reasons for the corrosion are on the one hand the aggressive rotting exhaust gas and on the other hand the enrichment of the exhaust gas with sulphuric acid in connection with the preceding operation of the “acid scrubber”. The latter is allegedly linked to the control of the extraction of ammonium sulfate.

As a solution, the protective paint coating was renewed to longer withstand the aggressive rotting exhaust gas and to delay corrosions. Those conduit parts which had already been destroyed were removed and replaced with high-quality steal. The combustion chambers were completely isolated on the outside to prevent the formation of condensation water. At present, the control of the extraction of ammonium sulphate is being repaired.

In spring 2007, the plant constructor will furnish the plant with high-quality protection against inner corrosion which has to withstand the high temperatures in the plant. At the moment, it is impossible to judge whether apart from these passive measures other measures will have to be taken afterwards.

A formation of ice on the valves during winter, as observed by other MBT-plant operators, has so far not been detected on the RTO Singhofen.

Further issues in connection with the RTO as essential component of exhaust gas cleaning will be taken up in a further down following contribution by DACH ET AL.

3.2 Process-related

3.2.1 In general

The adaptation of the MBT-plant to the new legal regulations, also required process-related changes. To comply with the storage parameters of calorific value or TOC in solids, from 1st June 2005 on, the high calorific fraction had to be extracted and passed on to external processing. Only a few weeks after the AbfAblV had been introduced, it was exactly on this interface that complications arose all over Germany. At first, the processing plants were not able to completely put through the incoming amounts of high calorific fractions because a considerably higher amount than predicted was supplied by the commercial waste sector. In many places, this fact led to a reception stop for high calorific fractions. Also the MBT-plant Singhofen had to face these consequences. Because of this, it was necessary to set up interim storage capacities for this material flow. In 2005, about 2 500 t of high calorific fraction were stored temporarily, but it was possible to close these interim storage facilities already in the beginning of 2006.

Already at an early stage, it became obvious that the high calorific fraction is still contaminated with 15 – 25 % of biogenetic fine material. To create a type-specific high calorific fraction this flow stream is screened a second time several times a week. The thus improved purer quality created a further sales potential. Furthermore the nationwide market situation increasingly relaxed and as a result the disposal of the high calorific fraction is safe by now.

Other process-related issues in the individual plant sections will be discussed in the following.

3.2.2 Intensive composting

3.2.2.1 In general

Against the background of the starting date of operation, the biological process step had to be operated under full load from the beginning on and has worked without problems for the past 2 years. During the planning period, a treatment duration of 5 weeks was intended for intensive composting. In this respect, the respiration activity was distinctly below 20 mgO_2/gDM, usually reaching values of less than 10 mgO_2/gDM. The treatment duration of intensive composting could be reduced to 4 weeks and thus the throughput was improved.

The flexible, easy and robust feed and discharge technology by wheel loader proved to be very helpful in coping with the logistical challenges (e.g. occasional tunnel breakdowns) which arise in operating the intensive composting. As interface between intensive composting and biological post processing serves a container vehicle which guarantees a high degree of flexibility regarding the discharges out of intensive composting and the feed of the biological post processing fields.

3.2.2.2 Water supply

For the elimination of initial problems concerning the use of process water in intensive composting, at first a three-stage settling basin with preceding sieve in front of the process water reservoir basin was installed. To eliminate contraries that still appeared in the process water and to thereby prevent pump damages, an additional sieve container was installed behind the settling basin at the beginning of this year. The process water coming from the tunnels passes since then first a sieve (> 5 mm) and then reaches the settling basin. Substances which are still contained in the process water are held back by the subsequent sieve container (< 2 mm) so that the process water is largely free of contraries when it flows into the reservoir basin. Damages of the pump or a clogging of the nozzles by through-coming (cleaned) process water was this way prevented.

A substitution of the process water by surface water did not significantly change the intensive composting output so that the use of process water in the MBT-plant Singhofen is the most reasonable irrigation option. Only for biological post processing, there are concerns about a contamination of the rotting material with the highly concentrated process water. This is why cleaned leachate is used for irrigation at this stage having the positive effect that the MBT not only works sewage-free but that also further sewage can be used (from the landfill) (see 3.6).

3.2.2.3 Air management

For the discharge of the predominantly by biodegradation released heat, higher amounts of fresh air are necessary, accompanied by the equivalently increasing amounts of exhaust gas. A substitution of fresh air by recirculation air is possible when a recirculation cooling is used. This way, additional amounts of exhaust gas which would lead to a higher load of the RTO can be avoided. At present, it is being checked whether a corresponding optimization can be economically implemented.

3.2.3 Biological post processing

Also the biological post processing as second biological stage had to run from early on with a high throughput performance and comply with the storage criteria. Initial problems with even irrigation of the rotting material could mainly be eliminated by plant-related optimization (already described under 3.1.3).

To support the discharge of thermal energy out of the windrows, apart from the irrigation of residual waste during biological post processing, the material was more often shifted. Aiming at a largely homogeneous moisture content of the whole rotting material, it was also irrigated during shifting. These process-related changes led to an improved discharge of thermal energy and to a better biodegradation of organic substances.

First measurements during operation showed that the biological post processing remained without significant diffuse emissions even when run under full load. The measurement showed concentrations of about 3 to 4 ppm methane. This means that there is no relevant emission pollution issuing from biological post processing. Further measurements in the frame of an optimization have shown that biological post processing is working aerobic even in windrow heights (table windrows) of more than 3 m. In the rotting exhaust gas, not even in per thousand could methane emissions be detected, which is an indicator for anaerobic degradation processes; a certain sign for an optimal aeration of the material.

3.2.4 Exhaust gas cleaning

3.2.4.1 „Acid scrubber”

With the help of the „acid scrubber“ as first step of exhaust gas cleaning, it was possible to eliminate so much ammonia out of the exhaust gas that nitrous oxide emissions appeared in only very low amounts and considerably less than legally required.

The „acid scrubber“ produces an ammonium sulphate solution (ASS) which can be reused as fertilizer in agriculture depending on its consistency. A relatively high amount of condensate, e.g. because of the moisture saturation in the composting exhaust gas resulted in increased amounts of ASS which had to be discharged in connection with a low concentration of nitrogen. It was possible to optimize the nitrogen concentration by e.g. thermal insulation of the scrubber and the installation of a demister unit so that the processing costs of the ASS could be reduced to one third of the initial cost. In future, the programming of a changed discharge control shall contribute to an increase of the ASS density.

3.2.4.2 RTO

For cleaning and maintenance, usually only one RTO was switched off at a time, so that the second RTO could still process the incoming exhaust gas (redundancy). When only one RTO was operated, increased C_{total} values were detected from time to time which nevertheless largely complied with the limit values. Why the values rose in one-line operation has been clarified. Often, a high pressure in front of the RTO is responsible for raw air permeating the bypass valves (not 100 % leakproof) thus directly reaching the stack. As a consequence, the exhaust gas volume will be temporarily reduced to avoid C_{total} peaks.

To avoid temperature variations in the pure gas and to guarantee an optimal energy and cleaning efficiency of the RTO, the rinse intervals of the individual chambers have additionally been reprogrammed.

3.3 Analysis results of the rotting material

Already the first rotting batches have shown that the compliance with the parameter DOC in the eluate (till 1st February 2007 TOC in the eluate) would be harder to achieve than the compliance with the respiration activity. The DOC in the eluate is not stable. It is not reduced continuously during the rotting process. Possible reasons are amongst others discussed by WARNSTEDT ET AL., 2006. This factor has been taken into account by setting up the correspondence value to 300 mg/l and the limit value to 600 mg/l (BMU, 2006). The other parameters in accordance with annex 2 do not pose any problem.

Optimizing approaches regarding the biodegradation of organic substances have already been discussed in the above-mentioned context so that only exemplary approaches will be referred to here without claiming completeness.

In each rotting stage, the rotting material has to be irrigated to the corresponding optimal extent. When the material has dried out because of inadequate irrigation, it will not be possible to achieve the optimal irrigation degree later on. The use of process water is not recommendable during the last composting weeks.

Shifting the material more often improves the aeration of the whole rotting material, contributes to homogenization and supports the discharge of released thermal energy.

To examine the dependence of the DOC in the eluate from the temperature of the corresponding sampling point in the windrow body and the influence of aeration, an already biologically treated material has been divided into two batches and afterwards composted for an additional period of 18 days. One windrow with a height of about 1.10 m was still actively suction-aerated and the other one with a height of about 0.80 m was separately left non-aerated. The temperature was measured in both windrows.

Actively aerated windrow: While the DOC in the eluate was reduced from 253 mg/l in the input to 222 mg/l (on average) in the lower part of the windrow (largely without atmospheric influences) at an average temperature of 48.5°C, the surface material was reduced to 171 mg/l (on average) at an average temperature of 29°C. As the moisture content was roughly the same at the sampling points, it can be assumed that the DOC level in the leachate correlates with the temperature.

Non-aerated windrows: Here, no significant reduction of the DOC in the eluate was detected in the course of the 18 days. The temperature on the inside of the windrow was at 43°C and on the outside at about 41°C (on average). The missing aeration seems to be detrimental to the DOC in the eluate.

During optimization, it became obvious that some optimizing steps aiming at the DOC in the eluate were detrimental to the AT_4 (cf. also figure 2) so that we are now turning our attention to the AT_4.

3.4 Emissions standards

Regarding emissions standards, the Singhofen plant had to face initial difficulties rather in collecting measuring data than in complying with the limit values in accordance with Section 6 of the 30th BImSchV. The individual measurements always complied with the required limit values. The positive experience described by WALLMANN ET AL., 2006 concerning individual measurements of dioxin / furan could also be confirmed for the RTO of the MBT Singhofen. The measuring results were below the limit value by the factor 10 to 100.

The continually collected exhaust gas parameters complied completely with the limit values under the 30th BImSchV and stayed clearly below them; only exception was the parameter C_{total}. At the beginning, the C_{total} was surpassed on some occasions which could be explained by an incorrect volume flow metering. However, the annual mean value also remained clearly below the limit value. Generally, also the contract value which is even below the 30th BImSchV value can surely be complied with.

Nitrous oxide (N_2O) and the other continually collected parameters complied throughout with the required limit values.

3.5 Energy flows

The consumption of high amounts of fresh air in intensive composting and the related high volumes of exhaust gas to be cleaned cause an additional demand of energy and primary energy sources (natural gas) as auxiliary gas for the combustion in the RTO. With more and more operation routine, energy flows increasingly move into the centre of attention. As auxiliary gas, natural gas could largely be substituted by landfill gas from the adjacent landfill. Naturally, the amount of landfill gas is bound to decrease in the medium term which will at some point rise the question how auxiliary gas can be used more efficiently. In the MBT Singhofen, the automatic gas injection, which the manufacturer had claimed to be economic, has not yet proven its saving potential in comparison with the burner operation.

The most important objective is to avoid or at least minimize peaks in energy consumption (electricity, natural gas). To this effect, an energy monitoring system is being set up momentarily. In a first approach, the natural gas peaks are supposed to be minimized by temporarily reducing the exhaust gas volume when there is a temporal shortage of landfill gas. Additionally, it is tested whether the installation of a cooling system for the water-saturated recirculation air in intensive composting could be economically favourably implemented.

3.6 Water balance

For an optimal operation of the MBT, a sufficient watering of the rotting material is essential. Synergy effects at the Singhofen site can be profited from by using leachate from the adjacent landfill to meet the water demand which cannot be covered by the upcoming process water. Biologically cleaned leachate is used in the homogenization drum for the irrigation of the raw waste, in intensive composting as process water and end-cleaned leachate especially in biological post processing for irrigation. In particular during the dry summer months, plant water from the roof surfaces and rainwater from the plant roads is used additionally. Table 1 gives an overview over the water demand exemplary for the year 2006.

Table 1 Water demand of the MBT Singhofen (2006) subdivided according to plant unit

plant unit	quality	total amount per year (m³)
Mechanical Treatment (MT)	**total**	5,090
	leachate	5,087
	process water	3
Intensive composting (IC)	**total**	23,567
	leachate	22,921
	process water	646
biological post processing (BPP)	**total**	8,072
	leachate	1,628
	process water	6,444
Total MBT	**total**	36,729
	leachate	29,636
	process water	7,093

This not only proves that the plant, as required in the administrative regulation on wastewater (AbwVwV), works wastewater-free, but also that the joint use of leachate allows to considerably reduce water pollution. Since Mai 2006, no leachate has been fed into the draining ditch. At a previous amount of leachate of 36.360 m³/a, this signifies a reduction of water pollution of 5,8 t/a of COD, of 2,2 t/a of inorganic total nitrogen and 4 kg/a of AOX (based on the data of 2004). Thanks to the use of leachate in the

MBT, the 2nd purification stage could be converted from an energy-intensive wet oxidation to activated carbon in summer 2006. This way, an energy expenditure of 1,5 - 2 MWh/a can be saved in the leachate cleaning system.

When planning biological post processing, a low amount of low contaminated condensate water was assumed. For reasons of plant layout, the dewatering of biological post processing was connected to the leachate disposal of the landfill. Because of the considerable irrigation of the biological post processing windrows, also high contaminated process water is produced temporarily.

The biological post processing has up to now been sprinkled during the working hours from 8 – 16 o'clock. The process water output of the biological post processing adds up to about 1 m³/h on average and shows a mean COD of about 12 000 mg/l. It is shown that this concentration overloads the biological treatment of the leachate cleaning system. Previously, leachate concentrations were at a COD of about 2 000 mg/l. Attempts will be made to minimize the leachate output of the biological post processing by interval controlled sprinkling. At the same time, it will be tested whether organic substances have been washed out because of the targeted sprinkling of the biological post processing which would mean an improvement of the landfill material. In this case, it would be necessary to find the ideal combination of optimizing the biological post processing and minimizing the operational effort of the leachate cleaning system. It might be necessary to separate process water from leachate and to pass it on directly to the process water basin of intensive composting. However, this would require the construction of an additional 600 m-long drain line.

3.7 Emplacement of mechanically-biologically treated materials

The emplacement of mechanically-biologically treated waste has proved to be unproblematic. Especially the requirement in annex 3, AbfAblV could be fulfilled: after reaching 95 % of the maximal emplacement density identified in an emplacement test, an average water content of about 35 m.-% could be achieved by using a compacting device from soil engineering. The changes since 2005 have resulted in the emplacement nowadays being more comparable to soil engineering than to the conventional compaction of municipal waste in the past.

Since 1st February 2007, the amended Waste Storage Ordinance no longer strictly requires to daily cover the emplacement area. On the landfill Singhofen, the storage area is only covered when rain can be expected. Thus, the landfill operation has become much easier without having any negative effects on waste storage.

4 Considerations of correlations

4.1 Dry matter – DOC in the eluate

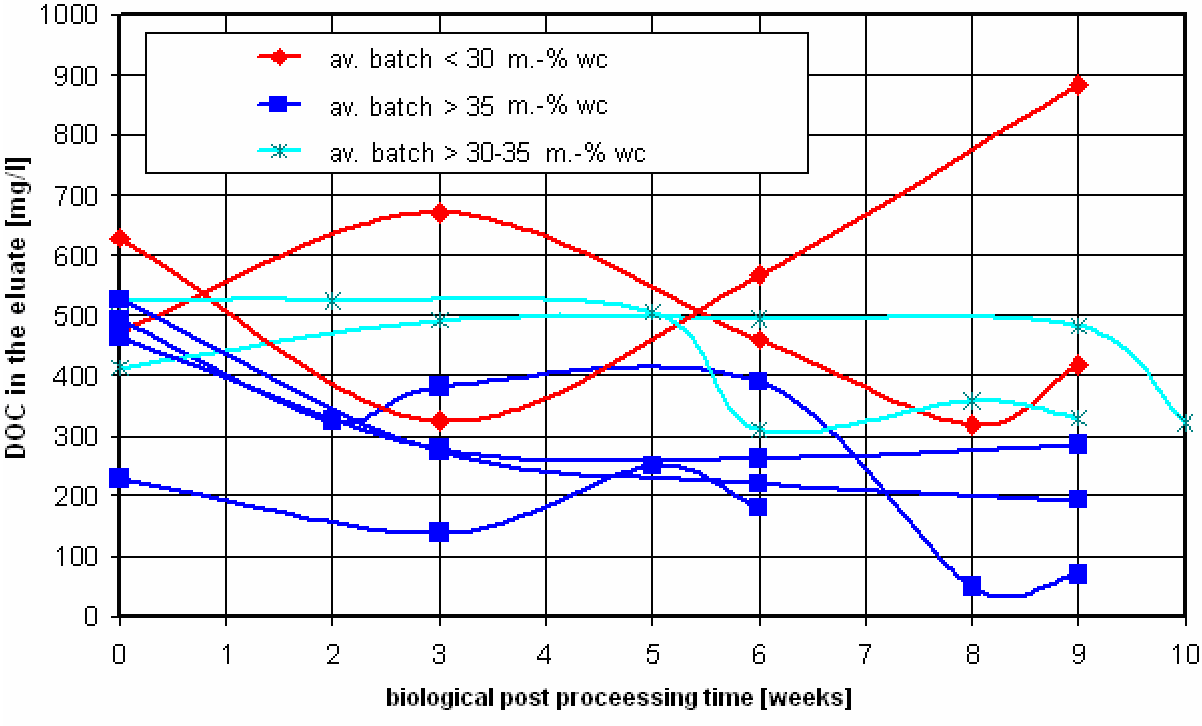

Figure 1 Average DOC in the eluate and average AT_4 depending on the average dry matter content

The diagram in figure 1 shows that an average water content > 35 m.-% during the rotting process seems to have a positive effect on the degradation of organic matter, here represented by the parameter DOC in the eluate. Not optimally degraded batches were further treated accordingly.

4.2 Dry matter – DOC in the eluate / AT_4

While the DOC decreases in eluate of low dry matter content (on average) and is thus favourable for the storage conditions, this has the contrary effect on the AT_4. Both parameters seem to depend on the average DM content in the biological post processing, but adversely. Correspondingly, a high moisture content of the reduction of the DOC in the eluate is beneficial, but results in an increased AT_4. This aspect has to be taken into consideration in optimization approaches of the rotting process.

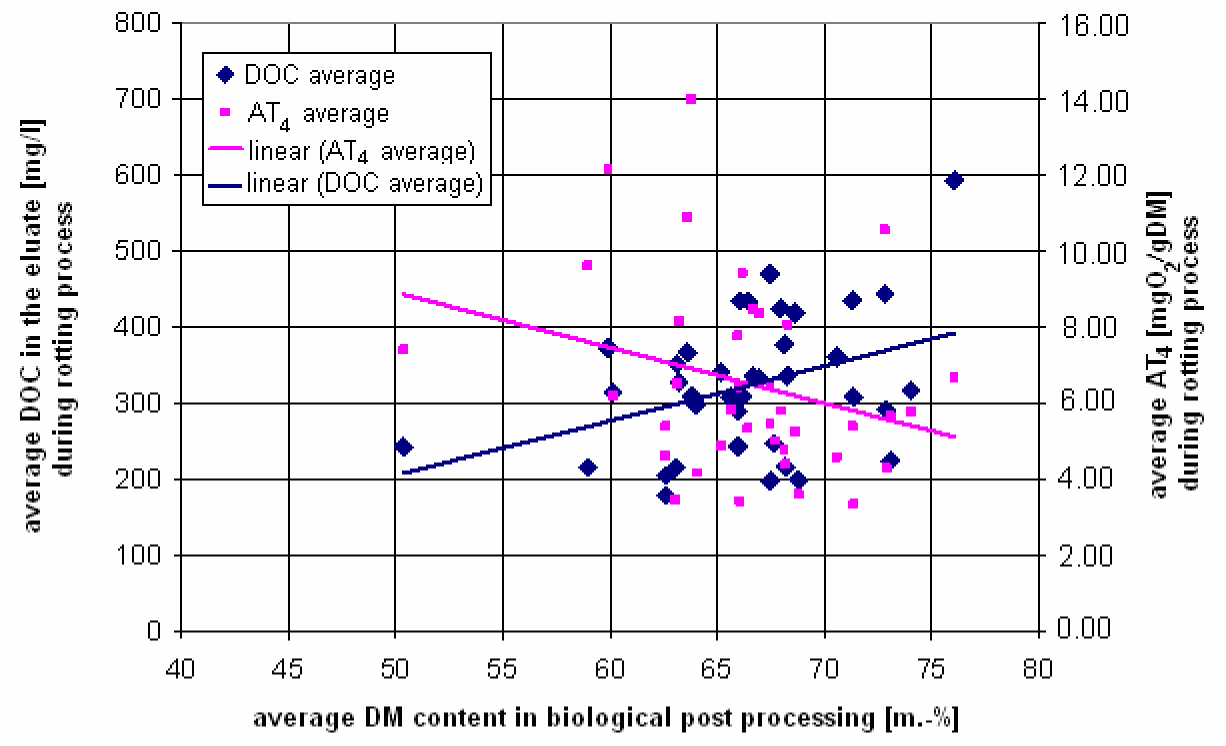

Figure 2 Average DOC in the eluate and average AT_4 (in the course of the rotting process) depending on the average dry matter content

5 Material flow streams

5.1 High calorific fraction

In the MBT-plant Singhofen, the high calorific fraction is gathered by screening the shredded domestic waste. Like already described, the amount can be adapted through the adjustment of the shredding degree in the pre-shredder. If required, it is possible to pass the high calorific fraction via bypass to the post-shredder. Furthermore, the high calorific fraction is Fe-separated by using a magnetic separator. A further treatment of the high calorific fraction is not done, as special processing plants have better possibilities to treat high calorific fractions in a user specific way.

5.2 Metals

With regard to the plant layout, the mechanism is not equipped with an NF-separator. The Fe-separation in the existing plant via magnetic separator for coarse-grain (high calorific fraction) and fine-grain (biological treatment) has proved successful. Whereas the Fe of the coarse-grain is polluted with adherences and can only be put on the market against extra payment, the fine-grain reaches considerable prices. In this context, the installation of a magnetic pulley in the fine waste line has a positive effect. This way, the amount of Fe-metals in the fine waste line could be increased by about 30 %. The mixed scrap directly separated from the incoming waste also reaches high prizes. In total, 1,636 t of metal are collected in the MBT-plant Singhofen per year which is equivalent to 1.9 % of the amount of domestic waste.

5.3 Pollutant discharge

At delivery, it is possible to discharge pollutants from the incoming waste by grab dredger or wheel loader. Annually, about 15.4 t scrap tires, 2.1 t television sets and monitors, several fire extinguishers and even refrigerators and other problematic waste are separated.

6 Summary

The introduction of the Waste Storage Ordinance (AbfAblV) on 1st June 2005 and of the 30th Federal Immission Control Ordinance (30th BImSchV) on 1st March 2006 at the latest has forced MBT-plant operators to carry out numerous modifications and install new systems. The mechanically-biologically treated residual waste has since complied with the requirements under annex 2 and 4 of the AbfAblV and the exhaust gas produced by the treatment was collected and thermally treated with the help of RTO. Setting up new composting and exhaust gas treatment technology made it possible to comply with the fixed limit values and set process- and plant-related challenges, which could largely be coped with in the course of commissioning and the related optimization phase.

7 Literature

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Authors' addresses

Dipl.-Ing. Andreas Warnstedt
Rhein-Lahn-Kreis Abfallwirtschaft
AWZ Singhofen
An der B 260
D-56379 Singhofen
Phone: +49 2604 941316
Email: a.warnstedt@web.de
Website: www.rhein-lahn-info.de

Dipl.-Ing. Günter Müller
Rhein-Lahn-Kreis Abfallwirtschaft
Insel Silberau 1
D-56130 Bad Ems
Phone: +49 2603 972302
Email: guenter.mueller@rhein-lahn.rlp.de
Website: www.rhein-lahn-info.de

Dr.-Ing. Joachim Dach
Björnsen Beratende Ingenieure
Maria Trost 3
D-56070 Koblenz
Phone: +49 261 8851181
Email: j.dach@bjoernsen.de
Website: www.bjoernsen.de