ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

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Description of Austrian Plants

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Description of Austrian plants

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CONTENT

LIST OF ABBREVIATIONS

AEL .....Associated Emission Level

AOX .....Adsorbable organic halogen compounds (reported as Cl)

BAT .....Best Available Techniques

BATC .....Best Available Techniques Conclusions

BOD_5 ..... Biological Oxygen Demand (5 day)

COD .....Chemical Oxygen Demand

EDM .....Elektronisches Daten Management: Electronic Data Management
operated by the Austrian Federal Environment Agency

ELV .....Emission Limit Value

EMREG .....Austrian Emission Register

EMS .....Energy Management System

EW_{100} ..... Population equivalent (100 g COD load per inhabitant)

EW_{60} ..... Population equivalent (60 g BOD_5 per inhabitant)

fpdcs .....Flow Proportional unsettled homogenised Daily Composite Sample

fpwcs.....Flow Proportional unsettled homogenised Weekly Composite Sample

IED .....Industrial Emissions Directive

IPPC .....Integrated Pollution Prevention and Control

ÖWAV.....Österreichischer Wasser- und Abfallwirtschaftsverband
(Austrian Water and Waste Management Association)

Q .....Volumetric flow rate
(Quantity of water or wastewater per time unit)

SBR .....Sequencing Batch Reactor

TN .....Total Nitrogen

TOC .....Total Organic Carbon

TP .....Total Phosphorus

TSS.....Total Suspended Solids

VOC .....Volatile Organic Compounds

WW .....Wastewater

WWTP .....Wastewater treatment plant

1 STAND DER TECHNIK (BVT)

1.1 Allgemeine BvT Schlussfolgerungen – Tierschlachtanlagen und Anlagen zur Verarbeitung tierischer Nebenprodukte

Ausgehend von erhobenen Emissions- und Verbrauchsdaten der österreichischen Tierschlacht- und Tierkörperverarbeitungsindustrie wurden die folgenden Techniken und Emissionswerte als Stand der Technik abgeleitet. Der Begriff „Stand der Technik“ ist dem Begriff „Beste verfügbare Technologie“ gleichbedeutend.

Die im Folgenden beschriebenen Techniken gelten weder als bindend noch als vollständig.

1.1.1 Allgemeine BvT – Energieverbrauch und Energieeffizienz

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Verminderung von Energieverbrauch und zur Erhöhung der Energieeffizienz angesehen:

- Verwendung hocheffizienter Dampfkessel (mitsamt Economiser für die Vorbehandlung von Wasser und/oder Luft);
- Implementierung eines Energie Management Systems oder wiederkehrender Audits (alle 4 Jahre);
- Verminderung des Abwärmeanfalles durch Einsatz von Einrichtungen zur Wärmerückgewinnung in Wärmetauschern;
- Anwendung erneuerbarer Energiequellen wie Photovoltaik und/oder Solarthermie und Biogas (z. B. aus der anaeroben Abwasserbehandlungsstufe und/oder Produktionsrückständen; sofern anwendbar);
- Verwendung von Kraftstoffen mit einem geringen Kohlenstoffgehalt;
- Anwendung frequenzgesteuerter Luftkompressoren mitsamt Wärmerückgewinnung (ausgenommen Grundlastabdeckung).

1.1.2 Allgemeine BvT – Wasserverbrauch und Abwasseremissionen

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Verminderung von Wasserverbrauch und Abwasseremissionen angesehen:

- Weitestgehender innerbetrieblicher Rückhalt von Stechblut, Jauche, Gülle, Magen-, Darm- und Panseninhalt sowie Darmschleim, Feststoffen und Fett;
- Erfassung und Ableitung belasteter Abwässer und Niederschlagswässer getrennt von unbelasteten Niederschlags- oder Kühlwässern in verschiedenen Abwassersystemen (Trennkanalisation);
- Einrichtung von Pufferbecken und Rückhaltesystemen in Kombination mit operativen Vorbeugemaßnahmen zur Vermeidung direkter Einleitung von Rohabwasser, Chemikalien oder Löschwasser in die Kanalisation bei Unfällen;

- Verwendung von Regenwasserrückhalte- und Pufferbecken, um hydraulische und thermische Spitzen sowie Schmutzfrachtspitzen abzumindern;
- bevorzugter Einsatz von Oberflächenkondensatoren bei der Brüdenbehandlung; Verzicht auf den Einsatz von Mischkondensatoren;
- Verminderung des Wasserverbrauches und des Abwasseranfalles durch
  - Einrichtung von Kreisläufen für Waschwasser sowie für Reinigungs- oder Desinfektionslösungen, erforderlichenfalls unter Einsatz von Zwischenbehandlungsmaßnahmen in den Kreisläufen,
  - Weiterverwendung von erwärmtem Kühlwasser aus Wärmetauschern sowie von Dampfkondensaten aus der Energieerzeugung als Reinigungs-, Kesselspeise- oder Brauchwasser,
  - automationsunterstützte Programmsteuerung von Verarbeitungs- und Reinigungsvorgängen,
  - Verwendung wassersparender Armaturen und Einrichtungen für den Produktionsprozess,
  - Einsatz von Trockenreinigungsmaßnahmen vor der Nassreinigung von Arbeitsräumen oder Anlagen;
- Verwendung von CIP (cleaning-in-place) Reinigungssystemen, sofern anwendbar (mitsamt eines Kreislaufsystems, basierend auf Leitfähigkeitsmessungen); Verwendung von CIP Reinigungssystemen für die Reinigung von Behältern;
- Reinigung der Kraftfahrzeuge in ausschließlich dafür bestimmten Bereichen; anfallende Abwässer müssen erfasst und der Reinigung zugeleitet werden;
- Verwendung halogenfreier Desinfektionsmittel und Reinigungsmittel (z. B. Peroxyessigsäure) und Aufzeichnen der Verwendung von Desinfektions- und Reinigungsmitteln; sofern die Verwendung chlorhaltiger Reinigungsmittel nicht vermieden werden kann: bedarfsorientierte Verwendung chlorhaltiger Reinigungsmittel;
- Durchführung von Dichtheitsüberprüfungen des Abwassersystems (z. B. alle 5 bis 10 Jahre) oder regelmäßige optische Kanalinspektion des Kanal- und Abwasserbehandlungssystems;
- weitestgehender Verzicht auf organische Arbeits- und Hilfsstoffe, insbesondere organische Komplexbildner, deren Gesamtabbaubarkeit durch aerobe Mikroorganismen in einem wässrigen Medium nach einer Testdauer von 28 Tagen nicht größer als 80% ist (ÖNORM EN ISO 7827:2013 04 15).

1.1.2.1 Allgemeine BvT – Überwachung

Die BvT besteht in der Überwachung von Emissionen in Gewässer, wie im Folgenden (siehe Tabelle 1) beschrieben, in der jeweils angegebenen Häufigkeit und unter Einhaltung maßgeblicher Messmethoden (angeführt in Tabelle 6 und Tabelle 7).

Tabelle 1: Überwachungsfrequenz für Emissionen in Gewässer.

Überwachungsfrequenz		
Parameter	**bis zu 3.000 kg/d CSB oder 1.000 kg/d TOC**	**> 3.000 kg/d CSB oder 1.000 kg/d TOC**
Abwassermenge	kontinuierlich	kontinuierlich
Temperatur	kontinuierlich	kontinuierlich
pH-Wert	kontinuierlich	kontinuierlich
Abfiltrierbare Stoffe[1]	täglich[5]	täglich[5]
Adsorbierbare organisch gebundene Halogene (AOX)	jährlich	jährlich
Schwerflüchtige lipophile Stoffe	jährlich	jährlich
Total Cl[2]	jährlich	jährlich
CSB[3, 4]	3-mal wöchentlich	täglich[5]
TOC[3, 4]	3-mal wöchentlich	täglich[5]
BSB_5[4]	wöchentlich	2-mal wöchentlich
ges. geb. Stickstoff[4]	3-mal wöchentlich	täglich[5]
Phosphor – gesamt[4]	5-mal wöchentlich	täglich[5]
NH_4-N[4]	5-mal wöchentlich	täglich[5]
Fischtoxizität (künftig: Fischeitoxizität)[6]	jährlich	jährlich
Summe der Kohlenwasserstoffe (künftig: KW-Index)[6]	jährlich	jährlich
Sulfid[6]	jährlich	jährlich

Überwachung durch den Betrieb

Die Überwachung der Emissionen in Gewässer gemäß Tabelle 1 kann durch den Betrieb durchgeführt werden.

Externe, unabhängige Überwachung

Wenn die Überwachung durch den Betrieb selbst durchgeführt wird, ist eine externe, unabhängige Überwachung mindestens einmal jährlich durchführen zu lassen. Diese ist stets an repräsentativen Produktionstagen mit entsprechend hoher Auslastung der Anlage durchzuführen.

Mittelungszeiträume für BvT-assoziierte Emissionswerte

Die Bestimmung von Emissionsparametern anhand von mengenproportionalen, nicht abgesetzten, homogenisierten Tagesmischproben ist für die Mehrheit der Parameter BvT. Eine Tagesmischprobe ist die über die tatsächliche Abwasserablaufzeit innerhalb eines Zeitraumes von 24 Stunden mengenproportional gezogene Mischprobe.

[1] Alternativ zum Parameter abfiltrierbare Stoffe können auch bei der indirekten Einleitung von Abwässern die absetzbaren Stoffe bestimmt werden

[2] nur für Schlachthäuser

[3] Es ist ausreichend, einen der beiden Parameter (TOC, CSB) zu messen.

[4] nur für Direkteinleiter

[5] während Werk-/Betriebstagen

[6] nur für Anlagen zur Verarbeitung von tierischen Nebenprodukten

Bestimmte Parameter sind kontinuierlich zu messen (wie etwa Abwassermenge, Temperatur und pH-Wert), wobei andere Parameter (aus analytischen Gründen) anhand von Stichproben bestimmt werden (wie etwa abfiltrierbare Stoffe, Gesamtchlor).

Es wird nachdrücklich empfohlen, die Messung des gesamt organisch gebundenen Kohlenstoffs (TOC) als Alternative zum Parameter CSB zuzulassen. Deshalb sollen BvT-assoziierte Emissionswerte für beide Parameter verfügbar sein.

1.1.2.2 Allgemeine BvT – Indirekteinleitung von Abwässern

Die Bvt für die indirekte Einleitung von Abwässern (vor der finalen Behandlung in einer externen Abwasserreinigungsanlage) ist die **Vorbehandlung** von Abwässern aus dem Produktionsprozess mittels physikalischer oder physlikalisch-chemischer Abwasserbehandlung. Die Vorbehandlung kann aus einer Kombination der im Folgenden angegebenen Behandlungsstufen bestehen. (Die angeführten Entfernungstechniken sind vor allem bezüglich der fett hervorgehobenen Parameter wirksam.)

- Sieben (**abfiltrierbare und absetzbare Stoffe**, schwerflüchtige lipophile Stoffe, CSB, BSB_5, TOC, Phosphor, gesamter gebundener Stickstoff);
- Flotation (**schwerflüchtige lipophile Stoffe, abfiltrierbare und absetzbare Stoffe**, CSB, BSB_5, TOC, gesamter gebundener Stickstoff, Phosphor);
- Ausflocken und Fällung (**Phosphor**, CSB, BSB_5, TOC, AOX);
- Neutralisation (**pH-Wert**);
- Sedimentation (**abfiltrierbare und absetzbare Stoffe**, CSB, BSB_5, TOC, gesamter gebundener Stickstoff).

1.1.2.3 Allgemeine BvT – Direkteinleitung von Abwässern

Die BvT im Fall der Direkteinleitung von Prozessabwässern ist die Anwendung physikalisch oder physikalisch-chemischer Abwasserbehandlung (siehe Kapitel 1.1.2.2) und zusätzlich eine biologische Abwasserbehandlung. Dies dient der Pufferung von Belastungsspitzen, vorzugsweise im Aufstaubetrieb oder mehrstraßig, einschließlich dem Abbau organischer Komponenten (CSB, BSB5, TOC), der Entfernung von Stickstoff (gesamt gebundenen Stickstoff, NH_4-N) und von Phosphor. AOX wird teilweise im Klärschlamm adsorbiert.

1.1.3 Allgemeine BvT – Abfallmanagement

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Vermeidung oder Verminderung von Abfallerzeugung angesehen:

- Vermeiden des Verpackens (Umhüllens) von (Waren) Paletten mittels Plastikfolie;
- Verwendung wiederverwendbarer Paletten (hausinterne Reinigung);
- Wiederverwertung von Kartonagen; so gut wie möglich;
- getrenntes Erfassen und Recyceln von Papier, Kartonagen und Plastik;
- Verwendung standardisierter Verpackungsmaterialien, um Recycling zu vereinfachen;
- Verwertung von Produktionsrückständen in Biogasanlagen; sofern anwendbar.

1.1.4 Allgemeine BvT – Lärm

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Verminderung von Lärm angesehen:

- Einschränken von Nachtlieferungen;
- Implementierung von Kontrollen durch externe Lärmmessungen (z. B. auf Nachbargrundstücken, um Lärmquellen zu identifizieren);
- Errichtung von Lärmschutzwänden;
- Einhausen von Abwasserbecken, um Lärmemissionen zu vermindern;
- Installierung von Schalldämpfern („silencer“) bei Abluftrohren;
- Verwendung von Ventilatoren mit geringen Lärmemissionen.

1.1.5 Allgemeine BvT – Geruchsemissionen

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Verminderung von Geruch angesehen:

- Kühlen, Einhausen und Installation von Abluftfiltern (z. B. biologische Filter), um Geruchsemissionen aus der Abwasserbehandlung und/oder dem Produktionsprozess zu mindern;
- Verwendung von Abwärmeverwertungskesseln, um geruchsintensive Abluft aus dem Produktionsprozess mitzuverbrennen.

1.1.6 Allgemeine BvT – Grundwasserschutz

Die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) werden als BvT zur Vorbeugung von Boden- und Grundwasserkontamination angesehen:

- Ausschließliches Laden und Verladen von Roh- und Hilfsstoffen sowie deren Lagerung in dazu bestimmten Bereichen, welche gegen den ungewollten Austritt von Leckagen gesichert sind;
- Ausstatten aller Pumpensümpfe, Zwischenspeicher und Auffangwannen mit einem Alarmsystem, welches Leckagen bzw. Überfüllung anzeigt;
- Erstellen und Implementierung eines Systems zur Prüfung und Dokumentation des Zustands von Becken, Rohrleitungen, Flanschen und Ventilen, welche Rohmaterialien, Additive und andere Substanzen befördern (leakage tests);
- Bereitstellung einer adäquaten Menge an Sicherheitsbehältern und passenden Absorbierern oder gleichwertigen Vorkehrungen für einen evtl. Unglücksfall;
- Vermeidung unteriridischer Rohrleitungen zum Transport von Substanzen (außer Wasser);
- Errichtung impermeabler Böden in Becken oder anderen Containern für Oberflächenwässer oder andere Abwasserströme, um einen ungewollten Austritt zu verhindern.

1.2 Spezifische BvT – Schlachthäuser

Zusätzlich zu den in Kapitel 1.1 beschriebenen Techniken werden die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) als BvT angesehen:

1.2.1 BvT – Energiekonsum und Energieeffizienz

- Installation von Wärmerückgewinnungssystemen für die Abwärme des Kühlhauses;
- Verwendung von Produktionsrückständen (welche nicht gesondert entsorgt werden müssen), Filtermaterial der Abwasser(vor)behandlung und/oder Überschuss-Klärschlamm in Biogasanlagen.

1.2.2 BvT – Wasserverbrauch und Abwasseremissionen

- Die Abwassermenge ist kontinuierlich zu messen;
- Einsatz von Trockenkühl- oder nassen Kreislaufkühlsystemen anstelle von nassen Durchlaufkühlsystemen;
- Verwerten von flüssigen Rohstoff- oder Produktionsresten sowie von hochkonzentrierten Abwasserteilströmen für die Energiegewinnung (z. B. mittels Faulung oder Verbrennung), sofern keine gesonderte Entsorgung erforderlich ist.

1.2.2.1 BvT – Indirekteinleitung von Abwässern

Tabelle 2: BvT-assoziierte Emissionsniveaus und BvT für Probenahme für die indirekte Einleitung von vorbehandelten Abwässern aus Schlachthäusern.

Parameter (indirekte Einleitung)	Einheit	BvT-AEL (ohne biologische Reinigungsstufe)	BvT-AEL (mit biologischer Reinigungsstufe)	AEV	BvT-Probenart
Temperatur	°C	7,3–30,9	11,8–28,1	35	kontinuierlich
pH-Wert		6,0–9,5	6,0–9,5	6,0–9,5	kontinuierlich
schwerflüchtige lipophile Stoffe	mg/l	27,0–117,0	1,0–5,0	150	Tagesmischprobe[7]
absetzbare Stoffe	ml/l	0,1–8,0	0,1–6,0	10[8]	Stichprobe
abfiltrierbare Stoffe	mg/l	9,6–148,0[9]	2,0–23,7	150[10]	Stichprobe
Gesamtchlor	mg/l	–[11]	0,01–0,087	0,4	Stichprobe
AOX	mg/l	0,005–0,49	0,05–0,1	1,0	Tagesmischprobe[7]
NH_4-N	mg/l	150	0,2–35,6	–[12]	Tagesmischprobe[7]

AEL … Associated Emission Level

AEV … Abwasseremissionsverordnung

[7] mengenproportionale, nicht abgesetzte homogenisierte Tagesmischprobe

[8] In der spezifischen AEV wird kein Emissionsgrenzwert für den Parameter absetzbare Stoffe festgesetzt. Falls von der Behörde vorgeschrieben, dann mit 10 ml/l.

[9] Anlagen, für die die Ausnahmebestimmung (Fußnote 10) im Einzelfall zur Anwendung kommt, weisen Konzentrationen von 300–500 mg/l abfiltrierbarer Stoffe auf.

[10] Im Einzelfall ist eine höhere Emissionsbegrenzung zulässig, sofern sichergestellt ist, dass es zu keinen Ablagerungen infolge einer Einleitung gemäß § 1 Abs. 2 kommt, die den Betrieb der öffentlichen Kanalisations- oder Abwasserreinigungsanlage stören (AEV Fleischverarbeitung i.d.g.F.).

[11] Aus analytischen Gründen ist die Bestimmung des Parameters Gesamtchlor bei vorbehandelten Schlachtabwässern ohne biologischer Reinigungsstufe anhand der laut AAEV (i.d.g.F.) vorgeschriebenen Messmethode nicht aussagekräftig (persönliche Mitteilung: Sachverständige, Messlabors).

[12] Die Emissionsbegrenzung ist im Einzelfall bei Gefahr von Geruchsbelästigungen oder bei Korrosionsgefahr für zementgebundene Werkstoffe im Bereich der öffentlichen Kanalisations- oder Abwasserreinigungsanlage festzulegen.

1.2.2.2 BvT – Direkteinleitung von Abwässern

Tabelle 3: BvT-assoziierte Emissionsniveaus und BvT für Probenahme für die direkte Einleitung von behandelten Abwässern aus Schlachthäusern.

Parameter (direkte Einleitung)	Einheit	BvT-AEL	AEV	BvT-Probenart
Temperatur	°C	10–28,5	30	kontinuierlich
pH-Wert		6,5–8,5	6,5–8,5	kontinuierlich
CSB	mg/l	18–58	90	Tagesmischprobe[13]
TOC	mg/l	5–12	30	Tagesmischprobe[13]
BSB_5	mg/l	2–10	20	Tagesmischprobe[13]
gesamter geb. Stickstoff TN_b	mg/l	1,3–45	–[14]	Tagesmischprobe[13]
gesamter geb. Stickstoff Wirkungsgrad	%	96–98,7	75	
Phosphor – gesamt	mg/l	0,1–1,0	1,0	Tagesmischprobe[13]
schwerflüchtige lipophile Stoffe	mg/l	4–6	20	Tagesmischprobe[13]
abfiltrierbare Stoffe	mg/l	2–13	30	Stichprobe
NH_4-N	mg/l	1,6–4	5,0[15]	Tagesmischprobe[13]
Gesamtchlor	mg/l	0,05–0,1	0,4	Stichprobe
AOX (angeg. als Cl)	mg/l	0,02–0,07	0,1	Tagesmischprobe[13]

AEL … Associated Emission Level

AEV … Abwasseremissionsverordnung

1.2.3 BvT – Abfallmanagement

- Trennung von Schlachtabfällen/-rückständen, die gesondert entsorgt werden müssen (z. B. via Tierkörperverwertungsanlagen) und anderen Schlachtabfällen/-rückständen;
- Trennung und klare Ausweisung von Containern und Bereichen, in denen Special Risk Material (SRM) zwischengelagert wird;
- Die Einbringung von fremden Materialien (z. B. Metallen, Plastik) in Schlachtabfälle/-rückstände ist zu vermeiden, um deren Weiterverwendung zu erleichtern.

[13] mengenproportionale, nicht abgesetzte homogenisierte Tagesmischprobe

[14] Liegt der wasserrechtlichen Bewilligung der biologischen Stufe der Abwasserreinigungsanlage eine Tagesrohzulauffracht von mehr als 150 kg BSB_5 zugrunde, so ist die der biologischen Stufe der Abwasserreinigungsanlage zufließende Fracht an TN_b um mehr als 75 % zu vermindern (Mindestwirkungsgrad). Der Mindestwirkungsgrad bezieht sich auf die der biologischen Stufe der Abwasserreinigungsanlage zufließende bzw. die aus der biologischen Stufe der Abwasserreinigungsanlage abfließende Fracht an TN_b eines Tages.

[15] Gilt nur bei einer Abwassertemperatur größer 12 °C im Ablauf der biologischen Stufe der Abwasserreinigungsanlage. Die Abwassertemperatur von 12 °C gilt als unterschritten, wenn bei fünf über den Untersuchungszeitraum gleichmäßig verteilten Temperaturmessungen mehr als ein Messwert nicht größer ist als 12 °C.

1.3 Spezifische BvT – Anlagen zur Verarbeitung tierischer Nebenprodukte

Zusätzlich zu den in Kapitel 1.1 beschriebenen Techniken werden die folgenden Techniken (in entweder individueller Anwendung oder in einer passenden Kombination) als BvT angesehen:

1.3.1 BvT – Energiekonsum und Energieeffizienz

- Verwendung von Fallstromverdampfern und/oder Scheibentrocknern, um den Feuchtegehalt der End-/Zwischenprodukte zu reduzieren;
- (Vor-)Kühlen von End-/Zwischenprodukten durch Flusswasser oder mittels Luftkühlung (in einer geschlossenen Kühllinie), sofern anwendbar;
- thermische Verwertung von Tierfett entweder am Standort oder extern (kann aufgrund höherer NO_x-Emissionen zu Cross-Media-Effekten führen).

1.3.2 BvT – Wasserverbrauch und Abwasseremissionen

- Die Abwassermenge ist kontinuierlich zu messen;
- weitestgehende Verkürzung der Zeitspanne zwischen Sammlung, Anlieferung und Verarbeitung der Rohware;
- bevorzugter Einsatz kontinuierlicher Verarbeitungsverfahren;
- sofern unter Anwendung gesetzlicher Bestimmungen zulässig, Rücknahme von Reinigungswasser der unreinen Seite in den Produktionsprozess;
- weitestgehender Verzicht auf den Einsatz von Konservierungschemikalien zur Verzögerung oder Verhinderung unkontrollierter Zersetzungsvorgänge in der angelieferten Rohware;
- bevorzugter Einsatz mechanischer Entfettungsverfahren; bei chemischer Entfettung Kreislaufführung der Extraktionsmittel;
- Verzicht auf den Einsatz halogenierter organischer Lösemittel bei der chemischen Entfettung;
- Verzicht auf den Einsatz von Desodorierungstechniken, bei denen halogenabspaltende oder halogenhaltige Chemikalien eingesetzt werden.

1.3.2.1 BvT – Indirekteinleitung von Abwässern

Tabelle 4: BvT-assoziierte Emissionsniveaus und BvT für Probenahme für die indirekte Einleitung von vorbehandelten Abwässern aus Anlagen zur Verarbeitung von tierischen Nebenprodukten (mit biologischer Reinigungsstufe).

Parameter (indirekte Einleitung – biologische Reinigungsstufe)	**Einheit**	**BvT-AEL**	**AEV**	**BvT-Probenart**
Temperatur	°C	14,2–30,4	35	kontinuierlich
pH-Wert		6,5–9,5	6,5–9,5	kontinuierlich
schwerflüchtige lipophile Stoffe	mg/l	-	150	Tagesmischprobe[16]
abfiltrierbare Stoffe	mg/l	5,0–57,0	150	Stichprobe
AOX	mg/l	0,09	1,0	Tagesmischprobe[16]
NH_4-N	mg/l	0,2–1,4	–[17]	Tagesmischprobe[16]
Summe der Kohlenwasserstoffe	mg/l	–	20	Tagesmischprobe[16]
Sulfid	mg/l	–	1,0	Stichprobe

AEL … Associated Emission Level

AEV … Abwasseremissionsverordnung

[16] mengenproportionale, nicht abgesetzte homogenisierte Tagesmischprobe

[17] Die Emissionsbegrenzung ist im Einzelfall bei Gefahr von Geruchsbelästigungen oder bei Korrosionsgefahr für zementgebundene Werkstoffe im Bereich der öffentlichen Kanalisations- oder Abwasserreinigungsanlage festzulegen.

1.3.2.1 BvT – Direkteinleitung von Abwässern

Tabelle 5: BvT-assoziierte Emissionsniveaus und BvT für Probenahme für die direkte Einleitung von behandelten Abwässern aus Anlagen zur Verarbeitung von tierischen Nebenprodukten.

Parameter (direkte Einleitung)	Einheit	BvT-AEL	AEV	BvT-Probenart
Temperatur	°C	18–34	35	kontinuierlich
pH-Wert		6,5–8,5	6,5–8,5	kontinuierlich
CSB	mg/l	26–110	150	Tagesmischprobe[18]
CSB Wirkungsgrad[19]	%	95,4–99,8	85	
TOC	mg/l	13,5[20]	50	Tagesmischprobe[18]
BSB_5	mg/l	2–12	25	Tagesmischprobe[18]
gesamter geb. Stickstoff	mg/l	3,2–12,8	–[21]	Tagesmischprobe[18]
gesamter geb. Stickstoff Wirkungsgrad	%	98,7–99,3	75	
Phosphor – gesamt	mg/l	0,07–1,3[22]	2,0	Tagesmischprobe[18]
schwerflüchtige lipophile Stoffe	mg/l	1–2	20	Tagesmischprobe[18]
abfiltrierbare Stoffe	mg/l	4–7	30	Stichprobe
NH_4-N	mg/l	0,06–8,2	50[23]	Tagesmischprobe[18]
AOX	mg/l	0,05–0,06	0,1	Tagesmischprobe[18]
Fischtoxizität (künftig: Fischeitoxizität)		–	4	Tagesmischprobe[18]
Sulfid	mg/l	–	0,1	Stichprobe
Summe der Kohlenwasserstoffe (künftig: KW-Index)	mg/l	–	10	Tagesmischprobe[18]

AEL … Associated Emission Level

AEV … Abwasseremissionsverordnung

[18] mengenproportionale, nicht abgesetzte homogenisierte Tagesmischprobe

[19] Bei CSB-Zulaufkonzentrationen der Tagesmischproben von größer als 1.000 mg/l (gemessen als arithm. Monatsmittel im Zulauf zur biologischen Stufe der Abwasserreinigungsanlage) ist eine Ablaufkonzentration entsprechend einer CSB-Mindestabbauleistung von 85 % zulässig. Die Abbauleistung bezieht sich auf das Verhältnis der CSB-Tagesfrachten im Zulauf bzw. Ablauf der Abwasserreinigungsanlage. Als CSB-Tagesfracht im Zulauf ist die der wasserrechtlichen Bewilligung zugrundeliegende Belastung der Abwasserreinigungsanlage maßgebend.

[20] Einzelwert

[21] Die der biologischen Stufe der Abwasserreinigungsanlage zufließende Fracht an ges. geb. Stickstoff ist um mehr als 75 % zu vermindern (Mindestwirkungsgrad). Der Mindestwirkungsgrad für den Parameter ges. geb. Stickstoff bezieht sich auf die der biologischen Stufe der Abwasserreinigungsanlage zufließende bzw. die aus der biologischen Stufe der Abwasserreinigungsanlage abfließende Fracht an ges. geb. Stickstoff eines Tages.

[22] Maximalwert Eigenüberwachung 1,94 mg/l

[23] Gilt nur bei einer Abwassertemperatur größer 12 ºC im Ablauf der biologischen Stufe der Abwasserreinigungsanlage. Die Abwassertemperatur von 12 ºC gilt als unterschritten, wenn bei fünf über den Untersuchungszeitraum gleichmäßig verteilten Temperaturmessungen mehr als ein Messwert unter dem Wert von 12 ºC liegt.

1.3.3 BvT – Abfallmanagement

- Soweit aufgrund der eingesetzten Verarbeitungstechnologie möglich, Rücknahme von Sterilisatorabläufen sowie von Schlämmen aus der mechanischen oder biologischen Abwasserreinigung in den Verarbeitungsprozess.

1.4 Methodenvorschriften der Probennahme und Analyse

Die BvT ist die Anwendung internationaler oder nationaler Standards für Probenahme, Probenbehandlung und Analyse. Verwendete Methoden sind in Tabelle 6 und Tabelle 7 angeführt.

Tabelle 6: Methoden zur Probenahme, Konservierung und Homogenisierung.

Parameter	Methode	
Abwassermengenmessung – offene Gerinne und Freispiegelleitungen	DIN 19559-1	1983-07-01
	DIN 19559-2	1983-07-01
Abwassermengenmessung – offene Messgerinne – Venturikanäle	ÖNORM B 2402	1987-07-01
Abwassermengenmessung – Venturigerinne – induktive Durchflussmessgeräte	ÖNORM M 5880	1998-02-01
Abwassermengenmessung – Ultraschalldurchflussmessung Rohrleitungen	VDI/VDE 2642	1996-12-01
Probenahme – Probenahmeprogramme und Probenahmetechnik	ÖNORM EN ISO 5667-1	2007-04-01
Probenahme von Abwasser – Probenentnahme-Technik	ÖNORM M 6258	1992-01-01
Probenahme – biologische Testverfahren		1999-07-01
Probenahme – automatisierte Entnahme	ÖNORM M 5891	2003-02-01
	ÖNORM M 5892	2003-02-01
	ÖNORM M 5893	2003-02-01
	ÖNORM M 5894	2003-02-01
	ON – ZP M 5894 Bbl. 1	2003-02-01
Probenkonservierung	ÖNORM EN ISO 5667-3	2013-04-15
Homogenisierung von Wasserproben	DIN 38402-30 (DEV A 30)[24]	1998-07-01

[24] Die Homogenisierung ist im geschlossenen und gekühlten Gefäß durchzuführen, wenn leicht flüchtige Substanzen in der Wasserprobe enthalten sind.

Tabelle 7: Angewandte Methoden zur chemischen Analyse.

Parameter	Methode		Probe	Messung
Ammoniak (berechnet)	gemäß Bericht BE-076	(UMWELTBUNDESAMT 1996)	-	-
Ammonium	DIN 38406-5 (DEV E 5)	1983-10-01	M	D
	ÖNORM ISO 5664	1986-12-01	M	D
	ÖNORM ISO 7150-1	1987-12-01	M	D
	ÖNORM EN ISO 14911	1999-11-01	M	D
	ÖNORM EN ISO 11732	2005-06-01	M	D
Chlor – freies Chlor	ÖNORM EN ISO 7393-1	2000-06-01	S	D
	ÖNORM EN ISO 7393-2	2000-06-01	S	D
Chlor – Gesamtchlor	ÖNORM EN ISO 7393-1	2000-06-01	S	D
	ÖNORM EN ISO 7393-2	2000-06-01	S	D
	ÖNORM EN ISO 7393-3	2000-06-01	S	D
Nitrat	ÖNORM EN ISO 10304-1	2012-06-01	M	D
	ÖNORM EN ISO 13395	1997-01-01	M	D
Nitrit	ÖNORM EN 26777	1993-05-01	S	D
	ÖNORM EN ISO 10304-1	2012-06-01	S	D
	ÖNORM EN ISO 13395	1997-01-01	S	D
Phosphor – Gesamt	ÖNORM EN ISO 6878[25]	2004-09-01	M	G
	ÖNORM EN ISO 15681-1	2005-04-01	M	G
	ÖNORM EN ISO 15681-2	2005-04-01	M	G
	ÖNORM EN ISO 11885[26]	2009-11-01	M	G
	ÖNORM EN ISO 17294-2[25]	2005-02-01	M	G
Stickstoff – gesamter gebundener Stickstoff (TN_b)[27]	ÖNORM EN 12260[28]	2003-12-01	M	D
	ÖNORM EN ISO 11905-1	1998-10-01	M	D
Sulfat	ÖNORM EN ISO 10304-1	2012-06-01	M	D
Sulfid	ÖNORM M 6615	1994-03-01	S	F
	DIN 38405-26 (DEV D 26)	1989-04-01	S	F
Sulfid – leicht freisetzbar	ÖNORM M 6615	1994-03-01	S	D
	DIN 38405-27 (DEV D 27)	1992-07-01	S	D
Sulfit	ÖNORM EN ISO 10304-3	1998-05-01	S	D
Adsorbierbare organisch gebundene Halogene (AOX)	ÖNORM EN ISO 9562[29]	2004-12-01	M	D
	DIN 38409-22 (DEV H 22)[29]	2001-02-01	M	D

[25] Die Bestimmung ist nach Abschnitt 7 der ÖNORM EN ISO 6878 durchzuführen (Aufschluss mit Kaliumperoxodisulfat).

[26] Der Aufschluss ist gemäß ÖNORM EN ISO 15587-1:2002 07 01 durchzuführen (Königswasseraufschluss). Eine andere Aufschlussmethode ist zulässig, wenn gezeigt wird, dass für das untersuchte Abwasser kein Minderbefund im Vergleich zum Königswasseraufschluss auftritt.

[27] Sofern in einer Verordnung für diesen Parameter keine Emissionsbegrenzung als Konzentrationswert festgelegt ist, sondern eine Mindestabbauleistung vorgegeben wird, ist mit den angegebenen oder gleichwertigen Methoden eine Mindestbestimmungsgrenze von 0,5 mg/l (ber. als N) zu erreichen.

[28] Zur Erreichung einer vollständigen Mineralisation ist eine Verbrennungstemperatur von größer 700 °C zu gewährleisten.

[29] Für Abwässer mit Chloridkonzentrationen > 1 g/l, für die der AOX gemäß ÖNORM EN ISO 9562 nach Verdünnung nicht mehr bestimmbar ist, ist die SPE-Methode gemäß DIN 38409-22 anzuwenden.

Parameter	Methode		Probe	Messung
Biochemischer Sauerstoffbedarf (BSB_5) mit Nitrifikationshemmung[30]	ÖNORM EN 1899-1	1998-08-01	M	D
	ÖNORM EN 1899-2	1998-08-01	M	D
	DEV H 55 (Vorschlag)[31]	2000-01-01	M	D
Chemischer Sauerstoffbedarf (CSB)	ÖNORM M 6265	1991-03-01	M	D
	DIN 38409-41 (DEV H 41)	1980-12-01	M	D
	ÖNORM ISO 15705[32]	2003-06-01	M	D
Gesamter organisch gebundener Kohlenstoff (TOC)	ÖNORM EN 1484 [33]	1997-08-01	M	D
Kohlenwasserstoff-Index (KW-Index)	ÖNORM EN ISO 9377-2[34]	2001-06-01	M	D
Schwerflüchtige lipophile Stoffe	DIN 38409-56 (DEV H 56)[34]	2009-06-01	M	D
Abfiltrierbare Stoffe [35]	ÖNORM EN 872	2005-04-01	S	D
	DIN 38409-2 (DEV H 2) [36]	1987-03-01	S	D
Absetzbare Stoffe	DIN 38409-9 (DEV H 9)	1980-07-01	S	D
	ÖNORM M 6271	1985-05-01	S	D
Oberflächenspannung	ÖNORM EN 14370 [37]	2004-11-01	S	D
	ÖWAV-Arbeitsbehelf 38	2012-01-01		
pH-Wert	ÖNORM EN ISO 10523	2012-04-15	S	D
Temperatur	DIN 38404-4 (DEV C 4)	1976-12-01	S	D
	ÖNORM M 6616	1994-03-01	S	D

M = 24h-Mischprobe, S = Stichprobe, D = direkt zu bestimmen (ohne vorhergehende Filtration), F = aus der filtrierten Probe zu bestimmen, G = Gesamtgehalt (unfiltrierte Probe nach Aufschluss)

[30] Sofern in einer Verordnung für diesen Parameter keine Emissionsbegrenzung als Konzentrationswert festgelegt ist, sondern eine Mindestabbauleistung vorgegeben wird, ist mit den angegebenen oder gleichwertigen Methoden eine Mindestbestimmungsgrenze von 0,2 mg/l (ber. als O_2) zu erreichen.

[31] Die Bestimmung des BSB_5 mit der manometrischen/respirometrischen Methode ist jedenfalls im Rahmen der Eigenüberwachung zulässig. Im Rahmen der Fremdüberwachung ist der Nachweis der Gleichwertigkeit zur ÖNORM EN 1899-1 im Sinne des § 4 Abs. 4 Z 2 zu erbringen.

[32] Die Bestimmung des CSB mit Küvettentest ist jedenfalls im Rahmen der Eigenüberwachung zulässig. Im Rahmen der Fremdüberwachung ist der Nachweis der Gleichwertigkeit zur ÖNORM M 6265 im Sinne des § 4 Abs. 4 Z 2 zu erbringen.

[33] Für die Bestimmung ist ein Gerät mit thermisch – katalytischer Verbrennung (Mindesttemperatur 670 °C) zu verwenden. Bei Untersuchung von partikelhaltigen Proben sind Kontrollmessungen nach Anhang C der ÖNORM EN 1484 durchzuführen.

[34] Als Extraktionsmittel ist n-Hexan zu verwenden.

[35] Sofern in einer Verordnung für diesen Parameter keine Emissionsbegrenzung als Konzentrationswert festgelegt ist, sondern eine produktionsspezifische Fracht vorgegeben wird, ist mit den angegebenen oder gleichwertigen Methoden eine Mindestbestimmungsgrenze von 1 mg/l zu erreichen.

[36] Die Bestimmung ist gemäß Punkt 5.2 (Membranfilter 0,45 µm) oder gemäß Punkt 5.3.(Glasfaserfilter 0,3 bis 1 µm) durchzuführen.

[37] Die Bestimmung der Oberflächenspannung ist gemäß ÖNORM EN 14370:2004-11-01 unter Beachtung der Angaben des ÖWAV-Arbeitsbehelfes 38 durchzuführen.

2 STATE OF THE ART (BAT)

2.1 General BAT conclusions for slaughterhouses and animal by-products installations

Based on real emission and consumption data of the Austrian slaughter and animal by-products industries, the following techniques and emission values can be described as state of the art. The term “state of the art” is synonymous with the term “best available techniques”.

The techniques listed and described in this section are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection.

2.1.1 General BAT – Energy consumption and energy efficiency

The following techniques (used either individually or in a suitable combination) are considered to be BAT for reducing energy consumption and increasing energy efficiency:

- use of high-efficiency steam boilers (including economiser for preheating water and/or air)
- to implement an energy management system or audit every 4 years
- recover heat from wastewater or cooling water with heat exchangers and/or heat pumps
- use of renewable energy sources like on-site photovoltaic and/or solar heat and biogas (e.g. from anaerobic wastewater treatment or production residues; if applicable)
- use of fuels with low carbon intensity
- to use frequency-controlled air compressors with heat recovery (except for base load coverage)

2.1.2 General BAT – Water consumption and wastewater emissions

The following techniques (used either individually or in a suitable combination) are considered to be BAT for reducing water consumption and the emission of pollutants:

- to introduce internal measures preventing the disposal of blood, solid waste as well as fat to the sewer (wastewater system)
- separate collection and treatment of polluted and non-polluted wastewater (e.g. wastewater from the process, cooling water, run-off water, wastewater from sanitary facilities)
- to provide buffer tanks and throttling devices in combination with operative measures to prevent the direct discharge of untreated wastewater, chemicals or extinguishing water into the sewer system in case of an accident
- use of rainwater retention basins and buffer tanks to balance hydraulic, thermal and pollution peaks
- to use surface condensers instead of injection condensers (indirect cooling)
- to reduce water consumption and wastewater generation by e.g.
  - recirculation of process- and cleaning water and recirculation of cleaning/ disinfection solutions, if required: appropriate pre-treatment (e.g. settling tank)
  - reuse of cooling water or condensates for cleaning purposes, boiler feed water preparation or as process water
  - apply industrial automation in processing and cleaning
  - to use water-saving fittings and devices for the production process
  - apply dry cleaning before the wet cleaning of workspaces and facility components
- to use a CIP cleaning system if applicable (including recirculation system based on conductivity measurements); to use CIP also for the cleaning of containers
- to clean trucks and vehicles in dedicated areas only; accruing wastewaters need to be collected and sent to wastewater treatment
- use of halogen-free disinfectants and cleaning agents (e.g. peracetic acid) and keeping a record of the consumption of disinfectant/cleaning agents; if the use of chloro-organic cleaning agents cannot be avoided: demand-oriented use of chloro-organic cleaning agents
- to perform leakage tests of the wastewater system (e.g. every 5 – 10 years) or regular optical inspections of the sewage and wastewater treatment system
- to avoid the use of organic working or auxiliary materials, especially organic complexing agents with a degradation level (through aerobic microorganisms) that is not greater than 80% in an aqueous medium after a testing period of 28 days (ÖNORM EN ISO 7827:2013 04 15)

2.1.2.1 General BAT – Monitoring

BAT is to monitor emissions to water, as indicated below (Table 8), with the indicated frequency and according to specific measurement standards (presented in Table 13 and Table 14).

Table 8: Frequency of sampling for emissions into water.

Frequency of sampling		
Parameter	**up to 3 000 kg/d COD or 1 000 kg/d TOC**	**> 3 000 kg/d COD or 1 000 kg/d TOC**
Q	continuous	continuous
T	continuous	continuous
pH	continuous	continuous
TSS[38]	daily[42]	daily[42]
AOX	once per year	once per year
low volatile lipophilic substances	once per year	once per year
Total Cl[39]	once per year	once per year
COD[40, 41]	3 times a week	daily[42]
TOC[40, 41]	3 times a week	daily[42]
BOD_5 [41]	once a week	2 times a week
Total N[41]	3 times a week	daily[42]
Total P[41]	5 times a week	daily[42]
NH_4-N[41]	5 times a week	daily[42]
Fish toxicity (future: Fish egg toxicity)[43]	once a week	once a week
Sum of hydrocarbons (future: KW Index) [43]	once a week	once a week
Sulphide[43]	once a week	once a week

Self-monitoring system

The monitoring of emissions to water according to Table 8 can be performed by the operator.

External-monitoring

If monitoring is carried out by the operator, external-monitoring has to take place at least once a year. External-monitoring has to be carried out on representative production days.

Averaging periods for BAT-AEL

For the majority of parameters it is BAT to implement a monitoring regime that allows for the expression of emission parameters as **daily average values**. A daily average value is defined as average over a sampling period of 24 hours taken as a flow proportional unsettled homogenised daily composite sample.

[38] For indirect discharges, settleable substances can be measured alternatively to the parameter TSS

[39] Only for slaughterhouses

[40] It is sufficient to measure one of the two parameters (TOC or COD)

[41] Only for direct discharge

[42] During operating days

[43] Only for animal by-products installations

Certain parameters are **continuously measured** (such as Q, T and pH), whereas some parameters are monitored (for analytical reasons) by taking **spot samples** (such as total suspended solids, total Cl)

Permitting TOC measurements as an additional option (in addition to COD) is highly recommended. Therefore BAT-AELs for both parameters should be available for every SA sector.

2.1.2.2 General BAT – Indirect discharge of wastewater

BAT for the indirect release of wastewater (before final treatment in an external WWTP) is to pre-treat wastewater from the process by physical or physical-chemical water treatment, which can include a combination of the following procedures. (The listed removal techniques are most effective for the highlightened parameters.)

- Sieving (**TSS and settleable solids**, low volatile lipophilic substances, COD, BOD_5, TOC, Phosphor, total N)
- Flotation (**low volatile lipophilic substances**, TSS and settleable solids, COD, BOD_5, TOC, total N, Phosphor)
- Flocculation and precipitation (**Phosphor**, COD, BOD_5, TOC, AOX)
- Neutralisation (**pH-value**)
- Sedimentation (**TSS and settleable solids**, COD, BOD_5, TOC, total N)

2.1.2.3 General BAT – Direct discharge of wastewater

In case of a direct discharge of wastewater from the process it is BAT to apply physical or physical-chemical water treatment (see 2.1.2.2) and additional biological wastewater treatment, preferably in a sequencing batch or multiple line system (to absorb peak loads), including the biodegradation of organic components (**COD, BOD_5, TOC**), removal of nitrogen (**total N, NH_4-N**) and phosphorus. AOX is partly adsorbed in the sewage sludge.

2.1.3 General BAT – Waste management

The following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT for the prevention or reduction of waste production:

- to avoid the wrapping of (goods) pallets in plastic foils
- to use reusable pallets (cleaned in-house)
- to reuse cartons as far as possible
- to separately collect and recycle paper, cartons and plastics
- to use standardized packaging material to simplify recycling
- to treat production residues in biogas plants; if applicable

2.1.4 General BAT – Noise

The following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT for reducing noise emissions:

- to reduce night-time deliveries of goods
- to implement noise control measures through external noise measurements (e.g. at neighbouring sites to identify sources of noise)
- to install noise barriers
- to use housing for wastewater tanks to reduce noise emissions
- to install silencers at exhaust air tubes
- to use fans with a low noise design

2.1.5 General BAT – Odour emissions

The following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT for reducing odour:

- to use cooling and housing systems and to install exhaust air filters (e.g. biological filters) in order to prevent odour emissions from wastewater treatment and/or production
- to install waste heat recovery boilers in order to burn heavily odour-polluted exhaust air from the production process

2.1.6 General BAT – Groundwater protection

The following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT for the prevention of emissions to soil and groundwater:

- load, unload and store raw and auxiliary materials only in designated areas which are protected against leaks and run-off
- equip all sump pits, intermediary storage facilities and retention basins where spillages might occur with alarms that are activated by leakages and/or high levels of liquids
- establish and implement a programme for testing the condition of tanks, pipelines, flanges and valves carrying raw materials, additives and other substances (leakage tests) including documentation
- provide an adequate supply of containment booms and suitable absorbent material
- avoid underground piping for transporting substances other than water
- construct basins with impermeable bottoms or other containment for surface water run-off from outdoor areas or other wastewater sources, to prevent leaching

2.2 Specific BAT – Slaughterhouses

In addition to the techniques described in 2.1 the following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT:

2.2.1 BAT – Energy consumption and energy efficiency

- to install heat recovery from the cooling system
- to use production residues (which do not have to be disposed via rendering), filter material and/or sewage sludge from wastewater treatment in biogas plants.

2.2.2 BAT – Water consumption and wastewater emissions

- wastewater quantities are to be measured continuously
- to apply dry cooling or wet circuit cooling systems instead of wet flow cooling systems
- to use liquid raw materials or production residues as well as highly concentrated wastewater streams for energy generation (e.g. through decomposition or thermal application) if their disposal via rendering is not obligatory

2.2.2.1 BAT – Indirect discharge of wastewater

Table 9: BAT associated emission levels and BAT for sample taking for indirect discharges of pre-treated wastewater from slaughterhouses.

Parameter (indirect discharge)	Unit	BAT-AEL (no biological treatment)	BAT-AEL (biological treatment)	Ordinance	BAT – type of sample
T	°C	7.3 – 30.9	11.8 – 28.1	35	continuous
pH		6.0 – 9.5	6.0 – 9.5	6.0 – 9.5	continuous
low volatile lipophilic substances	mg/l	27.0 – 117.0	1.0 – 5.0	150	fpdcs
settleable substances	ml/l	0.1 – 8.0	0.1 – 6.0	10[44]	spot sample
TSS	mg/l	9.6 – 148.0[45]	2.0 – 23.7	150[46]	spot sample
total Cl	mg/l	-[47]	0.01 – 0.087	0.4	spot sample
AOX (reported as Cl)	mg/l	0.005 – 0.49	0.05 – 0.1	1.0	fpdcs
NH_4-N	mg/l	150	0.2 – 35.6	-[48]	fpdcs

[44] The ordinance does not specify this parameter. If applied by the public authorities, the applicable value is 10 ml/l (permit)

[45] Installations to which the individual exception (footnote 46) applies have concentrations between 300 mg/l and 500 mg/l TSS.

[46] In individual cases a higher ELV (than prescribed by the specific ordinance on wastewater emissions) can be permitted, if no accumulation of deposits caused by a discharge according to section 1 (2) has occurred, which can disrupt the operation of the public sewer system or wastewater treatment plant (Ordinance on wastewater emissions from meat processing; AEV Fleischverarbeitung idgF).

[47] For analytical reasons, determination of the parameter "total Cl" in pre-treated wastewaters from slaughterhouses without a biological treatment step according to the method prescribed by the ordinance on wastewater (AAEV idgF) is not significant (verbal information provided by the public authorities and measuring laboratories).

[48] An ELV can be set if there is a need to reduce odour emissions or a risk of public sewer corrosion.

2.2.2.2 BAT – Direct discharge of wastewater

Table 10: BAT associated emission levels and BAT for sample taking for direct discharges of wastewater from slaughterhouses.

Parameter (direct discharge)	Unit	BAT-AEL	Ordinance	BAT – type of sample
T	°C	10 – 28.5	30	continuous
pH		6.5 – 8.5	6.5 – 8.5	continuous
COD	mg/l	18 – 58	90	fpdcs
TOC (reported as C)	mg/l	5 – 12	30	fpdcs
BOD	mg/l	2 – 10	20	fpdcs
total N	mg/l	1.3 – 45	-[49]	fpdcs
total N removal efficiency	%	96 – 98.7	75	
total P	mg/l	0.1 – 1.0	1.0	fpdcs
low volatile lipophilic substances	mg/l	4 – 6	20	fpdcs
Total suspended solids	mg/l	2 – 13	30	spot sample
NH_4-N	mg/l	1.6 – 4	5.0[50]	fpdcs
total Cl	mg/l	0.05 – 0.1	0.4	spot sample
AOX (reported as Cl)	mg/l	0.02 – 0.07	0.1	fpdcs

2.2.3 BAT – Waste management

- to separate slaughtering residues which have to be disposed via rendering installations from other slaughtering residues
- to separate and clearly mark containers and areas where special risk material (SRM) is stored
- to reduce foreign matter (e.g. metal, plastic) in slaughtering residues to facilitate their further processing

[49] The total nitrogen inlet load to the biological wastewater treatment step has to be reduced by 75% (minimum efficiency) if the permit is based on a daily BOD_5 inlet load into the biological treatment step of more than 150 kg. Minimum efficiency is determined by the total nitrogen loads at the inlet to and in the discharge from the biological wastewater treatment step.

[50] Applies only to wastewater temperatures of effluents (from the biological treatment step) greater than 12 °C. A wastewater temperature of 12 °C counts as not exceeded if more than one out of five temperature measurements (equally spread over the evaluation period) are below 12 °C.

2.3 Specific BAT – Animal by-products installations

In addition to the techniques described in 2.1 the following techniques (used either individually or in a suitable combination under economically and technically viable conditions) are considered to be BAT:

2.3.1 BAT – Energy consumption and energy efficiency

- to use falling film evaporators and/or disk dryers for the concentrating (i.e. lowering the moisture content) of products/intermediate products
- (pre-)cooling of products/intermediate products through river water or using air cooling (cooling line); if applicable
- thermal application of animal fat either on- or off-site (may cause cross-media effects due to higher NO_x emissions)

2.3.2 BAT – Water consumption and wastewater emissions

- wastewater quantities are to be measured continuously
- shortening the time period between the collection, delivery and processing of raw materials as much as possible
- to preferably apply a continuous processing method
- to recirculate cleaning water in the process; if applicable
- to avoid the use of preservatives for delaying or preventing the uncontrolled decomposition of the raw material as much as possible
- to preferably apply mechanical wastewater degreasing methods; in case of chemical degreasing, circulating systems for the extracting agents should be used
- to not use halogenated organic solvents chemical degreasing
- to not use chemicals containing halogens in exhaust air purification

2.3.2.1 BAT – Indirect discharge of wastewater

Table 11: BAT associated emission levels and BAT for sample taking for indirect discharges of pre-treated wastewater from animal by-products installations (with a biological treatment step).

Parameter (indirect discharge – biological treatment)	Unit	BAT-AEL	Ordinance	BAT – type of sample
T	°C	14.2 – 30.4	35	continuous
pH		6.5 – 9.5	6.5 – 9.5	continuous
low volatile lipophilic substances	mg/l	-	150	fpdcs
TSS	mg/l	5.0 – 57.0[51]	150	spot sample
AOX (reported as Cl)	mg/l	0.09	1.0	fpdcs
NH_4-N	mg/l	0.2 – 1.4	-[52]	fpdcs
Sum of hydrocarbons	mg/l	-	20	fpdcs
Sulphide	mg/l	-	1.0	spot sample

[51] Max. value self-monitoring 185 mg/l, no exceedance, "4 out of 5" rule

[52] An ELV can be set if there is a need to reduce odour emissions or a risk of public sewer corrosion.

2.3.2.2 BAT – Direct discharge of wastewater

Table 12: BAT associated emission levels and BAT for sample taking for direct discharges of wastewater from animal by-products installations.

Parameter (direct discharge)	Unit	BAT-AEL	Ordinance	BAT – type of sample
T	°C	18 – 34	35	continuous
pH		6.5 – 8.5	6.5 – 8.5	continuous
COD	mg/l	26 – 110	150	fpdcs
COD removal[53]	%	95.4 – 99.8	85	calculated from loads
TOC (reported as C)	mg/l	13.5	50	fpdcs
BOD_5	mg/l	2 – 12	25	fpdcs
total N	mg/l	3.2 – 12.8	-[54]	fpdcs
total N	%	98.7 – 99.3	75	
total P	mg/l	0.07 – 1.3	2.0	fpdcs
low volatile lipophilic substances	mg/l	1 – 2	20	fpdcs
Total suspended solids	mg/l	4 – 7	30	spot sample
NH_4-N	mg/l	0.06 – 8.2	50[55]	fpdcs
AOX (reported as Cl)	mg/l	0.05 – 0.06	0.1	fpdcs
Fish toxicity		-	4	fpdcs
Sulphide	mg/l	-	0.1	spot sample
Sum of hydrocarbons	mg/l	-	10	fpdcs

2.3.3 BAT – Waste management

- to separate process and other wastewaters (from e.g. sanitary facilities, canteens, social rooms, offices, etc.) in order to reuse excess sewage sludge and filter material from wastewater treatment in the production of category 1 animal by-products

[53] At an inlet load bigger than 1000 mg/l COD

[54] The total nitrogen inlet load of total nitrogen into the biological wastewater treatment step has to be reduced by 75% (minimum efficiency) if the permit is based on a daily BOD_5 inlet load into the biological treatment step of more than 150 kg. Minimum efficiency is determined by the total nitrogen loads at the inlet to and in the discharge from the biological wastewater treatment step.

[55] Applies only to wastewater temperatures of effluents (from the biological treatment step) greater than 12 °C. A wastewater temperature of 12 °C counts as not exceeded if more than one out of five temperature measurements (equally spread over the evaluation period) are below 12 °C.

2.4 Standards for sampling and analyses

BAT is to apply international or national standards for sampling, sample treatment, and analysis; applied methods are given in Table 13 and Table 14.

Table 13: Methods for sample taking, homogenisation and conservation.

Parameter	Method	
Measurement wastewater quantity - open channel	DIN 19559-1	1983-07-01
	DIN 19559-2	1983-07-01
Measurement wastewater quantity - open measurement channel	ÖNORM B 2402	1987-07-01
Measurement wastewater quantity - open measurment channel - MFM	ÖNORM M 5880	1998-02-01
Measurement wastewater quantity - ultrasound flow meter pipe channel	VDI/VDE 2642	1996-12-01
Sample taking	ÖNORM EN ISO 5667-1	2007-04-01
Sample taking wastewater	ÖNORM M 6258	1992-01-01
Sample taking – biological test methods	ÖNORM EN ISO 5667-16	1999-07-01
Sample taking – automated sample taking	ÖNORM M 5891	2003-02-01
	ÖNORM M 5892	2003-02-01
	ÖNORM M 5893	2003-02-01
	ÖNORM M 5894	2003-02-01
	ON - ZP M 5894 Bbl. 1	2003-02-01
Conservation	ÖNORM EN ISO 5667-3	2013-04-15
Homogenisation	DIN 38402-30 (DEV A 30) [56]	1998-07-01

[56] Homogenisation has to be carried out in a closed and cooled vessel if the water probe used for measuring contains low volatile substances

Table 14: Methods applied for chemical analysis.

Parameter	Method		Sample	Measurment
Ammonia (calculated)	according to report BE-076	(UMWELTBUNDESAMT 1996)	-	-
Ammonium	DIN 38406-5 (DEV E 5)	1983-10-01	M	D
	ÖNORM ISO 5664	1986-12-01	M	D
	ÖNORM ISO 7150-1	1987-12-01	M	D
	ÖNORM EN ISO 14911	1999-11-01	M	D
	ÖNORM EN ISO 11732	2005-06-01	M	D
Chlorine – free cholrine	ÖNORM EN ISO 7393-1	2000-06-01	S	D
	ÖNORM EN ISO 7393-2	2000-06-01	S	D
Chlorine – total chlorine	ÖNORM EN ISO 7393-1	2000-06-01	S	D
	ÖNORM EN ISO 7393-2	2000-06-01	S	D
	ÖNORM EN ISO 7393-3	2000-06-01	S	D
Nitrate	ÖNORM EN ISO 10304-1	2012-06-01	M	D
	ÖNORM EN ISO 13395	1997-01-01	M	D
Nitrite	ÖNORM EN 26777	1993-05-01	S	D
	ÖNORM EN ISO 10304-1	2012-06-01	S	D
	ÖNORM EN ISO 13395	1997-01-01	S	D
Total P	ÖNORM EN ISO 6878 [57]	2004-09-01	M	G
	ÖNORM EN ISO 15681-1	2005-04-01	M	G
	ÖNORM EN ISO 15681-2	2005-04-01	M	G
	ÖNORM EN ISO 11885 [58]	2009-11-01	M	G
	ÖNORM EN ISO 17294-2 [57]	2005-02-01	M	G
Total N[59]	ÖNORM EN 12260[60]	2003-12-01	M	D
	ÖNORM EN ISO 11905-1	1998-10-01	M	D
Sulphate	ÖNORM EN ISO 10304-1	2012-06-01	M	D
Sulphide	ÖNORM M 6615	1994-03-01	S	F
	DIN 38405-26 (DEV D 26)	1989-04-01	S	F
Sulphide – easily released	ÖNORM M 6615	1994-03-01	S	D
	DIN 38405-27 (DEV D 27)	1992-07-01	S	D
Sulphite	ÖNORM EN ISO 10304-3	1998-05-01	S	D
AOX	ÖNORM EN ISO 9562[61]	2004-12-01	M	D
	DIN 38409-22 (DEV H 22)[61]	2001-02-01	M	D
BOD_5	ÖNORM EN 1899-1	1998-08-01	M	D
	ÖNORM EN 1899-2	1998-08-01	M	D
	DEV H 55 (Vorschlag)[62]	2000-01-01	M	D

[57] Determination according to section 7 ÖNORM EN ISO 6878 (disintegration with potassium persulphate)

[58] Disintegration according to ÖNORM EN ISO 15587-1:2002 07 01 (aqua regia). Alternatively, other disintegration methods are permitted if the quality of the findings for the analysed wastewater is comparable to aqua regia.

[59] If no emission limit value has been set by the ordinance for the concentration of this parameter but a removal efficiency instead, a minimal limit of determination of 0.5 mg/l (calculated as N) has to be reached using either the method specified or an equivalent method.

[60] For reaching complete mineralisation the combustion temperature has to be greater than 700 °C.

[61] For wastewaters with chloride concentrations > 1 g/l, for which the AOX according to ÖNORM EN ISO 9562 after dilution is not determinable, the SPE method according to DIN 38409-22 is to be applied.

Parameter	Method		Sample	Measurment
COD	ÖNORM M 6265	1991-03-01	M	D
	DIN 38409-41 (DEV H 41)	1980-12-01	M	D
	ÖNORM ISO 15705[63]	2003-06-01	M	D
TOC	ÖNORM EN 1484 [64]	1997-08-01	M	D
Hydrocarbon index (KW-Index)	ÖNORM EN ISO 9377-2[65]	2001-06-01	M	D
Low volatile lipophilic substances	DIN 38409-56 (DEV H 56)[65]	2009-06-01	M	D
TSS [66]	ÖNORM EN 872	2005-04-01	S	D
	DIN 38409-2 (DEV H 2) [67]	1987-03-01	S	D
Settleable substances	DIN 38409-9 (DEV H 9)	1980-07-01	S	D
	ÖNORM M 6271	1985-05-01	S	D
Surface tension	ÖNORM EN 14370 [68]	2004-11-01	S	D
	ÖWAV-Arbeitsbehelf 38	2012-01-01		
pH	ÖNORM EN ISO 10523	2012-04-15	S	D
Temperature	DIN 38404-4 (DEV C 4)	1976-12-01	S	D
	ÖNORM M 6616	1994-03-01	S	D

M = flow proportional daily composite sample, S = spot sample, D = direct measurement, F = measure from filtered sample, G = total content (unfiltered sample)

[62] The determination of BOD_5 with a manometric/respirometric method is permitted in the course of self-monitoring permitted. For external-monitoring proof of equivalence to ÖNORM EN 1899-1 in terms of Section 4 Art 4 Number 2 has to be provided.

[63] The determination of COD via a cuvette test is permitted in the course of self-monitoring. For external-monitoring proof of equivalence to ÖNORM M 6265 in terms of Section 4 Art 4 Number 2 has to be provided.

[64] For the determination of TOC a device for thermal catalytic combustion (minimal temperature 670 °C) has to be used. For the analysis of particle-containing samples, a control measurement according to ÖNORM EN 1484, Appendix C.

[65] N-hexane is to be used as an extraction agent

[66] If no emission limit value has been set by the ordinance for the concentration of this parameter but a product-specific load instead, a minimal limit of determination of 1 mg/l (calculated as N) has to be reached using either the method specified or an equivalent method.

[67] Determination has to be carried out according to point 5.2 (membrane filter 0.45 µm) or according to point 5.3 (glass fibre filter 0.3 to 0.1 µm).

[68] Determination of surface tension has to be carried out according to ÖNORM EN 14370:2004-11-01, taking into account the working tool “ÖWAV-Arbeitsbehelf 38”.

3 LEGAL BACKGROUND

In Austria a variety of media specific regulations define the environmental legal framework for slaughterhouses and rendering installations, most relevant are the following:

Water and wastewater:

- Water Act (Federal Legal Gazette No. 215/1959 as amended by BGBl. I 54/2014)
- Ordinance on wastewater emissions (Federal Legal Gazette No. 186/1996 idgF)
- Specific ordinances on wastewater emissions for the meat industry and rendering (Abwasseremissionsverordnung, AEV Fleischwirtschaft, Federal Legal Gazette II No. 12/1999 idgF and AEV Tierkörperverwertung Federal Legal Gazette No. 891/1995 idgF)

Air:

- Ordinance on firing installations (Federal Legal Gazette II No. 331/1997 as amended by BGBl. II Nr. 312/2011)
- Emission Protection Act for Steam Boilers (Federal Legal Gazette I No. 127/2013 as amended by BGBl. I Nr. 81/2015)

Waste:

Waste Management Act (Federal Legal Gazette I No. 102/2002 as amended by BGBl. I Nr. 193/2013)

Horizontal:

Industrial Code (Federal Legal Gazette No. 194/1994 as amended by BGBl. I Nr. 212/2013)

3.1.1 Ordinance on firing installations

Scope

The ordinance on firing installations (Feuerungsanlagen-Verordnung – FAV, Federal Legal Gazette II No. 331/1997 as amended 26 March 2014) applies to combustion plants with a rated thermal input from 50 kW to 50 MW which produce usable heat (meaning, it does not apply to steam-boilers).

This ordinance does not apply to plants, which

- use combustion gases for direct treatment of goods or materials,
- incinerate or co-incinerate waste
- operate less than 250 hours a year,
- are combustion engines and gas turbines,
- are used for thermal afterburning to clean exhaust gases.

Regulated parameters

Emission parameters depend on the used fuel. A qualitative overview is shown in Table 15.

Table 15: Regulated parameters sorted by the respective fuels. (Source: Ordinance on firing installations, BGBl. II No. 331/1997 idgF)

Used fuel	Regulated parameters
Coal and coke	dust, SO_2, CO, NO_X
Wood	dust, CO, HC, NO_X
Straw or similar plant products (e.g. cereals, grasses, miscanthus)	dust, CO, HC, NO_X, SO_2, HCl
Oil	soot, dust, SO_2[69], CO, NO_X
Gas (natural and liquid gas)	CO, NO_X

NH_3 is also regulated if NH_3 or ammonium compounds are used to reduce NO_x.

Limit values are based on a content of oxygen in the exhaust gas of 3% (oil and gas), 6% (coal and coke) and 11% (wood, straw, etc) and referred to standard conditions (273 K, 101.3 kPa, dry gas).

Provisions for existing installations

Existing combustion plants have to fulfil the requirements of the ordinance on firing installations not later than January 1st 2018.

Existing wood fired combustion plants up to 2 MW have to comply with the emission limit values for dust not later than January 1st 2020.

Existing wood fired combustion plants between 2 and 5 MW have to be in line with an emission limit value for dust of 50 mg/m³ at 11% O_2 (instead of 20 mg/m³) after extending the capacity of the plant or after the renewal of the combustion chamber but at the latest by the 1st of January 2018. This rule does not apply if the installation already complies with a legal limit of 50 mg/m³ (related to 13% O_2 content in the exhaust gas) or if the emissions are below 20 mg/m³ dust (at 11% O_2) without additional technical adjustments.

Self-monitoring

If the capacity of a plant reaches certain threshold levels, continuous measuring is required for dust, CO, SO_2 and NO_x (see Table 16). Registered data has to be automatically converted into half-hour mean values. The minimum data availability shall be at least 90% over a period of one month.

Table 16: Threshold values (in MW) for the application of continuous measurement. (Source: Ordinance on firing installations, BGBl. II No. 331/1997 idgF)

Fuel	Dust	CO	SO_2	NO_x	Unit
Solid	> 10	> 10	> 30	> 30	MW
Liquid	> 10	> 10	-	> 30	MW
Gas	-	> 10	-	> 30	MW

The ordinance also requires periodic calibration of the measurement system (at least every three years) and a yearly functioning control by accredited bodies, institutions run by the federation or a federal state, government-authorised institutions, civil engineers or engineering companies.

[69] regulated by the S-content of the fuel

Functioning of devices for the removal of dust has to be monitored unless dust is already measured continuously. This can be done by checking the filter voltage and current or triboelectric dust sensors. If the filter unit uses a starting bypass, continuous recording of the damper position is also mandatory.

Records of self-monitoring have to be stored for a minimum period of three years.

External-monitoring

If continuous measuring is not required, individual measurements shall be carried out at least every 5 (1-2 MW) or 3 years (> 2 MW). If secondary techniques to remove SO_2 or HCl are in use, these parameters (SO_2 and/or HCl) have also got to be measured at plants with less than 1 MW (every 5 years).

Periodic measurements have to be carried out under normal operating conditions (including the use of permitted fuels) at a representative sampling point by accredited bodies, institutions run by the federation or a federal state, government-authorised institutions, civil engineers or engineering companies. If the rated thermal input is less than 10 MW it can also be carried out by private companies within the framework of their competences.

As a rule three consecutive half-hour average values shall be measured independently within a period of three hours.

Firing installations and their emission control systems have to be visually checked once a year. In the course of these yearly checks the parameters CO, exhaust gas losses and soot (oil firing systems only) have to be measured, if emission limit values are prescribed and no continuous monitoring is installed. It also has to be verified that only the specified fuels have been used. If applicable, results of continuous measurements have to be verified.

Assessment of compliance

Emission limit values are considered exceeded if a validated daily mean value exceeds the limit value or if 3% of the validated half-hour mean values exceed the emission limit value by more than 20% or if one half-hour mean value exceeds the emission limit value by the factor two. Periods of start-up and shut-down shall not be considered.

In the case of periodic measurement – as a minimum requirement – compliance is achieved if the half-hour mean value does not exceed the emission limit value, taking into account the measurement uncertainty.

CO measurements during the periodic inspections (generally 15 minutes mean values) shall not exceed the limit value, taking into account the measurement uncertainty.

All external inspection documents shall be retained at the installation for at least five years to provide this information to the authorities.

3.1.2 Emission protection Act for Steam Boilers

Scope

The Emission Protection Act for Steam Boilers (Emissionsschutzgesetz für Kesselanlagen – EG-K, BGBl. I No. 127/2013 idgF) applies to stationary combustion plants consisting of:

- one or several steam boilers
- heat recovery boiler
- gas turbines
- gas engines
- other directly connected units if they have an effect on emissions and pollution

Installations which do not release any emissions to the environment are excluded from the scope of the law if the emissions are solely used for a production process. Gas engines and gas turbines are excluded if they are part of an installation with a rated thermal input of less than 50 MW. Detailed rules on methods of measurements, calibration, documentation, location of sampling sites and compliance assessment are given in the ordinance regarding monitoring of air pollutants (Emissionsmessverordnung Luft - EMV-L, BGBl. II Nr. 153/2011).

Regulated parameters

Emission parameters depend on the used fuel and the rated thermal input. Further distinctions are made between new, existing and old plants. Existing plants have been put into operation before January 7th 2014, old plants before November 27th 2003.

The parameters in Table 17 apply to plants with a rated thermal input of 50 MW or more.

Table 17: Regulated parameters sorted by the respective fuels. (Source: Emissionsschutzgesetz für Kesselanlagen – EG-K, BGBl. I No. 127/2013 idgF)

Used fuel	Regulated parameters
Coal and other solid fuels	dust, SO_2, NO_x, CO
Biomass	dust, SO_2, NO_x
Liquid fuels	dust, SO_2[70], NO_x, CO
Gaseous fuels	dust[70], SO_2[70], NO_x, CO

NH_3 is also regulated if NH_3 or ammonium compounds are used to reduce NO_X. Emission limit values are based on a volume content of oxygen in the exhaust gas of

- 6% for solid fuel,
- 3% for liquid and gaseous fuels (except gas turbines and gas engines),
- 15% for turbines and gas engines

and refer to standard conditions (273 K, 101.3 kPa, dry gas).

[70] Except gas turbines and gas engines

General monitoring rules

Selection of sampling points has to be in line with the standard ÖNORM EN 15259. In general monitoring has to be performed according to state of the art. In the absence of specific permit conditions half-hour average values have to be recorded.

Systems for continuous monitoring have to fulfil the criteria of ÖNORM EN 15267-3. Existing systems shall be in line with the Austrian standard ÖNORM M 9411. There are less stringent requirements regarding measurement at combustion plants with a rated thermal input of less than 10 MW.

Periodic calibration of the continuous measurement system (at least every three years) and a yearly functioning control by accredited bodies, institutions run by the federation or a federal state, government-authorised institutions, civil engineers or engineering companies is required. The operator has to perform weekly checks of the monitoring systems.

Self-monitoring

Monitoring shall be performed by the operator. Registered data have to be automatically converted into half-hour mean values. The minimum data availability shall be at least 90% over a period of one month. Periods of start-up and shutdown of the plant have to be included in the recordings.

As a general rule, oxygen content, humidity and exhaust gas temperature as well as pressure have to be measured continuously. In addition the thermal input and the waste gas volume have to be measured or calculated in combustion plants with a rated thermal input of more than 30 MW. Fuel ratios have to be recorded, if applicable.

If the capacity of a single steam boiler or gas turbine reaches certain threshold levels, continuous measuring is required for dust, CO, SO_2 and NO_x (see Table 18).

Table 18: Threshold values (in MW) for the installation of continuous measurement systems. (Source: Emissionsschutzgesetz für Kesselanlagen – EG-K, BGBl. I No. 127/2013 idgF)

	Dust	**CO**	**SO_2**	**NO_x**	**Unit**
Rated thermal input	> 15	> 15	> 30	> 30	MW

If the total rated thermal input of a combustion plant exceeds 100 MW, continuous measuring is compulsory. There are certain exemptions from continuous measurements, such as for combustion plants fired with natural gas or biomass or combustion plants < 100 MW.

External-monitoring

Periodic measurements have to be carried out by accredited bodies, institutions run by the federation or a federal state, government-authorised institutions, civil engineers or engineering companies at least every 5 years (1–2 MW) or 3 years (> 2 MW).

Monitoring has to be done in order to obtain representative results. In case of combustion plants with a rated thermal input of more than 30 MW, measurement planning and sampling strategy shall be done in accordance to ÖNORM 15259. If the rated thermal input of the combustion plant is less than 10 MW and the plant is fired with certain standardised fuels (e.g. liquid or natural gas, heating oil with very low or no sulphur content), the sampling time may be reduced to 15 minutes.

As a rule three consecutive half-hour average values shall be measured independently within a period of three-hours.

Assessment of compliance

By subtracting a given measurement uncertainty from the measured value, the validated value is generated. In case of periodic measurement no validated value shall exceed the emission limit value. In case of continuous monitoring emission limit values are fulfilled, if

- no validated daily mean value exceeds the emission limit value,
- 97% of all validated values do not exceed the emission limit value by the factor 1.2 or
- no validated value exceeds the emission limit value by the factor 2.

All documents, reports and measured data shall be stored at the installation for at least five years.

3.1.3 Wastewater

3.1.3.1 General

The Austrian Water Act (Wasserrechtsgesetz 1959 – WRG 1959, BGBl. Nr. 215/1959 idF BGBl I Nr 54/2014) constitutes the legal basis for the following three topics:

- Use of water
- Water quality and water protection
- Protection against natural hazards

The Austrian Water Act includes a general ordinance on wastewater discharges, but also specific ordinances for the discharge of wastewater from different industrial activities. These specific ordinances lay down general provisions and emission limit values for a variety of parameters, as well as requirements regarding monitoring.

Relevant for the slaughterhouses and animal by-products sector are the ordinances on:

- Meat industry (AEV Fleischwirtschaft, BGBl. II No. 12/1999 idgF)
- Rendering (AEV Tierkörperverwertung BGBl. No. 891/1995 idgF)

Table 19 and Table 20 provide a brief overview of the primary wastewater emission limit values for the meat industry and rendering installations. Standards and directives to be followed for sample taking, sample treatment and the measurement of emission limit values can be found in the respective appendices (according to Article 7, Section 4 of the AAEV). The competent authority has the possibility to restrict less parameters for self- and external-monitoring after examination of each individual case (e.g. if a parameter can be excluded from a process-related point of view). Parameters shall not exceed the limits given in the AAEV or AEVs (Article 4, Section 1 of the AAEV).

Table 19: Wastewater emission limit values for direct and indirect discharge of wastewater from the meat industry. (Source: AEV Fleischwirtschaft, BGBl. II No. 12/1999 idgF)

Parameter	Unit	Direct discharge	Indirect discharge
Temperature	°C	30	35[71]
Total Suspended Solids (TSS)[72]	mg/l	30	150[73]
pH		6.5-8.5	6.0-9.5
Total Cl[74]	mg/l	0.4	0.4
Ammonium (NH_4-N)	mg/l	5[75]	-[76]
Total N[77]	%[78]	75[79]	-
Total P	mg/l	1.0	-
Total Organic Carbon (TOC)	mg/l	30	-
Chemical Oxygen Demand (COD)	mg/l	90	-
Biological Oxygen Demand (BOD_5)	mg/l	20	-
Adsorbable organic halogen compounds (AOX) – reported as Cl	mg/l	0.1	1.0
Low volatile lipophilic substances	mg/l	20	150[80]

[71] In individual cases a higher emission limit value is permissible, if no formation of steam or glaciation and no endangerment of the health condition of the operating personnel of the public canalisation is ensured.

[72] The determination of total suspended solids spares the determination of settleable substances.

[73] In individual cases a higher emission limit value is permissible, if no accumulation of deposits caused by a discharge according to § 1 Abs 2, which can disrupt the operation of the public canalisation or wastewater treatment plant, is ensured.

[74] The determination of the parameter total chloride spares the determination of the parameter available chloride.

[75] Applies only to an effluent wastewater temperature (from the biological treatment step) greater than 12 °C. The wastewater temperature of 12 °C counts as not exceeded, if more than one out of five temperature measurements (measures have to be equally spread over the evaluation period) are below 12 °C.

[76] To be set in individual cases, if odour nuisance or risk of corrosion (cement bound materials) for the canalisation or the wastewater treatment plant exist (ÖNORM B 2503, September 1992).

[77] Sum of organically bound nitrogen, ammonium-nitrogen, nitrit-nitrogen and nitrat-nitrogen.

[78] Minimum removal efficiency

[79] The inlet load of total nitrogen into the biological wastewater treatment step has to be reduced by 75% (minimum efficiency), if the permit is based on a daily BOD_5 inlet load into the biological treatment step of more than 150 kg. The minimum efficiency is determined by the inlet and discharge loads of total nitrogen into and from the biological wastewater treatment step.

[80] In the case of a risk of formations of obstructive fat accumulation within the public sewer system or wastewater treatment plant or a risk of formations of obstructive swimming sludge inside the clarification tanks of the public wastewater treatment plant due to a discharge according to § 1 Abs. 2, a lower emission limit value has to be prescribed, which is, however, not lower than 100 mg/l.

Table 20: Wastewater emission limit values for direct and indirect discharge of wastewater from rendering installations. (AEV Tierkörperverwertung BGBl. No. 891/1995 idgF)

Parameter	Unit	Direct discharge	Indirect discharge
Temperature	°C	35	35
Fish toxicity[81]	-	4	no impairment of biological degradation processes
Total Suspended Solids (TSS)[82]	mg/l	30	150
pH	-	6.5 – 8.5	6.5 – 9.5
Ammonium (NH_4-N)	mg/l	50[83]	-[84]
Total N[85]	%[86]	75[87]	-
Total P	mg/l	2	-
Sulphide[88]	mg/l	0.1	1.0
Total Organic Carbon (TOC)	mg/l	50[89]	-
Chemical Oxygen Demand (COD)	mg/l	150[90]	-
Biochemical Oxygen Demand (BOD_5)	mg/l	25	-
Adsorbed organically bound halogens (AOX)[91]	mg/l	0.1	0.1
Low volatile lipophilic substances	mg/l	20	150
Sum of hydrocarbons[92]	mg/l	10	20

[81] To be measured in the course of external-monitoring (according to § 4 Abs. 3), in case of justified suspicion or concrete evidence of running water impairment due to wastewater discharge. Not to be measured in the course of self-monitoring (according to § 4 Abs. 2).

[82] The determination of total suspended solids spares the determination of settleable substances.

[83] Applies only to an effluent wastewater temperature (from the biological treatment step) greater than 12 °C. The wastewater temperature of 12 °C counts as not exceeded, if more than one out of five temperature measurements (measures have to be equally spread over the evaluation period) are below 12 °C.

[84] To be set in individual cases, if odour nuisance or risk of corrosion (cement bound materials) for the canalisation or the wastewater treatment plant exist (ÖNORM B 2503, September 1992).

[85] Sum of organically bound nitrogen, ammonium-nitrogen, nitrit-nitrogen and nitrat-nitrogen.

[86] Minimum removal efficiency

[87] The inlet load of total nitrogen into the biological wastewater treatment step has to be reduced by 75% (minimum efficiency). The minimum efficiency is determined by the inlet and discharge loads of total nitrogen into and from the biological wastewater treatment step.

[88] Only required if wastewater originates exclusively or mainly from processing of feathers.

[89] If the TOC inlet concentration of the flow proportional unsettled homogenised daily composite sample exceeds 330 mg/l (measured as a monthly average of the biological wastewater treatment step inlet) a TOC minimum removal efficiency of 85% is permissible. The minimum removal efficiency is determined by the daily TOC inlet and discharge loads into and from the wastewater treatment plant. For the daily TOC inlet load the permitted value of the respective wastewater treatment plant is decisive.

[90] If the COD inlet concentration of the flow proportional unsettled homogenised daily composite sample exceeds 1100 mg/l (measured as a monthly average of the biological wastewater treatment step inlet) a COD minimum removal efficiency of 85% is permissible. The minimum removal efficiency is determined by the daily COD inlet and discharge loads into and from the wastewater treatment plant. For the daily COD inlet load the permitted value of the respective wastewater treatment plant is decisive.

[91] The determination of AOX emission limit values spares the determination of POX emission limit values.

[92] Regulation only required if hydrocarbon containing solvents are applied during chemical degreasing.

Monitoring

The pH value, total suspended or settleable substances, total chlorine (only for meat industry) and the wastewater temperature (discharge) have to be measured by means of frequent spot samples. All other parameters have to be measured by an unsettled, homogenised daily composite sample.

According to Article 7, Section 8 of the AAEV the frequency for self- and external-monitoring for each installation shall be specified by the competent authority. External monitoring has to be carried out by authorised experts, institutions or companies (Article 134, Section 1 of the WRG 1959 and Article 1, Section 3 of the AAEV).

Operators may choose – in order to optimize the production process and to control the functioning of the wastewater treatment plant – to monitor additional parameters in the course of self-monitoring, to introduce shorter monitoring intervals or to monitor the same parameter upstream and downstream (e.g. online monitoring of N and P dosage).

Compliance Control

Emission limit values have to be fulfilled in the course of self-monitoring and external-monitoring. Compliance of the emission limit values is given if the following is achieved.

Self-monitoring

For parameters monitored by a flow proportional unsettled homogenised daily composite sample, the legal limit is not deemed to have been exceeded if 4 out of 5 consecutive individual measurements are below the prescribed emission limit value and the exceeding value does not exceed the emission limit value by more than 50% (for ammonium by more than 100%). This rule is referred to as the “4 out of 5” rule.

For the parameters temperature and pH-value the “4 out of 5” rule has to be applied to a spot sample of one day. Discharged wastewater temperature is complying if the highest measured value is not exceeding the temperature limit value by its 1.2-fold magnitude. The pH-value is complying if the measured pH-value is not varying by more than ±0.3. In case of continuous sampling of temperature and the pH-value, emission levels have to be below the emission limit value at least over 80% of the wastewater discharge time of one day.

The required removal of total nitrogen is reached if the annual arithmetic average is higher than the minimum removal efficiency of 75%.

Methods for sampling, sample treatment, and analysis are described in appendix C of the AAEV.

External-Monitoring

If the frequency of external-monitoring is below 4 measurements per year, sampling has to be repeated if one (by a flow proportional unsettled homogenised daily composite sample) measured value exceeds the emission limit value by 50% (except ammonia, 100%). The result of the repeated measurement has to be within the emission limit value. For temperature and the pH value and in case of more frequent flow proportional unsettled homogenised daily composite sample measurements the “4 out of 5” rule applies (see above).

3.1.3.2 Slaughter

The ordinance (AEV Fleischwirtschaft, BGBl. II No. 12/1999 idgF) applies to plants for the slaughtering of animals, for processing, manufacturing and packaging of meat and poultry as well as for cleaning of such facilities.

Parameters

Direct discharge: Temperature, total suspended solids, pH, total chlorine, ammonium, total nitrogen, total phosphorus, TOC, COD, BOD_5, AOX, low volatile lipophilic substances

Indirect discharge: Temperature, total suspended solids, pH, total chlorine, ammonium[93], AOX, low volatile lipophilic substances

Furthermore it is prohibited to discharge, neither directly nor indirectly, slaughtering blood, muck and animal slurry.

Table 19 presents emission limit values for the prescribed parameters.

Transition period

This ordinance was published on the 12th of January 1999 and entered into force one year later. The transitional period ended 5 years after the date of entry into force.

3.1.3.3 Rendering

The ordinance (AEV Tierkörperverwertung BGBl. No. 891/1995 idgF) applies to plants for the thermal treatment of dead animals which are not used for human consumption, animal by-products (e.g. skins, feathers, blood, bones, horns, claws, etc.) or animal based products (e.g. meat, eggs, milk, etc.). Furthermore the ordinance applies to plants for the production of animal, blood, bone, feather or bristles meal as well as for the production of fat from the thermally treated corpses or animal by-products.

The ordinance does not apply to wastewaters from tanneries, leather factories, slaughterhouses, plants processing fur or meat or plants producing hide glue, gelatine or bone glue.

Parameters

Direct discharge: Temperature, fish toxicity[94], total suspended solids, pH, ammonium, total nitrogen, total phosphorus, sulphide[95], TOC, COD, BOD_5, AOX, low volatile lipophilic substances, sum of hydrocarbons[96]

Indirect discharge: Temperature, total suspended solids, pH, ammonium[97], sulphide[95], AOX, low volatile lipophilic substances, sum of hydrocarbons[96].

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[93] To be set in individual cases, if odour nuisance or risk of corrosion (cement bound materials) for the canalisation or the wastewater treatment plant exist (ÖNORM B 2503, September 1992).

[94] To be measured in the course of external-monitoring (according to § 4 Abs. 3), in case of justified suspicion or concrete evidence of running water impairment due to wastewater discharge. Not to be measured in the course of self-monitoring (according to § 4 Abs. 2).

[95] Only required if wastewater originates exclusively or mainly from processing of feathers.

[96] Regulation only required if hydrocarbon containing solvents are applied during chemical degreasing.

Table 20 presents emission limit values for the prescribed parameters.

Transition period

This ordinance was published on the 20th of December 1995 and entered into force one year later. The transitional period ended 7 years after the date of entry into force.

[97] To be set in individual cases, if odour nuisance or risk of corrosion (cement bound materials) for the canalisation or the wastewater treatment plant exist (ÖNORM B 2503, September 1992).

4 APPLIED PROCESSES AND TECHNIQUES

4.1 Overview of the Austrian slaughter and animal by-products industries

The numbers of animals slaughtered in Austria from 2013 and 2014 are shown in Table 21.

Table 21: Overview about the installations covered in the present study. (Source: Statistik Austria Geflügelproduktion und Statistik Austria Schlachtungsstatistik)

	2013	2014
Chicken	74 309	76 954
Foal	471	379
Horses and other solipeds	533	564
Calves	69 097	67 203
Bulls	291 617	280 340
Oxen	30 015	29 225
Heifer	103 622	102 855
Cows	198 018	196 282
Pigs	5 396 038	5 376 923
Sheeps	140 266	144 520
Goats	5 107	4 479

Numbers for ducks, geese and guinea fowls are not shown for reasons of data protection. In Austria there are 17 slaughterhouses for which the Industrial Emission Directive (IED) applies and according to the inventory of the AMA-Gütesiegel 68 slaughterhouses which are below the quantity threshold for being regulated by the IED – 50 t/d carcass production capacity. This study is describing the Austrian IED installations. Table 22 presents the Austrian IED slaughterhouses.

Table 22 shows all slaughterhouses according to the Industrial Emissions Directive listed in the environmental inspection programmes of the Austrian federal states.

In Austria there are 17 slaughterhouses for which the Industrial Emission Directive (IED) applies and according to the inventory of the AMA-Gütesiegel 68[98] slaughterhouses which are below the quantity threshold for being regulated by the IED – 50 t/d carcass production capacity. This study is describing the Austrian IED installations. Table 22 presents the Austrian IED slaughterhouses.

[98] October 2015; a list of all 68 installations is presented in the appendix

Table 22: Austrian slaughterhouses according to Annex I, 6.4a) of the IED. (Source: Environmental inspection programmes of the federal states, as per December 2015)

Slaughterhouses		
Operator	**Address**	**Process under Annex I of the IED**
Dachsberger & Söhne GmbH	3730 Eggenburg, Gaudernsdorf 32	6.4a)
Hubers Landhendl GmbH	5222 Pfaffstätt, Hauptstraße 80	6.4a)
Schlachthof Oberndorfer GmbH respectively IBOSCHWEIN Vertriebs GmbH	4551 Ried im Traunkreis, Rehberger Straße 9	6.4a)
Higelsberger GmbH & Co. KG	4311 Schwertberg, Aisting 66	6.4a)
Rudolf Großfurtner GmbH, Utzenaich	4972 Utzenaich, Hofmarkt 1	6.4a)
Rudolf Großfurtner GmbH, St. Martin	4973 St. Martin, Diesseits 230	6.4a)
Schweinsspezialbetrieb Innviertel GmbH	4772 Lambrechten, Nummer 30	6.4a)
Viehvermarktung Nord reg.Gen.m.b.H.	4541 Adlwang, Wangerstraße 1	6.4a)
Herbert Handlbauer GmbH	4020 Linz, Holzstraße 5	6.4a)
Jöbstl Bauerngut GmbH	8472 Straß in Steiermark, Hofgasse 1	6.4a)
Steirerfleisch Gesellschaft m.b.H.	8421 Wolfsberg, Wolfsberg 1	6.4a)
Titz Geflügelschlachthof GmbH	8330 Feldbach, Rohr a. d. Raab 66	6.4a)
Scheucher Fleisch GmbH	8091 Jagerberg, Ungerdorf 1	6.4a)
Fleischof Raabtal GmbH	Kirchberg an der Raab, Berndorf 119	6.4a)
Norbert Marcher GmbH	8020 Graz, Lagergasse 158	6.4a)
Alpenrind GmbH	5020 Salzburg, Metzgerstraße 67	6.4a)
Stürzenbecher Vieh- und Fleischhandelsgesellschaft m.b.H. (part of Norbert Marcher GmbH)	9020 Klagenfurt, Schlachthofstraße 7	6.4a)

There are 5 installations performing processes under Annex I, 6.5. of the IED which produce meat, bone and/or feather meal, animal fats, gelatine and/or highly-valuable industrial greases and proteins. To be regulated by the IED the rendering installation needs to exhibit a treatment capacity higher than 10 t/d. Table 23 shows all animal by-product installations according to the Industrial Emissions Directive listed in the environmental inspection programmes of the Austrian federal states.

Table 23: Austrian animal by-product installations according to Annex I, 6.5. of the IED. (Source: Environmental inspection programmes of the federal states, as per December 2015)

Animyl By-Product installations		
Operator	**Adress**	**Process under Annex I of the IED**
Boxmark Leather GmbH & Co. KG	8380 Jennersdorf, Lederstraße 1	6.5.
Burgenländische Tierkörperverwertungsgesellschaft mbH & Co.KG	7321 Unterfrauenhaid, Industriegebiet 1	6.5.
Saria Bio Industries	Tulln, Bildereiche 3	6.5.
TKV Oberösterreich GmbH	4844 Regau, Regau 63	6.5.
Steirische Tierkörperverwertungsges.m.b.H. & Co KG	8461 Gabersdorf, Landscha an der Mur 8	6.5.

4.2 Slaughter

The meat processing industry includes three main areas: slaughtering, cutting and processing of meat. Cutting and processing of meat are described in the BREF “Food, Drink and Milk” (EC 2006) and are not further dealt with here.

The slaughtering process comprises in its core, regardless the type of animal handled, animal reception and lairage, stunning, bleeding, removal of skin, feathers, hooves, etc., evisceration and chilling. The processing operations differ, however, according to the type of animal handled but also to the respective slaughterhouse, wherefore a process description is carried out individually for each installation.

The environmental medium affected most by slaughtering is water. Wastewater accrues during washing of the lairage and other facilities, the lorries delivering the animals, as well as from washing the animals after transportation (if applied). Furthermore considerable wastewater is generated by the scalding of pigs and chicken, in order to facilitate the removal of bristles, toenails or feathers. Scalding tanks are usually emptied at the end of the day shift and would hold for a slaughterhouse processing 100 pigs an hour about 5 500 litres (GERMAN FEDERAL ENVIRONMENTAL AGENCY 2003).

Liquid blood has a COD of about 400 g/l and represents the liquid effluent with the highest COD strength accruing during the processing of meat (GERMAN FEDERAL ENVIRONMENTAL AGENCY 2003). The BOD level of liquid blood is about 200 g/l (GERMAN FEDERAL ENVIRONMENTAL AGENCY 2003). During bleeding the accruing blood is collected in a trough or tank for further usage. The containment system for blood is of high importance as an accidental spillage can cause problems due to shock loading the on-site WWTP and thus affecting the environment adversely (GERMAN FEDERAL ENVIRONMENTAL AGENCY 2003).

4.2.1 Titz Geflügelschlachthof GmbH

4.2.1.1 General description

Table 24: General description of installation. (Source: verbal information from 26.08.2015 and 13.10.2015)

Name of the installation	**Titz Geflügelschlachthof GmbH, Rohr a.d. Raab 66, 8330 Feldbach**
IPPC activity	6.4 a)
Capacity	40 000 – 70 000 chicken per day
Type and amount of products	Exclusively chickens are slaughtered, cut and packed at Titz Geflügelschlachthof GmbH.
Operating hours	1-shift operation from Monday to Friday. Duration of shift depends on delivered amount of chicken. On average the slaughtering process takes about 8 - 10 hours.
Description	The installation was founded in 1956 and is specialized in the slaughtering of chicken. Besides slaughtering, also meat cutting and packaging – hence the production of various final fresh and frozen products such as fillets, chicken drumsticks, etc. – takes place at Titz Geflügelschlachthof GmbH. The products are destined for retail sale.

The birds are received in the reception hall, where they remain in boxes until being put onto the killing line. The reception hall is illuminated by blue lights which the chicken cannot perceive and thus remains calm. After the birds have had time to settle they are put onto a conveyer belt which transports them into a tunnel where the stunning takes place. Chickens at Titz Geflügelschlachthof GmbH are stunned by CO_2. In the first part of the stunning tunnel the birds are exposed to a higher ratio of O_2 increasing respiration and numbness whilst a steadily increasing share of CO_2 is added. Immediately after stunning the chickens are hung upside down by their feet using shackles on a conveyor belt which moves them through the operation steps. Two automatic circular knives initiate the bleeding by cutting the neck arteries. The accruing blood is collected and sent to rendering installations. After stunning and bleeding, the chickens enter the scalding tank which loosens the feathers and thus facilitates de-feathering. In order to prevent a loss of meat quality the water temperature is below 58 °C. Involuntary defecation can take place while scalding, leading to an accumulation of faeces in the water. Birds' faeces dissociate to form ammonium nitrate and uric acid in the water (GERMAN FEDERAL ENVIRONMENTAL AGENCY 2003). The scalding tank contains on average 10 m³ of hot water (depending on the amount of chicken being slaughtered). The tank is emptied and cleaned at the end of the day shift. After scalding the feathers are mechanically plucked and remaining feathers are plucked by hand. The feathers are sent to rendering installations. The claws, head, intestines and organs get removed. The organs pass quality control and are sold to the food industry if the quality requirements are met. The intestines as well as the claws and heads are sent to rendering installations. The cleaned chicken carcases are sent through a cooling tunnel where the carcase is cooled down from 40 °C to 0 °C. After cooling the chicken gets classified and sent to meat cutting or directly to packaging where a room temperature of 10 °C is maintained.

4.2.1.2 Energy generation and use

A 1.5 MW boiler (boiler 1) and a 0.85 MW boiler (boiler 2) are applied at Titz Geflügelschlachthof GmbH. Both boilers are charged by natural gas. For the assessment of the boiler system three consecutive half-hour measurements were conducted on March 5th 2013 for boiler 1 and on May 29th 2015 for boiler 2. Both external emission evaluations were performed during normal operation.

Table 25: Combustion plants operated on-site. (Source: Prüfbericht technisches Büro für Umwelttechnik Dipl.-Ing. Horst Kaufmann, 08.03.2013 and 29.05.2015)

Combustion plants	Boiler 1	Boiler 2
Rated thermal Input (MW)	1.5	0.85
Start of operation	2011	2014
Fuel	natural gas	natural gas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	175[99]	186[99]
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)	95.93	93.16
Oxygen content (%)	2.9[99]	2.9[99]

Table 26: Short term measurements for the operated boilers through the combustion of natural gas – presented concentrations of exhaust air at 0 °C and 1 013 hPa. (Source: Prüfbericht technisches Büro für Umwelttechnik Dipl.-Ing. Horst Kaufmann, 08.03.2013 and 29.05.2015)

Short term emission level (3 half-hour measurements)					
	Boiler 1		Boiler 2		ELV (30 min average)
Pollutant	Max	Average	Max	Average	
NO_x (mg/Nm³; 3% O_2)	92.9	92.4	114.4	113	120
CO (mg/Nm³; 3% O_2)	76	64.9	3	2.6	80
CO_2 (%)	10.6	10.5	10.6	10.6	-

4.2.1.3 Waste and residues

Sludge accruing during the pre-treatment (flotat) of wastewater is collected and sent to biogas plants. Residues from the slaughtering process, e.g. feathers, blood, claws, intestines and heads, are sent to rendering installations. A detailed breakdown of the on-site accruing waste and residues is presented for the year 2014 in the table below.

[99] Full load

Table 27: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept Titz Geflügelschlachthof GmbH, 09.2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Flotat	m³	1 934	Flotation (WWTP)	Biogas plants
Blood	t	720	Slaughtering	Rendering installations
Feathers	t	4 863	Slaughtering	Rendering installations
Intestines, heads, claws and meat cutting residues	t	1 854	Slaughtering and meat cutting	Rendering installations; pet food producer
Faeces	m³	183	Reception of chickens	Land spreading by farmers
Household-type commercial waste	t	24	Entire installation	Authorised waste disposal company
Biogenic waste	t	0.8	Entire operation, lawn mowing	Composting by farmers
Excess sludge from biological wastewater treatment	m³	671	WWTP	Land spreading by farmers
Paper	t	3	Office	Authorised waste disposal company
Glass	t	0.2	Entire installation	Authorised waste disposal company
Aluminium cans	t	0.2 – 0.3	Entire installation	Authorised waste disposal company
Polysterene, PP, PE	m³	85	Packaging	Authorised waste disposal company
Plastic containers	t	0.73	Entire installation (cleaning and disinfection)	Authorised waste disposal company
Plastic film	t	2	Packaging	Authorised waste disposal company
Cardboard packaging	t	10	Entire installation	Authorised waste disposal company
Hazardous waste				
Lead-accumulator	pieces	23	Lorry maintenance	Returned to recycling company
Fluorescent tubes	pieces	190	Entire installation	Authorised waste treatment company
Used oil filters	t	0.26	Maintenance of machines	Authorised waste disposal company
Waste oil				
Waste oil	t	1.98	Lorry maintenance	Authorised waste disposal company

4.2.1.4 Noise and odour emissions

No systems for reducing noise or odour emissions are installed at Titz Geflügelschlachthof GmbH.

4.2.1.5 Water and wastewater

Table 28: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 26.08.2015 and 13.10.2015)

Consumption and treatment of water 2014	
Consumption of fresh water	on average 9 litres per chicken (including washing water and rinse water)
Type of wastewater discharge	Treated wastewater gets directly discharged into the river Raab.
Capacity	23 000 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Chemical, physical pre-treatment Biological treatment Sludge flotation Sedimentation basin/ buffer tank Tertiary treatment
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being directly discharged into the river Raab. Mechanical pre-treatment consists of a drum screen (gap width 0.7 mm). The filtered material is sent to rendering installations. Chemical, physical pre-treatment consists of a flotation unit where $FeCl_3$ and Polyelectrolyte is added. Adding $FeCl_3$ improves the removal of emulsified fats and remaining blood. Polyelectrolyte enhances flocculation. The removed flotat is sent to biogas plants. Biological treatment consists of two nitrification basins and one denitrification basin. Phosphate precipitation takes place during nitrification by adding $FeCl_3$. After biological treatment the wastewater passes sludge flotation. During this physical treatment step the water gets separated from the sludge. The sludge is sent back to biological treatment and the water enters the sedimentation basin. Before the treated water enters the receiving water body, the wastewater passes a sand filter (tertiary treatment).

Table 29: Emission limit values and monitoring frequency for the direct discharge of process wastewater according to permit. (Source: Wasserrechtlicher Bescheid BH Feldbach, BHFB-3.0-98/2012-15; Bericht Kläranlagenüberprüfung Agrolab Austria GmbH, 30.07.2014)

Process wastewater					
Parameter	**Unit**	**ELV Permit[100]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Inlet					
COD load	kg/d	1 950	calculated	-	1 per year
Removal efficiency					
BOD_5	%	95	calculated	-	1 per year
COD	%	85	calculated	-	1 per year
Total N	%	75	calculated	-	1 per year
Discharge					
Wastewater quantities (Q)	m³/d	500 m³/d 25 m³/h	continuous	-	1 per year
pH		6.5-8.5	continuous	-	1 per year
T	°C	30	continuous	-	1 per year
BOD_5	mg/l	15	fpdcs	-	1 per year
BOD_5 load	kg/d	7.5	calculated	-	1 per year
COD	mg/l	60	fpdcs	1 per week	1 per year
COD load	kg/d	30	calculated	-	1 per year
TOC	mg/l	20	fpdcs	-	1 per year
TOC load	kg/d	10	calculated	-	1 per year
Total N	mg/l	20	fpdcs	1 per week	1 per year
Total N load	kg/d	10	calculated	-	1 per year
NH_4-N	mg/l	2.5	fpdcs	1 per week	1 per year
NH_4-N load	kg/d	1.25	calculated	-	1 per year
Total Cl	mg/l	0.4	spot sample	-	1 per year
Total P	mg/l	0.7	fpdcs	1 per week	1 per year
Total P load	kg/d	0.35	calculated	-	1 per year
AOX	mg/l	0.1	fpdcs	-	1 per year
Low volatile lipophilic substances	mg/l	10	fpdcs	-	1 per year
TSS	mg/l	30	spot sample	-	1 per year

[100] If not stated differently

Table 30: Summary of self-monitoring results 2014. (Source: Self-monitoring report Titz Geflügelschlachthof GmbH, 2014)

Parameter		**Self-monitoring 2014**				
		Daily min.	**Daily max.**	**Annual average**	**Number of samples**	**ELV**
Inlet						
Total N	mg/l	2.36	312	232.83	52	-
Removal efficiency						
Total N	%	95.44	99.88	98.5	52	75
Discharge						
Q	m³/d	145	424	302.08	52	500 m³/d 25 m³/h
T	°C	15.2	28.4	22.6	52	30
pH		6.6	7.6	7.15	52	6.5-8.5
COD	mg/l	31	58	43.37	52	60
Total N	mg/l	1.28	6.4	3.26	52	20
NH_4-N	mg/l	0.01	1.62	0.36	52	2.5
NO_3	mg/l	0.1	12.3	5.17	51	-
NO_2	mg/l	0.016	0.147	0.056	52	-
Total P	mg/l	0.03	0.91	0.36	52	0.7

Table 31: Results of external-monitoring 2014. (Source: Bericht Kläranlagenüberprüfung Agrolab Austria GmbH, 30.07.2014)

External-monitoring 2014 (representative fpdcs from 29.07.2014 to 30.07.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
Q	m³/d	423	-	
BOD_5	mg/l	2 360	-	EN 1899-1
BOD_5 load	kg/d	1 000	-	calculated
COD	mg/l	4 220	-	ÖNORM M 6265
COD load	kg/d	1 790	1 950	calculated
Total N	mg/l	295	-	EN 25663
Total N load	kg/d	125	-	calculated
Removal efficiency				
BOD_5	%	> 99	95	calculated
COD	%	99.7	85	calculated
Total N	%	98.7	75	calculated
Discharge				
Q	m³/d	243	500 m³/d 25 m³/h	
T	°C	23.7	30	DIN 38 404 C4
pH		7.8	6.5-8.5	DIN 38 404 C5
BOD_5	mg/l	< 3	15	EN 1899
BOD_5 load	kg/d	0	7.5	calculated
COD	mg/l	22	60	ISO 15705
COD load	kg/d	5.35	30	calculated
TOC	mg/l	7.3	20	ÖNORM EN 1484
TOC load	kg/d	1.8	10	calculated
Total N	mg/l	6.8	20	DIN 348409 – H56
Total N load	kg/d	1.6	10	calculated
NH_4-N	mg/l	0.18	2.5	DIN 38 406 E5
NH_4-N load	kg/d	0.04	1.25	calculated
Total P	mg/l	0.41	0.7	ISO 6878
Total P load	kg/d	0.1	0.35	calculated
AOX	mg/l	0.072	0.1	DIN EN ISO 9562
TSS	mg/l	2.8	30	DIN 38 409 H2
Low volatile lipophilic substances	mg/l	6	10	DIN 348409 – H56
Total Cl	mg/l	< 0.05	0.4	DIN 38 408 G4

4.2.2 Norbert Marcher GmbH

4.2.2.1 General description

Table 32: General description of installation. (Source: verbal information from 26.08.2015 and 16.10.2015)

Name of the installation	**Norbert Marcher GmbH, Lagergasse 158, 8020 Graz**
IPPC activity	6.4 a)
Capacity	350 t/d (permitted capacity) 2 500 cattle per week 12 000 pigs per week
Type and amount of products	At Norbert Marcher GmbH cattle and pig slaughtering is carried out. Within one week about 2 500 cattle and 12 000 pigs are slaughtered and about 300 t of animal fat is produced. For beef, meat cutting and packaging takes also place at the installation. Pig meat is cut at another company-owned installation in Villach. Pig and cattle slaughtering are two completely separated lines.
Operating hours	1-shift operation per slaughtering line. Operating hours are from Sunday evening to Saturday morning. Pig slaughtering takes place from Monday to Friday between 06:00 o'clock and 12:00 o'clock (exclusive cleaning time). Cattle slaughtering is carried out in the afternoon from about 12:00 o'clock until 17:00 o'clock (exclusive cleaning time). Overall about 300 people are employed at Norbert Marcher GmbH. About 26 are working in the slaughtering of cattle and 20 in the slaughtering of pigs.
Description	Overall 4 slaughterhouses specialized in the slaughtering of cattle and pigs and three meat cutting and meat processing installations belong to Norbert Marcher GmbH. About 1 500 employees are working for Norbert Marcher GmbH. In total about 130 000 cattle and 1 000 000 pigs are annually slaughtered. Products are exported to over 40 countries in 4 continents.

Production process

As cattle and pig slaughtering are two completely separated lines, they will be discussed individually in the following.

Cattle slaughtering

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. The carotid is immediately incised, followed by a stab in the heart and a cut from the heart to the carotid incision in order to initiate a rapid bleeding. The accruing blood is collected in a blood tank and sent to rendering installations. Before skinning, the lower part of the legs and the head are removed. The legs and head are destined for off-shore food industry apart from the Special Risk Material (SRM) graded part of the head which is sent to rendering installations. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold to tanneries. Evisceration is carried out manually. The intestines are sent as category 3 animal by-products to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are checked by veterinarians and sold to the food industry if the quality requirements are met. Otherwise the organs enter the pet-food industry or rendering, depending on the quality. The cleaned stomachs are destined for off-site food production. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sent to the on-site fat melting unit. After evisceration the cattle carcase is split

along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent to the meat cutting line, where a core temperature of 7 °C is never exceeded.

Pig slaughtering

The pigs are received in a separate reception hall and remain there for at least an hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into single file for entering the killing line individually. For the stunning the pig is lifted so that it cannot move. An electrically charged 3 point stunner with a current of 1.3 A is then applied to the head (2 points) and the heart (1 point). The stunned pig is put on the bleeding table where the carotid gets immediately incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase is lifted by its hind leg and passes through scalding to loosen the bristles and toenails. Scalding is carried out by spraying 60 °C hot water on the carcase for 4 to 5 minutes. Per pig about 1.5 to 2 litres of water are needed. After scalding the bristles get automatically removed by rubber flails. De-hairing is repeated in order to remove the bristles entirely before the carcase enters singeing. The singeing unit consists of 48 burners charged by natural gas. Singeing provides a firmer skin texture and eliminates micro-organisms as well as residual hair. After singeing the carcase is manually eviscerated. The organs are checked by veterinarians and if the quality requirements are met, the organs enter the food industry (except for the spleen). The stomach also enters the food industry, after being cleaned. The intestines are sent to pet-food and rendering installations. After evisceration the pig carcase gets split in halves and the spinal cord is sucked out and utilized as category 3 animal by-products in rendering installations. After evisceration the pig halves are getting categorized and pass quality control before getting chilled so that the core temperature is not exceeding 7 °C. On the subsequent day the pig halves are sent to the company-owned meat cutting installation in Villach.

Fat melting

Accruing slaughtering fat is melted in the on-site fat melting unit. The fat is melted by the injection of steam and separated from residual solids by a decanter. The remaining fat-water-paste is subsequently sent into a centrifuge generating clean fat which is sold as industrial fat.

4.2.2.2 Energy generation

The steam boiler system at Norbert Marcher GmbH consists of 4 steam boilers of 175 kW, 135 kW, 579 kW and 869 kW. The steam boilers are charged with natural gas. All four steam boilers have low-NO_x burner. External emission evaluation was performed on April 28th 2015 during normal operation according to the Styrian ordinance on firing installations (Steiermärkisches Feuerungsanlagengesetz – LGBl. Nr. 73/2001 idgF). The evaluated emissions are presented in Table 34 general information on the steam boiler system is presented in Table 33.

Table 33: Combustion plants operated on-site. (Source: External-monitoring report Bernd Jaklitsch, 28.04.2015; verbal information from 26.08.2015)

Combustion plants	**Steam boiler 1**	**Steam boiler 2**	**Steam boiler 3**	**Steam boiler 4**
Rated thermal Input (kW)	175	135	579	869
Start of operation	1992	1982	1992	2001
Fuel	natural gas	natural gas	natural gas	natural gas
Flue gas cleaning	low-NO_x burner	low-NO_x burner	low-NO_x burner	low-NO_x burner
Flue gas temperature (°C)	200	164	201	135
Operating hours (h/a)				
Energy recovery				
Steam production (t/h)				
Steam parameter (p, T)	5 bar, 160 °C			
Fuel use (%)	91.6			
Oxygen content (%)	4.5			

Table 34: Emission measurements for the operated boilers through the combustion of natural gas – presented concentrations of exhaust air at 0 °C and 1013 hPa. (Source: External-monitoring report Bernd Jaklitsch, 28.04.2015)

Emission levels (30 min average)					
	Steam boiler 1	**Steam boiler 2**	**Steam boiler 3**	**Steam boiler 4**	**ELV (30 min average)**
Pollutant	**Average**	**Average**	**Average**	**Average**	
NO_x (mg/Nm³; 3% O_2)	77	103	122	53	150
CO (mg/Nm³; 3% O_2)	20	16	4	11	100
CO_2 (%)	8.3	8	9.6	9	-

4.2.2.3 Waste and residues

Table 35: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept Norbert Marcher GmbH, 2015)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Packaging	t	11.25	Packaging, fat melting, canteen	Authorised waste disposal company
Plastics from packaging	t	77.26	Meat processing	Authorised waste disposal company
Waste paper	t	22.8	Office, meat processing	Authorised waste disposal company
Household type commercial waste	t	12.64	Entire operation	Authorised waste disposal company
Metal scraps	t	3.5	Garage	Authorised waste disposal company
Flotat (sludge from flotation)	t	80	Flotation (wastewater pre-treatment)	Authorised waste disposal company
Rumen content	t	3000	Slaughtering (cattle)	Authorised waste disposal company
Catering waste	t	5.2	Canteen	Rendering installation
Biological waste	t	300	Reception hall (cattle and pig)	Authorised waste disposal company
Slaughtering waste	t	2950.99	Slaughtering	Rendering installation
Hazardous waste				
Batteries	t	0.038	Garage	Authorised waste disposal company
Fluorescent tubes	t	0.086	Garage	Authorised waste disposal company
Waste oil				
Waste oil	t	0.74	Garage, cooling	Authorised waste disposal company
Solid fat and oil polluted equipment	t	0.218	Garage	Authorised waste disposal company

4.2.2.4 Noise and odour emissions

Norbert Marcher GmbH is located in the city of Graz, thus also close to settlements wherefore a noise barrier (wall) was erected in order to lower the noise emissions, primarily from the delivering trucks.

Odour emissions from the flotation tank, from draining the blood (exhaust air from the tank of the lorries) and from the factory halls are prevented by the installation of carbon filters. Furthermore a communal animal corpse collection point is positioned on the premises of Norbert Marcher GmbH. The collecting point was equipped with a cooling system in order to prevent odour emissions. The collected corpses are emptied daily by rendering companies.

4.2.2.5 Water and wastewater

Table 36: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 26.08.2015)

Consumption and treatment of water 2014	
Consumption of fresh water	1 400 m³/d
Thereof cooling water	128 429 m³/a (on average 350 m³/d)
Type of wastewater discharge	Indirect discharge of pre-treated wastewater via the communal WWTP Graz.
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment
Short description of the process wastewater treatment	Total wastewater is mechanically pre-treated before being indirectly discharged via the communal WWTP Graz The mechanical pre-treatment consists of a drum screen. Physical pre-treatment consist of a flotation tank. Solids are accumulating on the wastewater surface inside the flotation tank and get removed by a rake. The flotat is sent to biogas plants.

The permit on wastewater discharge from Norbert Marcher GmbH into the communal WWTP was updated in the summer of 2015 (17.07.2015). The until July 2015 permitted emission limit values are presented in Table 37. The updated and from 07.2015 on binding values are listed in Table 38.

Table 37: Emission limit values and monitoring frequency for the indirect discharge of process wastewater according to permit. (Source: Wasserrechtliche Bewilligung, Amt der steirischen Landesregierung 3-33 Ga 158-92/31, Abwasseruntersuchungsbefund von der Flotationsanlage Drain Control-Consulting, 21.07.2014)

Process wastewater					
Parameter	**Unit**	**ELV Permit[101]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Q		1 560 m³/d 160 m³/h	continuous	-	1 per year
T	°C	30[102]	spot sample	-	1 per year
pH		6.5 – 9.5	spot sample	-	1 per year
BOD_5 load[103]	kg/d	2100	calculated	-	1 per year
COD[103]	mg/l	5000	fpdcs	daily	1 per year
COD load[103]	kg/d	3500	calculated	-	1 per year
Low volatile lipophilic substances	mg/l	150	fpdcs	-	1 per year
Settleable substances	ml/l	10	spot sample	daily	1 per year
Total Cl[104]	mg/l	0.4	spot sample	-	1 per year

[101] If not stated differently

[102] Maximum Temperatures up to 36 °C for maximum 15 minutes and 4 times per day

[103] As stated in external-monitoring report (Abwasseruntersuchungsbefund von der Flotationsanlage Drain Control-Consulting, 21.07.2014)

[104] ELV on total Cl applied until 31.12.1997 (5 years after completion of flotation unit)

Table 38: Emission limit values and monitoring frequency for the indirect discharge of process wastewater according to permit valid from 07.2015 on. (Source: Wasserrechtliche Bewilligung, Stadt Graz A17-047484/2008/0019)

Process wastewater					
Parameter	**Unit**	**ELV Permit[105]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Q	-	1 400 m³/d 140 m³/h	continuous	continuous	every 6 months
pH	-	6.5 – 9.5	continuous	continuous	every 6 months
T	°C	35	continuous	continuous	every 6 months
BOD_5 load	kg/d	2 450	calculated	-	every 6 months
COD load	kg/d	4 100	calculated	daily	every 6 months
Total Cl	mg/l	0.5	spot sample	-	every 6 months
Total Cl load	g/d	70	calculated	-	every 6 months
Low volatile lipophilic substances	mg/l	150	fpdcs	-	every 6 months
Low volatile lipophilic substances load	kg/d	210	calculated	-	every 6 months
AOX	mg/l	1	fpdcs	-	every 6 months
AOX load	g/d	1 400	calculated	-	every 6 months

Table 39: Results of external-monitoring 2014. (Source: Abwasseruntersuchungsbefund von der Flotationsanlage Drain Control-Consulting, 21.07.2014)

External-monitoring 2014[106] (representative fpdcs from 16.07.2014 to 17.07.2014)				
Parameter	**Unit**	**Daily average**	**ELV Permit[107]**	**Method**
Discharge				
Q	m³/d	873	1 560	
pH		7.3	6.5 – 9.5	DIN 38404-5
BOD_5	mg/l	1 500	-	DIN EN 1899-2
BOD_5 load[108]	kg/d	1 309.5	2 100	calculated
COD[108]	mg/l	4 000	5 000	DIN 38409-41-1
COD load[108]	kg/d	3 492	3 500	calculated
Low volatile lipophilic substances	mg/l	135	150	DIN 38409 – 56
Low volatile lipophilic substances load	kg/d	117.86	173.5	calculated
Total Cl	mg/l	< 0.03	-	ISO 7393-2

[105] If not stated differently

[106] No measurement of wastewater discharge temperature and settleable substances

[107] If not stated differently

[108] According to external-monitoring report (Abwasseruntersuchungsbefund von der Flotationsanlage Drain Control-Consulting, 21.07.2014)

4.2.3 Stürzenbecher Vieh- und Fleischhandelsgesellschaft m.b.H.

4.2.3.1 General description

Table 40: General description of installation. (Source: verbal information from 19.01.2016)

Name of the installation	**Stürzenbecher Vieh- und Fleischhandelsgesellschaft m.b.H., Schlachthofstraße 7, 9020 Klagenfurt**
IPPC activity	6.4 a)
Capacity	3 000 pigs per week 500 cattle per week
Type and amount of products	At Stürzenbecher Vieh- und Fleischhandels GmbH cattle and pig slaughtering is carried out. Within one week about 3 000 pigs and 500 cattle are slaughtered. Exclusively slaughtering is carried out at the installation. Pig and cattle slaughtering are two completely separated lines.
Operating hours	1-shift operation from Monday to Friday. Operating hours and slaughtered animals are varying from day to day as follows (exclusive cleaning): Monday: 07:00 o'clock until 16:00 o'clock, pig slaughtering until 13:00 o'clock, then cattle slaughtering Tuesday: 10:00 o'clock until 17:00 o'clock, cattle slaughtering Wednesday: 11:30 o'clock until 16:00 o'clock, cattle slaughtering Thursday: 08:00 o'clock until 13:00 o'clock, pig slaughtering Friday: 08:00 o'clock until 16:00 o'clock, until 14:00 o'clock pig slaughtering then cattle Overall about 40 people are employed at Stürzenbecher Vieh- und Fleischhandels GmbH. About 30 are working in the slaughtering process.
Description	Stürzenbecher Vieh- und Fleischhandels GmbH is part of the Norbert Marcher GmbH. The slaughtered animals are sent to Norbert Marcher installations in Graz (cattle) and Villach (pigs) for cutting. Overall 4 slaughterhouses specialized in the slaughtering of cattle and pigs and three meat cutting and meat processing installations belong to Norbert Marcher GmbH. About 1 500 employees are working for Norbert Marcher GmbH. In total about 130 000 cattle and 1 000 000 pigs are annually slaughtered. Products are exported to over 40 countries in 4 continents.

Production process

As cattle and pig slaughtering are two completely separated lines, they will be discussed individually in the following.

Cattle slaughtering

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. In order to initiate a rapid bleeding a chest stab is executed. The accruing blood is collected in a blood tank and sent to rendering installations. Before skinning, the lower part of the legs and the head are removed. The legs and head are sent for further processing (and separation of the SRM) to Norbert Marcher GmbH in Graz. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are also sent to Norbert Marcher GmbH Graz and successively sold to tanneries. Evisceration is carried out manually. The intestines are sent as category 3 animal by-products to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are checked by veterinarians and sold to the food industry if the

quality requirements are met. Otherwise the organs are sent to rendering installations. The cleaned stomachs are destined for off-site food production. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sent to the Norbert Marcher GmbH installation in Graz, where the slaughtering fat is getting processed in the on-site fat melting unit. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent into the cooling house. At a temperature of around 1 °C the cow halves remain for at least 12 hours before being sent to the meat processing unit in Graz (Norbert Marcher GmbH).

Pig slaughtering

The pigs are received in a separate reception hall. Along a fenced passageway the pigs are step by step put into single file for entering the killing line individually. For the stunning the pig is lifted so that it cannot move. An electrically charged 3 point stunner with a current of 1.3 A is then applied to the head (2 points) and the heart (1 point). The stunned pig is put on the bleeding table where the carotid gets immediately incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase is lifted by its hind leg and passes through scalding to loosen the bristles and toenails. Scalding is carried out by spraying 60 °C hot water on the carcase for about 3 minutes. After scalding the bristles get automatically removed by rubber flails. De-hairing is repeated by wet whips in order to remove the bristles entirely before the carcase enters singeing. The singeing unit consists of 28 burners charged by natural gas. Singeing provides a firmer skin texture and eliminates micro-organisms as well as residual hair. After singeing the carcase's surface is again cleaned through dry whipping before entering manual evisceration. The organs are checked by veterinarians and if the quality requirements are met, the organs enter the food industry. If not the organs are sent to rendering installations. The stomach is cleaned and enters the food industry as well. The intestines are processed by an external company on the premises of Stürzenbecher Vieh- und Fleischhandels GmbH. After evisceration the pig carcase gets split in halves and the spinal cord is sucked out and utilized as category 3 animal by-products in rendering installations. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at about 1 °C so that the core temperature is not exceeding 7 °C. The pig halves remain at least 12 hours in the cooling house before being sent to the company-owned meat cutting installation in Villach (Norbert Marcher GmbH).

4.2.3.2 Energy generation

No combustion plants are operated on the premises. Thus heat and energy demand are covered by the communal supply.

4.2.3.3 Waste and residues

Table 41: Values of on-site accruing waste and residues from 2015. (Source: Abfallwirtschaftskonzept Stürzenbecher Vieh- und Fleischhandels GmbH, 05.2015)

Waste and residue management 2015				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Packaging	t	1.96	Office, cattle slaughtering	Authorised waste disposal company
Household type commercial waste	t	0.56	Office, cattle slaughtering, pig slaughtering, social rooms, garage	Authorised waste disposal company
Metal scrap	t	3.5	Garage	Authorised waste disposal company
Content of fat screens	t	127.66	WWTP (flotation)	Biogas plant
Rumen and intestine content	t	2000	Cattle slaughtering, pig slaughtering	Authorised waste disposal company
Organic waste	t	50.0	Slaughtering	Authorised waste disposal company
Content from fat separator	t	60.78	WWTP	Authorised waste disposal company
Residues from sewer cleaning	t	7.56	WWTP	Authorised waste disposal company
Hazardous waste				
Blood	t	1 412.36	Slaughtering	Rendering installation
Meat, skin, intestine residues	t	837.18	Slaughtering	Rendering installation
Slaughtering scrap	t	1 668.3	Slaughtering	Rendering installation
Reaction and distillation residue	t	837.18	Slaughtering, cooling house	Authorised waste disposal company
Waste oil				
Waste oil	t	0.1	Garage	Authorised waste disposal company
Solid fat and oil polluted equipment	pieces	1 000	Garage	Authorised waste disposal company

4.2.3.4 Noise and odour emissions

No systems for reducing odour emissions are installed at Stüzenbecher Vieh- und Fleischhandels GmbH. The premises is fenced by a shoulder-high wall for sight protection.

4.2.3.5 Water and wastewater

Table 42: Summary of water consumption and wastewater treatment 2016. (Source: verbal information from 19.01.2016; Prüfbericht, MAPAG Materialprüfung GmbH, 2016)

Consumption and treatment of water 2016	
Consumption of fresh water	358 m³/d
Type of wastewater discharge	Indirect discharge of pre-treated wastewater via the communal WWTP Klagenfurt.
Internal treatment of wastewater from the process	Mechanical pre- treatment Physical pre-treatment (expanded by a chemical treatment step in December 2015) Sand filter
Short description of the process wastewater treatment	Mechanical pre-treatment consists of a drum screen. The filtered material is sent to rendering installations. Physical pre-treatment consists of a flotation unit which was expanded by a chemical treatment step in December 2015. By adding NaOH and $FeCl_3$ the removal efficiency for remaining blood in the wastewater and emulsified fats was improved. For enhancing flocculation polymers are added. The removed flotat is sent to biogas plants. As a final step the wastewater passes a sand filter for removing residual solids before entering the communal sewer system.
Measures in case of other than normal operating conditions	The slaughterhouse Stüzenbecher Vieh- und Fleischhandels GmbH was in public hands until 2002. From then on measures for adjusting the wastewater pre-treatment have been undertaken. A drum screen, a flotation unit and a sand filter were installed in 2003. In spring 2015 a general cleaning of the WWTP was carried out. In December 2015 the physical wastewater pre-treatment was expanded by a chemical treatment step in order to enhance the removal efficiency of the flotation unit. A monitoring device was also installed in the course of the expansion in December 2015 allowing self-monitoring. The extended wastewater pre-treatment unit was audited by an authorised company from April 18 until April 19 and April 21 2016. A flow proportional daily composite sample was taken from April 18 to April 19 2016. The wastewater emissions were confronted with the ELVs defined by the branch-specific ordinance on wastewater emissions (AEV Fleischverarbeitung) for the indirect discharge of wastewater. The requirements as defined by ordinance were met. The conducted external-monitoring forms the basis for a inlet contract between Stürzenbecher Vieh- und Fleischhandelsgesellschaft GmbH and the communal WWTP. The results of the external-monitoring are presented in Table 43.

External-monitoring was conducted from April 18 until April 19 and April 21 2016. From April 18 to 19 the flow proportional daily composite sample was taken. Furthermore two spot samples, one during pig slaughtering (spot sample 1) and one during cleaning (spot sample 2), was taken on April 18. A spot sample was also taken during cattle slaughtering on April 21.

Table 43: Results of external-monitoring 2016. (Source: Prüfbericht, MAPAG Materialprüfung, 2016)

External-monitoring 2016 (representative fpdcs from 18.04.2016 to 19.04.2016)							
Parameter	**Unit**	**fpdcs 18. – 19.04.2016**	**spot sample 1 18.04.2016**	**spot sample 2 18.04.2016**	**spot sample 21.04.2016**	**ELV Ordinance**	**Method**
Discharge							
Q	m³/d	-	463	-	-	-	MFM
pH		7.32	8.9	7.3	6.0	6.5 – 9.5	on-site measurement
T	°C	17.6	24.0	19.9	23.6	35	on-site measurement
TSS	mg/l	148	148	114	150	150	DIN 38409-2
Total Cl	mg/l	< 0.1	< 0.1	< 0.1	< 0.1	0.4	ÖNORM EN ISO 7393-1
AOX	mg/l	0.29	< 0.2	< 0.2	0.25	1.0	ÖNORM EN ISO 9562
Low volatile lipophilic substances	mg/l	124	128	19	105	150	DIN 38409 – 17

4.2.4 Fleischhof Raabtal GmbH

4.2.4.1 General description

Table 44: General description of installation. (Source: verbal information from 13.01.2016)

Name of the installation	**Fleischhof Raabtal GmbH, Berndorf 119, 8324 Kirchberg an der Raab**
IPPC activity	6.4 a)
Capacity	about 6 700 pigs per week (350 000 pigs/year) about 190 cattle per week (10 000 cattle/year)
Type and amount of products	At Fleischhof Raabtal GmbH cattle and pig slaughtering is carried out. Within one year about 10 000 cattle and 350 000 pigs are slaughtered. Besides slaughtering, meat cutting is also carried out at Fleischhof Raabtal GmbH. Pig and cattle slaughtering are, except lairage and cooling, two completely separated lines.
Operating hours	1-shift operation per slaughtering line from 06:00 o'clock until 16:00 o'clock (without cleaning). Operating hours are from Monday to Friday. Pig slaughtering takes place every working day, except when cattle is slaughtered. Cattle slaughtering is carried out on Tuesdays and Fridays in the afternoon. Overall about 170 people are employed at Fleischhof Raabtal GmbH. About 30 are working in the slaughtering process.
Description	Around 60% of the slaughtered animals are destined for the domestic market, 30% for the EU market and the remaining 10% for foreign markets. Fleischhof Raabtal GmbH was founded in 1994 and expanded in 1999 and 2004.

Production process

As cattle and pig slaughtering are separated lines, they will be discussed individually in the following.

Pig slaughtering

The pigs are received in the reception hall and remain there for at least an hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into groups of four for entering stunning. Stunning takes place with CO_2. The pigs are sent in gondolas transporting 4 pigs at once into a CO_2 bath. The stunned pigs get lifted up from the CO_2 bath and removed from the gondola on a designated landing spot. The pig gets lifted on their hind leg and the stunned animal's carotid gets incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes scalding to loosen the bristles and toenails. Scalding is carried out by spraying 60 °C hot water on the carcase for about 7 minutes. The water used for scalding is recirculated. After scalding the bristles get automatically removed by rubber flails. Subsequently the pig carcase gets singed. The singeing unit consist in total of 24 burners charged by natural gas. After singeing the carcase is manually eviscerated. The organs are destined for the food industry after being checked by veterinarians. If the organs are not passing the quality control they are sent to rendering installations. The stomach gets emptied, flushed and frozen for exporting it to foreign markets. The intestines are cleaned and sold to the pet-food industry. The spinal cord is sucked out and utilized as category 3 animal by-products in rendering installations. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 0 °C to 2 °C. The pig halves are cooled for at least 18 hours before sending them into meat cutting.

Cattle slaughtering

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. The carotid is immediately incised, followed by a stab in the heart and a cut from the heart to the carotid incision in order to initiate a rapid bleeding. The accruing blood is collected in a blood tank and sent to rendering installations. Before skinning the head is removed. The head flesh is sent to the pet-food industry apart from the Special Risk Material (SRM) graded part of the head. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold to tanneries. The lower part of the legs is removed while skinning and also sold to tanneries. Evisceration is carried out manually. The intestines are sent as category 3 animal by-products to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are sold to the food industry after being checked by a veterinarian. If organs do not pass the quality control they are sent to rendering installations. The cleaned stomachs are destined for pet food production. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sent to rendering installations. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent into chilling. The cow halves are cooled at 0 °C to 2 °C for at least 48 hours before being sent to the meat cutting line.

4.2.4.2 Energy generation

80% of the heating demand is covered through district heating. The remaining fraction is supplied by a boiler of 280 kW. A description and emission values from the boiler are presented in Table 45 and
Table 46. External emission-measurement was conducted in the course of the environmental inspection 2014. The presented ELVs are according to the Styrian ordinance on firing installations (Steiermärkisches Feuerungsanlagengesetz – LGBl. Nr. 73/2001 idgF).

On the flat roof of the production hall a photovoltaic system is installed which is operated by an external company.

Table 45: Combustion plant operated on-site. (Source: Environmental inspection report, 2014)

Combustion plants	**Boiler**
Rated thermal Input (kW)	280
Start of operation	
Fuel	natural gas
Flue gas cleaning	no secondary installations for emission reduction
Flue gas temperature (°C)	
Operating hours (h/a)	2 405[109]
Energy recovery	
Steam production (t/h)	
Steam parameter (p, T)	
Fuel use (%)	
Oxygen content (%)	

Table 46: Emission measurements for the operated boiler through the combustion of natural gas – presented concentrations of exhaust air at 0 °C and 1 013 hPa. (Source: Environmental inspection report, 2014)

Emission levels (30 min average)		
	Boiler	**ELV (30 min average)**
Pollutant		
NO_x (mg/Nm³; 3% O_2)	73	150
CO (mg/Nm³; 3% O_2)	3	100

4.2.4.1 Waste and residues

Table 47: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept Fleischhof Raabtal GmbH, 11.2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Bedding for animal transport (lorries)	m³	200	Animal transport	Collection by local farmers
Blood	m³	1 650	Slaughter	Rendering installation
Category I animal by-products	t	220	Slaughter	Rendering installation
Category II animal by-products	t	3 200	Slaughter	Rendering installation
Bristles	t	280	Slaughter	Rendering installation
Rumen content	t	150	Slaughter	Collection by local farmers
Animal by-products	t	800	Slaughter	Pet-food industry
Sewage sludge	t	400	WWTP	Authorised waste disposal company
Flotat	m³	900	WWTP	Biogas plant
Bones	t	400	Meat processing	Rendering installation
Packaging material	t	10	Meat processing	Authorised waste disposal company
Waste oil				
Cooking fat	l	250	Canteen	Biogas plant
Waste oil from oil separator	l	20	Garage	Authorised waste disposal company
Waste oil from air compressor	l	6	Air compressor	Authorised waste disposal company

[109] Full load

4.2.4.1 Noise and odour emissions

No systems for reducing noise or odour emissions are installed at Fleischhof Raabtal GmbH.

4.2.4.1 Water and wastewater

Table 48: Summary of water consumption and wastewater treatment 2015. (Source: verbal information from 13.01.2016)

Consumption and treatment of water 2015	
Consumption of fresh water	48 000 m³/a
Type of wastewater discharge	Direct discharge of treated wastewater into the river Raab.
Capacity	9 667 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment Biological treatment Sludge flotation Sedimentation basin/ buffer tank
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being directly discharged into the river Raab. Mechanical pre-treatment consists of a drum screen (gap width 0.8 mm). The filtered material is sent to rendering installations. Chemical, physical pre-treatment consists of a flotation unit where $FeCl_3$ and polymeres is added. Adding $FeCl_3$ improves the removal of emulsified fats and remaining blood. Polymeres enhances flocculation. The removed flotat is sent to biogas plants. Biological treatment consists of one nitrification basins and one denitrification basin. Phosphate precipitation takes place during nitrification by adding $FeCl_3$. After biological treatment the wastewater passes sludge flotation. During this physical treatment step the water gets separated from the sludge. The sludge is sent back to biological treatment and the water enters the sedimentation basin. From the sedimentation basin the treated wastewater enters the receiving water body. Treated wastewater (water from the sedimentation basin) is also used for cleaning the delivery lorries, thus contributing in reducing overall water consumption.

Table 49: Emission limit values and monitoring frequency for the direct discharge of process wastewater according to permit. (Source: Wasserrechtlicher Bescheid BH Feldbach, BHFB-3.0-103/2009-16)

Process wastewater					
Parameter	**Unit**	**ELV Permit[110]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Inlet (biological treatment)					
BOD_5 load	kg/d	580	calculated	1 per week	1 per year
COD load	kg/d	1 050	calculated	1 per week	1 per year
Removal efficiency					
Total N[111]	%	75	calculated	1 per week	1 per year
Discharge					
Wastewater quantities (Q)	m³/d	150 m³/d 2 l/s	continuous	-	1 per year
T	°C	30	spot sample	-	1 per year
pH		6.5 – 8.5	spot sample	-	1 per year
Total Cl	mg/l	0.4	spot sample	-	1 per year
NH_4-N	mg/l	3	fpdcs	1 per week	1 per year
Total P	mg/	1.0	fpdcs	1 per week	1 per year
TOC	mg/l	20	fpdcs	-	1 per year
TOC load	kg/d	3.0	calculated	-	1 per year
COD	mg/l	75	fpdcs	1 per week	1 per year
COD load	kg/d	11.25	calculated	-	1 per year
BOD_5	mg/l	15	fpdcs	1 per week	1 per year
BOD_5 load	kg/d	2.25	calculated	-	1 per year
Low volatile lipophilic substances	mg/l	20	fpdcs	-	1 per year
AOX[112]	mg/l	0.1	fpdcs	-	1 per year
TSS[112]	mg/l	30	spot sample	-	1 per year

[110] If not stated differently

[111] Referring to inlet load into biological treatment

[112] According to ordinance

Table 50: Summary of self-monitoring 2015. (Source: Self-monitoring report Fleischhof Raabtal GmbH, 2015)

Parameter		Self-monitoring 2015				
		Daily min	Daily max	Annual average	Number of samples	ELV
Inlet (biological treatment)						
COD	mg/l	3 640.0	4 950.0	4 175.2	49	-
COD load	kg/d	491.4	584.1	564.0	49	1 050
Total N	mg/l	367.0	521.0	438.5	49	-
Total N load	kg/d	50.3	72.9	59.2	49	580
Removal efficiency						
Total N	%	88.9	95.5	92.2	49	75.0
Discharge						
Q	m³/d	72.0	145.0	135.1	365	150.0
pH		7.2	7.8	7.4	45	6.5 – 8.5
Total N	mg/l	20.7	44.7	34.0	49	-
NH_4-N	mg/l	0.1	2.8	1.1	49	3.0
Total P	mg/l	0.2	1.0	0.6	49	1.0
COD	mg/l	20.0	50.8	36.1	49	75.0

Table 51: Results of external-monitoring 2015. (Source: Bericht Kläranlagenüberprüfung Agrolab Austria GmbH, 23.07.2015)

External-monitoring 2015 (representative fpdcs from 18.06.2015)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
Q	m³/d	205	-	
Inlet (biological treatment)				
BOD_5 load	kg/d	443	580	calculated
COD load	kg/d	738	1 050	calculated
Removal efficiency				
BOD_5	%	> 99.9	-	calculated
COD	%	99	-	calculated
TOC	%	99	-	calculated
Total N	%	96	75	calculated
Discharge				
Q	m³/d	140	150	
BOD_5	mg/l	< 3	15	EN 1899-1
BOD_5 load	kg/d	< 0.4	2.25	calculated
COD	mg/l	35	75	ÖNORM M 6265
COD load	kg/d	4.9	11.25	calculated
TOC	mg/l	12	20	EN 1484
TOC load	kg/d	1.7	3	calculated
T	°C	18.8 – 22.0	30	DIN 38404-4
TSS	mg/l	3.0	30	DIN 38409-H2
pH		7.02 – 7.05	6.5 – 8.5	DIN 38404-5
Total Cl	mg/l	< 0.1	0.4	ÖNORM M 6256
NH_4-N	mg/l	0.3	3.0	ÖNORM ISO 7150-1
Total P	mg/l	0.5	1.0	EN ISO 11885
AOX	mg/l	0.025	0.1	EN ISO 9562
Low volatile lipophilic substances	mg/l	< 5	20	DIN 38409-H56

4.2.5 Steirerfleisch GmbH

4.2.5.1 General description

Table 52: General description of installation. (Source: verbal information from 14.01.2016)

Name of the installation	**Steirerfleisch GmbH, Wolfsberg im Schwarzautal 1, 8421 Wolfsberg**
IPPC activity	6.4 a)
Capacity	2 000 pigs per day
Type and amount of products	At Steirerfleisch GmbH exclusively pig slaughtering is carried out. Within one week about 10 000 pigs are slaughtered. Besides slaughtering meat cutting is also carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 16:00 o'clock (without cleaning). Overall about 430 people are employed at Steirerfleisch GmbH. About 32 are working in the slaughtering process.
Description	Around 55% of the slaughtered animals are destined for the domestic market; the remaining 45% are exported to foreign markets. The slaughterhouse was founded in 1970.

The pigs are received in the reception hall and remain there for at least one hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into groups of four for entering stunning. Stunning takes place with CO_2. The pigs are sent in gondolas transporting 4 pigs at once into a CO_2 bath where the gondola remains for 100 seconds. The stunned pigs get lifted up from the CO_2 bath and removed from the gondola on a designated landing spot. The pig gets lifted on their hind leg and the stunned animal's carotid gets incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes through scalding to loosen the bristles and toenails. Scalding is carried out by spraying 62 °C hot water on the carcase for about 5 to 10 minutes. The water used for scalding is recirculated. The water tank for the scalding water is emptied at the end of the day shift. The scalding tank has a capacity of about 12 m³. After scalding the bristles get automatically removed by rubber flails. For removing residual bristles, the carcase passes a second bristle removing step consisting of brushes and whips. Subsequently the pig carcase gets singed. The singeing unit consists in total of 28 burners charged by natural gas. After singeing the carcase passes again bristle removal (brushes) before being manually eviscerated. The organs are destined for the food industry after being checked by veterinarians. If the organs are not passing the quality control they are sent to pet-food production sites or rendering installations (depending the quality). The stomach gets emptied, flushed and cleaned. It is mainly destined for exporting it to foreign markets. The intestines are cleaned and sent to rendering installations and for the production of sausage peel. After evisceration the carcase gets split in halves. The spinal cord is sucked out and sent to rendering installations. Accruing fat (slaughtering fat) is sold to external fat melting installations. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 3 °C to a core temperature of 7 °C. The pig halves are cooled for at least 12 hours before being sent into meat cutting.

4.2.5.2 Energy generation

No combustion plants are operated on the premises. Thus heat and energy demand are covered by the communal supply.

4.2.5.3 Waste and residues

Table 53: Values of on-site accruing waste and residues from 2014. (Source: Abfall-wirtschaftskonzept Steirerfleisch GmbH, 01.2015)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Slaughtering fat	t	471	Slaughtering	Fat melting installations
Animal by-products (category 3)	t	1148	Slaughteirng	Pet-food industry
Fallen stock (category 2 animal by-product)	t	9.5	Slaughteirng	Rendering installations
Animal by-products (category 2)	t	153	Slaughtering	Rendering installations
Bones	t	8284	Cutting	Rendering installations
Bristles	t	696	Slaughtering	Rendering installations
Animal by-products (category 3)	t	2592	Slaughtering	Rendering installations
Organic waste (manure, rumen- and intestine-content)	t	n.V.	Slaughtering	Biogas plant
Waste paper	t	1.6	Office	Authorised waste disposal company
Cardboard packaging	t	103	Entire operation	Authorised waste disposal company
Waste wood (untreated)	t	49	Entire operation	Authorised waste disposal company
Waste wood for incineration	t	142	Entire operation	Authorised waste disposal company
Plastic waste	t	10	Entire operation	Authorised waste disposal company
Bulky waste		n.V.	Entire operation	Authorised waste disposal company
Scrap metal		n.V.	housing technology	Authorised waste disposal company
Blank canisters		n.V.	Cleaning	Authorised waste disposal company
Construction waste		n.V.	housing technology	Authorised waste disposal company
Hazardous waste				
Batteries		n.V.	Entire operation	Authorised waste disposal company
Waste oil				
Waste oil and oil polluted operating materials	t	0	housing technology	Authorised waste disposal company

4.2.5.4 Noise and odour emissions

For reducing noise emissions (mainly from animal reception) to neighbouring settlements a noise barrier was erected on the premises of Steirerfleisch GmbH. No systems for reducing odour emissions are installed at Steirerfleisch GmbH.

The noise level is accepted by the neighbouring settlements.

4.2.5.5 Water and wastewater

Table 54: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 14.01.2016; Betriebsanweisung für die ARA, Steirerfleisch)

Consumption and treatment of water 2014	
Consumption of fresh water	270 m³ – 280 m³ per day (about 67 000 m³ – 70 000 m³ per year)
Type of wastewater discharge	Treated wastewater gets directly discharged into the Schwarzaubach.
Capacity	8 330 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment Biological treatment Buffer tank Tertiary treatment
Short description of the process wastewater treatment	Process wastewater is treated by an on-site wastewater treatment plant before being directly discharged into the Schwarzaubach. Mechanical pre-treatment comprises a drum screen for filtering solids. Physical pre-treatment consist of a floatation unit for extracting emulsified fats and suspended solids. Biological treatment is carried out by two Sequence Batch Reactors (SBR). A SBR combines the aerobe and the anoxic phase, as well as sedimentation and clear water removal. Whereas a common activated sludge process requires a local division of theses treatment steps, a SBR system requires a temporal division. Thus biological treatment can be carried out within one basin in a SBR system. At Steirerfleisch GmbH two SBR are installed. In the course of biological treatment alkaline dosing and phosphor precipitation is carried out. Clear water removal is carried out by linear decanters. The treated wastewater is subsequently discharged into the buffer tank. Excess sludge is sent into the sludge storage and applied in agriculture. Tertiary treatment is carried out by a sand filter in order to remove residual solid particles.

Table 55: Emission limit values and monitoring frequency for the direct discharge of wastewater according to permit. (Source: Wasserrechtliche Bewilligung BH Leibnitz, 3.0-516/2005)

Process wastewater					
Parameter	**Unit**	**ELV Permit[113]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Removal efficiency					
Total N	%	75	calculated	all 14 days	6 per year[114]
Discharge					
Wastewater quantities (Q)	m³/d	250 m³/d 2.9 l/s	continuous	-	6 per year[114]
pH[115]		6.5-8.5	continuous	-	6 per year[114]
T[115]	°C	30	continuous	-	6 per year[114]
BOD_5	mg/l	7	fpdcs	1 per week	6 per year[114]
COD	mg/l	28	fpdcs	2 per week	6 per year[114]
TOC	mg/l	9	fpdcs	-	6 per year[114]
NH_4-N	mg/l	2.5	fpdcs	3 per week	6 per year[114]
Total Cl[115]	mg/l	0.4	spot sample	-	6 per year[114]
Total P	mg/l	0.8	fpdcs	2 per week	6 per year[114]
AOX	mg/l	0.1	fpdcs	-	6 per year[114]
Low volatile lipophilic substances[115]	mg/l	20	fpdcs	-	6 per year[114]
TSS[115]	mg/l	30	spot sample	-	6 per year[114]

Table 56: Summary of self-monitoring 2014. (Source: Self-monitoring report Steirerfleisch GmbH, 2014)

Parameter		**Self-monitoring 2014**				
		Daily min.	**Daily max.**	**Annual average**	**Number of samples**	**ELV**
Removal efficiency						
BOD_5	%	99.6	99.9	99.8	111	-
COD	%	98.7	99.6	99.3	115	-
Total N	%	86.1	98.5	95.8	365	75
Discharge						
Q	m³/d	42.1	249.5	173.2	365	250
T	°C	10.2	26.5	21.7	365	30
pH		5.9	8.6[116]	7.2	365	6.5 – 8.5
BOD_5	mg/l	2.0	6.0	3.2	111	7
COD	mg/l	10.7	25.4	18.2	115	28
NH_4-N	mg/l	0.02	2.2	0.3	114[117]	2.5
Total P	mg/l	0.09	0.60	0.32	115	0.8

[113] If not stated differently

[114] Out of the six external-monitoring one has to be an overall inspection of the WWTP according to ÖWAV rule sheet 6, part 2 (ÖWAV-Regelblatt 6, Teil 2).

[115] According to ordinance

[116] No exceedance according to §4.(2) 3.: the pH value can be 0.3 units below or above the determined ELV

[117] According to permit to be measured 3 times per week, resulting in 156 samples a year. In 2014 NH_4-N was only measured 114 times (2.2 times per week) in the course of self-monitoring

Due to the increase in the production and thus the inlet load into the WWTP, the WWTP got expanded by a second SBR, a buffer tank and a tertiary treatment step. The construction was completed in June 2013. According to the updated permit for the direct discharge of treated wastewater (3.0-516/2005) external-monitoring has to be conducted six times a year. Out ofthese six controls one has to be an overall inspection according to ÖWAV rule sheet 6, part 2 (ÖWAV-Regelblatt 6, Teil 2). External-monitoring presented in Table 57 shows the measurements evaluated within the overall inspection of 2014 (conducted from September 22nd to 23rd 2014).

Table 57: Results of external-monitoring overall inspection 2014. (Source: Prüfbericht Funktionsprüfung der BARA, clug Trofaiach Saubermacher Dienstleistungs AG, 27.11.2014)

External-monitoring 2014 (representative fpdcs from 22.09.2014 to 23.09.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
Q	m³/d	285	-	
T	°C	21.5	-	DIN 38 404-C4
pH		7.73	-	DIN 38 404 – C5
TSS	mg/l	370	-	DIN 38 409 – H2
COD	mg/l	2 950	-	DIN 38 409 – H44
BOD_5	mg/l	1 610	-	ÖNORM EN 1899 – 1
TOC	mg/l	915	-	
NH_4-N	mg/l	75.6	-	DIN 38 406 – E5
Total N	mg/l	270	-	DIN EN ISO 11905-1
Total P	mg/l	37.3	-	DIN EN 1189
Removal efficiency				
Total N	%	98.7	75	calculated
Discharge				
Q	m³/d	203 m³/d 2.35 l/s	250 m³/d 2.9 l/s	
T	°C	21.4	30	DIN 38 404-C4
pH		6.71	6.5-8.5	DIN 38 404 – C5
TSS	mg/l	1.2	30	DIN 38 409 – H2
COD	mg/l	18	28	DIN 38 409 – H44
BOD_5	mg/l	4	7	ÖNORM EN 1899 – 1
TOC	mg/l	5.1	9	
NH_4-N	mg/l	0.021	2.5	DIN 38 406 – E5
Total N	mg/l	3.6	-	DIN EN ISO 11905-1
Total P	mg/l	0.058	0.8	DIN EN 1189
AOX	mg/l	0.034	0.1	DIN EN 1485
Total Cl	mg/l	< 0.05	0.4	DIN EN ISO 7391-2
Low volatile lipophilic substances	mg/l	< 5	20	DIN 38 409– H17

4.2.6 Jöbstl Bauerngut GmbH

4.2.6.1 General description

Table 58: General description of installation. (Source: verbal information from 02.02.2016)

Name of the installation	**Jöbstl Bauerngut GmbH, Hofgasse 1, 8472 Straß i.d. Steiermark**
IPPC activity	6.4 a)
Capacity	10 000 pigs per week
Type and amount of products	At Jöbstl Bauerngut GmbH exclusively pig slaughtering is carried out. Within one week about 10 000 pigs are slaughtered. Besides slaughtering meat cutting is also carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 16:00 o'clock (without cleaning). Overall about 280 people are employed at Jöbstl Bauerngut GmbH. About 30 are working in the slaughtering process.
Description	Jöbstl Bauerngut GmbH is a subsidiary of Steirerfleisch GmbH. The majority of the slaughtered animals are destined for the domestic market. Parts not demanded in the domestic market are exported.

The pigs are received in the reception hall and remain there for at least one hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into single file for entering stunning. The pig is lifted so that it cannot move. An electrically charged 3 point stunner with a current of 1.3 A is applied to the head (2 points) and the heart (1 point). The stunned pig is put on the bleeding table where the carotid gets immediately incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase is lifted by its hind leg and passes scalding to loosen the bristles and toenails. Up to the shoulder the pig carcase passes a water tank which holds 6 m³ of 62 °C hot water. The remaining part of the pig carcase is sprayed by the heated water from the water tank, thus scalding water recirculates. In order to compensate for water loss, the tank gets recharged by fresh water. At the end of the day shift the water tank gets emptied. After scalding the bristles get automatically removed by rubber flails. For removing residual bristles, the carcase passes a second bristle removing step consisting of whips. Subsequently the pig carcase gets singed. The singeing unit is charged by natural gas. After singeing the carcase passes cleaning by whips before being manually eviscerated. The organs are destined for the food industry after being checked by a veterinarian. If the organs are not passing the quality control they are sent to pet-food production sites or rendering installations depending on the quality. The stomach gets emptied, flushed and cleaned. Stomach processing is carried out by an external company. The intestines are also processed by external companies. After evisceration the carcase gets split in halves. The spinal cord is sucked out and sent to rendering installations. Accruing fat (slaughtering fat) is sold as industrial fat. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 3 °C to a core temperature of 7 °C. The pig halves are cooled for at least 18 hours before being sent into meat cutting.

4.2.6.1 Energy generation

No combustion plants are operated on the premises. Thus heat and energy demand are covered by the communal supply.

4.2.6.1 Waste and residues

Table 59: Values of on-site accruing waste and residues from 2014 (Source: Abfall-wirtschaftskonzept Jöbstl Bauerngut GmbH, 08.2015)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Animal by-products (bristles, intestines, rumen- and intestine content, meat and skin residues)	t	2 928	Slaughtering	Rendering installations
Blood	t	2 136	Slaughtering	Rendering installations
Bones	t	2 410	Slaughtering	Rendering installations
Waste paper	t	18.31	Office	Authorised waste disposal company
Tinfoil	kg	40	Garage	Authorised waste disposal company
Cardboard packaging	t	65.52	Entire operation	Authorised waste disposal company
Spray cans	pieces	300	Garage	Authorised waste disposal company
Fluorescent tubes	pieces	150	Entire operation	Authorised waste disposal company
Household-type commercial waste	t	12.76	Entire operation	Authorised waste disposal company
Hazardous waste				
Cooling devices	kg	50	Cooling house	Authorised waste disposal company
Batteries	kg	25	Office	Authorised waste disposal company
Oil separator content	t	2.5	Garage	Authorised waste disposal company
Waste oil				
Waste oil and oil polluted operating materials	t	0.61	Garage	Authorised waste disposal company

4.2.6.2 Noise and odour emissions

For reducing noise emissions (mainly from animal reception) to neighbouring settlements a noise barrier was erected on the premises of Jöbstl Bauerngut GmbH. No systems for reducing odour emissions are installed.

The noise level is accepted by the neighbouring settlements.

4.2.6.3 Water and wastewater

Table 60: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 02.02.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	100 m³ per day
Type of wastewater discharge	Pre-Treated wastewater gets indirectly discharged via the communal WWTP Leibnitzerfeld-Süd.
Capacity	6 750 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment
Short description of the process wastewater treatment	Total wastewater is mechanically pre-treated before being directly discharged into the communal sewer system. Mechanical pre-treatment comprises a drum screen for filtering solids. Physical pre-treatment consists of a floatation unit for extracting emulsified fats and suspended solids.
Measures in case of other than normal operating conditions	The permit for the discharge of wastewater from Jöbstl Bauerngut GmbH is at the moment in revision. The permit was elaborated for direct discharge of treated wastewater. Jöbstl Bauerngut GmbH is discharging indirectly via the communal sewer system. The requirements need therefore to be revised and updated.

Table 61: Emission limit values and monitoring frequency for the indirect discharge of wastewater according to permit. (Source: Wasserrechtliche Bewilligung Amt der Steiermärkischen Landesregierung, 3 – 33 Jo 32 – 90/4)

Process wastewater					
Parameter	**Unit**	**ELV Permit[118]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	137 m³/d 30 m³/h 8.3 l/s	continuous	-	all 2 years
T	°C	30[119]	continuous	daily	all 2 years
TSS	mg/l	200	spot sample	-	all 2 years
Settleable substances	ml/l	2	spot sample	daily	all 2 years
pH		6.5 – 9.5	continuous	daily	all 2 years
NH_4-N	mg/l	50	fpdcs	daily	all 2 years
Total Cl	mg/l	0.4	spot sample	-	all 2 years
BOD	mg/l	1500	fpdcs	-	all 2 years
COD	mg/l	4000	fpdcs	daily	all 2 years
AOX	mg/l	0.1	fpdcs	-	all 2 years
Low volatile lipophilic substances[115]	mg/l	100	fpdcs	-	all 2 years

[118] If not stated differently

[119] Single peaks up to 36 °C

Table 62: Summary of self-monitoring results 2014. (Source: Self-monitoring report Jöbstl Bauerngut GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min.	Daily max.	Annual average	Number of samples	ELV
Inlet						
Settleable substances	ml/l	0.4	23	8.71	236	-
Discharge						
T	°C	7.3	30.9	19.67	236[120]	30
pH		6.24	7.73	7.28	236[120]	6.5-9.5
Settleable substances	ml/l	0.1	1.9	0.23	235[120]	2

Table 63: Summary of self-monitoring results 2015. (Source: Self-monitoring report Jöbstl Bauerngut GmbH, 2015)

Parameter		Self-monitoring 2015				
		Daily min.	Daily max.	Annual average	Number of samples	ELV
Inlet						
Settleable substances	ml/l	7.5	17	11.41	248	-
Discharge						
T	°C	14.2	22	18.16	248[120]	30
pH		6.09[121]	9.12	7.42	248[120]	6.5 – 9.5
Settleable substances	ml/l	0.1	1.2	0.12	248[120]	2

No external-monitoring was carried out in 2014, due to the external-monitoring frequency defined by the respective permit. Therefore the evaluation conducted in 2015 is presented in Table 64.

[120] Only every working day – to be measured every day according to permit 3 – 33 Jo 32 – 90/4

[121] Exceedance as pH value is not allowed to be 0.3 units below or above the determined ELV

Table 64: Results of external-monitoring 2015. (Source: Untersuchungsbefund, Drain Control-Consulting, 22.10.2015)

External-monitoring 2015 (representative fpdcs from 01.10.2015 to 02.10.2015)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Discharge				
Q	m³/d	101	137	
T	°C	20.3[122]	30	DIN 38 404-4
pH		7.13[123]	6.5 – 9.5	DIN 38 404 – 5
TSS	mg/l	146.3[124]	200	DIN 38 409 – 2
Settleable substances	ml/l	1.2[125]	2	DIN 38409 - 9
Total Cl	mg/l	< 0.03[126]	0.4	DIN EN ISO 7393
NH_4-N	mg/l	150[127]	40	ISO 11732
AOX	mg/l	0.052	0.1	DIN EN 1485
BOD_5	mg/l	1 000	1 500	DIN EN 1899 – 2
COD	mg/l	2 610	4 000	DIN 38409-41 – 1
Low volatile lipophilic substances	mg/l	95	100	DIN 38409 – 56

[122] Mean value from three spot samples conducted on 01.10.2015 and 02.10.2015 (19.8 °C, 20.4 °C, 20.8 °C)

[123] Mean value from three spot samples conducted on 01.10.2015 and 02.10.2015 (7.1, 6.9, 7.4)

[124] Mean value from three spot samples conducted on 01.10.2015 and 02.10.2015 (145 mg/l, 185 mg/l, 109 mg/l)

[125] Mean value from three spot samples conducted on 01.10.2015 and 02.10.2015 (0.9 ml/l, 1.7 ml/l, 1 ml/l)

[126] Mean value from three spot samples conducted on 01.10.2015 and 02.10.2015 (< 0.03 mg/l, < 0.03 mg/l, < 0.03 mg/l)

[127] Exceedance, NH_4-N value can exceed the ELV by 100%

4.2.7 Scheucher Fleisch GmbH

4.2.7.1 General description

Table 65: General description of installation. (Source: verbal information from 14.01.2016)

Name of the installation	**Scheucher Fleisch GmbH, Ungerdorf 1, 8091 Jagerberg**
IPPC activity	6.4 a)
Capacity	2 800 pigs per week 300 cattle per week
Type and amount of products	At Scheucher Fleisch GmbH cattle and pig slaughtering is carried out. Within one week about 300 cattle and 2 800 pigs are slaughtered. Besides slaughtering meat cutting is also carried out at the installation.
Operating hours	Pig slaughtering takes place on Monday and Thursday in 1-shift operation from 06:00 o'clock until 16:00 o'clock (without cleaning). Cattle slaughtering is carried out on Tuesday in 1 shift-operation from 08:00 o'clock until 18:00 o'clock (without cleaning). No slaughtering takes place on Wednesdays. Overall about 80 people are employed at Scheucher Fleisch GmbH. About 34 are working in the slaughtering of cattle and pigs.
Description	Scheucher Fleisch was founded in 1945 and the installation was significantly expanded in 1986. The majority of the products are destined for the domestic market. Products which are not requested on the domestic market, such as pig ears or the majority of stomachs, are exported inside and outside the EU.

Production process

Besides animal reception, cattle and pig slaughtering are two separated lines and are therefore discussed individually in the following.

Pig slaughtering

The pigs are received in the reception hall and remain there for at least an hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into single file for entering the killing line individually. For the stunning the pig is lifted so that it cannot move. An electrically charged 3 point stunner with a current of 1.3 A is then applied to the head (2 points) and the heart (1 point). The stunned pig is put on the bleeding table where the carotid gets immediately incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase is lifted by its hind leg and passes through scalding to loosen the bristles and toenails. Scalding is carried out by letting the carcase pass through a water tank. The water tank has a volume of 12 m³ and the water temperature is 62 °C. The water tank is emptied at the end of the day shift. The wastewater is sent to the on-site WWTP. After scalding the bristles get automatically removed by rubber flails. De-hairing is repeated with another machine applying rubber flails again. After the second de-hairing step the carcase gets singed. The singeing unit is integrated into the second de-hairing machine and consists of 20 burners charged by natural gas. Singeing provides a firmer skin texture and eliminates micro-organisms as well as residual hair. After singeing the carcase is manually eviscerated. The organs are controlled by veterinarians and if the quality requirements are met enter the food industry, if not the organs are used as an input for the pet-food industry. The stomach is emptied and cleaned and also destined for the food industry. The intestines are sent to rendering installations. Accruing fat, i.e. slaughtering fat, is sent to rendering installations. After evisceration the pig

carcase gets split in halves and the spinal cord is sucked out and sent to rendering installations. Afterwards the pig halves are getting categorized and pass quality control before getting chilled at about 3 °C so that the core temperature is not exceeding 7 °C. The pig half is cooled for at least 12 hours before being sent into the meat cutting line.

Cattle slaughtering

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. In order to initiate a rapid bleeding a chest stab is executed. The accruing blood is collected in a blood tank and sent to rendering installations. Before skinning, the lower part of the legs and the head are removed. The legs are sent to rendering installations. The head is used as an input in the pet-food industry apart from the Special Risk Material (SRM) graded part of the head which is sent to rendering installations. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold to tanneries. Evisceration is carried out manually. The intestines are sent as category 3 animal by-products to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are sold to the food industry if the quality controls (carried out by veterinarians) are met. If not the organs are used as an input in the pet-food industry. The cleaned stomachs are destined for off-site food production. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sent to rendering installations. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent into the cooling house where it is cooled down to a core temperature of 7 °C. The cattle halves remain for at least 12 hours in the cooling house before being sent into meat cutting.

4.2.7.1 Energy generation

Two steam boilers, both charged with heating oil (light) are operated at Scheucher Fleisch GmbH.

For the assessment of the boiler system three consecutive half-hour measurements were conducted on May 11th 2011. The next external-monitoring has to be conducted in 2016. External emission evaluations were performed during normal operation and are presented in Table 67. General information on the steam boiler system is presented in Table 66.

Emission limit values of steam boiler 1 are regulated by permit (BHFB-4.1-68/13-2010) and the Ordinance on Air Pollution from Boiler Plants (Luftreinhaltegesetz für Kesselanlagen, LRV-K). Emission limit values for steam boiler 2 are regulated by the Emission protection Act for Steam Boilers (EG-K).

Table 66: Combustion plants operated on site. (Source: Bericht der Emissionsmessungen TÜV Austria Services GmbH, 13.05.2011)

Combustion plants	Steam boiler 1	Steam boiler 2
Rated thermal Input (kW)	850	500
Start of operation		
Fuel	heating oil (light)	heating oil (light)
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	234	
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	4.8	

Table 67: Short term measurements for the operated steam boilers through the combustion of heating oil (light) – presented concentrations of exhaust air at 0 °C and 1013 hPa. (Source: Bericht der Emissionsmessungen TÜV Austria Services GmbH, 13.05.2011)

Short term emission level (3 half-hour measurements)						
	Steam boiler 1		ELV permit[128] (30 min average)	Steam boiler 2		ELV (30 min average)
Pollutant	**Max**	**Average**		**Max**	**Average**	
Dust (mg/Nm³; 3% O_2)	-	-	50	-	-	-
NO_x (mg/Nm³; 3% O_2)	406	404	450	-	-	-
CO (mg/Nm³; 3% O_2)	22	15	100	-	-	-
Soot indicator	0	0	2[129]	0	0	2

4.2.7.2 Waste and residues

The waste management concept at Scheucher Fleisch GmbH has to be updated all five years. The last waste management concept was compiled in 2013 and is presented in Table 68.

[128] If not stated differently

[129] According to ordinance (LRV-K)

Table 68: Values of on-site accruing waste and residues from 2013. (Source: Abfallwirtschaftskonzept Scheucher Fleisch GmbH, 02.2014)

Waste and residue management 2013				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Flotat	t	29	Flotation	Authorised waste disposal company
Bristles		n.V.	Slaughtering	Rendering installations
Bones	t	700[130]	Slaughtering and meat cutting	Rendering installations
Intestines	t	606[130]	Slaughtering	Pet-food industry
Blood	t	616[130]	Slaughtering	Rendering installations
Meat, skin and intestine residues, other animal by-products, meat cutting scraps	t	1 382[130]	Slaughtering, meat cutting	Rendering installations
Special Risk Material	t	375[130]	Slaughtering	Rendering installations
Organic waste	m³	300	Animal reception, lairage	Land spreading by farmers
Skins	pieces	10 688[130]	Slaughtering	Skin and fur distributors
Waste paper		n.V.	Entire installation	Authorised waste disposal company
Glass		n.V.	Entire installation	Authorised waste disposal company
Tinplate and aluminium cans		n.V.	Canteen	Authorised waste disposal company
Waste for incineration	t	24	Entire installation	Authorised waste disposal company
Kitchen and canteen waste		n.V.	Canteen	Authorised waste disposal company
Excess sludge from WWTP	m³	1 000	WWTP	Land spreading by farmers
Hazardous waste				
Fluorescent tubes	pieces	120	Entire installation	Returning to distributor
Batteries, accumulators	pieces	50	Entire installation	Returning to distributor
Waste oil				
Waste oil	l	30	Lorry maintenance	Authorised waste disposal company

[130] 2012

4.2.7.3 Noise and odour emissions

No systems for reducing noise or odour emissions are installed at Scheucher Fleisch GmbH.

4.2.7.4 Water and wastewater

Table 69: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 13.01.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	7 572 m³/a (communal supply) 25 000 m³/a – 30 000 m³/a (own supply)
Type of wastewater discharge	Treated wastewater gets directly discharged into the Lembach.
Capacity	9 660 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment Biological treatment Sedimentation basin
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being directly discharged into the Lembach. Mechanical treatment consists of a drum screen for filtering out solids (mainly grain from rumen content). Physical pre-treatment consists of a flotation unit. Biological treatment consists of two aeration tanks for nitrification and de-nitrification. Phosphorus precipitation is carried out by iron(III) chloride. Before entering the receiving water body the treated wastewater enters the sedimentation basin.

As presented in Table 70 external-monitoring has to be conducted four times a year. One of these four external-monitorings has to be according to the Austrian Water and Waste Management Association (ÖWAV) rule sheet number 6. Table 72 presents the results from the external-monitoring according to ÖWAV rule sheet number 6.

Table 73 presents the remaining three external-monitoring values for 2014.

Table 70: Emission limit values and monitoring frequency for the direct discharge of process wastewater according to permit. (Source: Wasserrechtliche Bewilligung BH Feldbach, BHFB-3.0-313/2000-32)

Process wastewater					
Parameter	**Unit**	**ELV Permit**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Removal efficiency					
Total N	%	75	calculated	52 per year[131]	4 per year
Discharge					
Wastewater quantities (Q)	m³/d	100 m³/d 2.8 l/s	continuous	-	-
pH		6.5-8.5	spot sample	-	4 per year
T	°C	30	spot sample	-	4 per year
Total Cl	mg/l	0.4	spot sample	-	4 per year
TSS	mg/l	30	spot sample	-	4 per year
BOD_5	mg/l	20	fpdcs	52 per year[131]	4 per year
COD	mg/l	90	fpdcs	52 per year[131]	4 per year
TOC	mg/l	30	fpdcs	-	4 per year
AOX	mg/l	0.1	fpdcs	-	4 per year
Low volatile lipophilic substances	mg/l	20	fpdcs	-	4 per year
NH_4-N[132]	mg/l	5	fpdcs	52 per year	4 per year
Total P	mg/l	1	fpdcs	52 per year[131]	4 per year

Recording of self-monitoring was carried out with an operation log (handwritten) until 2014. From 2015 self-monitoring got recorded electronically wherefore the 2015 values were analysed in this study.

Table 71: Summary of self-monitoring results 2015. (Source: Self-monitoring report Scheucher Fleisch GmbH, 2015)

Parameter		**Self-monitoring 2015**				
		Daily min.	**Daily max.**	**Annual average**	**Number of samples**	**ELV**
Discharge						
BOD_5	mg/l	< 2	10	4,4	57	20
COD	mg/l	21	48	37,6	57	90
NH_4-N	mg/l	0,1	3,8	0,8	57	-
Total N	mg/l	11,9	45	27,7	57	-
PO_4-P	mg/l	0,1	0,94	0,5	57	-
Total P	mg/l	0,66	1	0,9	27[133]	1

For the external-monitoring one fpdcs was taken from December 16th 2014 09:00 o'clock until December 17th 2014 09:00 o'clock and three spot samples were taken, two on December 16th 2014 and one on December 17th 2014. The emission values from the parameters evaluated via spot samples presented in Table 72 represent the average value of the three conducted spot samples.

[131] Self-monitoring has to be conducted in regular intervals and on alternating week days.

[132] Applies only to a wastewater discharge temperature (from the biological treatment step) higher than 12 °C.

[133] According to permit total P emissions have to be measured every week (52 times per year). IN 2015 total P emissions were only recorded 27 times.

Table 72: Results of external-monitoring 2014 according to ÖWAV rule sheet number 6. (Source: Kläranlagenfunktionsprüfung DI Markus Nehammer GmbH, 22.12.2014)

External-monitoring 2014 according to ÖWAV rule sheet nr.6 (representative fpdcs from 16.12.2014 to 17.12.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
BOD_5 load	kg/d	186.6	-	calculated
COD load	kg/d	386.1	-	calculated
Total N load	kg/d	23.9	-	calculated
Total P load	kg(d	2.27	-	calculated
Removal efficiency				
BOD_5	%	99.8	-	calculated
COD	%	98.9	-	calculated
Total N	%	86.7	75	calculated
Total P		96.0	-	calculated
Discharge				
Q	m³/d	91	100	MID
T	°C	16.2	30	DIN 38404-C4-2
pH		6.9	6.5 – 8.5	DIN 38 404-C5
TSS	mg/l	13.3	30	DIN 38409-H2-2
Total Cl	mg/l	0.1	0.4	Merck, Aquamerck 11135
BOD_5	mg/l	4	20	DIN 38409-H52
BOD_5 load	kg/d	0.36	-	calculated
COD	mg/l	47.8	90	DIN 38409-H41-1
COD load	kg/d	4.3	-	calculated
TOC	mg/l	7.7	30	ÖNORM EN 6284
NH_4-N	mg/l	1.69	5	DIN 348406-E5-1
NO_3-N	mg/l	4.5	-	DIN EN ISO 10304-1-D19 (IC)
NO_2-N	mg/l	0.05	-	DIN 38405-D10
Total N	mg/l	28.5	-	DIN EN 25663-H11
Total P	mg/l	0.95	1	DIN 38406-D11-4
AOX	mg/l	0.05	0.1	DIN 38409-H14
Low volatile lipophilic substances	mg/l	4.8	20	DIN 348409-H17

Table 73: Results of external-monitoring 2014 apart from external-monitoring according to ÖWAV rule sheet number 6. (Source: Laborbefund, DI Markus Nehammer GmbH, 26.02.2014; 01.07.2014; 26.09.2014)

External-monitoring 2014 (representative fpdcs)						
Parameter	**Unit**	**25.02.2014 – 26.02.2014**	**30.06.2014 – 01.07.2014**	**25.09.2014 – 26.09.2014**	**ELV**	**Method**
Removal efficiency						
Total N	%	83.29	81.93	84.8	75	calculated
Discharge						
Q	m³/d	91	92	87	100	MID
T	°C	9.4	21.7	20.2	30	DIN 38404-C4
pH		7	6.8	6.8	6.5 – 8.5	DIN 38404-C5
TSS	mg/l	8	8	11	30	DIN 38409-H2
Total Cl	mg/l	< 0.05	< 0.05	< 0.05	0.4	DIN 38408-G4
BOD_5	mg/l	3	2	3	20	DIN 38409-H51
BOD_5 load	kg/d	0.27	0.18	0.26	-	calculated
COD	mg/l	42.1	47.6	45.6	90	DIN 38409-H41-1
COD load	kg/d	4	4	4	-	calculated
TOC	mg/l	7.6	13.1	7.5	30	DIN 38409-H3
NH_4-N	mg/l	1.98	1.97	1.45	5	DIN 348406-E5-1
Total N	mg/l	44.9	41.5	37.5	-	DIN 38409-H27
Total P	mg/l	0.93	0.91	0.88	1	DIN 38406-D11-4
AOX	mg/l	< 0.01	< 0.01	< 0.01	0.1	DIN 38409-H14
Low volatile lipophilic substances	mg/l	< 0.5	< 0.5	1.2	20	DIN 348409-H17

4.2.8 Higelsberger GmbH

4.2.8.1 General description

Table 74: General description of installation. (Source: verbal information from 22.01.2016)

Name of the installation	**Higelsberger GmbH, Aisting 66, 4311 Schwertberg**
IPPC activity	6.4 a)
Capacity	5 000 pigs per week
Type and amount of products	At Higelsberger GmbH pig slaughtering is carried out. Within one week about 5 000 pigs are slaughtered. Exclusively slaughtering is carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 16:00 o'clock (without cleaning). Overall about 35 people are employed at Higelsberger GmbH. About 15 are working in the slaughtering process.
Description	Higelsberger GmbH was founded in 1990. Today Higelsberger GmbH belongs to Großfurtner GmbH. At Higelsberger GmbH pig halves are produced and sent to the meat cutting installation of Großfurtner GmbH or sold to other meat processing companies. The pig halves are destined for the domestic market.

The pigs are received in the reception hall and remain there for at least one hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into single file for entering stunning. The pig is lifted so that it cannot move. An electrically charged 2 point stunner with a current of 1.4 A is applied to the head. The stunned pig's carotid gets immediately incised initiating a rapid and profuse bleeding. Afterwards the pig is put on the bleeding table where remaining blood is bleeding out. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes through scalding to loosen the bristles and toenails. Scalding is carried out by spraying 62 °C hot water on the carcase for about 5 minutes. After scalding the pig carcase gets singed. The singeing unit consists in total of 32 burners charged by natural gas. After singeing the carcase passes again bristle removal. The remaining bristles are getting removed by whips. Evisceration is carried out manually. The organs are destined for the food industry after being checked by veterinarians. If the organs are not passing the quality control they are sent to pet-food production sites or rendering installations (depending the quality). The stomach and the intestines are processed by an external company (on-site). After evisceration the carcase gets split in halves. The spinal cord is sucked out and utilized as category 3 animal by-products in rendering installations. Accruing fat (slaughtering fat) is sent to rendering installations and sold as industrial fat. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 3 °C to a core temperature of 7 °C. The pig halves are cooled between 15 hours to 22 hours before being sent to meat cutting installations.

4.2.8.2 Energy generation

At Higelsberger GmbH two low-temperature boilers are installed. The boilers are regulated by federal law on air pollution control and energy technology (Landesgesetz über das Inverkehrbringen, die Errichtung und den Betrieb von Heizungsanlagen, sonstigen Gasanlagen sowie von Lagerstätten für brennbare Stoffe (Oö. Luftreinhalte- und Energietechnikgesetz 2002 – Oö. LuftREnTG – LGBl. Nr. 114/2002 idgF). A heat recovery system of the compressor unit which generates 15 kW is also installed at the installation. Heat recovery from the cooling unit is planned to be installed in 2016.

Table 75: Combustion plants operated on site. (Source: Prüfbericht der Vereinigung österreichischer Kessellieferanten, 06.05.2014 & 12.05.2014)

Combustion plants	**Low-temperature boiler 1 (Buderus)**	**Low-temperature boiler 2 (Bösch)**
Rated thermal Input (kW)	762	80
Start of operation	1989	2003
Fuel	Natural gas	Natural gas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	71	160
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	14.7	3.3

According to the federal law on air pollution control and energy technology (Oö. LuftREnTG, Anhang 1) the NO_x emissions from the combustion of natural gas can exceed the respective emission limit value by 100%.

Table 76: Emission limit values and measurements for the operated combustion plants. (Source: Prüfbericht der Vereinigung österreichischer Kessellieferanten, 06.05.2014 & 12.05.2014)

Emission level (30 min average)			
	Low-temperature boiler 1 (Buderus)	**Low-temperature boiler 2 (Bösch)**	**ELV (30 min average)**
Pollutant			
NO_x (mg/Nm³; 3% O_2)	240[134]	12	120
CO (mg/Nm³; 3% O_2)	2	2	80

[134] According to the federal law on air pollution control and energy technology (Oö. LuftREnTG, Anhang 1) the NO_x emissions from the combustion of natural gas can exceed the respective emission limit value by 100%.

4.2.8.3 Waste and residues

Table 77: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept Higelsberger GmbH, 10.2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Animal by-products,	t	4 800	Slaughtering, meat cutting	Rendering installations
Waste paper		n.V.	Office	Authorised waste disposal company
Metal scraps		n.V.	Garage	Authorised waste disposal company
Plastic scraps	t	n.V.	Entire installation	Authorised waste disposal company
Household-type commercial waste	t	21	Entire installation	Authorised waste disposal company
Kitchen and canteen waste		n.V.	Canteen	Rendering installations
Content of fat separator		n.V.	Garage, WWTP	Rendering installations
Hazardous waste				
Metal container with hazardous residual content		n.V.	Garage	Authorised waste disposal company
Batteries, accumulators		n.V.	Garage, office	Authorised waste disposal company
Fluorescent tubes		n.V.	Garage	Authorised waste disposal company
Plastic container with hazardous residual content		n.V.	Entire installation	Authorised waste disposal company

4.2.8.4 Noise and odour emissions

No systems for reducing noise or odour emissions are installed at Higelsberger GmbH. A shoulder-high wall is fencing the premises which serves as flood protection (due to the installation's proximity to the river Danube).

4.2.8.5 Water and wastewater

Table 78: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 22.01.2016; Mitteilung gemäß §7.(2) der IEV, RHV GB Mauthausen, 05.2010)

Consumption and treatment of water 2014	
Consumption of fresh water	26 035 m³/a (communal supply) 4 252 m³/a (own supply)
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Reinhaltungsverband Gerichtsbezirk Mauthausen-Ost.
Capacity	7 423 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment Biological treatment Buffer tank
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being indirectly discharged via the communal WWTP Reinhaltungsverband Gerichtsbezirk Mauthausen-Ost. Mechanical treatment consists of a screw screen, a drum screen and flotation. Physical-chemical pre-treatment consist of a flotation unit. The wastewater gets enriched by polymers to enhance flocculation. Biological treatment consists of nitrification and de-nitrification and is carried out in a batch procedure.

Table 79: Emission limit values and monitoring frequency for the indirect discharge of process wastewater according to permit. (Source: Wasserrechtliche Bewilligung BH Perg, Wa10-168-16-2008)

Process wastewater					
Parameter	**Unit**	**ELV Permit[135]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	110 m³/d	continuous	daily	1 per year
T	°C	35	spot sample	-	1 per year
TSS	mg/l	150	spot sample	-	1 per year
pH		6.0 – 9.5	spot sample	every working day	1 per year
Total Cl	mg/l	0.4	spot sample	-	1 per year
COD load	kg/d	14.4	fpdcs	weekly	1 per year
BOD_5 load	kg/d	9	fpdcs	monthly	1 per year
AOX	mg/l	1.0	fpdcs	-	1 per year

[135] If not stated differently

Table 80: Summary of self-monitoring results 2014. (Source: Self-monitoring report Higelsberger GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min.	Daily max.	Annual average	Number of samples	ELV
Discharge						
Q	m³/d	0	109	79	365	110
T	°C	11.8	28.1	19.8	250	35
pH		7.7	7.5	7.9	52	6.0 – 9.5
Settleable solids	ml/l	0.11	0.1	0.3	52	-
BOD_5	mg/l	4	5	4	12	-
BOD_5 load	kg/d	0.3	0.4	0.54	12	9
COD	mg/l	28	122	59	52	-
COD load	kg/d	2.44	11.1	5.4	52	14.4
NH_4-N	mg/l	0.2	10.12	3.57	52	-
NH_4-N load	kg/d	0.02	0.8	0.32	52	-

According to the permit on water emissions (Wa10-168-16-2008) external-monitoring has to be conducted for a duration of three days. Fpdcs were taken on March 31st 2014, April 1st 2014 and April 2nd 2014 from 00:00 o'clock to 24:00 o'clock. Spot samples were taken on April 1st, 2nd and 3rd 2014. The emission values from the parameters evaluated via spot samples presented in Table 81 represent the average value of the three conducted spot samples.

Table 81: Results of external-monitoring 2014. (Source: Prüfbericht, IWA, 23.05.2014)

External-monitoring 2014 (representative fpdcs from 31.03.2014 to 02.04.2014)							
Parameter	**Unit**	**fpdcs 31.03.2014**	**fpdcs 01.04.2014**	**fpdcs 02.04.2014**	**Spot sample (3 day average)**	**ELV**	**Method**
Q	m³/d	69	74	79	-	110	MID
T	°C	-	-	-	12.2	35	DIN 38404-4
pH		-	-	-	7.8	6.0 – 9.5	ÖNORM EN ISO 10523
TSS	mg/l	-	-	-	23.7	150	DIN 38409-2
Total Cl	mg/l	-	-	-	< 0.1	0.4	ÖNOMR EN ISO 7393-2
BOD_5	mg/l	< 3	< 3	< 3	-	-	ÖNORM EN 1899-1
BOD_5 load	kg/d	< 0.2	< 0.2	< 0.2	-	9	calculated
COD	mg/l	27	25	26	-	-	DIN 38409-H41/44
COD load	kg/d	1.9	1.9	2.1	-	17.4	calculated
AOX	mg/l	< 0.01	0.018	0.017	-	1	EN ISO 9562

4.2.9 Dachsberger & Söhne GmbH

4.2.9.1 General description

Table 82: General description of installation. (Source: verbal information from 22.01.2016)

Name of the installation	**Dachsberger & Söhne GmbH, Gauderndorf 32, 3730 Eggenburg**
IPPC activity	6.4 a)
Capacity	6 000 pigs per week 20 cattle per week
Type and amount of products	Pig cattle and slaughtering is carried out at Dachsberger & Söhne GmbH. Within one week about 6 000 pigs and 20 cattle are slaughtered. Apart from slaughtering meat cutting and packaging takes also place at the installation. Pig and cattle slaughtering are two separated lines.
Operating hours	1-shift operation per slaughtering line. Operating hours are from Monday to Friday 06:00 o'clock until 14:00 o'clock (exclusive cleaning). Pigs are slaughtered every working day. Cattle slaughtering is carried out on Monday after pig slaughtering (approximately from 12:00 o'clock until 14:00 o'clock). Overall about 200 people are employed at Dachsberger & Söhne GmbH. About 25 are working in the slaughtering process.
Description	Dachsberger & Söhne GmbH was founded in 1949. The installation produces meat predominantly for the domestic market (approximately 80%). In December 2015 a CO_2 stunning unit was installed. Relocation and expansion of the animal reception hall and stables, in order to facilitate animal reception is currently being carried out and planned to be finished by the end of March 2016. In the course of the animal reception hall expansion a bio-filter unit is going to be installed for cleaning the exhaust air of the production hall as well as the stables. Noise barriers to neighbouring settlements are also erected in the course of the expansion, as well as flooding protection.

Production process

As cattle and pig slaughtering are two separated lines, they will be discussed individually in the following.

Pig slaughtering

The pigs are received in the reception hall and remain there for at least one hour for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into groups of four for entering stunning. Stunning takes place with CO_2. The pigs are sent in gondolas transporting 4 pigs at once into a CO_2 bath where the gondola remains for 100 seconds. The stunned pigs get lifted up from the CO_2 bath and removed from the gondola on a designated landing spot. The pig gets lifted on their hind leg and the stunned animal's carotid gets incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes through scalding to loosen the bristles and toenails. Scalding is carried out by passing two water tanks (8 000 litres and 4 000 litres). The water in the tanks has a temperature of 60 °C–62 °C. The water used for scalding is discharged into wastewater pre-treatment at the end of the day shift. After scalding the bristles get automatically removed by passing two bristle removing units, equipped with rubber flails. The second bristles removal unit has also an integrated singeing unit (charged with natural gas). After passing the bristle removal units remaining bristles get removed by whips, before the pig carcase passes through a second singeing step. The singeing unit consists in total of 24 burners charged by natural gas. After singeing the carcase is cleaned by whips before entering evisceration. Evisceration is carried out manually. The organs are destined for the

food industry after being checked by a veterinarian. If the organs are not passing the quality control they are sent to pet-food production sites or rendering installations. The stomach gets emptied, flushed and cleaned. The intestines are cleaned by an external company. The small intestine is destined for the food industry, the large intestine is sent to rendering installations. After evisceration the carcase gets split in halves. The spinal cord is sucked out and utilized as category 3 animal by-products in rendering installations. Accruing fat (slaughtering fat) is sold as industrial fat. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 0 °C to 3 °C to a core temperature of 7 °C. The pig halves are cooled for at least 18 hours before being sent into meat cutting.

Cattle slaughtering

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. In order to initiate a rapid bleeding a chest stab is executed. The accruing blood is collected in a blood tank and sent to rendering installations. Before skinning, the lower part of the legs and the head are removed. The legs are sent to rendering installations. The useable head flesh is cut off. The SRM part of the head is sent as category 1 animal by-product to rendering installations. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold to tanneries. Evisceration is carried out manually. The intestines are sent as category 3 animal by-products to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are checked by veterinarians and sold to the food industry if the quality requirements are met. Otherwise the organs enter the pet-food industry or rendering, depending on the quality. The rumen gets cleaned and sold to the food industry. The remaining parts of the stomach are sent to rendering installations. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sold as industrial fat. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is scratched out and disposed as SRM before the cow half enters classification. The cattle halves remain in a separate cooling house for about 36 hours. The temperature in the cooling house is between 0 °C and 3 °C so that the core temperature does not exceed 7 °C.

4.2.9.2 Energy generation

At Dachsberger & Söhne GmbH a heat recovery system from the cooling house is installed which generates about 60 – 100 kW. Additionally three boilers (Hoval, Viessmann 1 and Viessmann 2) charged by natural gas are installed at the installation. Table 83 and Table 84 present technical characteristics as well as air emissions from the boilers. External-monitoring was conducted during representative operation hours and during full load of the boilers.

Table 83: Combustion plants operated on site. (Source: Prüfbericht Olymp Werk GmbH, 04.03.2015)

Combustion plants	**Boiler 1 (Hoval)**	**Boiler 2 (Viessmann 1)**	**Boiler 3 (Viessmann 2)**
Rated thermal Input (kW)	350 – 620	170	170
Start of operation			
Fuel	natural gas	natural gas	natural gas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	187	181	160.6
Operating hours (h/a)			
Energy recovery			
Fuel use (%)			
Oxygen content (%)			3.4

Table 84: Emission limit values and external measurements for the operated combustion plants. (Source: Prüfbericht Olymp Werk GmbH, 04.03.2015)

Emission level (30 min average)				
	Boiler 1 (Hoval)	**Boiler 2 (Viessmann 1)**	**Boiler 3 (Viessmann 2)**	**ELV**
Pollutant				
CO content (ppm)	27	51	0	
CO_2 content (%)	8.9	8.6	9.89	

4.2.9.3 Waste and residues

Table 85: On-site accruing waste and residues. (Source: Abfallwirtschaftskonzept Dachsberger & Söhne GmbH, 07.2015)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Animal by-products		n.v.	Slaughtering	Rendering installations
Blood		n.v.	Slaughtering	Rendering installations
Bones		n.v.	Slaughtering	Rendering installations
Waste paper		n.v.	Office	Authorised waste disposal company
Cardboard packaging		n.v.	Entire operation	Authorised waste disposal company
Household-type commercial waste		n.v.	Entire operation	Authorised waste disposal company
Floatat		n.v.	Wastewater pre-treatment	Rendering installations
Metal scraps		n.v.	Entire operation	Authorised waste disposal company

4.2.9.4 Noise and odour emissions

In the course of the expansion noise barriers are being erected (starting in December 2015) for reducing noise emissions to neighbouring settlements mainly from animal reception.

A bio-filter unit is planned to be installed in March 2016 (after the construction of the new animal reception hall is completed). The closed bio-filter (container) will be situated in the new animal reception hall for purifying exhaust air from the production hall as well as the stables.

4.2.9.5 Water and wastewater

Table 86: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 27.01.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	120 – 150 m³
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Röschitz
Capacity	3 000 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment
Short description of the process wastewater treatment	Total wastewater is pre-treated before being discharged into the communal sewer system. Mechanical pre-treatment comprises a drum screen for filtering solids. Physical-chemical pre-treatment consists of a floatation unit for extracting emulsified fats and suspended solids. For enhancing flocculation an aluminium based solution is added in the floatation.

Table 87: Emission limit values and monitoring frequency for the indirect discharge of wastewater according to permit. (Source: Wasserrechtliche Bewilligung BH Horn, HOW2-BA-081/001; Wasserrechtliche Bewilligung BH Horn, HOW2-BA-081/002)

Process wastewater					
Parameter	**Unit**	**ELV Permit[136]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	250 m³/d 20 m³/h 6 l/s	continuous	-	1 per year
T	°C	35	continuous	-	1 per year
pH		6.0 – 9.5	spot sample	-	1 per year
TSS	mg/l	150	spot sample	-	1 per year
Total Cl	mg/l	0.4	spot sample	-	1 per year
AOX	mg/l	1.0	fpdcs	-	1 per year
BOD_5 load	kg/d	180	fpdcs	-	1 per year
COD load	kg/l	360	fpdcs	-	1 per year
Low volatile lipophilic substances[115]	mg/l	150	fpdcs	-	1 per year

[136] If not stated differently

No self-monitoring of wastewater emissions is imposed by the authorities, thus only external-emission is conducted as defined by permit.

Table 88: Results of external-monitoring 2014 (Source: Untersuchungsbericht, Terrachem, 10.01.2015)

External-monitoring 2014 (representative fpdcs from 27.11.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Discharge				
Q	m³/d	91	250	MFM[137]
T	°C	22.4	35	DIN 38 404 - C4
pH		7.0 – 7.4	6.0 – 9.5	DIN 38 404 – C5
TSS	mg/l	148	150	DIN 38 409 – H2
Total Cl	mg/l	0.06	0.4	DIN 38 408 – G4
AOX	mg/l	0.14	1.0	DIN EN 1485
BOD_5	mg/l	1965	-	DIN 38409-H51
BOD_5 load	kg/d	178.8	180	calculated
COD	mg/l	3920	-	ÖNORM M 6265
COD load	kg/d	356.7	360	calculated
Total P	mg/l	12.8	-	DIN 38405-D11-4
Low volatile lipophilic substances	mg/l	95	100	DIN 38409 – 56

[137] Magnetic flow meter

4.2.10 Hubers Landhendl GmbH

4.2.10.1 General description

Table 89: General description of installation. (Source: verbal information from 03.02.2016)

Name of the installation	**Hubers Landhendl GmbH, Hauptstraße 80, 5222 Pfaffstätt**
IPPC activity	6.4 a)
Capacity	147 000 chicken per day
Type and amount of products	Exclusively chickens are slaughtered, cut, processed (convenience products) and packed at Hubers Landhendl GmbH.
Operating hours	Monday to Friday, 8 to 10 hours (exclusive cleaning)
Description	The installation is specialized in the slaughtering of chicken. Besides slaughtering, also meat cutting, processing and production of convenience products takes place at the installation site.

The birds are received in the reception hall, where they remain in boxes until being put onto the killing line. After the birds have had time to settle they are put onto a conveyer belt which transports them into a tunnel where the stunning takes place. Chickens at Hubers Landhendl GmbH are stunned by using CO_2. Immediately after stunning the chickens are hung upside down by their feet using shackles on a conveyor belt which moves them through the operation steps. One automatic circular knife initiates the bleeding by cutting the throat. The accruing blood is collected and sent to rendering installations. After stunning and bleeding, the chickens enter the scalding tank which loosens the feathers and thus facilitates the de-feathering. Involuntary defecation can take place while scalding, leading to an accumulation of faeces in the water. Birds' faeces dissociate to form ammonium nitrate and uric acid in the water (German Federal Environmental Agency, 2003). The scalding tank has a volume of 20 m³. The water temperature is about 52 °C. At the end of the working day the scalding tank gets emptied and cleaned. The scalding tank is continuously fed with fresh water. After scalding the feathers are mechanically plucked and remaining feathers are plucked by hand. The feathers are sent to rendering installations. In a final step the claws, head, intestines and organs get removed. The intestines as well as the claws and heads are sent to rendering installations. Heart, liver, stomach and the throat are sold as food products, if the quality requirements are met and demand is sufficient. If not they are sold to the pet-food industry or sent to rendering installations. Before the chicken enters chilling it gets washed using chlorine dioxide. Chilling is carried out by letting the chicken carcases pass a chilling line which reaches over three floors. Overall the chicken carcase spends 2.6 hours passing the different chilling stages until the core temperature is cooled down from 35 °C to 2 °C. After chilling the carcases are weighed and classified. Depending on the quality of the chicken it gets sold as an entire chicken or enters meat cutting and processing.

4.2.10.1 Energy generation

Two boilers (each 850 kW) are operated at Hubers Landhendl GmbH. The boilers are regulated by federal law on furnaces (Vereinbarung gemäß Art 15a B VG über das Inverkehrbringen von Kleinfeuerungen und die Überprüfung von Feuerungsanlagen und Blockheizkraftwerken LGBl Nr 1/2013 idgF). According to Article 14 LGBl Nr 1/2013 emission limit values of the ordinance on firing installations

are applicable for furnaces with a rated thermal input bigger than 50 kW. External-monitoring has to be carried out annually (for firing installations >50 kW) during normal operation. Monitoring has to be carried out preferably according to the respective ÖNORM. Annual monitoring of the boiler system at Hubers Landhendl GmbH was conducted according to ÖNORM M 7510.

Table 90: Combustion plant operated on site (Source: Messprotokoll, 28.05.2015; Messprotokoll 06.08.2015)

Combustion plants	**Boiler 1 (Bösch LRP)**	**Boiler 2 (Bösch LR26)**
Rated thermal Input (kW)	850	850
Start of operation		
Fuel	natural gas	natural gas
Flue gas cleaning		
Flue gas temperature (°C)	145 full load 103 partial load	164 full load 89 partial load
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	4.7 full load 3.5 partial load	5.5 full load 3.5 partial load

Table 91: Emission limit values and measurements for the operated combustion plant according to ÖNORM M 7510 (Source: Messprotokoll, 28.05.2015; Messprotokoll, 06.08.2015)

Emission level (30 min average)			
	Boiler (Bösch LRP)	**Boiler (Bösch LR26)**	**ELV (30 min average)**
Pollutant	**Partial load**	**Full load**	
NO_x (mg/Nm³; 3% O_2)	0 full load 0 partial load	0 full load 0 partial load	120
CO (mg/Nm³; 3% O_2)	14 full load 18 partial load	0 full load 0 partial load	80

4.2.10.2 Waste and residues

Table 92: On-site accruing waste and residues. (Source: Abfallwirtschaftskonzept Hubers Landhendl GmbH, 01.2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Food and kitchen waste	t	4	Entire installation	Rendering installations
Animal by-products	t	9 500	Slaughtering, meat cutting, meat processing	Rendering installations
Waste wood	kg	50	Slaughtering, garage	Sold
Waste paper	m³	1 000	Entire installation	Authorised waste disposal company
Industrial waste	t	100	Entire installation	Authorised waste disposal company
Residues from cleaning and disinfection		n.V.	Office, canteen, slaughtering	Authorised waste disposal company
Empty truss		n.V.	Meat processing	Return to distributor
Hazardous waste				
Fluorescent tubes		n.V.	Entire installation	Authorised waste disposal company
Batteries and accumulators		n.V.	Office, garage, canteen	Authorised waste disposal company
Glass, hard plastic		n.V.	Entire installation	Authorised waste disposal company
Waste oil				
Waste oil and grease	t	25	Canteen, garage	Authorised waste disposal company

4.2.10.3 Noise and odour emissions

In order to reduce noise emissions, especially from the animal delivery, a noise barrier was erected.

For reducing odour emissions two bio-filter units are installed at Hubers Landhendl GmbH. Bio-filter unit 1 purifies the exhaust air from the slaughtering process. Bio-filter unit 2 purifies the exhaust air from lairage.

Bio-filter unit 1 consists of three closed bio-filters (container) which are connected in series. Overall the bio-filter unit has a capacity of 25 000 m³/h and the filter medium is bark mulch. Bio-filter unit 2 is opened and has a capacity of 150 000 m³/h. The filter medium is bark mulch.

Before entering the bio-filter units the exhaust air passes air washers and heating so that the exhaust air meets the required temperature and moisture content for ensuring proper operation of the bio-filter units. A functional check of the bio-filter units has to be executed by annual olfactory measurements. The olfactory measurement has to be below 500 odour unit/m³ and the removal efficiency has to be 85% according to permit Ge20-172-2009.

Table 93: External-monitoring of odour emissions. (Source: Protokoll ABluftmessung Biofilteranlagen, FP Ablufttechnik, 07.03.2014)

External-monitoring of bio-filters 2014				
	Discharge	**Removal efficiency**	**ELV Permit**	
	Odour unit/m³	**%**	**Odour unit/m³**	**%**
Bio-filter unit 1	287	97	500	85
Bio-filter unit 2	445	55[138]	500	85

[138] The removal efficiency of bio-filter unit 2 was below the by permit defined value of 85%. The modest removal efficiency can be explained by the inherent odour of the newly filled in filter medium. The inherent odour is expected to decrease.

4.2.10.4 Water and wastewater

Table 94: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 03.02.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	1 250 m³/day
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Reinhalteverband Mattig-Hainbach.
Capacity	16 000 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment Biological treatment Sedimentation basin
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being indirectly discharged via the communal WWTP Reinhalteverband Mattig-Hainbach. Mechanical treatment consists of a drum screen. Physical-chemical pre-treatment consists of a flotation unit. For enhancing flocculation flocculating agents are added. Biological treatment consists of nitrification, de-nitrification. Before the pre-treated wastewater gets discharged into the public sewer system it enters a sedimentation basin.

Table 95: Emission limit values and monitoring frequency for the indirect discharge of process wastewater. (Source: Gewerberechtliche Genehmigung BH Braunau, Ge20-226-2013; Wasserrechtliche Bewilligung BH Braunau Wa10-159-61-1998)

Process wastewater					
Parameter	**Unit**	**ELV Permit**[139]	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	800 m³/d[140] 54 m³/h	continuous	every working day	-
pH		6.5-9.5	spot sample	1 per week	1 per year (over a duration of 1 working week)
T	°C	35	spot sample	-	1 per year (over a duration of 1 working week)
Total Cl[141]	mg/l	0.4	spot sample	-	1 per year
Settleable substances	ml/l	10	spot sample	2 per week	-
TSS	mg/l	30	spot sample	-	1 per year (over a duration of 1 working week)
BOD_5 load	kg/d	16	fpdcs	1 per week	1 per year (over a duration of 1 working week)
COD load	kg/d	72	fpdcs	2 per week	1 per year (over a duration of 1 working week)
AOX	mg/l	0.6	fpdcs	-	1 per year
Low volatile lipophilic substances	mg/l	20	fpdcs	-	1 per year (over a duration of 1 working week)
NH_4-N	mg/l	5[142]	fpdcs	2 per week	1 per year (over a duration of 1 working week)

[139] If not stated differently

[140] In individual cases 1 250 m³/d

[141] According to ordinance

[142] > 12 °C (Average over measurment days)

The permitted ELVs for the indirect discharge of pre-treated wastewater got recently changed and came into force in 2015. Thus self- and external-monitoring from 2015 is presented in the following.

Table 96: Summary of self-monitoring 2015. (Source: Überprüfungsbericht, Maringer & Watschinger Labor GmbH, 29.01.2015)

Parameter		Self-monitoring 2015			
		Daily max.	Annual average	Number of samples	ELV
Discharge					
Q	m³/d	1 283	877.9	365	800 m³/d[143] 54 m³/h
T	°C	27.40	22.23	246	35
pH		6.8[144] 7.8[145]	7.2	246	6.5 – 9.5
BOD_5 load	kg/d	13.40	3.21	87	16
COD load	kg/d	49.37	23.15	119	72
NH_4-N	mg/l	35.60[146]	7.07[147]	125	5
Settleable substances	ml/l	6.00	3.51	150	10

External-monitoring was carried out on five working days – 07.01.2015 (A), 08.01.2015 (B), 09.01.2015 (C), 12.01.2015 (D), 13.01.2015 (E). The determined values are presented in Table 97.

Table 97: Results of external-monitoring 2015. (Source: Überprüfungsbericht, Maringer & Watschinger Labor GmbH, 29.01.2015)

External-monitoring 2015 (representative fpdcs)								
Parameter	**Unit**	**A**	**B**	**C**	**D**	**E**	**ELV**	**Method**
Discharge								
Q	m³/d	820	1 118	1 204	628	1 052	800 1 250	MID
T	°C	-	-	-	-	-	35	DIN 38404-C4
pH		7.19	7.21	7.02	7.05	6.98	6.5-8.5	DIN 38404-T5
TSS	mg/l	4	2	3	3	4	30	DIN 38409-H9
Total Cl	mg/l	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	0.4	DIN 38408-G4
BOD_5	mg/l	3	6	4	3	3	-	DIN 38409-H51
BOD_5 load	kg/d	2	7	5	2	3	16	calculated
COD	mg/l	25.03	73.42	52.42	27.3	32.8	-	DIN 38409-T41
COD load	kg/d	21	82[148]	63	17	35	72	calculated
NH_4-N	mg/l	3.38	9.76[149]	8.4[150]	4.91	4.43	5	DIN 348406-T5
AOX	mg/l	0.087	< 0.01	0.064	0.015	0.022	0.6	DIN EN ISO 9562-H14
Low volatile lipophilic substances	mg/l	< 1	2	1	2	2	20	DIN 348409-T17

[143] In individual cases 1 250 m³/d

[144] Value 2014

[145] Value 2014

[146] Exceedance

[147] Exceedance

[148] No exceedance due to „4 out of 5" rule – if 4 out of 5 measures comply and one measure is not by 50% higher than the ELV the parameter is complying with the ELV

[149] Exceedance

[150] Exceedance

4.2.11 Alpenrind GmbH

4.2.11.1 General description

Table 98: General description of installation (Source: verbal information from 02.02.2016)

Name of the installation	**Alpenrind GmbH, Metzgerstraße 67, 5020 Salzburg**
IPPC activity	6.4 a)
Capacity	1 500 – 2 000 cattle/week
Type and amount of products	At Alpenrind GmbH cattle slaughtering is carried out. Within one week about 1 500 to 2 000 cattle are slaughtered. Slaughtering and meat cutting is carried out at the installation.
Operating hours	1-shift operation from Monday to Friday from 09:00 o'clock to 17:00 o'clock (exclusive cleaning). Overall about 200 people are employed at Alpenrind GmbH. About 32 are working in the slaughtering process.
Description	Alpenrind GmbH is part of the OSI Europe Foodworks GmbH. The slaughtered animals are predominantly destined for the EU market.

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. The carotid is immediately incised initiating a rapid bleeding. The accruing blood is collected in a blood tank and sent to rendering installations. Successively the carcase gets skinned and the lower part of the legs and the head are removed. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold. The lower part of the legs is sent to rendering installations. The heads are processed on site, apart from the SRM graded parts of the head, which are sent to rendering installations. Evisceration is carried out manually. The intestines are separated into white and red intestines. White intestines are processed, red intestines are sent to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are checked by veterinarians and sold to the food industry if the quality requirements are met. Otherwise the organs enter the pet-food industry or rendering, depending on the quality. The cleaned stomachs are further processed and sold to the food industry. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sold as industrial fat. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent into the cooling house for lowering the core temperature to 7 °C. The cow halves remain for about 24 hours in the cooling house before entering meat cutting.

4.2.11.1 Energy generation

Two 300 kW boilers are installed at Alpenrind GmbH. Emission values are regulated by federal law (Gesetz vom 4. Februar 2009 zum Zweck der Reinhaltung der Luft beim Betrieb von Heizungsanlagen (Luftreinhaltegesetz für Heizungsanlagen)). Furthermore heat recovery from the cooling unit which generates 400 kW is installed at Alpenrind GmbH. In 2015 heat recovery from the compressor unit which generates 70 kW was also installed.

Table 99: Combustion plants operated on site. (Source: Prüfbericht für Feuerungsanlagen, 20.05.2014)

Combustion plants	Boiler 1	Boiler 2
Rated thermal Input (kW)	300	300
Start of operation		
Fuel	Natural gas	Natural gas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	145	170
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	3.5	3.4

Table 100: Emission limit values and measurements for the operated combustion plants. (Source: Prüfbericht für Feuerungsanlagen, 20.05.2014)

Emission levels (30 min average)			
Pollutant	**Boiler 1**	**Boiler 2**	**ELV (30 min average)**
CO (ppm)	7	3	100
Exhaust gas loss (%)	5.6	6.6	10
Boiler efficiency (%)	93.2	92.2	86

4.2.11.2 Waste and residues

Table 101: On-site accruing waste and residues. (Source: Abfallwirtschaftskonzept Alpenrind GmbH, 08.2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Rumen content	t	1 180	Slaughtering	Distributor
Organic waste from cattle	t	105	Lairage	Distributor
Bedding	t	272.5	Lairage	Distributor
Blood	t	2 280.18	Slaughtering, meat cutting	Rendering installations
Animal by-products	t	5 525.51	Slaughtering, meat cutting	Rendering installations
Packaging material	t	40	Office, canteen, packaging	Authorised waste disposal company
Plastic foil	t	257.18	Office, canteen, packaging	Authorised waste disposal company
Household-type commercial waste	t	282.66	Entire installation	Authorised waste disposal company
Plastic containers	t	4.8	Meat cutting	Returning to distributor
Pressure gas packs	kg	50	Garage	Authorised waste disposal company
Kitchen and canteen waste (organic)	t	2	Canteen	Authorised waste disposal company
Metal scraps	t	2	Garage	Authorised waste disposal company

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Hazardous waste				
Fluorescent tubes	kg	25	Entire installation	Authorised waste disposal company
Electronic waste	kg	95	Entire installation	Authorised waste disposal company
Batteries	kg	16	Garage	Authorised waste disposal company
Laboratory waste	kg	7	Laboratory	Returning to distributor
Sludge from wastewater treatment with hazardous contents	t	1 020.36	WWTP	Rendering installations
Waste oil				
Waste oil	kg	564	Garage	Authorised waste disposal company
Oil contaminated equipment	kg	100	Garage	Authorised waste disposal company
Oil separator content	kg	6 030	Cleaning area transporters	Authorised waste disposal company

4.2.11.3 Noise and odour emissions

In order to reduce odour emissions a bio-filter unit is installed at Alpenrind GmbH purifying the exhaust air from the production hall (stomach processing, SRM-room) and the wastewater treatment. The closed bio-filter has a volume of about 27 m³. Filter medium is bark mulch. No emission limit values for odour emissions are imposed by the authorities.

As Alpenrind GmbH is located in an industrial area, there is no need for the installation of noise barriers.

4.2.11.4 Water and wastewater

Table 102: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 02.02.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	600 m³/day
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Reinhalteverband Großraum Salzburg.
Capacity	1 000 m³/d (technical capacity)
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment
Short description of the process wastewater treatment	Wastewater streams from Alpenrind GmbH are separated into three streams – slaughtering, cleaning of the animal transporters and cleaning of the meat transporters. Wastewater accruing in the slaughtering process is pre-treated before being discharged into the communal sewer system. Wastewater from cleaning the transporters is sent through oil separators before entering the communal sewer system. In the following wastewater from slaughtering is discussed. Process wastewater is mechanically and chemically, physically pre-treated before being indirectly discharged communal WWTP Reinhalteverband Großraum Salzburg. Mechanical treatment consists of a drum screen. Physical-chemical pre-treatment consists of a flotation unit. For enhancing flocculation flocculating agents are added.

Table 103: Emission limit values and monitoring frequency for the indirect discharge of process wastewater. (Source: Jahresbericht 2014, Hydrologische Untersuchungsstelle Salzburg, 02.03.2015)

Process wastewater					
Parameter	**Unit**	**ELV Permit[151]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	400 m³/d 7 l/s	continuous	continuous	6 per year
pH		6.0–9.5	spot sample	continuous	6 per year
T	°C	35	spot sample	continuous	6 per year
Total Cl	mg/l	0.4	spot sample	-	6 per year
Total Cl load	kg/d	0.16	calculated	-	6 per year
TSS	mg/l	150	spot sample	-	6 per year
TSS load	kg/d	60	calculated	-	6 per year
Settleable substances	ml/l	10	spot sample	-	6 per year
Settleable substances load	l/d	4 000	calculated	-	6 per year
BOD_5	mg/l	1 400	fpdcs	-	6 per year
BOD_5 load	kg/d	560	calculated	-	6 per year
COD	mg/l	1 875	fpdcs	-	6 per year
COD load	kg/d	750	calculated	-	6 per year
AOX	mg/l	0.6	fpdcs	-	6 per year
AOX load	kg/d	0.24	calculated	-	6 per year
Total P	mg/l	50	fpdcs	-	6 per year
Total P load	kg/d	20	calculated	-	6 per year
Low volatile lipophilic substances	mg/l	100	fpdcs	-	6 per year
Low volatile lipophilic substances load	kg/ d	40	calculated	-	6 per year
Total N	mg/l	200	fpdcs	-	6 per year
Total N load	kg/d	80	calculated	-	6 per year
SO_4	mg/l	200	fpdcs	-	6 per year
SO_4 load	kg/d	80	calculated	-	6 per year

Table 104: Summary of self-monitoring 2014. (Source: Jahresbericht 2014, Hydrologische Untersuchungsstelle Salzburg, 02.03.2015)

Parameter		**Self-monitoring 2014**				
		Daily min	**Daily max**	**Annual average**	**Number of samples**	**ELV**
Q	m³/d	161	519	320.16	248	400
pH		6.1	7.4	6.99	247	6.0 – 9.5

[151] If not stated differently

Fpdcs for external-monitoring were taken on the dates presented in the following.

- 21. – 22.01.2014
- 20. – 21.03.2014
- 27. – 28.05.2014
- 21. – 22.07.2014
- 04. – 05.11.2014
- 22. – 23.01.2015

Table 105: Results of external-monitoring 2014. (Source: Jahresbericht 2014, Hydrologische Untersuchungsstelle Salzburg, 02.03.2015)

External-monitoring 2014 (representative fpdcs)									
Parameter	**Unit**	**A**	**B**	**C**	**D**	**E**	**F**	**ELV**	**Method**
Q	m³/d	290	519[152]	328	232	398	339	400	MID
Settleable substances	ml/l	8.5	0.5	0.8	3.0	2.0	0.4	10	ÖNORM M 6271
Settleable substances load	l/d	2 465	295	262.4	696	796	136	4 000	calculated
TSS[153]	mg/l	710	310	230	220	230	188	150	ÖNORM M 6274
TSS load[154]	kg/d	205.9	160.9	75.4	51.0	91.5	63.7	60	calculated
COD	mg/l	1 310	1 000	810	860	890	530	1 875	ÖNORM M 6265
COD load	kg/d	379.9	519	265.7	199.5	354.2	179.7	750	calculated
BOD_5	mg/l	720	610	670	700	500	460	1 400	manometric
BOD_5 load	kg/d	208.8	316.6	219.8	162.4	199	155.9	560	calculated
Total N	mg/l	72	55	47	55	107	32	200	DIN EN ISO 11905-1
Total N load	kg/d	20.9	28.6	15.4	12.8	42.6	10.8	80	calculated
Total P	mg/l	12.8	10.7	9.6	9.2	14.7	5.8	50	DIN EN ISO 6878
Total P load	kg/d	3.71	5.55	3.15	2.13	5.85	1.97	20	calculated
Total Cl	mg/l	0.07	0.154	0.062	< 0.05	< 0.05	0.066	0.4	DIN 38408-4-2
Total Cl load	kg/d	0.02	0.09	0.02	< 0.01	< 0.02	0.02	0.16	calculated
SO_4	mg/l	11.6	10.9	10.0	9.9	16.8	9.1	200	DIN EN ISO 10304-1
SO_4 load	kg/d	3.36	5.66	3.28	2.3	6.69	3.08	80	calculated
AOX	mg/l	0.23	0.49	0.43	0.36	0.21	0.12	0.6	CSN EN ISO 9552
AOX load	kg/d	0.07	0.25[155]	0.14	0.08	0.09	0.04	0.24	calculated
Low volatile lipophilic substances	mg/l	72	84	70	82	44	26	100	DIN 38409-17 (analog)
Low volatile lipophilic substances load	kg/d	20.9	43.6[156]	23.0	19.0	17.5	8.8	40	calculated

[152] Exceedance

[153] Exceedance of all 6 measures

[154] Exceedance except for the measurement undertaken on the 21. – 22.07.2014

[155] No exceedance due to „4 out of 5“ rule

[156] No exceedance due to „4 out of 5“ rule

4.2.12 Rudolf Großfurtner GmbH

Rudolf Großfurtner GmbH consists of two slaughtering installations (St. Martin and Utzenaich) which are about 3 km apart from each other (beeline). Both installations are dealt with together in this sub-chapter.

4.2.12.1 General description

Table 106: General description of installation – Utzenaich. (Source: verbal information from 03.02.2016)

Name of the installation	**Rudolf Großfurtner GmbH, Hofmarkt 1, 4972 Utzenaich**
IPPC activity	6.4 a)
Capacity	1 200 cattle/week
Type and amount of products	On the premises Utzenaich cattle slaughtering is carried out exclusively. Within one week about 1 200 cattle are slaughtered. Besides slaughtering meat cutting and packaging is also carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 05:00 o'clock until 16:00 o'clock (without cleaning). Overall about 100 people are employed at the premises Utzenaich. About 25 are working in the slaughtering process.
Description	About 60% of the slaughtered animals are destined for foreign markets. Rudolf Großfurtner GmbH exports worldwide.

Table 107: General description of installation – St. Martin. (Source: verbal information from 03.02.2016)

Name of the installation	**Rudolf Großfurtner GmbH, Diesseits 230, 4973 St. Martin**
IPPC activity	6.4 a)
Capacity	10 000 pigs/week
Type and amount of products	On the premises St. Martin pig slaughtering is carried out exclusively. Within one week about 10 000 pigs are slaughtered. Besides slaughtering meat cutting and packaging is also carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 04:00 o'clock until 20:00 o'clock (without cleaning). Overall about 350 people are employed at the premises St. Martin. About 25 are working in the slaughtering process.
Description	About 60% of the slaughtered animals are destined for foreign markets. Rudolf Großfurtner GmbH exports worldwide.

Cattle slaughtering (Utzenaich):

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. Bleeding is immediately initiated. The accruing blood is collected in a blood tank. Successively the carcase gets skinned and the lower part of the legs and the head are removed. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold. The lower part of the legs is sent to rendering installations. The heads are processed on site, apart from the SRM graded parts of the head, which are sent to rendering installations. Evisceration is carried out manually. The intestines are sent to rendering installations. Organs, e.g. heart, liver, kid-

neys and lung, are checked by veterinarians and sold to the food industry if the quality requirements are met. Otherwise the organs enter the pet-food industry or rendering, depending on the quality. The cleaned stomachs are destined for food production. Rumen content from the stomachs are applied in the company owned biogas plant (St. Martin). Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sold as industrial fat. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent to the cooling unit.

Pig slaughtering (St. Martin):

The pigs are received in the reception hall. Along a fenced passageway the pigs are step by step put into groups of two for entering stunning. Stunning takes place with CO_2. The pigs are sent in gondolas transporting 2 pigs at once into a CO_2 bath where the gondola remains for 100 seconds. The stunned pigs get lifted up from the CO_2 bath and removed from the gondola on a designated landing spot. The pig gets lifted on their hind leg and the stunned animal's carotid gets incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank. After bleeding the pig carcase passes through scalding to loosen the bristles and toenails. Scalding is carried out by letting the carcase pass through a water tank filled with 60.5 °C hot water for about 6 to 7 minutes. The water used for scalding is recirculated. The water tank for the scalding water is emptied at the end of the day shift. The scalding tank has a capacity of about 10 m³. After scalding the bristles get automatically removed by dry whips. Subsequently the pig carcase gets singed. The singeing unit consists in total of 24 burners charged by natural gas. After singeing the carcase passes again bristle removal (wet whips) before being manually eviscerated. The organs are destined for the food industry after being checked by a veterinarian. If the organs are not passing the quality control they are sent to pet-food production sites. The stomach gets emptied, flushed and cleaned. It is also destined for the food industry. The intestines are cleaned and sent to the food industry – apart from the colon (large intestine) which is applied in the company owned biogas plant. After evisceration the carcase gets split in halves. The spinal cord is sucked out and sent to rendering installations. Accruing fat (slaughtering fat) is sold to external fat melting installations. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 3 °C to a core temperature of 7 °C. The pig halves are cooled for at least 12 hours before being sent into meat cutting.

4.2.12.1 Energy generation

Utzenaich:

At the premises Utzenaich two boilers for heating and hot water treatment are installed. Heat recovery from the cooling house is currently getting installed and is planned to be completed until the end of 2016.

Table 108: Combustion plants operated on site – Utzenaich. (Source: Prüfbericht, 16.02.2015)

Combustion plants Utzenaich	**Boiler 1 (Viessmann)**	**Boiler 2 – steam boiler (Loos)**
Rated thermal Input (kW)	170	670
Start of operation		
Fuel	Natural gas	Natural gas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	187 (full load) 157 (partial load)	238 (full load) 167 (partial load)
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	10.1 (full load) 9.9 (partial load)	10.1 (full load) 9.7 (partial load)

Table 109: Emission limit values and measurements for the operated combustion plants – presented concentrations of exhaust air at 1 013 hPa and 3% oxygen content – Utzenaich. (Source: Prüfbericht, 16.02.2015)

Short term emission levels as half-hour averages Utzenaich					
	Boiler 1		**Boiler 2**		**ELV (30 min average)**
Pollutant	**Full load**	**Partial load**	**Full load**	**Partial load**	
NO_x (mg/Nm³; 3% O_2)	69	54	100	91	120
CO (mg/Nm³; 3% O_2)	0	0	0	0	80
Exhaust gas loss (%)	7.3	5.9	9.8	6.8	10

St. Martin:

Two boilers and a biogas plant (with an attached cogeneration unit) are installed at the premises St. Martin. The biogas plant generates about 3 000 MWh/a and covers 40% of the required heat demand. The biogas is predominantly produced by the fermentation of accruing animal by-products (which do not have to be disposed via rendering installations) and the floatat and filtered solids from the wastewater treatment. The type of organic waste allowed to enter the biogas plant is defined by permit (AUWR-2006-874/519-Ai/Bö). Residues from the fermentation are used for agricultural landspreading, which is also regulated by the same permit (AUWR-2006-874/519-Ai/Bö). Emissions of the combustion of biogas have to be measured for the parameters NO_x, CO, Total C without CH_4, H_2S and exhaust air velocity. The cogeneration unit has to be externally monitored at least every year. In the course of the annual monitoring CO and NO_x emissions have to be measured. Nevertheless at least all five years the emission values of all before listed parameters need to be monitored. Requirements regarding air pollution control are also regulated via permit (AUWR-2006-874/519-Ai/Bö).

Table 110 presents the general information of the combustion plants operated on-site (St. Martin). Table 111 and Table 112 present the emission values and emission limit values for the combustion plants.

Table 110: Combustion plants operated on site – St. Martin. (Source: Gutachten, Bösch, 26.05.2015; Bericht TÜV Austria, 27.03.2015; Bescheid AUWR-2006-874/519-Ai/Bö, Amt der Oö. Landesregierung, 26.03.2015)

Combustion plants St. Martin	**Boiler 1 (Omnical)**	**Boiler 2 (Hoval)**	**Cogeneration unit**
Rated thermal Input (kW)	1 450	580	526
Start of operation	1994	1991	2008
Fuel	Natural gas	Natural gas	Biogas
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction	Oxidation catalyst
Flue gas temperature (°C)			183
Operating hours (h/a)			
Energy recovery			
Steam production (t/h)			
Steam parameter (p, T)			
Fuel use (%)			78
Oxygen content (%)			8.3

Table 111 presents the emission levels and emission limit values for the two boilers operated on the premises St. Martin. Three consecutive half-hour measurements were conducted on March 16th 2015. External emission evaluations were performed during full, minimal and normal load.

Table 111: Emission limit values and short term measurements for the operated boilers through the combustion of natural gas – presented concentrations of exhaust air at 1013 hPa and 3% oxygen content. (Source: Gutachten, Bösch, 26.05.2015)

Short term emission levels as half-hour averages St. Martin							
	Boiler 1			**Boiler 2**			**ELV (30 min average)**
Pollutant	**Full load**	**Minimal load**	**Normal load**	**Full load**	**Minimal load**	**Normal load**	
NO_x (mg/Nm³; 3% O_2)	109.6	109.3	101.3	102.5	111.3	109.4	120
CO (mg/Nm³; 3% O_2)	7.0	7.3	7.8	1.0	7.9	8.6	80
Exhaust gas loss (%)	8.4	5.3	6.0	8.3	4.1	4.5	10

Table 112 presents the emission levels and emission limit values (as defined by permit) for the cogeneration unit of the biogas plant. Three consecutive half-hour measurements were conducted on November 06th 2014. External emission evaluations were performed during normal operation.

Table 112: Emission limit values and short term measurements for the operated cogeneration unit through the combustion of biogas – presented concentrations of exhaust air at 1 013 hPa and 5% oxygen content. (Source: Bericht TÜV Austria, 27.03.2015, Bescheid AUWR-2006-874/519-Ai/Bö, Amt der Oö. Landesregierung, 26.03.2015)

Short term emission levels (3 half-hour measurements) St. Martin			
	Cogeneration unit (biogas plant)		**ELV (Permit)**
Pollutant	**Max**	**Average**	
NO_x (mg/Nm³; 5% O_2)	379	377	400
CO (mg/Nm³; 5% O_2)	139	137	650
Total C (mg/Nm³, 5% O_2)	1 386	1 366	-
CH_4 (mg/Nm³, 5% O_2)	1 380	1 374	-
Total C without CH_4 (mg/Nm³, 5% O_2)	66	64	150
H_2S (mg/Nm³, 5% O_2)	< 3	< 3	5
Exhaust air velocity	-	23.0	≥ 6

4.2.12.2 Waste and residues

Organic waste, especially animal by-products (which do not have to be disposed via rendering installations) and the flotat from wastewater treatment, is predominantly applied in the company owned biogas plant in St. Martin. Residues from the fermentation are collected by farmers for agricultural landspreading. Table 113 presents the accruing waste and residue amounts of both installations, Utzenaich and St. Martin.

Table 113: Values of on-site accruing waste and residues from 2014 – both installations. (Source: Abfallwirtschaftskonzept, Rudolf Großfurtner GmbH, 2014)

Waste and residue management 2014 Utzenaich & St. Martin				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Unusable food		n.V.	Slaughtering cattle &pig, meat cutting cattle & pig, canteen Utzenaich & St. Martin	Rendering installations
Animal by-products which have to be disposed via rendering installtions	t	5 134	Slaughtering cattle &pig, meat cutting cattle & pig	Rendering installations
Skins and furs	pieces	49 898	Slaughtering cattle	Tannery
Waste wood (clean)	t	13	Packaging, broken pallets	Authorised waste disposal company
Waste paper	t	19.62	Office Utzenaich & St. Martin	Authorised waste disposal company
Metal scraps	t	9.94	Garage Utzenaich & St. Martin, canteen Utzenaich	Authorised waste disposal company
Plastic containers	t	15.12	Entire installation Utzenaich & St. Martin	Authorised waste disposal company
Household-type commercial waste	t	98.6	Entire installation	Authorised waste disposal company
Fat separator content	t	8.62	Garage Utzenaich & St. Martin	Authorised waste disposal company
Hazardous waste				
Hazardous waste	t	0.66	Garage Utzenaich & St. Martin	Authorised waste disposal company
Waste oil				
Waste oil		n.V.	Canteen Utzenaich & St. Martin	Authorised waste disposal company

4.2.12.3 Noise and odour emissions

Utzenaich:

In order to lower odour emissions an activated carbon filter purifying the exhaust air form the production hall, the blood tank and storage facilities for animal by-products was installed. The activated carbon filter has a capacity of 40 000 m³/h.

St. Martin:

For reducing odour emissions from the blood tank an activated carbon filter was installed. The activated carbon filter has a capacity of 36 000 m³/h. No exhaust air purification from the animal by-product storage facilities is required, as those are cooled.

4.2.12.4 Water and wastewater

Table 114: Summary of water consumption and wastewater treatment 2014 – Utzenaich. (Source: verbal information from 03.02.2016)

Consumption and treatment of water 2014 **Utzenaich**	
Consumption of fresh water	32 386 m³/a (from company owned wells and fountains)
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Reinhalteverband Mittlere Antiesen.
Capacity	2 000 EW_{100}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment
Short description of the process wastewater treatment	Total wastewater is pre-treated before being indirectly discharged via the communal WWTP Reinhalteverband Mittlere-Antiesen. Mechanical treatment consists of a drum screen. Physical-chemical pre-treatment consists of flotation where flocculating agents are added.

Table 115: Summary of water consumption and wastewater treatment 2014 – St. Martin. (Source: verbal information from 03.02.2016)

Consumption and treatment of water 2014 **St. Martin**	
Consumption of fresh water	96 296 m³/a (from company owned wells and fountains)
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Reinhalteverband Mittlere Antiesen.
Capacity	4 400 EW_{100}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment
Short description of the process wastewater treatment	Total wastewater is pre-treated before being indirectly discharged via the communal WWTP Reinhalteverband Mittlere-Antiesen. Mechanical treatment consists of a drum screen. Physical-chemical pre-treatment consists of flotation where flocculating agents are added.

Table 116: Emission limit values and monitoring frequency for the indirect discharge of process wastewater – Utzenaich. (Source: Antrag auf Wiederverleihung der IEV-Zustimmung, Machowetz & Partner Consulting Ziviltechniker GmbH, 14.07.2014; Anlagengenehmigung BH Ried i. Innkreis, Ge21-3-2006)

Process wastewater Utzenaich					
Parameter	**Unit**	**ELV Permit[157]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	150	continuous	every working day	1 per year (over a period of one working week)
Q weekly average	m³/d	100	calculated	-	1 per year (over a period of one working week)
Settleable substances	ml/l	10	spot sample	-	1 per year (over a period of one working week)
TSS	mg/l	150[158]	spot sample	-	1 per year (over a period of one working week)
BOD_5 load (weekly average)	kg/d	160[159]	calculated	-	1 per year (over a period of one working week)
COD load	kg/d	312	calculated	-	1 per year (over a period of one working week)
COD load (weekly average)	kg/d	200	calculated	-	1 per year (over a period of one working week)
pH		6.0 – 9.5	spot sample	-	1 per year (over a period of one working week)
Low volatile lipophilic substances	mg/l	150	fpdcs	-	1 per year (over a period of one working week)
Total N load (weekly average)	kg/d	25[159]	calculated	-	1 per year (over a period of one working week)
T	°C	35	spot sample	-	1 per year (over a period of one working week)
AOX	mg/l	1.0	fpdcs	-	1 per year
Total Cl[160]	mg/l	0.4	fpdcs	-	1 per year (over a period of one working week)

[157] If not stated differently

[158] Higher values are allowed if no technical malfunctions of the sewer system or the communal WWTP arise (according to consent with communal WWTP)

[159] According to consent with communal WWTP

[160] No measurement method is currently existing for defining Total Cl concentrations in stained wastewater

Table 117: Emission limit values and monitoring frequency for the indirect discharge of process wastewater – St. Martin. (Source: Antrag auf Wiederverleihung der IEV-Zustimmung, Machowetz & Partner Consulting Ziviltechniker GmbH, 14.07.2014; Anlagengenehmigung BH Ried i. Innkreis, Ge21-3-2006)

Process wastewater St. Martin					
Parameter	**Unit**	**ELV Permit[161]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	550	continuous	every working day	1 per year (over a period of one working week)
Settleable substances	ml/l	10	spot sample	-	1 per year (over a period of one working week)
TSS	mg/l	150[162]	spot sample	-	1 per year (over a period of one working week)
BOD_5 load (weekly average)	kg/d	380[163]	calculated	-	1 per year (over a period of one working week)
COD load	kg/d	840	calculated	-	1 per year (over a period of one working week)
COD load (weekly average)	kg/d	440	calculated	-	1 per year (over a period of one working week)
pH		6.0 – 9.5	spot sample	-	1 per year (over a period of one working week)
Low volatile lipophilic substances	mg/l	150	fpdcs	-	1 per year (over a period of one working week)
Total N load (weekly average)	kg/d	55[163]	calculated	-	1 per year (over a period of one working week)
T	°C	35	continuous	-	1 per year (over a period of one working week)
AOX	mg/l	1.0	fpdcs	-	1 per year
Total Cl[164]	mg/l	0.4	fpdcs	-	1 per year (over a period of one working week)

[161] If not stated differently

[162] Higher values are allowed if no technical malfunctions of the sewer system or the communal WWTP arise (according to consent with communal WWTP)

[163] According to consent with communal WWTP

[164] No measurement method is currently existing for defining Total Cl concentrations in stained wastewater

Table 118: Emission limit values and monitoring frequency for the indirect discharge of process wastewater – Utzenaich & St. Martin. (Source: Antrag auf Wiederverleihung der IEV-Zustimmung, Machowetz & Partner Consulting Ziviltechniker GmbH, 14.07.2014; Anlagengenehmigung BH Ried i. Innkreis, Ge21-3-2006)

Process wastewater **Both installations**					
Parameter	**Unit**	**ELV Permit[165]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	700	calculated	-	1 per year (over a period of one working week)
Q weekly average	m³/d	500	calculated	-	1 per year (over a period of one working week)
BOD_5 load	kg/d	972[166]	calculated	-	1 per year (over a period of one working week)
BOD_5 load weekly average	kg/d	540[166]	calculated	-	1 per year (over a period of one working week)
COD load	kg/d	1 152	calculated	-	1 per year (over a period of one working week)
COD load (weekly average)	kg/d	640	calculated	-	1 per year (over a period of one working week)
Total N load	kg/d	120	calculated	-	1 per year (over a period of one working week)
Total N load (weekly average)	kg/d	80	calculated	-	1 per year (over a period of one working week)

Table 119: Summary of self-monitoring 2014 – Utzenaich. (Source: Mengen- und Verbrauchsliste für Frisch- und Abwasser 2014, Rudolf Großfurtner GmbH)

Parameter		**Self-monitoring 2014 – Utzenaich**				
		Daily min	**Daily max**	**Annual average**	**Number of samples**	**ELV**
Q	m³/d	38	123	82.29	249	150
Settleable substances	ml/l	1	18	7.28	250	10

Table 120: Summary of self-monitoring 2014 – St. Martin. (Source: Mengen- und Verbrauchsliste für Frisch- und Abwasser 2014, Rudolf Großfurtner GmbH)

Parameter		**Self-moinitoring 2014 – St. Martin**				
		Daily min	**Daily max**	**Annuaul average**	**Number of samples**	**ELV**
Q	m³/d	2	389	277.34	252	550
Settleable substances	ml/l	1	10	3.67	260	10

[165] If not stated differently

[166] According to consent with communal WWTP

Table 121: Summary of self-monitoring 2014 – both installations. (Source: Mengen- und Verbrauchsliste für Frisch- und Abwasser 2014, Rudolf Großfurtner GmbH)

Parameter		Self-monitoring 2014 – both installations			
		Daily min	Daily max	Annual average	ELV
Q	m³/d	40	512	359.64	700
Settleable substances	ml/l	2	28	10.95	-

External-monitoring was carried out from December 9th 2014 to December 15th 2014 at both installations. Table 122 presents the measurements of the fpdcs for the installation in Utzenaich. Table 123 presents the weekly averages for the parameters with weekly average ELVs for the installation Utzenaich.

Table 124 presents the measurements for St. Martin. Table 125 presents the weekly averages for the parameters with weekly average ELVs for the installation St. Martin.

Table 125 presents the weekly average values for both installations. The in the tables used acronyms A, B, C, D and E represent the single days of measurement, thus:

- 09.12.2014
- 10.12.2014
- 11.12.2014
- 12.12.2014
- 15.12.2014.

Table 122: Results of external-monitoring 2014 – Utzenaich. (Source: Fremduntersuchung 2014, Machowetz & Partner Consulting Ziviltechniker GmbH, 30.01.2015)

External-monitoring 2014 (representative fpdcs) Utzenaich								
Parameter	**Unit**	**A**	**B**	**C**	**D**	**E**	**ELV**	**Method**
Discharge								
Q	m³/d	95	90	105	97	99	150	MID
T	°C	-	-	-	-	-	35	-
pH		6.8	6.2	6.6	6.7	6.5	6.0–9.5	DIN 38404-C5
TSS	mg/l	220	270	300	480	270	700	DIN 38409-H2
TSS load	kg/d	20.9	24.3	31.5	46.6	26.7	-	calculated
Settleable substances	ml/l	2.4	0.3	3.5	8.0	1.4	10	ÖN M 6271
Settleable substances load	l/d	228	27.0	368	776	139	-	calculated
Total N	mg/l	126	183	139	215	151	-	ÖN EN ISO 12260
Total N load	kg/d	12.0	16.5	14.6	20.9	14.9	-	calculated
Total P	mg/l	3.2.	4.04	4.23	9.37	3.87	-	ÖN EN ISO 6878
Total P load	kg/d	0.31	0.36	0.44	0.91	0.38	-	calculated
COD	mg/l	1 070	1 710	1 150	1 810	1 290	-	ÖN M 6265
COD load	kg/d	102	154	121	176	128	312	calculated
BOD_5	mg/l	575	929	615	995	686	-	ÖN EN 1899-1
BOD_5 load	kg/d	54.6	83.6	64.6	96.5	67.9	-	calculated
Low volatile lipophilic substances	mg/l	39	47	54	77	40	150	DIN 38409-H56
Low volatile lipophilic substances load	kg/d	3.71	4.23	5.67	7.47	3.69	-	calculated
AOX	mg/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.0	ÖN EN ISO 9562
AOX load	g/d	< 4.75	< 4.5	< 5.25	< 4.85	< 4.95	-	calculated
Total Cl	mg/l	n.d.[167]	n.d.[169]	n.d.[169]	n.d.[169]	n.d.[169]	0.4	ÖN EN ISO 7393

Table 123: Results of external-monitoring 2014 (weekly averages) – Utzenaich. (Source: Fremduntersuchung 2014, Machowetz & Partner Consulting Ziviltechniker GmbH, 30.01.2015)

External-monitoring 2014 – weekly averages Utzenaich				
Parameter	**Unit**	**Weekly average**	**ELV (weekly average)**	**Method**
Discharge				
Q	m³/d	69	100	calculated
BOD_5 load	kg/d	52.5	160	calculated
COD load	kg/d	97.3	200	calculated
Total N load	kg/d	11.3	25[168]	calculated

[167] Due to colouration of the wastewater not determinable

[168] According to consent with communal WWTP

Table 124: Results of external-monitoring 2014 – St. Martin. (Source: Fremduntersuchung 2014, Machowetz & Partner Consulting Ziviltechniker GmbH, 30.01.2015)

External-monitoring 2014 (representative fpdcs) St. Martin								
Parameter	**Unit**	**A**	**B**	**C**	**D**	**E**	**ELV**	**Method**
Discharge								
Q	m³/d	293	350	323	335	311	550	MID
T	°C	-	-	-	-	-	35	-
pH		6.8	6.7	6.6	6.9	6.6	6.0-9.5	DIN 38404-C5
TSS	mg/l	110	150	180	130	170	500	DIN 38409-H2
TSS load	kg/d	32.2	52.5	58.1	43.6	52.9	-	calculated
Settleable substances	ml/l	1.2	0.9	3.5	0.7	0.8	10	ÖN M 6271
Settleable substances load	l/d	352	315	1131	235	249	-	calculated
Total N	mg/l	240	200	217	211	261	-	ÖN EN ISO 12260
Total N load	kg/d	70.3	70.0	70.1	70.7	61.2	-	calculated
Total P	mg/l	2.30	2.06	2.16	1.81	3.76	-	ÖN EN ISO 6878
Total P load	kg/d	0.67	0.72	0.70	0.61	1.17	-	calculated
COD	mg/l	1 580	1 350	1 450	1 390	2 040	-	ÖN M 6265
COD load	kg/d	463	473	468	466	634	840	calculated
BOD_5	mg/l	839	707	755	720	1 100	-	ÖN EN 1899-1
BOD_5 load	kg/d	246	247	244	241	342	-	calculated
Low volatile lipophilic substances	mg/l	27	36	44	39	56	150	DIN 38409-H56
Low volatile lipophilic substances load	kg/d	7.91	12.6	14.2	13.1	17.4	-	calculated
AOX	mg/l	0.10	0.21	0.15	0.12	0.24	1.0	ÖN EN ISO 9562
AOX load	g/d	29.3	73.5	48.5	40.2	74.6	-	calculated
Total Cl	mg/l	n.d.[169]	n.d.[169]	n.d.[169]	n.d.[169]	n.d.[169]	0.4	ÖN EN ISO 7393

Table 125: Results of external-monitoring 2014 (weekly averages) – St. Martin. (Source: Fremduntersuchung 2014, Machowetz & Partner Consulting Ziviltechniker GmbH, 30.01.2015)

External-monitoring 2014 – weekly averages St. Martin				
Parameter	**Unit**	**Weekly average**	**ELV (weekly average)**	**Method**
Discharge				
Q	m³/d	230	400	calculated
BOD_5 load	kg/d	189	380[170]	calculated
COD load	kg/d	357	440	calculated
Total N load	kg/d	51.8	55[170]	calculated

[169] Due to colouration of the wastewater not determinable

[170] According to consent with communal WWTP

Table 126: Results of external-monitoring 2014 (weekly averages) – Utzenaich & St. Martin. (Source: Fremduntersuchung 2014, Machowetz & Partner Consulting Ziviltechniker GmbH, 30.01.2015)

External-monitoring 2014 – weekly averages Both installations				
Parameter	**Unit**	**Weekly average**	**ELV (weekly average)**	**Method**
Discharge				
Q	m³/d	299	500	calculated
BOD_5 load	kg/d	242	540[171]	calculated
COD load	kg/d	454	640	calculated
Total N load	kg/d	63.1	80[171]	calculated

[171] According to consent with communal WWTP

4.2.13 Herbert Handlbauer GmbH

4.2.13.1 General description

Table 127: General description of installation. (Source: verbal information from 12.02.2016)

Name of the installation	**Herbert Handlbauer GmbH, Holzstraße 5, 4020 Linz**
IPPC activity	6.4 a)
Capacity	2 000 cattle/week
Type and amount of products	At Herbert Handlbauer GmbH (premises Linz) cattle slaughtering is carried out. Within one week about 2 000 cattle are slaughtered. Besides slaughtering meat cutting of beef and pork (delivered from other company owned slaughterhouses) is carried out at the installation.
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 18:00 o'clock (without cleaning). Overall about 250 people are employed at the premises Linz. About 45 are working in the slaughtering process.
Description	The Herbert Handlbauer group consists of three slaughterhouses – Herbert Handlbauer GmbH Linz, Schweinespezialbetrieb Innviertel GmbH and IBOSCHWEIN Vertriebs GmbH – which are all included in the environmental inspection programmes of the Austrian federal states (Umwelltinspektionsprogramm). The slaughterhouse Viehvermarktung Nord reg.GenmbH is also part of the Herbert Handlbauer group, but is getting shut down in 2015. The slaughterhouse in Baumgartenberg has been shut down since 2014. Apart from slaughterhouses two other installations, one for deep freezing, jerky production and cattle skin sorting (Herbert Handlbauer GmbH Wels) and one for packaging (Herbert Handlbauer GmbH Pregarten), belong as well to the Herbert Handlbauer group. About 50% of the slaughtered animals (entire Handlbauer group) are destined for the domestic market. The remaining half is exported to several European markets.

The bovine animals are received in the reception hall. Along a fenced passageway the cattle are step by step put into single file for entering the killing line. The bovine animal enters the stunning pen individually where a captive bolt pistol is located accurately in the middle of the forehead. After stunning a door on the side of the stunning pen is opened so that the bovine animal falls onto a designated landing spot from where it gets lifted by its hind legs. Bleeding is immediately initiated by an incision of the carotid. The accruing blood is collected in a blood tank. Successively the carcase gets prepared for skinned and the lower part of the legs gets removed. For skinning two chains are attached to the forelegs of the bovine animal and wound onto a drum. The skins are sold. The lower part of the legs is sent to rendering installations. After skinning the head gets removed. The heads are processed on site, apart from the SRM graded parts of the head, which are sent to rendering installations. Evisceration is carried out manually. The intestines are sent to rendering installations. Organs, e.g. heart, liver, kidneys and lung, are checked by veterinarians and sold to the food industry if the quality requirements are met. Otherwise the organs enter the pet-food industry or rendering, depending on the quality. The same applies to the stomachs. Accruing fat from the evisceration, i.e. slaughtering fat, is collected and sold as industrial fat. After evisceration the cattle carcase is split along the spine using a saw. Water is sprayed on the saw blade to remove accruing bone dust. As a final step the spinal cord is sucked out and disposed as SRM before the cow half is sent to the cooling unit. The cow halves spend between 24 and 48 hours in the cooling house where a core temperature of 7 °C is never exceeded.

4.2.13.1 Energy generation

No combustion plants are operated on the premises. Thus heat and energy demand are covered by the communal supply.

4.2.13.2 Waste and residues

The waste-management concept for Herbert Handlbauer GmbH was updated in 2009 and refers to the operating sites in Linz, Wels, Pregarten and Baumgartenberg (even though the slaughterhouse Baumgartenberg is decommissioned at the moment). At the installation Pregarten meat packing is carried out. Dried beef production and cattle skin sorting takes places at the installation in Wels. Thus the waste-management concept only presents a rough indication of the in Linz accruing waste.

Table 128: Accruing waste for the installations Linz, Wels, Pregarten and Baumgartenberg. (Source: Abfallwirtschaftskonzept, Rudolf Herbert Handlbauer GmbH, 2009)

Waste and residue management 2009				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Unusable food		n.V.	Slaughtering, meat cutting	Rendering installations
Kitchen and canteen waste		n.V.	Canteen	Authorised waste disposal company
Organic waste		n.V.	Social rooms, canteen	Authorised waste disposal company
Waste glass		n.V.	n.V.	Authorised waste disposal company
Plastic containers		n.V.	Cleaning chemicals, waste water treatment	Authorised waste disposal company
Plastic film		n.V.	packaging	Authorised waste disposal company
Cardboard packaging		n.V.	packaging	Authorised waste disposal company
Waste paper		n.V.	Entire installations	Authorised waste disposal company
Metal containers		n.V.	Canteen, garage	Authorised waste disposal company
Filter bags		n.V.	Technical department	Authorised waste disposal company
Household-type commercial waste		n.V.	Entire installations	Authorised waste disposal company
Bulky waste		n.V.	Entire installations	Authorised waste disposal company
Garden waste		n.V.		Authorised waste disposal company
Hazardous waste				
Fat separator content		n.V.	Garage, lorry washing area	
Fluorescent tubes		n.V.	Entire installations	Authorised waste disposal company
Batteries		n.V.	Garage	Authorised waste disposal company
Oil containers		n.V.	Garage	Authorised waste disposal company
Solvents, varnish		n.V.	Garage	Authorised waste disposal company
Toner cartridges		n.V.	Offices	Authorised waste disposal company
Waste oil				
Waste oil		n.V.	Garage	Authorised waste disposal company

4.2.13.3 Noise and odour emissions

For reducing odour emissions originating from the blood tank a deo-filter containing a liquid deodorant to purify the exhaust air was installed.

4.2.13.4 Water and wastewater

Table 129: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 12.02.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	400 m³/d of which about 80 m³/d are from the company owned well (used as washing water)
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP Asten.
Capacity	appr. 20.000 EW_{60} for Handlbauer
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment (trial phase)
Short description of the process wastewater treatment	Total wastewater is pre-treated before being discharged into the communal sewer system. Mechanical pre-treatment comprises a drum screen for filtering solids. Physical-chemical pre-treatment consist of a floatation unit for extracting emulsified fats and suspended solids. For enhancing flocculation a flocculant is added in the floatation (trial phase).

Table 130: Emission limit values and monitoring frequency for the indirect discharge of process wastewater. (Source: Wasserrechtliche Bewilligung, UVS, VwSen-530907/22/Wim/Pe)

Process wastewater					
Parameter	**Unit**	**ELV Permit[172]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	600 m³/d 62 m³/h 22 l/s	continuous	daily	1 per year (consisting of 5 measurements)
T	°C	35	spot sample	-	1 per year (consisting of 5 measurements)
pH		6.0 – 9.5	continuous	daily	1 per year (consisting of 5 measurements)
TSS	mg/l	1200	spot sample	-	1 per year (consisting of 5 measurements)
Settleable substances	ml/l	10	spot sample	-	1 per year (consisting of 5 measurements)
AOX	mg/l	1.0	fpdcs	-	1 per year (consisting of 1 measurement)
Low volatile lipophilic substances	mg/l	150	fpdcs	-	1 per year (consisting of 5 measurements)
BOD_5	kg/d	-	calculated	-	1 per year (consisting of 5 measurements)
COD	kg/d	-	calculated	-	1 per year (consisting of 5 measurements)

[172] If not stated differently

Table 131: Summary of self-monitoring results 2014. (Source: Self-monitoring report Herbert Handlbauer GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV
Q	m³/d	0	562	296.61	365	600
pH		6.4	8.57	7.13	360	6.0 – 9.5

According to permit VwSen-530907/22/Wim/Pe external-monitoring has to be conducted once a year over a business week. In 2014 external-monitoring was carried out from September 15th until September 19th 2014.

- 15.09.2014
- 16.09.2014
- 17.09.2014
- 18.09.2014
- 19.09.2014

On September 18th an exceedance of low volatile lipophilic substances was detected. According to the "4 out of 5" rule the parameter complies with the determined ELV for low volatile lipophilic substances.

Table 132: Results of external-monitoring 2014. (Source: Fremdüberwachung, Dr. Begert Umweltconsulting GmbH, 23.10.2014)

External-monitoring 2014 (representative fpdcs)								
Parameter	**Unit**	**A**	**B**	**C**	**D**	**E**	**ELV**	**Method**
Q	m³/d	380	411	374	373	405	600	MFM
T	°C	23.4	26.1	25	23.1	18.9	35	DIN 38404-C4
TSS	mg/l	905	650	775	840	820	1 200	DIN 38409-2(H2)
Settleable substances	ml/l	9	5.2	6.9	8.4	8.3	10	ÖNORM M 6271
pH		6.9	6.9	7.2	7	7.3	6.0 – 9.5	EN ISO 10523
AOX	mg/l			<0.005			1	EN ISO 9562
Low volatile lipophilic substances	mg/l	145	143	137	198[173]	143	150	DIN 38409-56 (H56)
COD	mg/l	3 550	4 790	3 280	3 310	2 860	-	ÖNORM M 6265
COD load	kg/d	1 349	1 969	1 227	123	1 158	-	calculate
BOD_5	mg/l	1 350	1 660	1 220	1 020	1 190	-	EN 1899-1
BOD_5 load	kg/d	513	682	456	380	482	-	calculated

[173] No exceedance due to „4 out of 5" rule

4.2.14 IBOSCHWEIN Vertriebs GmbH

4.2.14.1 General description

Table 133: General description of installation (Source: verbal information from 12.02.2016)

Name of the installation	IBOSCHWEIN Vertriebs GmbH, Rehbergerstraße 9, 4551 Ried im Traunkreis
IPPC activity	6.4 a)
Capacity	3 500 pigs/week
Type and amount of products	At IBOSCHWEIN Vertriebs GmbH pig slaughtering is carried out. Within one week about 3 500 pigs are slaughtered and pre-cut (into halves or quarters).
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 17:00 o'clock (without cleaning). Overall about 25 people are employed at IBOSCHWEIN Vertriebs GmbH. About 15 are working in the slaughtering process.
Description	IBOSCHWEIN Vertriebs GmbH is part of the Herbert Handlbauer group.

The pigs are received in the reception hall and remain there stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into smaller groups for entering stunning. Stunning takes place with CO_2. The pigs are sent into gondolas transporting 2 pigs at a time into a CO_2 bath where the gondola remains for 100 seconds. The stunned pigs get lifted up from the CO_2 bath and removed from the gondola on a designated landing spot. The pig gets lifted on their hind leg and the stunned animal's carotid gets incised, initiating a rapid, profuse and complete bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes through scalding. By passing through a scalding tank which holds 5 m³ to 6 m³ of 62 °C hot water, the bristles and toenails are loosened in order to facilitate their removal. The scalding tank is emptied at the end of the day shift. After scalding the bristles get automatically removed by rubber flails. For removing residual bristles, the carcase passes a second bristle removing step consisting of whips. Subsequently the pig carcase gets singed for giving a firm skin texture. The singeing unit is charged by liquid gas. After singeing the carcase passes another dry cleaning step before being manually eviscerated. The organs are destined for the food industry after being checked by veterinarians. If the organs are not passing quality control they are sent to pet-food production sites or rendering installations (depending the quality). The same applies to the stomach. The intestines are sold to external companies. Cleaning, however, takes place at the installation. After evisceration the carcase gets split in halves. The spinal cord is sucked out and sent to rendering installations. Accruing fat (slaughtering fat) is sold as industrial fat. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 0 °C to 3 °C to a core temperature of 7 °C. The pig halves are cooled for 24 hours before being sent to meat cutting installations or sold as pig halves.

4.2.14.2 Energy generation

One boiler with a rated thermal input of 140 kW and charged by liquefied gas is installed at IBOSCHWEIN Vertriebs GmbH. Emission evaluation was conducted according to ÖNORM M7510 on a representative production day.

Table 134: Combustion plant operated on site. (Source: Prüfbericht für Gasfeuerungen, 19.10.2010)

Combustion plants	**Boiler**
Rated thermal Input (kW)	140
Start of operation	1984
Fuel	liquid gas
Flue gas cleaning	no secondary installations for emission reduction
Flue gas temperature (°C)	162.7
Operating hours (h/a)	
Energy recovery	
Steam production (t/h)	
Steam parameter (p, T)	
Fuel use (%)	
Oxygen content (%)	6.7

Table 135: Short term measurements for the operated boiler through the combustion of liquefied gas – presented concentrations of exhaust air at 0 °C and 1013 hPa. (Source: Prüfbericht für Gasfeuerungen, 19.10.2010)

Emission levels (30 min average)		
	Boiler	**ELV (30 min average)**
Pollutant		
CO_2 content (ppm)	104	-
CO_2 content (%)	10.9	-
Boiler efficiency (%)	92.6	90

4.2.14.3 Waste and residues

No waste-management concept is compiled for the installation.

4.2.14.4 Noise and odour emissions

No systems for reducing noise or odour emissions are installed at Herbert Handlbauer GmbH slaughterhouse in Ried im Traunkreis.

4.2.14.5 Water and wastewater

Table 136: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 12.02.2016; Wasserrechtliche Bewilligung BH Kirchdorf a.d. Krems, Wa10-154-2008, Wa-76/1984-HH/Se)

Consumption and treatment of water 2014	
Consumption of fresh water	100 m³/d
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the WWTP Ried im Traunkreis.
Capacity	8 800 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment Biological treatment (SBR)
Short description of the process wastewater treatment	Process wastewater is treated by an on-site wastewater treatment plant before being indirectly discharged via the WWTP Ried im Traunkreis. Mechanical pre-treatment comprises a drum screen for filtering solids. Physical pre-treatment consist of a floatation unit for extracting emulsified fats and suspended solids. Biological treatment is carried out by a Sequence Batch Reactor (SBR). A SBR combines the aerobe and the anoxic phase, as well as sedimentation and clear water removal. Whereas a common activated sludge process requires a local division of theses treatment steps, a SBR system requires a temporal division. Thus biological treatment can be carried out within one basin in a SBR system.

Table 137: Emission limit values and monitoring frequency for the indirect discharge of wastewater according to permit. (Source: Wasserrechtliche Bewilligung BH Kirchdorf a.d. Krems, Wa10-154-2008, Wa-76/1984-HH/Se)

Process wastewater					
Parameter	**Unit**	**ELV Permit[174]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Discharge					
Wastewater quantities (Q)	m³/d	50 m³/d 19 m³/h 6 l/s	continuous	every working day	1 per year (3 measurements)
pH		6.0–9.5	continuous	-	1 per year (3 measurements)
BOD_5	mg/l	-	fpdcs	every month	1 per year (3 measurements)
BOD_5 load	kg/d	-	calculated	every month	1 per year (3 measurements)
COD	mg/l	-	fpdcs	every week	1 per year (3 measurements)
COD load	kg/d	15	calculated	every week	1 per year (3 measurements)
AOX	mg/l	1.0	fpdcs	-	1 per year (1 measurement)
Low volatile lipophilic substances	mg/l	150	fpdcs	-	1 per year (3 measurements)
TSS	mg/l	150	spot sample	-	1 per year (3 measurements)

[174] If not stated differently

According to permit external-monitoring has to be conducted once a year by taking three measurements. In 2014 external-monitoring took place on the following days:

- 22.07.2014
- 23.07.2014
- 24.07.2014

Table 138: Results of external-monitoring 2014. (Source: Abwassererhebung, Dr. Begert Umweltconsulting GmbH, 01.08.2014)

External-monitoring 2014 (representative fpdcs from 22. – 24.07.2014)						
Parameter	**Unit**	**A**	**B**	**C**	**ELV**	**Method**
Discharge						
Q	m³/d	53[175]	63[176]	60[177]	50	MFM
T	°C	-	-	-	35	DIN 38404-C4
pH		8.3	8.3	8.2	6.0 – 9.5	EN ISO 10523
TSS	mg/l	9.6	11.0	13.0	150	DIN 38409-2 (H2)
AOX	mg/l	0.014	-	-	1.0	EN ISO 9562
BOD_5	mg/l	< 3	< 3	< 3	-	EN 1899-1
BOD_5 load	kg/d	< 0.16	< 0.16	< 0.16	-	calculated
COD	mg/l	28	37	32	-	ÖNORM M 6265
COD load	kg/d	1.5	2.33	1.92	15	calculated
Low volatile lipophilic substances	mg/l	< 5	< 5	< 5	150	DIN 38409-56 (H56)

[175] Exceedance

[176] Exceedance

[177] Exceedance

4.2.15 Schweinespezialbetrieb Innviertel GmbH

4.2.15.1 General description

Table 139: General description of installation (Source: verbal information from 12.02.2016)

Name of the installation	Schweinespezialbetrieb Innviertel GmbH, Lambrechten 30, 4772 Lambrechten
IPPC activity	6.4 a)
Capacity	5 000 pigs/week
Type and amount of products	At Schweinespezialbetrieb Innviertel GmbH pig slaughtering is carried out. Within one week about 5 000 pigs are slaughtered and pre-cut (into halves or quarters).
Operating hours	1-shift operation from Monday to Friday 06:00 o'clock until 17:00 o'clock (without cleaning). Overall about 25 people are employed at Schweinespezialbetrieb Innviertel GmbH. About 15 are working in the slaughtering process.
Description	Schweinespezialbetrieb Innviertel GmbH is part of the Herbert Handlbauer group.

The pigs are received in the reception hall and remain there for stress reduction (due to the transport). Along a fenced passageway the pigs are step by step put into single file for entering stunning. The pig is lifted so that it cannot move. An electrically charged ´3 point stunner with a current of 1.4 A is applied to the head. The stunned pig is put on the bleeding table where its carotid gets immediately incised initiating a rapid and profuse bleeding. The blood is collected in a blood tank and sent to rendering installations. After bleeding the pig carcase passes through scalding to loosen the bristles and toenails. By passing through a scalding tank which holds 5 m³ to 6 m³ of 62 °C hot water, the bristles and toenails are loosened in order to facilitate their removal. The scalding tank is emptied at the end of the day shift. After scalding the bristles get automatically removed by rubber flails. For removing residual bristles, the carcase passes a second bristle removing step consisting of whips. Subsequently the pig carcase gets singed for giving a firm skin texture. The singeing unit is charged by liquid gas. After singeing the carcase passes another dry cleaning step before being manually eviscerated. The organs are destined for the food industry after being checked by veterinarians. If the organs are not passing quality control they are sent to pet-food production sites or rendering installations (depending the quality). The same applies to the stomach. The intestines are sold to external companies. Cleaning, however, takes place at the installation. After evisceration the carcase gets split in halves. The spinal cord is sucked out and sent to rendering installations. Accruing fat (slaughtering fat) is sold as industrial fat. After evisceration the pig halves are getting categorized and pass quality control before getting chilled at 0 °C to 3 °C to a core temperature of 7 °C. The pig halves are cooled for 24 hours before being sent to meat cutting installations or sold as pig halves.

4.2.15.2 Energy generation

No combustion plants are operated on the premises. Thus heat and energy demand are covered by the communal supply.

4.2.15.3 Waste and residues

No waste-management concept is compiled for the installation.

4.2.15.4 Noise and odour emissions

For reducing odour emissions originating from the blood tank a deo-filter containing a liquid deodorant to purify the exhaust air was installed. For reducing odour emissions form the flotation unit and certain production steps an activated carbon filter with a capacity of 4 250 m³/h was installed.

4.2.15.5 Water and wastewater

Table 140: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 12.02.2016)

Consumption and treatment of water 2014	
Consumption of fresh water	80 – 100 m³/day (from company-owned well)
Type of wastewater discharge	Treated wastewater gets indirectly discharged via the communal WWTP.
Capacity	App. 8 500 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment
Short description of the process wastewater treatment	Total wastewater is mechanical pre-treated before being discharged into the communal sewer system. Mechanical pre-treatment comprises a drum screen for filtering solids and floatation for extracting emulsified fats and suspended solids. Sludge from floatation (floatat) is sent to biogas plants. The drum screen content is sent to rendering installations.
	Schweinespezialbetrieb Innviertel GmbH contributed in the construction of the communal WWTP. The permit on wastewater discharge was issued for the municipality. For the monitoring of wastewater emissions from the slaughterhouse, the inlet into the biological treatment step (SBR) of the communal WWTP is recorded. Table 141 presents the inlet concentrations.

Table 141: Inlet-monitoring into the biological treatment step (SBR) of the communal WWTP from Schweinespezialbetrieb Innviertel GmbH. (Source: Jahresübersicht SBR, ARA Lambrechten, 2014)

Inlet-monitoring 2014		
Parameter		**Annual average**
Q	m³/m	1 792.1
Settleable substances	ml/l	13.07
BOD5	mg/l	3 268.66
COD	mg/l	4 662.66

4.3 Animal by-products installations

For the rendering process animal by-products from the meat production – e.g. slaughterhouses, meat processing installations, livestock rearing facilities – as well as by-products from perished animals – e.g. road kill, naturally perished pets, etc. – are used. Animal by-products comprise carcases, parts of carcases, heads, feet, offal, excess fat and meat, hides, blood not intended for human consumption, skins, feathers and bones. The type of raw material processed in each rendering plant depends on the end product manufactured in the respective plant – e.g. poultry meal, blood meal, feather meal, etc.

The quality of the raw material determines the application of the end product. Animal by-products are categorized in three categories – category 1, 2 and 3 – whereof category 1 describes raw materials with the lowest quality characteristics. The categorization of animal by-products is regulated by Regulation (EC) No 1069/2009 laying down health rules as regards animal by-products and derived products not intended for human consumption. Category 1 animal meal and fat is only to be used for incineration or co-incineration (for instance in the cement industry). Processed category 2 products can be incinerated or used as organic fertilizers. Category 3 products can also be applied in the pet-food industry. There are no rendering plants in Austria processing category 2 animal by-products. Category 2 by-products are processed in category 1 plants.

The rendering process comprises in its core raw material reception and storage, core size reduction, sterilization, separation of fat from solids, drying and grinding of animal meal and cleaning of the accruing fat. Processing varies due to the processed materials and the manufactured end product, wherefore the production processes of the individual installations are discussed within the respective chapters. Core size reduction and sterilization are regulated by Regulation (EC) No 1069/2009.

The environmental medium affected most through the processing of animal by-products is water. The accruing wastewater from rendering depends, in both quantitative and qualitative terms, on the type of raw material and its degree of degradation, affecting particularly the BOD level of the wastewater (GERMAN FEDERAL ENVIRONMENTAL AGENCY, 2003).

As raw materials for rendering are frequently waste and are often allowed to degrade, odour problems while processing can occur. Therefore bio-filters, as described in detail in the following chapters, were installed at all Austrian rendering installations to purify the process exhaust air. Heavily odour-polluted exhaust air is burnt in the respective steam boiler systems.

4.3.1 SARIA Bio-Industries GmbH

4.3.1.1 General description

Table 142: General description of installation. (Source: verbal information from 29.06.2015)

Name of the installation	**Saria Bio-Industries GmbH,** **Zur Bildereiche 3, 3430 Tulln**
IPPC activity	6.5
Capacity	300 t/d About 75 000 t/y
Type and amount of products	Products are category 1 animal meal and animal fat as well as category 3 blood meal: 2014: 40 000 t
Operating hours	About 70 employees (20 work in production), 3-shift-operation and general cleaning on Monday
Description	SARIA Tulln is supplied by 54 000 agricultural producers and also by local communities with a market share of 20% in Austria. SARIA retails branches in 19 countries (total of about 120 employees) and belongs to the RETHMANN Group with a total of 60 500 employees.

Category 1 animal by-products are processed at Saria Tulln GmbH. Four skips with a capacity of 100 t each are used for storing the delivered animal by-products temporarily. Two screw presses are used to separate fat from meal. Animal meal is further dried by using a two stage vacuum drying system instead of more common disc dryers to safe energy where the first stage is entirely heated by the waste heat from the second dryer. Both, animal fat and meal are category 1 and are sent to thermal recovery.

Blood is coagulated by the use of steam, decanted, dried by a disk dryer and stored in Big Packs. The produced blood meal is category 3 and can therefore be used to produce e.g. pet food.

4.3.1.2 Energy generation and use

A 7 MW and a 6 MW steam boiler, both heated by animal fat (natural gas for start-up only), with max 17 t/h saturated steam are applied at Saria Tulln GmbH. The annual intra-unit consumption of animal fat amounts to about 2 200 t/y, whereof about 540 kg/h get burnt in the 6 MW steam boiler (Loos) and about 680 kg/h are burnt in the 7 MW steam boiler (Hoval).

Natural gas for the start-up of the steam boilers and intra-unit heating enters the production site with a pressure of 38 bar and gets reduced to 600 mbar for charging the steam boilers and to 250 mbar for the heating system.

Two separate power supply systems, that comprise two transformers each, are charged by an input voltage of 20 000 kVA and generate an output of 2 x 1 250 kVA and 2 x 800 kVA.

For the assessment of the boiler system three consecutive half-hour measurements were conducted on April 24th 2014. External emission evaluations were performed during normal operation and are presented in Table 144. General information on the steam boiler system is presented in Table 143.

Table 143: Combustion plants operated on site. (Source: Prüfbericht NUA-Umwelttechnik GmbH, 24.04.2014)

Combustion plants	**Steam boiler 1 (Hoval)**	**Steam boiler 2 (Loos)**
Rated thermal Input (MW)	6.9	6
Start of operation	1993	1975
Fuel	120–695 kg/h animal fat (natural gas for startup only)	120–590 kg/h animal fat (natural gas for startup only)
Flue gas cleaning	no secondary installations for emission reduction	no secondary installations for emission reduction
Flue gas temperature (°C)	226	257
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)	10	8
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	4.9	4.2

Table 144: Emission limit values and short term measurements for the operated combustion plants through the combustion of animal fat – presented concentrations of exhaust air at 1013 hPa and 11% oxygen content. (Source: Prüfbericht NUA-Umwelttechnik GmbH, 24.04.2014, Bescheid RU4-KB-55/005-2005, Amt der Nierderösterreichischen Landesregierung, 2005)

Short term emission level (3 half-hour measurements)					
	Steam boiler 1		**Steam boiler 2**		**ELV (30 min average)**
Pollutant	**Max**	**Average**	**Max**	**Average**	
Dust (mg/Nm³; 11% O_2)	16	15	18	14	20
NOx (mg/Nm³; 11% O_2)	145	138	147	146	200
CO (mg/Nm³; 11% O_2)	< 10	< 10	22	18	100
SO_2 (mg/Nm³; 11% O_2)	< 9	< 9	< 9	< 9	50
Total C (mg/Nm³; 11% O_2)	< 5	< 5	< 5	< 5	10

4.3.1.3 Waste and residues

Sewage sludge from the on-site the wastewater treatment plant is re-applied in the category 1 animal meal production. Sludge enters the production process from the scratch after being dried. Other accruing residues and waste, as listed below are either thermally or materially recycled.

Table 145: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept, Saria GmbH, 2014)

Waste and residue management 2014			
Type	**Amount (t)**	**Origin**	**Treatment**
Non-hazardous waste			
Household-type commercial waste	11.57	Production	Authorised waste disposal company
Household-type commercial waste	144.7	Production (sieve)	Thermal treatment (external)
Construction waste	6	Production (floor renovation)	Authorised waste disposal company
Hazardous waste			
Laboratory waste	0.027	Waste water treatment plant	Authorised waste disposal company/ recycled for laboratory equipment
Slag and ashes	0.388	Animal fat combustion	Authorised waste disposal company
Pressure gas packs	0.036	Garage scrap	Authorised waste disposal company
Waste oil			
Oil-polluted operating consumables	0.475	Garage scrap	Authorised waste disposal company

4.3.1.4 Noise and odour emissions

Two surface bio-filters, based on coconut fibre, are used to eliminate odour emissions from the processing of animal by-products. Biofilter neu is charged by the exhaust air from the production process and has a capacity of 120 000 m³/h. The bio-filter was built in 1993. Exhaust air from wastewater treatment and auxiliary buildings is sent to Biofilter alt which was built in 1985 and has a capacity of 80 000 m³/h.

Preliminary purification is carried out by air-washers. The thereof accruing residue water is sent to the wastewater treatment plant. For monitoring, periodic odour measurements are carried out by external experts.

Table 146: External-monitoring of odour emissions. (Source: Prüfbericht NUA-Umweltanalytik GmbH, 24.06.2014)

External-monitoring of bio-filters 2014				
	Inlet	**Discharge**	**Removal efficiency**	**ELV Permit**
	Odour unit/m³	**Odour unit/m³**	**%**	**Odour unit/m³**
Biofilter neu	40 530	165	>99	200
Biofilter alt	11 370	51	>99	200

4.3.1.5 Water and wastewater

Table 147: Summary of water consumption and wastewater streams 2014. (Source: Abwasseruntersuchung Labor Frenzl, 07.07.2014)

Consumption and treatment of water 2014	
Consumption of fresh water	29 239 m³/a
Thereof cooling water	2 647m³/a
Type of wastewater discharge	Treated wastewater gets directly discharged into the river Danube.
Capacity and partial wastewater streams	Total 47 000 EW_{60} – thereof 41 900 EW_{60} from production site, 1 600 EW_{60} from urban waste water and 3 500 EW_{60} from external cesspools
Internal treatment of wastewater from the process	Buffer tank Biological treatment I (Sequence Batch Reactor) Biological treatment II (Subsequent cleaning)
Short description of the process wastewater treatment	Total wastewater is treated in two steps – main cleaning and subsequent cleaning. Main cleaning is carried out in a Sequence Batch Reactor containing a simultaneous, aerobic sludge stabilisation process with nitrification, denitrification and phosphate elimination – biological treatment I. Subsequent cleaning (biological treatment II) consists of an upstream denitrification tank, an aeration basin and a secondary clarification basin. The treated wastewater is pumped into the river Danube.

Table 148: Emission limit values and monitoring frequency for the direct discharge of process wastewater. (Source: Wasserrechtlicher Bescheid Amt der Niederösterreichischen Landesregierung, WA1-12.152/126-98)

Process wastewater					
Parameter	**Unit**	**ELV Permit**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Removal efficiency					
COD	%	85	calculated	daily	1 per year
TOC	%	85	calculated	-	1 per year
Total N	%	75	calculated	weekly	1 per year
Discharge					
Q		750 m³/d 57 m³/h	Continuous (MID)	daily	1 per year
pH		6.5-8.5	Continuous (Hamilton pH probe)	daily	1 per year
T	°C	35[178]	continuous	daily	1 per year
BOD_5	mg/l	25	fpdcs	daily	1 per year
total P	mg/l	2	fpdcs	weekly	1 per year
NH_4-N	mg/l	50	fpdcs	daily	1 per year
AOX	mg/l	0.1	fpdcs	-	1 per year
Low volatile lipophilic substances	mg/l	20	fpdcs	-	1 per year
TSS	mg/l	30	spot sample	daily	1 per year

[178] If ambient temperature > 30 °C then T max. 40 °C

Table 149: Summary of self-monitoring results 2014. (Source: Self-monitoring report SARIA GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV
Inlet						
BOD_5	mg/l	1 400.0	6 800.0	4 136.5	52.0	-
COD	mg/l	1 642.0	9 633.0	5 009.3	247.0	-
Total P	mg/l	11.4	49.2	26.2	152.0	-
Total N	mg/l	267.0	1 290.0	758.7	53.0	-
Removal efficiency						
BOD_5	%	99.8	99.8	99.8	-	-
COD	%	98.4	98.9	99.1	-	85
Total P	%	99.4	98.2	98.9	-	-
Total N	%	98.8	99.0	99.3	-	75
Discharge						
Q (discharge)	m³/d	0	429	281	cont	750
T	°C	17.9	31.7	24.8	cont	35
pH		6.8	7.4	7	cont	6.5–8.5
BOD_5	mg/l	3	12	6.6	51	25
COD	mg/l	25.9	110	45.3	247	-
total N	mg/l	3.2	12.8	5.6	52	-
NH4-N	mg/l	0	1.65	0.3	246	50
total P	mg/l	0.07	0.89	0.28	154	2

Table 150: Results of external-monitoring 2014. (Source: Abwasseruntersuchung Labor Frenzl, 07.07.2014)

External monitoring 2014 (representative fpdcs from 07-07-2014 & 08-07-2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
BOD_5	mg/l	3 400	-	DEV L22
COD	mg/l	4 460	-	DEV H41/M
TOC	mg/l	1 280	-	DEV H3
Total N	mg/l	713	-	photometric
Total P	mg/l	25.2	-	photometric
Removal efficiency				
BOD_5	%	99.8	-	calculated
COD	%	99.2	85	calculated
TOC	%	98.9	85	calculated
Total N	%	99.3	75	calculated
Total P	%	99.5	-	calculated
Discharge				
Q (discharge)	m³/d	291	750	
T	°C	27.2	35	sensor
pH		7.9	6.5–8.5	sensor
BOD_5	mg/l	6	25	DEV L22
COD	mg/l	36.5	-	DEV H41/M
TOC	mg/l	13.4	-	DEV H3
Total N	mg/l	<5	-	photometric
NH_4-N	mg/l	0.06	50	photometric
NO_3-N	mg/l	1.33	-	IC
NO_2-N	mg/l	0.23	-	IC
Total P	mg/l	0.13	2	photometric
AOX	mg/l	0.06	0.1	DEV H14
TSS	mg/l	6	30	DEV S9
Low volatile lipophilic substances	mg/l	<1	20	DEV H17

4.3.2 TKV Oberösterreich GmbH

4.3.2.1 General description

Table 151: General description of installation. (Source: verbal information from 23.07.2015)

Name of the installation	**TKV Oberösterreich GmbH,** **Regau 63, 4844 Regau**
IPPC activity	6.5
Capacity	150 000 t/y
Type and amount of products	Products are category 3 animal meal and animal fat as well as category 3 blood meal. Collecting animal by-products (category 1 and 2) and fallen stock for transportation to category 1 rendering installations. The installation is operated at 80% capacity.
Operating hours	3-shift-operation from Monday to Saturday
Description	TKV Oberösterreich GmbH belongs to the Vivatis Holding AG (since Oktober 2012). The produced animal meal and blood meal is destined for the pet food and fertilizer industries. The accruing and cleaned animal fat was burnt on site until 2007 and is now sold.

Category 3 animal by-products are shredded into a core size of less than 4 cm before entering sterilisation. At 133 °C and 3 bar the shredded animal by-products are boiled into a sterile meat paste. The thereby accruing exhaust vapours are applied on site for the drying process (disc dryer). After sterilisation, solids are separated from liquids in a two phase separator. The liquids get further concentrated by using a falling film evaporator and can be (if necessary) added to the solids again. Metal residues are removed from the solids before being dried to a moisture content of 3% to 4% by using a disc dryer. The dried solids are subsequently compressed by screw presses whereby animal fat accrues (about 10% to 15% of the entering mass). The resulting product, referred to as Schilfer, gets as a final step shredded into category 3 animal meal.

The accruing animal fat contains a certain amount of fines (e.g. residual meat fibres) and is cleaned to a fines content of less than 0.15% by using a decanter. The cleaned animal fat is sold. Until 2007 the animal fat has been used to charge the intra-unit steam boilers. Currently natural gas is exclusively used.

For the production of blood meal anticoagulants are removed before coagulating, decanting and drying the blood. In order to prevent dust explosions the blood meal is stored under nitrogen.

4.3.2.2 Energy generation and use

The TKV Oberösterreich GmbH has three steam boilers with an intra-unit nomenclature of steam boiler 1 (K1), steam boiler 3 (K3) and steam boiler 4 (K4) to its disposal. Maximal two of the three steam boilers are simultaneously in use. The maximum heat performance of the steam boiler system is restrained to 20 MW (by the official permit), even though the heat performance has a potential of 36 MW. All steam boilers are suitable for the combustion of natural gas and animal fat – K1 and K4 contain one burner each, K3 contains two. Ever since 2007 the steam boiler system has been charged almost exclusively with natural gas.

K1, K3 and K4 are connected to a dust removal filter which was primarily installed for cleaning emissions connected to animal fat combustion. K1 and K4 comprise waste heat recovery boilers which are also used to burn heavily odour-polluted exhaust air from the production process.

According to the official permit and § 35 EG-K, emission monitoring has to be conducted all three years.

For the assessment of the boiler system six consecutive half-hour measurements were conducted on December 3rd 2013. External emission monitoring of the steam boiler system was conducted during normal operation. K1 and K3 were in use and charged exclusively by natural gas. As animal fat has not been applied for on-site combustion since 2007, the application and the therewith connected emissions were not measured within the external-monitoring report. The electrostatic dust filter was due to the exclusive application of natural gas not in use. During the external-monitoring the steam boiler system was used with an average thermal input of 11.4 MW which corresponds to 57% of the permitted performance.

Table 152: Combustion plants operated on-site. (Source: Bericht der Emissionsmessungen TÜV Austria Services GmbH, 03.12.2013)

Combustion plants	**Steam boiler 1**	**Steam boiler 3**	**Steam boiler 4**[179]
Rated thermal Input (MW)	< 20		
Start of operation			
Fuel	Natural gas, animal fat (currently not applied)		
Flue gas cleaning	electrostatic dust filter		
Flue gas temperature (°C)	186		
Flue gas moisture content (calculated) (g/m³)	106		
Operating hours (h/a)			
Energy recovery			
Steam production (t/h)			
Steam parameter (p, T)			
Fuel use (%)			
Oxygen content (%)	9.6		

Table 153: Short term measurements for the operated steam boilers through the combustion of natural gas – presented concentrations of exhaust air at 0 °C and 1013 hPa. (Source: Bericht der Emissionsmessungen TÜV Austria Services GmbH, 03.12.2013)

Short term emission level (3 half-hour measurements)			
Pollutant	**Steam boiler system Half-hour average**	**Steam boiler system max**	**ELV (30 min average)**
Dust (mg/Nm³; 3% O_2)	0[180]	< 0.1	50
NO_x (mg/Nm³; 15% O_2)	80	110	150
CO (mg/Nm³; 15% O_2)	0	< 3	60
C_{org} (mgC/Nm³; 15% O_2)	0	3.1	12

[179] Not in use during monitoring

[180] Sole natural gas combustion

4.3.2.3 Waste and residues

Table 154: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzept TKV OÖ GmbH, 2014)

Waste and residue management 2014				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Scrap iron	t	28.99	Garage	Authorised waste disposal company
Used glass	t	0.22	Office	Authorised waste disposal company
Waste paper	t	2.63	Office	Authorised waste disposal company
Sludge	t	81.44	WWTP	Authorised waste disposal company
Household type commercial waste	t	26.52	Office	Authorised waste disposal company
Waste wood	t	5.28	Production	Authorised waste disposal company
Plastic	t	1.48	Office	Authorised waste disposal company
Toner cartridge	t	0.07	Office	Authorised waste disposal company
Hazardous waste				
Lead accumulators	t	0.483	Garage	Authorised waste disposal company
Fluorescent tubes	t	0.018	Office	Authorised waste disposal company
Garage waste	t	0.32	Garage	Authorised waste disposal company
Waste oil				
Waste oil	t	5.48	Garage, washing plant	Authorised waste disposal company

4.3.2.4 Noise and odour emissions

The exhaust air from the machine rooms (Maschinenraum 1, Maschinenraum 2), the grinder and the delivery station is sent for preliminary purification into the air-washer system. The air-washer system consists of four chemical air-washers with a performance of 37 000 m³/h up to 62 000 m³/h. After preliminary purification the exhaust air is sent into the bio-filter system. 32 pressure-tight closed bio-filters and one open bio-filter are extracting the remaining odour from the exhaust air. The 32 closed bio-filters contain about 60 m³ of coconut fibre each and can together clean about 250 000 m³/h of exhaust air. The open bio-filter, which is also based on coconut fibre, can manage an additional exhaust air amount of 60 000 m³/h. About 96% of the odour pollution can be removed by the bio-filter system. No official permits regulating emission limit values were imposed by the authorities.

4.3.2.5 Water and wastewater

Table 155: Summary of water consumption and wastewater treatment 2014. (Source: Emissionsregister Oberflächenwasserkörper – EMREG-OW, 2014, verbal information 28.10.2015)

Consumption and treatment of water 2014	
Type of wastewater discharge	Pre-treated wastewater is indirectly discharged via the communal wastewater treatment plant Ager-West.
Capacity	90 000 EW_{60}
Internal treatment of wastewater from the process	Buffer tank Mechanical pre-treatment Physical pre-treatment Biological treatment Sedimentation tank
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being indirectly discharged via the communal wastewater treatment plant Ager-West. On site treatment comprises a buffer tank, mechanical pre-treatment consisting of a sieve and physical pre-treatment consisting of fat flotation. Biological treatment consists of nitrification and de-nitrification. Before the treated wastewater gets discharged into the sewer system it enters a sedimentation tank.

Table 156: Emission limit values and monitoring frequency for the indirect discharge of process wastewater. (Source: Wasserbuch-Evidenz BH Vöcklabruck 417/4214, Wasserrechtlicher Bescheid BH Vöcklabruck WA10-382-2009)

Process wastewater					
Parameter	**Unit**	**ELV Permit**[181]	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Wastewater quantities		650 m³/d, 40 m³/h	continuous (MID)	continuous	1 per year
pH		6.5–9.5	continuous (Hamilton pH probe)	continuous	1 per year
T	°C	35[182]	continuous	continuous	1 per year
BOD_5 load	kg/d	325	calculated	4 per week	1 per year
COD load	kg/d	541.7	calculated	daily	1 per year
Total N removal efficiency	%	75	calculated	4 per week	1 per year
Total N load	kg/d	59,6	calculated	daily	1 per year
TSS	mg/l	150	spot sample	4 per week	1 per year
AOX	mg/l	0.1	fpdcs	-	1 per year

[181] If not stated differently

[182] ELV according to ordinance for the indirect discharge of wastewater from rendering (AEV TKV)

Table 157: Summary of self-monitoring results 2014. (Source: Self-monitoring report TKV Oberösterreich GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV Permit[183]
Inlet						
BOD_5	mg/l	1 200.0	5 000.0	3 927.0	235	-
COD	mg/l	2 529.0	10 238.0	5 236.2	362	-
Total N	mg/l	1 232.0	387.0	732.4	362	-
Removal efficiency						
BOD_5	%	99.15	>99.99	99.85	235	-
COD	%	95.37	>99.99	98.62	362	-
Total N	%	84.63	99.31	95.05	362	75
Discharge						
Q (discharge)	m³/d	114.0	650.0	459.1	363	650 m³/d, 40 m³/h
T	°C	14.2	30.4	24.0	352	35[184]
pH		7.5	8.2	7.9	362	6.5–9.5
BOD_5	mg/l	1.0	34.0	6.3	235	-
BOD_5 load	kg/d	0.4	18.3	3.0	235	325
COD	mg/l	27.7	228.0	72.7	362	-
COD load	kg/d	4.4	114.7	33.7	363	541.7
NH_4-N	mg/l	0.0	1.4	0.2	362	-
Total N	mg/l	4.6	103.5	33.6	362	-
Total N load	kg/d	0.0	54.0	15.1	365	59.6
TSS	mg/l	5.0	185.0[185]	57.0	255	150

[183] If not stated differently

[184] ELV according to ordinance for indirect discharge of wastewater from rendering (AEV TKV)

[185] No exceedance due to „4 out of 5“ rule

Table 158: Results of external-monitoring 2014. (Source: Betriebliche Abwässer Fremdüberwachung Oikos Umweltmanagement GmbH, 20.-27.11.2014)

External-monitoring 2014 (representative fpdcs from 20.11.2014 to 26.11.2014 and spot sample from 27.11.2014)											
Parameter	**Unit**	**20.11.2014**	**21.11.2014**	**22.11.2014**	**23.11.2014**	**24.11.2014**	**25.11.2014**	**26.11.2014**	**27.11.2014 (spot sample)**	**ELV Permit[186]**	**Method**
Inlet											
Q	m³/d	472	482	464	444	458	520	558	-	650	IDM
Total N	mg/l	637	652	641	599	510	487	503	-	-	ÖN EN 12260
Total N load	kg/d	301	314	297	266	234	253	281	-	-	
Removal efficiency											
Total N	%	97.1	97.2	97	96.9	96.4	96.8	96.9	-	75	calculated
Discharge											
Q (discharge)	m³/d	458	455	472	434	434	483	544	-	650 m³/d 40 m³/h	IDM
T	°C	-	-	-	-	-	-		20.9	35[187]	ÖN M 6616
ph		-	-	-	-	-	-	-	7.5	6.9 - 9.5	DIN 38404-C5
COD	mg/l	44	43	42	45	47	42	46	-	-	ÖN M 6265
COD load	kg/d	20.2	19.6	19.8	19.5	20.4	20.3	25	-	541.7	
BOD_5	mg/l	3.3	3.3	3.2	3.4	3.5	3.2	3.5	-	-	ÖN EN 1899-1
BOD_5 load	kg/d	1.51	1.5	1.51	1.48	1.52	1.55	1.9	-	325	
TSS	mg/l	-	-	-	-	-	-	-	14	150	DIN 38409-H2
Total N	mg/l	18.9	19	18.8	18.9	19.2	17	16.1	-	-	ÖN EN 12260
Total N load	kg/d	8.66	8.65	8.87	8.2	8.33	8.21	8.76	-	59.6	
AOX	mg/l	-	-	-	-	-	-	0.09	-	0.1	ÖN EN ISO 9562

[186] If not stated differently

[187] ELV according to ordinance for indirect discharaging of wastewater from rendering (AEV TKV)

4.3.3 Burgenländische Tierkörperverwertungs GmbH

4.3.3.1 General description

Table 159: General description of installation. (Source: verbal information from 28.07.2015)

Name of the installation	Burgenländische Tierkörperverwertungs GmbH, Industriegebiet 1, 7321 Unterfrauenhaid
IPPC activity	6.5
Capacity	60 000 – 65 000 t/y
Type and amount of products	Products are category 1 animal meal and category 1 animal fat.
Operating hours	3-shift-operation from Monday to Saturday.
Description	The Burgenländische Tierkörperverwertungs GmbH belongs to the Vivatis Holding AG. The produced animal meal is sold for thermal application to the cement industry. The accruing and cleaned animal fat is entirely purchased by the biodiesel industry.

Category 1 animal by-products are shredded to a core size of less than 5 cm before entering sterilization. At 133 °C and 3 bar pressure the shredded animal by-products are boiled for 20 minutes into a sterile meat paste. Subsequently the sterile meat paste gets dried in the sterilization tanks before entering the screw presses where the remaining fat content is extracted from the sterile meat paste. The resulting product, referred to as Schilfer, gets then cooled down and once more shredded into category 1 animal meal, which is sold to the cement industry.

The out of the animal meal production accruing animal fat gets separated from remaining solids by using a decanter. The remaining solids re-enter the animal meal process whereas the resulting category 1 animal fat is sold for thermal usage.

4.3.3.2 Energy generation and use

The external emission evaluation was performed during normal operation. Steam boiler 1 (Bertsch 10 t) can be charged with animal fat, fuel oil and natural gas. Currently natural gas is exclusively used, thus steam boiler 1 was charged with natural gas during the external-monitoring. Steam boiler 2 (Bertsch 5 t) can only be charged with natural gas. Its respective emissions were measured during full-load and partial-load operation – emission values for both operation modes are presented in Table 161. For the assessment of the steam boiler system three consecutive half-hour measurements were conducted on the June 26th 2014.

Heavily odour-polluted exhaust air from the production process gets burnt in the steam boiler system. Emissions to air are discharged through a smokestack (16 m) into the atmosphere. According to § 33 (EG-K 2013) the steam boiler system is annually monitored. The next emission measurement will take place in 2017 – according to § 35 (EG-K 2013)

Table 160: Combustion plants operated on-site. (Source: Emissionsüberprüfung Energy Service Friesenbichler, 26.06.2014)

Combustion plants	**Steam boiler 1 (Bertsch 10 t)**	**Steam boiler 2 (Bertsch 5 t)**
Rated thermal Input (MW)	6.527	2.83
Start of operation	1985	1975
Fuel	natural gas (animal fat and fuel oil can also be used)	natural gas
Flue gas cleaning		
Flue gas temperature (°C)	205	247[188] (195[189])
Operating hours (h/a)	6 080	2 970
Energy recovery		
Steam production (t/h)	10	5
Steam parameter (p, T)		
Fuel use (%)	46	100[188] (33[189])
Oxygen content (%)	1.6	2.4[188] (3.1[189])

Table 161: Short term measurements for the operated steam boilers through the combustion of natural gas – presented concentrations of exhaust air at 0 °C and 1013 hPa. (Source: Emissionsüberprüfung Energy Service Friesenbichler, 26.06.2014)

Short term emission level (3 half-hour measurements)							
	Steam boiler 1 (Bertsch 10 t)	**Emission limit value (30 min average)[190]**			**Steam boiler 2 partial-load**	**Steam boiler 2 full-load**	**ELV (30 min average)[190]**
Pollutant	**Average**	**Animal fat**	**Heavy fuel oil**	**Natural gas**	**Average**	**Average**	**Natural gas**
Dust (mg/Nm³; 3% O_2)	<1[191]	30	60	5	<1	<1	5
NO_x (mg/Nm³; 3% O_2)	172.6	300	450	200	83.5	91	100
CO (mg/Nm³; 3% O_2)	3.2	100	80	80	4.1	2.8	80
SO_2 (mg/Nm³; 3% O_2)	-	100	0.6% of mass	-	-	-	-
Total C (mg/Nm³; 3% O_2)	-	20	-	-	-	-	-
HCl calculated as Cl (mg/Nm³, 3% O_2)	-	30	-	-	-	-	-

Pollutant concentrations of steam boiler 1 were measured at an oxygen content of 1.6% and got converted according to the oxygen content of the permitted ELVs, 3%. Pollutant concentrations of steam boiler 2 were measured at an oxygen contents of 2.4% (partial-load operation) and 3.1% (full-load operation) and got analogically converted.

Due to the exclusive application of natural gas in the steam boiler system, SO_2, total C and HCl emissions did not have to be measured.

[188] Full-load operation

[189] Partial-load operation

[190] Emisson limit values for dry flue gas under standard conditions and an oxygen content of 3%

[191] Emission value for the combustion of natural gas was arithmetically determined

4.3.3.3 Waste and residues

Sewage sludge from the on-site wastewater treatment plant is re-applied in category 1 animal meal production. Other accruing residues and waste, as listed in Table 162, are either thermally or materially recycled.

Table 162: Values of on-site accruing waste and residues from 2014. (Source: verbal information from 28.07.2015)

Waste and residue management 2014			
Type	**Amount (t)**	**Origin**	**Treatment**
Waste oil	0.4	Entire operation	Authorised waste disposal company
Garage scrap	0.05	Garage (locksmith)	Authorised waste disposal company
Residual waste	7.54	Entire operation	Authorised waste disposal company

4.3.3.4 Noise and odour emissions

The exhaust air from the production process is sent for preliminary purification into the air-washer system. The air-washer system consists of two air-washers with an overall performance of maximum 111 000 m³/h. After preliminary purification the exhaust air is sent into the bio-filter. The open bio-filter, which is based on coconut fibre and fibre turf, stretches over 700 m². No official permits regulating odour emission limit values were imposed by the authorities.

4.3.3.5 Water and wastewater

Table 163: Summary of water consumption and wastewater treatment 2014. (Source: Betriebliche Kläranlage Jahresbericht 2014 Büro Hofeneder Wasser & Bau Consulting GmbH, 2015)

Consumption and treatment of water 2014	
Consumption of fresh water	14 419 m³
Thereof cooling water	954 m³
Type of wastewater discharge	The pre-treated wastewater is indirectly discharged via the communal wastewater treatment plant Abwasserverband Mittleres Burgenland.
Capacity	22 000 EW_{60} (2014); 40 000 EW_{60} (2015)
Internal treatment of wastewater from the process	Buffer tank Mechanical treatment Physical-chemical pre-treatment Biological treatment Clarification basin
Short description of the process wastewater treatment	Total wastewater is treated by an on-site wastewater treatment plant before being indirectly discharged via the communal wastewater treatment plant Abwasserverband Mittleres Burgenland. Mechanical treatment consists of a sieve separating solids form the wastewater. Physical-chemical pre-treatment consists of a flotation unit. Biological treatment consists of two aerotian basins for nitrification and de-nitrification. Before being discharged the treated wastewater enters a clarification basin. Excess sludge gets removed and re-enters the category 1 animal meal production. Parts of the treated wastewater get used on-site for polymer preparation or air washers, wherefore wastewater inlet and discharge quantities can differ. Wastewaters from the on-site petrol station get sent through an oil separator.
Measures in case of other than normal operating conditions	In 2014 the on-site wastewater treatment plant was expanded from EW_{60} 22 000 to EW_{60} 40 000 for compensating wastewater volume fluctuations (due to quality and quantity changes of the input). The main constructing phase took place in the summer months of July and August 2014, wherefore self-monitoring couldn't be conducted at usual intervals. The expanded wastewater treatment plant was on trial operation until the end of 2014. From 2015 on the updated permit came into force. The wastewater treatment plant comprises a cooling system for the nitrification tanks with a refrigerating capacity of 2x90 kW. The cooling system is activated if the wastewater temperature is approaching the 35°C threshold, which only takes place during intense heat waves.
ELV excedance	Wastewater discharge quantity maximum exceedance: 280 m³/d (ELV permit 200 m³/d) on 12.04.2015 (self-monitoring). Out of 303 samples 33 exceedances have been detected for 2014 (self-monitoring). Less than half of the exceedances (15) took place after the main construction phase of expanding the wastewater treatment plant, thus within the trial operation period. Considering the updated permitted ELV for wastewater discharge (275 m³/d) the exceedance of the 12.04.2014 would represent the only non-compliance. Wastewater discharge quantity maximum exceedance within external-monitoring: 254 m³/d (ELV 200 m³/d) on 06.11.2014. In 2014 external-monitoring of the wastewater treatment plant were conducted four times. The wastewater discharge quantity exceedance was the only detected discharge exceedance and took place after the main construction phase of expanding the wastewater treatment plant, thus within the trial operation period. The wastewater discharge quantity of 254 m³/d is, however, compliant with the in the course of expanding the wastewater treatment plant updated permitted ELV of 275 m³/d. Except for the wastewater discharge quantity exceedance (06.11.2014) the imposed removal efficiency and discharge quantities and qualities have been met throughout 2014.

Consumption and treatment of water 2014	
Discussion of monitoring	Monitoring of the on-site wastewater treatment plant was conducted via a flow proportional unsettled homogenised weekly composite sample (fpwcs). The specific ordinance on wastewater emissions (AEV Tierkörper) prescribes a monitoring system based on flow proportional unsettled homogenised daily composite samples (fpdcs). The monitoring system was changed in 2016 from flow proportional unsettled homogenised weekly composite samples into flow proportional unsettled homogenised daily composite samples. Wastewater emissions measured from fpwcs were not taken into account for deriving the state of the art.

Table 164: Emission limit values and monitoring frequency for the indirect discharge of process wastewater until the end of 2014. (Source: Wasserrechtlicher Bescheid BH Oberpullendorf, OP-09/06-1456/1)

Process wastewater					
Parameter	**Unit**	**ELV Permit (valid until the end of 2014)**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Inlet					
COD	mg/l	-	fpdcs	52 per year	4 per year
BOD_5	mg/l	-	fpdcs	52 per year	4 per year
Total N	mg/l	-	fpdcs	52 per year	4 per year
Removal efficiency					
BOD_5 removal efficiency	%	95	calculated	52 per year	4 per year
COD removal efficiency	%	85	calculated	52 per year	4 per year
TOC removal efficiency	%	85	calculated	-	4 per year
Total N removal efficiency	%	75	calculated	52 per year	4 per year
Discharge					
Wastewater quantities	m³/d	200 10.8 m³/h	Continuous (MID)	continuous	4 per year
pH		6.5-9.5	Continuous (Hamilton pH probe)	continuous	4 per year
T	°C	35	continuous	continuous	4 per year
BOD_5 load	kg/d	120	calculated	52 per year	4 per year
COD load	kg/d	200	calculated	52 per year	4 per year
TOC load	kg/d	67	calculated	-	4 per year
NH_4-N load	kg/d	10	calculated	220 per year	4 per year
TSS load	kg/d	30	calculated	26 per year	4 per year
Low volatile lipophilic substances load	kg/d	30	calculated	-	4 per year
AOX load	kg/d	0.02	calculated	-	4 per year
NH_4-N	mg/l	50	fpdcs	220 per year	4 per year
TSS	mg/l	150	spot sample	26 per year	4 per year
Low volatile lipophilic substances	mg/l	150	fpdcs	-	4 per year
AOX	mg/l	0.1	fpdcs	-	4 per year

Table 165: Emission limit values and monitoring frequency for the indirect discharge of process wastewater from 2015 on. (Source: Wasserrechtlicher Bescheid BH Oberpullendorf, OP-09-06-24-45)

Process wastewater					
Parameter	**Unit**	**ELV Permit (valid from 2015 on)**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Inlet					
COD	mg/l	-	fpdcs	52 per year	4 per year
BOD_5	mg/l	-	fpdcs	52 per year	4 per year
Total N	mg/l	-	fpdcs	52 per year	4 per year
Removal efficiency					
BOD_5 removal efficiency	%	95	calculated	52 per year	4 per year
COD removal efficiency	%	85	calculated	52 per year	4 per year
TOC removal efficiency	%	85	calculated	-	4 per year
Total N removal efficiency	%	75	calculated	52 per year	4 per year
Discharge					
Wastewater quantities	m³/ d	275 15 m³/h	Continuous (MID)	continuous	4 per year
pH		6.5-9.5	Continuous (Hamilton pH probe)	continuous	4 per year
T	°C	35	continuous	continuous	4 per year
BOD_5 load	kg/d	110	calculated	52 per year	4 per year
COD load	kg/d	185	calculated	52 per year	4 per year
TOC load	kg/d	62	calculated	-	4 per year
NH_4-N load	kg/d	10	calculated	220 per year	4 per year
TSS load	kg/d	30	calculated	26 per year	4 per year
Low volatile lipophilic substances load	kg/d	30	calculated	-	4 per year
AOX load	kg/d	0.02	calculated	-	4 per year
NH_4-N	mg/l	50	fpdcs	220 per year	4 per year
TSS	mg/l	150	spot sample	26 per year	4 per year
Low volatile lipophilic substances	mg/l	150	fpdcs	-	4 per year
AOX	mg/l	0.1	fpdcs	-	4 per year

Table 166: Summary of self-monitoring results 2014. (Source: self-monitoring report BTKV GmbH, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV Permit
Inlet						
Q	m³/d	0	362	158.1	303[192]	-
COD	mg/l	1 220[193]	22 539[193]	12 695[193]	50	-
COD load	kg/d	0[193]	4 915[193]	1 561[193]	50	-
Total N	mg/l	982[193]	2 640[193]	1 595[193]	50	-
Total N load	kg/d	32.5[193]	483.89[193]	237.57[193]	42	-
Removal efficiency						
COD	%	93.1	99.8	98.9	40	85
Total N	%	93.2	99.6	98.1	40	75
Discharge						
Q (discharge)	m³/d	0.0	280.0	139.3	303	200
T	°C	10.2	30.4	23.1	303	35
pH		1.0	8.1	7.2	303	6.5–9.5
COD	mg/l	33.0[193]	576.0[193]	117.4[193]	49	-
COD load	kg/d	4.1[193]	123.3[193]	21.4[193]	40	200
NH_4-N	mg/l	0.1[193]	37.2[193]	3.1[193]	155	50
Total N	mg/l	4.7[193]	104.8[193]	21.8[193]	138	-
Total N load	kg/d	0.18[193]	23.7[193]	4.17[193]	129	-
NH_4-N load	kg/d	0.0035[193]	6.0258[193]	0.3672[193]	137	10

[192] No self-monitoring in July and August due to construction

[193] Based on weekly average values

Table 167: Results of external Monitoring 2014. (Source: Betriebliche Kläranlage Jahresbericht 2014 Büro Hofeneder Wasser & Bau Consulting GmbH, 2015; Wasserrechtlicher Bescheid BH Oberpullendorf, OP-09-06-24-45)

External-monitoring 2014 (representative fpwcs from 17.03.2014 to 23.03.2014; 23.07.2014 to 29.07.2014; 29.09.2014 to 05.10.2014; 03.11.2014 to 09.11.2014)							
Parameter	**Unit**	**Weekly average**				**ELV Permit**	**Method[194]**
		Q1[195]	**Q2[196]**	**Q3[197]**	**Q4[198]**		
Inlet							
COD	mg/l	10 410	10 970	12 080	10 450	-	DIN 38409-H41
TOC	mg/l	4 040	4 320	3 400	3 090	-	ÖNORM EN 1484
BOD_5	mg/l	3 950	3 720	3 100	2 550	-	ÖNORM M 6277
Total N	mg/l	1 580	1 640	1 590	1 290	-	calculated
NH_4-N	mg/l	1 290	1 290	1 354	1 060	-	DIN 38406-E5
Total P	mg/l	64.3	92.4	75.8	78.9	-	DIN 38405-D11
Removal efficiency							
COD	%	99	99.4	99.3	98.7	85	calculated
TOC	%	99	99.4	99.3	98.7	85	calculated
BOD_5	%	99.8	99.7	99.8	99.0	95	calculated
Total N	%	97.3	98.5	99.6	97.1	75	calculated
Discharge							
Q (discharge)	m³/d	131	109	142	194	200	
Q (discharge) weekly max[199]	m³/d	174	196	158	254	200	
T	°C	25.7	25.9	26	25.5	35	
pH		7.85	7.55	8.22	8.93	6.5–9.5	DIN 38404-C5
COD	mg/l	104	68.6	78.7	133	-	DIN 38409-H41
COD load	kg/d	13.6	7.5	11.2	25.8	200	calculated
COD load weekly max[199]	kg/d	18.1	13.4	12.4	33.8	200	calculated
TOC	mg/l	40.8	27	24.2	40.2	-	ÖNORM EN 1484
TOC load	kg/d	5.3	2.9	3.4	7.8	67	calculated
TOC load weekly max[199]	kg/d	7.1	5.3	3.8	10.4	67	calculated
BOD_5	mg/l	7.5	9.5	5.5	25	-	ÖNORM M 6277
BOD_5 load	kg/d	1.0	1.0	0.8	4.9	120	calculated
BOD_5 load weekly max[199]	kg/d	1.3	1.9	0.9	6.4	120	calculated
TSS	mg/l	68	51	77	60	150	DIN 38409-H2
TSS load	kg/d	8.91	5.56	10.9	11.6	30	calculated
TSS load weekly max[199]	kg/d	11.83	10	12.2	15.2	30	calculated
Total N	mg/l	42.2	25.2	6.2	37.6	-	calculated
NH_4-N	mg/l	0.157	1.16	0.165	0.229	50	DIN 38406-E5
NH_4-N load	kg/d	0.02	0.13	0.02	0.04	10	calculated
NH_4-N load weekly max[199]	kg/d	0.03	0.23	0.03	0.06	10	calculated
NO_2-N	mg/l	0.5	0.98	0.056	12.9	-	DIN 38409-D10
NO_3-N	mg/l	36	2.19	2.07	21.6	-	DIN 38405-D20

[194] According to Appendix C AAEV

[195] Fpwcs from 17.03.2014 to 23.03.2014

[196] Fpwcs from 23.07.2014 to 29.07.2014

[197] Fpwcs from 29.09.2014 to 05.10.2014

[198] Fpwcs from 03.11.2014 to 09.11.2014

[199] Calculation basis: Maximum value of respective fpwcs

External-monitoring 2014

(representative fpwcs from 17.03.2014 to 23.03.2014; 23.07.2014 to 29.07.2014; 29.09.2014 to 05.10.2014; 03.11.2014 to 09.11.2014)

Parameter	Unit	Weekly average				ELV Permit	Method[194]
		Q1[195]	Q2[196]	Q3[197]	Q4[198]		
Total P	mg/l	7.32	0.7	18.6	33.6	-	DIN 38405-D11
AOX	mg/l	0.05	0.017	0.017	0.042	0.1	ÖNORM M 6275
AOX load	kg/d	0.007	0.002	0.002	0.008	0.02	calculated
AOX load weekly max[199]	kg/d	0.009	0.003	0.003	0.011	0.02	calculated
Low volatile lipophilic substances	mg/l	<1.0	<1.0	<1.0	<10	150	DIN 38409-H17
Low volatile lipophilic substances load	kg/d	<1	<1	<1	<2	30	calculated
Low volatile lipophilic substances load weekly max[199]	kg/d	<1	<1	<1	<2.5	30	calculated

4.3.4 Steirische Tierkörperverwertungsgesellschaft m.b.H & CoKG

4.3.4.1 General description

Table 168: General description of installation. (verbal information from 25.08.2015 and 21.10.2015)

Name of the installation	**Steirische Tierkörperverwertungsgesellschaft m.b.H. & CoKG, Landscha 8, 8424 Gabersdorf**
IPPC activity	6.5
Capacity	115 000 – 130 000 t/y
Type and amount of products	Products are category 3 animal meal and poultry meal, animal fat and poultry fat, blood meal and feather meal. Category 1 animal by-products are received and transported to category 1 rendering installations.
Operating hours	3-shift operation from Monday until Saturday.
Description	The Steirische Tierkörperverwertungsgesellschaft m.b.H. & CoKG belongs to the Vivatis Holding AG. The produced animal, feather and blood meal mainly serves as organic fertilizers and pet food. Animal fat is applied in the chemical, biodiesel and the feed industry. Poultry meal and fat is exclusively applied in the pet-food industry.

At the Steirische Tierkörperverwertungsgesellschaft m.b.H. & CoKG – in the following referred to as StTKV – category 3 animal meal, poultry meal, animal fat, poultry fat, blood meal and feather meal is produced on separate lines. After reception the input gets addressed to its respective line.

Animal meal line:

Category 3 animal by-products are shredded in two steps into a core size of 25 mm before entering sterilization. At a temperature of 133 °C and 3 bar pressure the shredded animal by-products are boiled for 20 minutes into a sterile meat paste. Subsequently the water content of the sterile meat paste is reduced by sending it through a falling-film evaporator. After thickening, the solids are separated from fat by a decanter. The accruing animal fat enters the animal fat line. By sending the sterile meat paste into screw presses the remaining fat content is extracted (and collected for the animal fat line). The resulting product, referred to as Schilfer, gets crushed and cooled down in a cooling tower before being grinded into category 3 animal meal and sold to organic fertilizer and pet-food producers.

Poultry meal line:

The category 3 poultry by-products are sent through a metal detector in order to compensate for insufficient prior residue separation. The poultry by-products are grinded into a core size of 13 mm by passing through a mincer before being sent through a melting pipe. At 95 °C – 98 °C the minced poultry by-products are melted to facilitate further processing. For separating the solids from water and fat a tricanter is used. Thereof accruing poultry fat is collected and sent into the poultry fat line. The by its water and fat content reduced poultry paste is subsequently dried using disk dryers before being grinded into poultry meal. The from the tricanter extracted water gets concentrated by vaporisation and sent to the disk driers, hence added to the final product (poultry meal). The category 3 poultry meal is sold to the pet-food industry.

Blood meal line:

Category 3 blood is coagulated by injecting steam before being sent into a decanter for reducing the water content. The accruing wastewater is sent into the on-site WWTP. Subsequently the pre-treated blood is dried using disk dryers and grinded into category 3 blood meal which is sold to organic fertilizer and pet-food producers.

Feather meal line:

The received feathers are sent through a metal detector in order to compensate for insufficient prior residue separation, before being sent into a hydralisator where the feathers are treated with steam for amplifying the disintegration of the feathers. As a final step the feather paste is dried by using disk dryers and grinded into category 3 feather meal which is sold to organic fertilizer and pet-food producers.

Animal fat:

The out of the production of animal meal accruing animal fat is collected and cleaned before being sold as category 3 animal fat to the feedstuff, chemical or biodiesel industry. Cleaning is carried out through the application of a sheet filter (fat filter).

Poultry fat:

The out of the production of poultry meal accruing poultry fat is collected and cleaned before being sold as category 3 poultry fat to the pet-food industry. Cleaning is carried out by separating through a centrifuge (separator).

4.3.4.2 Energy generation

A 13 MW steam boiler (steam boiler 1) and a 6.5 MW steam boiler (steam boiler 2) are applied at StTKV. Steam boiler 1 is exclusively charged with natural gas, steam boiler 2 can be charged with natural gas and animal fat. The boilers have low-NO_x burner. Heavily odour-polluted exhaust air from the production process gets burnt in the steam boiler system.

External emission evaluation was performed during normal operation. Steam boiler 1 was operated with 60% of its nominal load and charged with natural gas. Steam boiler 2 was operated at 68% of its nominal load and charged with natural gas. For the last 2 years steam boiler 2 has exclusively been charged with natural gas. For the assessment of the steam boiler system three consecutive half-hour measurements were conducted on the January 31st 2013. The recorded emission values are presented in Table 170. The next external emission evaluation will be carried out in 2016.

Table 169: Combustion plants operated on-site. (Source: Befund Energy Service Friesenbichler GmbH, 31.01.2013)

Combustion plants	Steam boiler 1	Steam boiler 2
Rated thermal Input (MW)	13	6.52
Start of operation	1984	1975
Fuel	natural gas	natural gas (animal fat can also be used)
Flue gas cleaning	low NO_x-burner	low NO_x-burner
Flue gas temperature (°C)		
Operating hours (h/a)	6 138	
Energy recovery		
Steam production (t/h)		
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)		

Table 170: Short term measurements for the operated steam – presented concentrations of exhaust air at 0 °C and 1 013 hPa. (Source: Befund Energy Service Friesenbichler GmbH, 31.01.2013)

Short term emission level (3 half-hour measurements)				
	Steam boiler 1		Steam boiler 2	
Pollutant	Average	ELV (30 min average)	Average	ELV (30 min average)
Dust (mg/Nm³; 3% O_2)	< 1	10	< 1	5
NO_x (mg/Nm³; 3% O_2)	151.5	200	109.3	200
CO (mg/Nm³; 3% O_2)	0	100	6.7	80

4.3.4.3 Waste and residues

Excess sewage sludge re-enters the animal meal production. Exclusively wastewater from the production process enters the on-site WWTP. Household-type wastewater from e.g. kitchens, restroom facilities, etc. is indirectly discharged via the communal wastewater plant.

Table 171: Values of on-site accruing waste and residues from 2014. (Source: Abfallwirtschaftskonzep StTKV, 2014)

Waste and residue management 2014			
Type	Amount (t)	Origin	Treatment
Non-hazardous waste			
Household-type commercial waste	69.4	Animal-by products reception	Authorised waste disposal company
Waste paper	6.63	Entire installation	Authorised waste disposal company
Plastics from packaging collection	1.38	Entire installation	Authorised waste disposal company
Metal scraps	31.92	Garage	Authorised waste disposal company
Hazardous waste			
Laboratory waste	0.116	Laboratory	Authorised waste disposal company
Waste oil			
Engine and transmission oil	11.45	Garage	Authorised waste disposal company
Oil separator content	16.3	Garage	Authorised waste disposal company
Oil contaminated rags, oil and air filters	1.041	Garage	Authorised waste disposal company

4.3.4.4 Noise and odour emissions

The exhaust air from the production process is sent for preliminary purification into the air-washer system. The air-washer system consists of two air-washers with an overall performance of maximum 250 000 m³/h. After preliminary purification the exhaust air is sent into the bio-filter unit which consists of two open bio-filters. The bio-filter unit, which is based on coconut fibre and fibre turf, stretches over 1 800 m². No official permits regulating odour emission limit values were imposed by the authorities. In addition heavily polluted air is burnt in the steam boiler system.

A heaped up earth mound on the south side of the installation serves as a noise barrier and sight protection (privacy shield) for the neighbouring settlements.

4.3.4.5 Water and wastewater

Table 172: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 25.08.2015; Abfallwirtschaftskonzept StTKV, 2014; Überwachungsbericht der Gesamtprüfung Technisches Büro Ing. Jakob Strassegger, 07-08.04.2014)

Consumption and treatment of water 2014	
Consumption of fresh water	1 680 m³/a from communal water supply (Gemeinde Obervogau) 107 000 m³/a well water
Type of wastewater discharge	Treated process wastewater is directly discharged into the river Mur. All other wastewaters (kitchens, restroom facilities, etc.) are indirectly discharged via the communal WWTP.
Capacity	75 000 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical-chemical pre-treatment Biological treatment 2 buffer tanks
Short description of the process wastewater treatment	Process wastewater is treated by an on-site wastewater treatment plant before being discharged into the river Mur. All other wastewaters (kitchens, restroom facilities, etc.) are indirectly discharged via the communal WWTP. On site treatment comprises mechanical treatment by a drum screen, physical-chemical treatment by a flotation unit and biological treatment. Biological treatment consists of two aeration basins with separated denitrification. Phosphor precipitation is carried out by adding aluminium (liquid aluminium products – ca. 286 l/d) or limewash (ca. 857 l/d).

Table 173: Emission limit values and monitoring frequency for the direct discharge of process wastewater. (Source: Überwachungsbericht der Gesamtprüfung Technisches Büro Ing. Jakob Strassegger, 07-08.04.2014; Wasserrechtliche Bewilligung BH Leibnitz, 3.00 Ti 19 - 2000)

Process wastewater					
Parameter	**Unit**	**ELV Permit**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Inlet					
BOD_5 load	kg/d	4 500	calculated	-	1 per year
COD load	kg/d	7 500	calculated	-	1 per year
Total N load	kg/d	900	calculated	-	1 per year
Removal efficiency					
COD	%	86[200]	calculated	daily	1 per year
Total N	%	75	calculated	2 per week	1 per year
Discharge					
Wastewater quantities (Q)	m³/d	600 m³/d 35 m³/h	continuous (MID)	-	1 per year
pH		6.5–8.5	continuous (Hamilton pH probe)	continuous	1 per year
T	°C	35	continuous	continuous	1 per year
BOD_5	mg/l	25	fpdcs	2 per week	1 per year
COD	mg/l	150	fpdcs	daily	1 per year
NH_4-N	mg/l	50	fpdcs	daily	1 per year
Total P	mg/l	2	fpdcs	daily	1 per year
AOX	mg/l	0.1	fpdcs	-	1 per year
Low volatile lipophilic substances	mg/l	20	fpdcs	-	1 per year
TSS	mg/l	30	spot sample	daily	1 per year

[200] If inlet concentration exceeds 100 mg/l

Table 174: Summary of self-monitoring results 2014. (Source: Self-monitoring report StTKV, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV
Removal efficiency						
COD	%	95.40	99.80	99.56	305.00	86.00
Total N	%	96.80	99.80	99.38	105	75.00
Discharge						
Q	m³/d	173.00	595.00	422.83	365.00	600 m³/d 35 m³/h
T	°C	19.10	33.60	26.69	365.00	35.00
pH		6.60	7.60	7.15	365.00	6.5–8.5
BOD5	mg/l	2.00	9.00	3.83	105.00	25.00
COD	mg/l	26.00	62.00	35.17	300.00	150.00
NH4-N	mg/l	0.00	8.20	0.79	365.00	50.00
Total P	mg/l	0.00	1.94	1.34	365.00	2.00
TSS	mg/l	4.00	7.00	5.13	300.00	30.00

Table 175: Results of external-monitoring 2014. (Source: Überwachungsbericht der Gesamtprüfung Technisches Büro Ing. Jakob Strassegger, 07-08.04.2014)

External-monitoring 2014 (representative fpdcs from 07.04.2014 to 08.04.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet				
Q	m³/d	413	-	DIN 19559
BOD_5 load	kg/d	2 932	4 500	calculated
COD load	kg/d	5 087	7 500	calculated
Total N load	kg/d	535	900	calculated
Total P load	kg/d	41	-	calculated
Removal efficiency				
BOD_5	%	99.9	-	calculated
COD	%	99.5	86	calculated
Total N	%	98.7	75	calculated
Discharge				
Q	m³/d	357	600	DIN 19559
T	°C	26.3 – 26.6	35	DIN 38 404-4
pH		7.22 – 7.25	6.5-8.5	DIN 38 404-5
BOD_5	mg/l	10	25	DIN EN 1899-1-H51
COD	mg/l	32	150	DIN ISO 15705-H45
NH_4-N	mg/l	0.1	50	DIN 38 406 E5
Total P	mg/l	1.3	2	DIN EN 1189-D11
AOX	mg/l	< 0.05	0.1	DIN EN 1485-H14
TSS	mg/l	6	30	ÖNORM M 6274
Low volatile lipophilic substances	mg/l	< 2	20	DIN 348409 – H56

4.3.5 Boxmark Leather GmbH & Co KG

4.3.5.1 General description

Table 176: General description of installation. (verbal information from 13.01.2016)

Name of the installation	**Boxmark Leather GmbH & Co KG, Lederstraße 1, 8380 Jennersdorf**
IPPC activity	6.5
Capacity	56 t/y (permitted)
Type and amount of products	Products at Boxmark Leather GmbH & Co KG are mainly varieties of leather. Parts from the raw skin not usable for the production of leather (Leimleder) are further processed on the premises. The treatment of these by-products fall under IPPC activity 6.5 rendering of animal corpses or animal by-products. Products from the raw skin residues (Leimleder) are fat and greaves (Grieben). The fat is used as a fuel for the on-site operated steam boilers. The greaves are used as an input for fertilizer production due to their nitrogen content.
Operating hours	3-shift operation from Monday until Friday. Overall 400 to 500 people are employed at Boxmark Leather GmbH & Co KG out of which about 6 persons are working in the rendering of raw skin residues.
Description	Boxmark Leather GmbH & Co KG has two tanneries in Austria – Feldbach and Jennersdorf. Stamping and sewing is carried out in company owned factories in Slovenia and Croatia.

Greaves production takes place on the premises of the tannery in Jennersdorf. Raw skin residues from the company owned tanneries in Feldbach and Jennersdorf are treated at the greaves production unit in Jennersdorf. The production of greaves and fat depends on the production magnitude of the tanneries Feldbach and Jennersdorf. Apart from the input, the rendering process is completely separated from the tannery process.

The raw skin residues are stored in tanks and transported by screws into chemical pre-treatment. Chemical pre-treatment facilitates the separation of the raw skin materials into water, fat and greaves. The pre-treated residues are sent through melting pipes before entering a trikanter. The trikanter separates the solids (greaves) from the fat and water. The accruing water is sent to the on-site WWTP. The fat is used as a fuel for the on-site steam boilers. The greaves are dried by disk dryers and then sold as an input for fertilizer production.

4.3.5.2 Energy generation

At Boxmark Leather GmbH & CoKG two steam boilers with the internal nomenclature of Dampfkessel 1 and Dampfkessel 3 are operated. On the premises Jennersdorf leather production and greaves production is carried out. The steam boilers are supplying both production processes, thus only a share of the below listed emissions are part of the greaves production. An estimation of the shares is according to the company not possible.

Dampfkessel 1 is charged by animal fat, Dampfkessel 3 can be charged by animal fat or natural gas. Emission limit values for the combustion of animal fat as presented in Table 178 are defined by permit JE-BA-105-22/2-98. External-monitoring has to be conducted at least once a year for the parameters dust, NO_x, SO_2, CO, total C and HCl. The combustion of natural gas in Dampfkessel 3 is regulated by the Emission Protection Act for Steam Boilers.

For the assessment of the boiler system three consecutive half-hour measurements were conducted on October 21st 2015. External emission evaluations were performed during normal operation and are presented in Table 178. General information on the steam boiler system is presented in Table 177.

Table 177: Combustion plants operated on site. (Source: Prüfbericht DI Horst Kaufmann, 06.11.2015)

Combustion plants	**Steam boiler 1 (Dampfkessel 1)**	**Steam boiler 2 (Dampfkessel 3)**
Rated thermal Input (kW)	8 435	6 134
Start of operation		
Fuel	212–495 kg/h animal fat	natural gas 187–368 kg/h animal fat
Flue gas cleaning		
Flue gas temperature (°C)		
Operating hours (h/a)		
Energy recovery		
Steam production (t/h)	11	8
Steam parameter (p, T)		
Fuel use (%)		
Oxygen content (%)	2.6	3.0 (natural gas) 3.5 (animal fat)

Table 178: Emission limit values and short term measurements for the operated combustion plants through the combustion of animal fat and natural gas – presented concentrations of exhaust air at 1 013 hPa and 3% oxygen content. (Source: Prüfbericht DI Horst Kaufmann, 06.11.2015)

Short term emission level (3 half-hour measurements)								
	Steam boiler 1		**Steam boiler 2 (animal fat)**		**ELV**	**Steam boiler 2 (natural gas)**		**ELV (30 min average)**
Pollutant	**Max**	**Average**	**Max**	**Average**		**Max**	**Average**	
Dust (mg/Nm³; 3% O_2)	1.5	1.4	1.7	1.7	60	-	-	-
NO_x (mg/Nm³; 3% O_2)	238.5	225.4	203.8	196.1	300	46.4	45.7	100
CO (mg/Nm³; 3% O_2)	1.0	1.0	0.9	0.9	50	1.6	1.4	80
SO_2 (mg/Nm³; 3% O_2)	73.4	71.6	79.1	75.9	80	-	-	-
Total C (mg/Nm³; 3% O_2)	0.5	0.5	1.0	0.8	20	-	-	-
HCl (mg/Nm³, 3% O_2)	11.9	13.3	12.8	12.6	15	-	-	-

4.3.5.3 Waste and residues

Table 179 presents the accruing waste and residues on the premises Jennersdorf, thus from both production processes (leather production and greaves production).

Table 179: Values of on-site accruing waste and residues from 2013. (Source: Abfallwirtschaftskonzept Boxmark Leather GmbH & Co KG, 2014)

Waste and residue management 2013				
Type	**Unit**	**Amount**	**Origin**	**Treatment**
Non-hazardous waste				
Waste wood	t	481.04	Leather production	Authorised waste disposal company
Excess sludge	t	4 393.7	WWTP	Authorised waste disposal company
Household-type commercial waste	t	779.8	Entire installation	Authorised waste disposal company
Waste paper	t	3.01	Entire installation	Authorised waste disposal company
Kitchen and canteen residues	t	0.4	Entire installation	Authorised waste disposal company
Hazardous waste				
Batteries	t	0.016	Maintenance/ Garage	Authorised waste disposal company
Waste oil				
Waste oil	t	3.82	Leather production	Authorised waste disposal company
Industrial fat	t	0.955	Maintenance/ Garage	Authorised waste disposal company

4.3.5.4 Noise and odour emissions

Odour emissions from the rendering of raw skin residues are reduced by sending the exhaust air from the production hall through air-washers and a bio-filter (Biofilteranlage 1). Odour emissions from the WWTP are reduced by a separate bio-filter (Biofilteranlage 2).

Exhaust air from the greaves production is sent through a dust separator before entering the air-washers which are charged by water and sulphuric acid. The used water is partly recirculated. After pre-treatment the exhaust air is sent into the open bio-filter. The bio-filter has a capacity of 56 000 m³/h. The filter medium is a mixture of root wood, turf and heather.

For reducing odour emissions from the WWTP the exhaust air from the sludge container, the filter shaft, the primary clarifying basins, the sump shaft and the sludge concentrator is purified by Biofilteranlage 2. The bio-filter unit has a capacity of 25 000 m³/h. Before being sent into the bio-filter the exhaust air gets pre-treated by air-washers charged with water and sulphuric acid. The filter medium is a mixture of root wood, turf and heather.

Biofilteranlage 1 and Biofilteranlage 2 are connected to each other by a manually controllable butterfly valve, so that the exhaust air from the greaves production or WWTP can be redirected in case of a malfunction.

4.3.5.5 Water and wastewater

Table 180: Summary of water consumption and wastewater treatment 2014. (Source: verbal information from 13.01.2016)

Consumption and treatment of water 2014	
Type of wastewater discharge	Treated wastewater is directly discharged into the river Raab.
Capacity	47 620 EW_{60}
Internal treatment of wastewater from the process	Mechanical pre-treatment Physical pre-treatment Primary sedimentation basin Biological treatment Sedimentation basin Tertiary treatment step
Short description of the process wastewater treatment	The wastewater from the tannery Jennersdorf is predominantly treated in the on-site WWTP, wherefore the on-site WWTP is regulated by the ordinance on wastewater from tanneries (AEV Gerberein). Wastewater from raw skin rendering/ greaves production is also sent to the on-site WWTP but represents a low fraction of the overall inlet load. Process wastewaters from the tannery and the greaves production are treated by an on-site wastewater treatment plant before being discharged into the river Raab. All other wastewaters (kitchens, restroom facilities, etc.) are indirectly discharged via the communal WWTP. On-site treatment comprises mechanical treatment by a rotation filter. Parts of the screening material, i.e. hairs, enter the greaves production. Physical treatment is carried out by flotation. For biological treatment three nitrification and de-nitrification basins are installed on the premises. As a final step the treated wastewater enters a third cleaning step consisting of floatation, precipitation and neutralisation and a three-stage filtration. Phosphor precipitation is not necessary due to the composition of the wastewater.

The wastewater from the tannery Jennersdorf is predominantly treated in the on-site WWTP, wherefore the on-site WWTP is regulated by the ordinance on wastewaters from tanneries. Wastewater from the greaves production is also sent to the on-site WWTP but represents a low fraction of the overall inlet load. On average the overall inlet load accounted for 1451.68 m³ with a daily minimum value of 110.42 m³ and a daily maximum of 4091.98 m³ in 2014. According to a partial measurement of the wastewaters from the greaves production (Untersuchungsbefund Leimleder ARA, Dr. Rahimzadeh, 2014), carried out from September 8th to September 9th 2014, wastewater inlet quantity from the greaves production into the on-site WWTP accounted for 96 m³. According to the self-monitoring of overall wastewater inlet quantities an overall load of 2076.82 m³ was measured on September 8th 2014. Thus the share of wastewaters from the greaves production account for about 4.6% of the overall wastewater inlet load into the on-site WWTP. As the WWTP is predominantly treating wastewaters from the tannery and thus regulated by the ordinance on wastewaters from tanneries, the wastewater emissions were not taken into account for deriving the state of the art in the animal by-products industries. However, with the exception of total N and TOC, all parameters are also within the BAT-AEL range of animal by-products industries.

Table 181: Emission limit values and monitoring frequency for the direct discharge of process wastewater according to permit based on the ordinance for tanneries. (Source: Wasserrechtliche Bewilligung BH Jennersdorf, JE-BA-105-22/24-12; Wasserrechtliche Bewilligung, Amt der burgenländischen Landesregierung, VI/2-W-265/36-1997)

Process wastewater					
Parameter	**Unit**	**ELV Permit[201]**	**Type of sample**	**Min. frequency self-monitoring**	**Min. frequency external-monitoring**
Removal efficiency					
Total N	%	>75	calculated	52 per year	4 per year
TOC	%	>95	calculated	-	4 per year
COD	%	>95	calculated	240 per year	4 per year
BOD_5	%	>95	calculated	104 per year	4 per year
Discharge					
Wastewater quantities (Q)	m³/d	1 400	continuous	continuous	4 per year
pH		6.5–8.5	continuous	-	1 per year
T	°C	30	continuous	-	1 per year
Fish toxicity		4	fpdcs	-	4 per year
Settleable substances	ml/l	0.3	spot sample	-	1 per year
Al	mg/l	2.0	fpdcs	-	4 per year
As	mg/l	0.1	fpdcs	-	4 per year
Total-Cr	mg/l	0.5	fpdcs	-	4 per year
Fe	mg/l	2.0	fpdcs	-	4 per year
NH_4-N	mg/l	10.0	fpdcs	daily	4 per year
Total N	mg/l	135.0	fpdcs	52 per year	4 per year
Total N load	kg/d	189.0	calculated		4 per year
Total P	mg/l	1.0	fpdcs	240 per year	4 per year
S	mg/l	0.1	spot sample	-	1 per year
TOC	mg/l	100.0	fpdcs	-	4 per year
TOC load	kg/d	140.0	calculated	-	4 per year
COD	mg/l	275.0	fpdcs	240 per year	4 per year
COD load	kg/d	385.0	calculated		4 per year
BOD_5	mg/l	15	fpdcs	104 per year	4 per year
BOD_5 load	kg/d	19.6	calculated		4 per year
AOX	mg/l	0.5	fpdcs	-	4 per year
Low volatile lipophilic substances	mg/l	20.0	fpdcs	-	4 per year
Sum of hydrocarbons	mg/l	5.0	fpdcs	-	4 per year
Surface tension			spot sample	daily	1 per year
>4.6 m³/s		60 mN/m			
<4.6 m³/s & <3.4 m³/s		63 mN/m			
<3.4 m³/s & <2.2 m³/s		65 mN/m			
<2.2 m³/s		68 mN/m			

[201] If not stated differently

Table 182 presents the self-monitoring results for 2014. The by permit defined removal efficiency for COD (>95%) was not met on 1st of June 2014 (as presented in Table 182 removal efficiency COD daily min. 90.69%). For compliance, however, the arithmetic average of a business year has to fulfil the imposed removal efficiency which is the case as the arithmetic average for COD removal was 98.0% for 2014 (cf. §4(2) 6. AEV Gerbereien).

Table 182: Summary of self-monitoring results 2014. (Source: Self-monitoring report Boxmark Leather GmbH & Co KG, 2014)

Parameter		Self-monitoring 2014				
		Daily min	Daily max	Annual average	Number of samples	ELV
Inlet (biological treatment)						
COD	mg/l	1 225	9 105	5 936.0	237	-
COD load	kg/d	0	26 283	10 521.0	238	-
BOD	mg/l	700	3 400	2 163.0	93	-
BOD load	kg/d	247	8 593	4 239.0	93	-
Removal efficiency						
COD	%	90.69	99.14	98.0	237	>95
BOD	%	99.27	99.96	100.0	93	>95
Total N	%	75.3	96	87.0	88	>75
Discharge						
Q	m³/d	27	1 397	1 067.0	365	1400
COD	mg/l	51	215	108.0	237	275
COD	kg/d	0	248.1	127.0	241	385
BOD	mg/l	1	13	6.0	93	15
BOD	kg/d	1.1	16.3	8.0	93	19.6
NH4-N	mg/l	0.04	102	1.0	238	10
NO3-N	mg/l	8.6	75.81	45.0	238	-
Total N	mg/l	14	93	54.0	89	135
Total N load	kg/d	4.5	100.7	61.0	88	189
Total P	mg/l	0	0.5	0.21	235	1.0
PO4-P	mg/l	0	0.5	0.12	238	1.0

According to permit (JE-BA-105-22/24-12) external-monitoring has to be conducted four times per year. One external monitoring has to be carried out according to the Austrian Water and Waste Management Association (ÖWAV) rule sheet number 6. The remaining three external-monitorings have to be conducted by means of a fpdcs.

In the course of the annual external-monitoring according to ÖWAV rule sheet 6, three spot samples were taken for determining the temperature, pH-value and settleable substances. The values presented in Table 183 are the mean values of these three spot samples.

Table 183: Results of external-monitoring 2014 according to ÖWAV rule sheet 6.
(Source: Kläranlagenfunktionsüberprüfung, Dipl.-Ing. Dr. techn. Djabbar Rahimzadeh, 2014)

External-monitoring 2014 according to ÖWAV rule sheet nr.6 (representative fpdcs from 08.09.2014 to 09.09.2014)				
Parameter	**Unit**	**Daily average**	**ELV**	**Method**
Inlet (biological treatment)				
BOD_5	mg/l	2 400	-	DIN 38409-H 52
COD	mg/l	8 610	-	DIN 38409-H 41
TOC	mg/l	754	-	EN 1484
Chlorides	mg/l	6 400	-	DIN 38405-D 1
NH_4-N	mg/l	52	-	ÖNORM ISO 7150/1-1987
NO_3-N	mg/l	0.2	-	EN ISO 10304-1
Total N	mg/l	266	-	DIN 38409-27 (DEV-H27)
Total P	mg/l	24.0	-	EN ISO 6878:2004
PO_4-P	mg/l	15.3	-	EN ISO 6878:2004
Removal efficiency				
BOD_5	%	99.8	> 95	calculated
COD	%	99.6	> 95	calculated
TOC	%	97.6	> 95	calculated
Total N	%	80.9	> 75	calculated
Total P	%	99.6	-	calculated
Discharge				
Q	m³/d	1 097	1 400	MID
T	°C	29.4	30	DIN 38404-C 4
pH		7.5	6.5 – 8.5	DIN 38404-C 5
Settleable substances	ml/l	< 0.1	0.3	DIN 38409-H 9 - 2
BOD_5	mg/l	5	14	DIN 38409-H52
BOD_5 load	kg/d	5.49	19.6	calculated
COD	mg/l	46	275	DIN 38409-H41
COD load	kg/d	50.46	385.0	calculated
TOC	mg/l	23	100	EN 1484
TOC load	kg/d	25.23	140.0	calculated
Chlorides	mg/l	5 270	-	DIN 38405-D 1
NH_4-N	mg/l	0.61	10	ÖNORM ISO 7150/1-1987
NO_3-N	mg/l	76	-	EN ISO 10304-1
NO_2-N	mg/l	0.2	-	DIN 38405-D10
Total N	mg/l	65.4	135	DIN 38406-27 (DEV-H27)
Total N load	kg/d	71.74	189.0	calculated
Total P	mg/l	0.11	1.0	EN ISO 6878:2004
Total P load	kg/d	0.12	-	calculated
PO_4-P	mg/l	0.042	1.0	EN ISO 6878:2004
As	mg/l	< 0.010	0.1	EN ISO 11885
Al	mg/l	0.22	2.0	EN ISO 11885
Total Cr	mg/l	< 0.010	0.5	EN ISO 1185
Fe	mg/l	0.031	2.0	EN ISO 11885
AOX	mg/l	0.033	0.5	EN ISO 9562 (DEV-H14)
Low volatile lipophilic substances	mg/l	< 5.0	20.0	DIN 38409-H56
Sum of hydrocarbons	mg/l	0.12	5.0	ÖN M6608
Fish toxicity		< 2	< 4	EN ISO 11348-3 (DEV-L34)(KI)
S	mg/l	< 0.10	0.1	ÖNORM M 6615
Surface tension	mN/m	69.7	65	ÖNORM 14370

Table 184: Results of external-monitoring 2014 apart from external-monitoring according to ÖWAV rule sheet 6. (Source: Kläranlagenfunktionsüberprüfung, Dipl.-Ing. Dr. techn. Djabbar Rahimzadeh, 2014)

External-monitoring 2014 (representative fpdcs)						
Parameter	**Unit**	**17.03.2014 – 18.03.2014**	**16.06.2014 – 17.06.2014**	**01.12.2014 – 02.12.2014**	**ELV**	**Method**
Inlet (biological treatment)						
BOD_5	mg/l	2 220	2 250	1 800	-	DIN 38409-H 52
COD	mg/l	6 055	5 990	5 015	-	DIN 38409-H 41
TOC	mg/l	1 810	1 220	1 680	-	EN 1484
Total N	mg/l	320	374	291	-	DIN 38409-27 (DEV-H27)
Removal efficiency						
BOD_5	%	99.7	99.9	99.9	> 95	calculated
COD	%	97.0	98.4	98.7	> 95	calculated
TOC	%	97.3	99.2	99.2	> 95	calculated
Total N	%	83.9	91.7	78.4	> 75	calculated
Discharge						
Q	m³/d	1 118	1 101	1 175	1 400	MID
T	°C	25.4	29.8	15.0	30	DIN 38404-C4
pH		7.94	7.4	7.66	6.5 – 8.5	DIN 38404-C5
Settleable substances	mg/l	< 0.1	< 0.1	< 0.1	0.3	DIN 38409-H9-2
BOD_5	mg/l	8	4	< 3	14.0	DIN 38409-H52
BOD_5 load	kg/d	8.94	4.40	3.53	19.60	calculated
COD	mg/l	219	115	85	275.0	DIN 38409-H41
COD load	kg/d	244.84	126.62	99.88	385.0	calculated
TOC	mg/l	59	12	18	100.0	EN 1484
TOC load	kg/d	65.96	13.21	21.15	140.0	calculated
NH_4-N	mg/l	0.23	1.1	0.13	10	ÖNORM ISO 7150/1-1987
Total N	mg/l	61.8	38.5	81.6	135.0	DIN 38409-27 (DEV-H27)
Total N load	kg/d	69.09	42.39	95.88	189.0	calculated
Total P	mg/l	0.13	0.12	0.13	1.0	EN ISO 6878:2004
As	mg/l	< 0.010	0.016	< 0.010	0.1	EN ISO 11885
Al	mg/l	0.2	0.17	0.32	2.0	EN ISO 11885
Cr	mg/l	0.010	< 0.010	< 0.010	0.5	EN ISO 11885
Fe	mg/l	0.016	0.012	0.013	2.0	EN ISO 11885
Sum of hydrocarbons	mg/l	< 0.10	< 0.10	0.15	5.0	ÖN M6608
AOX	mg/l	0.069	0.034	0.49	0.5	EN ISO 9562 (DEV-H14)
Low volatile lipophilic substances	mg/l	< 5.0	< 5.0	< 5.0	20	DIN 348409-H17
Fish toxicity		3	3	3	< 4	DIN EN ISO 15088 (KI)
S	mg/l	< 0.10	< 0.10	< 0.10	0.1	ÖN M 6615
Surface tension	mN/m	72.8	70.6	65.4	60	ÖNORM 14370

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6 APPENDIX

6.1 Slaughterhouse installations Austria

Table 185: Austrian slaughterhouses according to Annex I, 6.4a) of the IED. (Source: Environmental inspection programmes of the federal states, as per December 2015)

Slaughterhouses regulated by IED		
Operator	**Address**	**Process under Annex I of the IED**
Dachsberger & Söhne GmbH	3730 Eggenburg, Gaudernsdorf 32	6.4a)
Hubers Landhendl GmbH	5222 Pfaffstätt, Hauptstraße 80	6.4a)
Schlachthof Oberndorfer GmbH respectively IBOSCHWEIN Vertriebs GmbH	4551 Ried im Traunkreis, Rehberger Straße 9	6.4a)
Higelsberger GmbH & Co. KG	4311 Schwertberg, Aisting 66	6.4a)
Rudolf Großfurtner GmbH, Utzenaich	4972 Utzenaich, Hofmarkt 1	6.4a)
Rudolf Großfurtner GmbH, St. Martin	4973 St. Martin, Diesseits 230	6.4a)
Schweinespezialbetrieb Innviertel GmbH	4772 Lambrechten, Nummer 30	6.4a)
Viehvermarktung Nord reg.Gen.m.b.H.	4541 Adlwang, Wangerstraße 1	6.4a)
Herbert Handlbauer GmbH	4020 Linz, Holzstraße 5	6.4a)
Jöbstl Bauerngut GmbH	8472 Straß in Steiermark, Hofgasse 1	6.4a)
Steirerfleisch Gesellschaft m.b.H.	8421 Wolfsberg, Wolfsberg 1	6.4a)
Titz Geflügelschlachthof GmbH	8330 Feldbach, Rohr a. d. Raab 66	6.4a)
Scheucher Fleisch GmbH	8091 Jagerberg, Ungerdorf 1	6.4a)
Fleischof Raabtal GmbH	Kirchberg an der Raab, Berndorf 119	6.4a)
Norbert Marcher GmbH	8020 Graz, Lagergasse 158	6.4a)
Alpenrind GmbH	5020 Salzburg, Metzgerstraße 67	6.4a)
Stürzenbecher Vieh- und Fleischhandelsgesellschaft m.b.H. (part of Norbert Marcher GmbH)	9020 Klagenfurt, Schlachthofstraße 7	6.4a)

Table 186: Austrian slaughterhouses not regulated by IED, according to AMA Gütesiegel, October 2015. (Source: AMA-Gütesiegel, http://www.fleisch-teilstuecke.at/anbieter/?no_cache=1)

Slaughterhouses not regulated by IED	
Operator	**Address**
Bäuerliche Vermarktung Kärntner Fleisch reg.gen.mbH	9020 Klagenfurt, Schlachthofstraße 5
Ilgenfritz Schlachtbetrieb Innviertel GmbH	9500 Villach, St. Josef Straße 35-37
Tauernfleisch Vertriebs GesmbH	9831 Flattach, Ausserfragant 97
Weiss Fleischveredelung GmbH	9360 Friesach, Bahnhofstraße 4
Marcher Norbert GesmbH	9524 St. Magdalen, Kasernengasse 12
Berger Fleischwaren GmbH & CoKG	3443 Sieghartskirchen, Koglerstraße 8
Berger Franz GmbH & Co KG	3153 Eschenau, Betriebsgebiet 17
Gantner Johann GesmbH	2020 Hollabrunn, Gewerbering 19
Gattringer - Kerzig GesmbH	3133 Traismauer, Florianigasse 2
Gloggnitzer GesmbH	2722 Weikersdorf, Industriestraße 304
Grandits GmbH	2860 Kirschlag, Ungerbachstraße 10
Grandits GmbH	3244 Ruprechtshofen, Zinhogen 9
Keusch Fleischvertriebs GmbH	3304 St. Georgen am Ybbsfelde, Matzendorf 10
Kloiber Julius Schlachthof GmbH	3121 Karlstetten, Schlachthausgasse 9
Kolobratnik GesmbH	3470 Kirchberg, Kremserstraße 31
Menzl Rudolf KG	4431 Haidershofen, Dorf/Enns 30

Slaughterhouses not regulated by IED	
Operator	**Address**
Nordwaldhof Thomas Bauer	3972 Bad Großpertholz, Bad Großpertholz
Ströbel Josef & Söhne KG	2115 Ernstbrunn, Simonsfeld 61
Tafftaler Schlachtverarbeitungs GmbH	3580 Horn, Frauenhofen 88
Teufner Alfons Vieh- und Fleischhandel	3454 Reidling, Baumgarten 25
Theurer GmbH	3822 Karlstein, Münchreith 3
Waldviertler Oberland Vieh- und Fleischverarbeitungsgesmbh	3971 St. Martin, Moorbach Harbach - Str. 2
Waldviertler Viktualien Vertriebsgesmbh	3971 St. Martin, Moorbach Harbach - Str. 3
Artmayr Schlachthof	4553 Schlierbach, Mahlhofweg 1
Rudolf Berghamer GesmbH	4724 Neukirchen im Walde, Kühbachstraße 4
Dachs Fleischveredelung GmbH	5272 Treubach, Untertreubach 1
Feköhrer GesmbH	4961 Mühlheim, Niederach 5
Gruber Josef Vieh- Fleisch GesmbH & Co KG	4632 Pichl, Welser Straße 12
Hütthaler KG Fleisch-Wurst-Versand	4690 Schwanenstadt, Linzer Straße 1
Humer Rupert GesmbH	4673 Gaspoltshofen, Hauptstraße 20
Maier Franz KG	4891 Pöndorf, Kirchham 1
Mühlviertler Alm Biofleisch GmbH	4273 Unterweissenbach, Markt 168
Neugschwandtner Fleischwaren GmbH	4323 Münzbach, Schwemmstraße 10
Pöll - Fleisch GmbH	4817 St. Konrad, Edt 73
Rieger GesmbH	4655 Vorchdorf, Bahnhofstraße 27
Riepl Anton Fleischmanufaktur KG	2091 Oberhöflein, Oberhöflein 39
Samböck Karl EU-Schlachthof	4363 Pabneukirchen, Markt 41
Scheincker Walter GesmbH	4652 Steinerkirchen, Landstraße 8
Strasser Günther	4642 Sattledt, Hauptstraße 15
Vöckla-Schlächterei Hollerweger GmbH	4871 Zipf, Zeiling 19
Zellinger Franz GesmbH	4400 Steyr, Schuhmeisterstraße 27
Ablinger Franz & Co Fleischhauereibetrieb GesmbH	5110 Oberndorf, Grimmstraße 3
Kirchtag Peter KG	5112 Lamprechtshausen, Amsdorf 1
Buchberger Robert GesmbH	8225 Pöllau, Mittelgasse 39
Erzeugergemeinschaft "Steirisches Rind" Vertriebs - GmbH	8010 Graz, Hamerlinggasse 3
Felgitischer Otmar Viehhandel - Fleischerei	8081 Heiligenkreuz, Pirchingstraße 3
Schultes GmbH & Co KG	5700 Zell am See, Alte Landstraße 12
Gassner GesmbH	8010 Graz, Rohrbachhöhe 23
Gruber Fleisch-Wurst GmbH & Co KG	8250 Vorau, Hauptstraße 36
Ramsauer Fleisch GmbH	8081 Heiligenkreuz, Grazerstraße 14
Schlachthof Zotter Günther	8274 Buch/Hartberg, Oberbuch 39
Turza GmbH & Co KG	8262 Ilz, Ilz 171
Weizer Bergland Spezialitäten	8160 Weiz, Werksweg 102
Kälberschlächterei Huber GmbH	6380 St. Johann, Anichweg 9
Öller Schlachthof OHG	2164 Wildendürnbach, Wildendürnbach 335
Fetz Kaspar GesmbH & Co KG	6886 Andelsbuch, Scheidbuchen 525
Schlachthof der Stadt Dornbirn	6850 Dornbirn, Schlachthofstraße 6
Walser OHG	6812 Meiningen, Industriestraße 12
Zeilinger Johann GmbH	1030 Wien, Fleischzentrum St-Marx
Ehn Friedrich Schlachthof GesmbH	3702 Oberrußbach, Großweikersdorferstraße 43
Schreiner GesmbH & Co KG	3663 Laimbach, Laimbach 5
Schuster Alexander	2034 Grossharras, Gossharras 13
CARNESSA Fleischgroßhandels- & Export GesmbH	4230 Pregarten, Buchenstraße 2
Hochhauser Johannes	4632 Pichl, Innbachstraße 3
Wech Geflügel GesmbH	9433 St. Andrä, Kolleggasse 8
Kicker Johann Geflügel und Wild GesmbH & Co KG	8322 Studenzen, Studenzen 56
Lugitsch Herbert u. Söhne GesmbH	8330 Feldbach, Gniebing 52
Tschilitsch Geflügel-, Wild- & Eiergroßhandel GesmbH & Co KG	8544 Pölfing-Brunn, Hauptstraße 96

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In this report the experts of the Umweltbundesamt describe processes and techniques applied in installations of the Austrian Slaughterhouses and Animal By-products Industries. The focus lies on environmentally relevant techniques and processes – either related to the consumption of energy and resources or related to emissions of pollutants. Predominantly affected by slaughtering and rendering processes is water, due to water consumption and emissions of organic pollutants in wastewater. Key parameters for wastewater emissions are COD/TOC, BOD, total nitrogen, total phosphorus, total suspended solids and low volatile lipophilic substances. Based on assessments of the techniques applied and associated consumption and emission figures, best available techniques for the Slaughterhouses and Animal By-products Industries are described.

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