Request Licence Amendment of Emission Limit Values set in Schedule B.2 for emission point reference No. F

for

KMK Metals Recycling Ltd.
Cappincur Industrial Estate,
Daingean Road,
Tullamore,
Co. Offaly

Waste Licence No. W0113-04

by

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February 2016

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Appendices

1. Introduction

Q.E.D. Engineering Ltd would like to submit the following additional information on behalf of KMK Metals Recycling Ltd. in relation to the Request Licence Amendment of Emission Limit Values set in Schedule B.2 of licence W0113-04 for emission point reference No. F. The proposed amendment relates to the parameters and the Emission Limit Values set in Schedule B.2 for Emission Point Reference No: F (treated sanitary waste water).

2. Background to the setting of ELV's for Emission point ref. F

KMK Metals Recycling Limited applied for a Waste Licence Review, Reg. No. W0113-04 in October 2009 with the following proposals:

- increase the waste intake from 20,000 tonnes to 35,000 tonnes per annum of metals-based waste and WEEE (80% of intake is envisaged to be WEEE);
- extend the site boundary to incorporate an area of land (2,913m2) adjacent to the existing D5 area of the licensed facility; and
- install and operate new equipment/machinery for WEEE dismantling and recycling.

During the review application process, it was determined that the existing sanitary effluent treatment system had insufficient capacity for the number of staff at the facility. A new treatment system was proposed with the final effluent from the treatment system discharging to land drain through Emission point ref. F. At the time of the proposal submission the manufacturer of the treatment system (Molloy Precast Products Ltd.) specified a treatment standard of 5mg/l BOD, 1mg/l Ammonia, and 1mg/l Phosphorous. Subsequently, emission limit values to the manufacturer's specifications for the discharge to drain were proposed for inclusion in Schedule B.2. of the licence, as detailed in the 'Inspectors Report on a Licence Application', dated 28th August 2013. These emission limit values were given in Schedule B.2 Emissions to Water of the Proposed Decision for Licence Reg. No. W0113-04 on 26th September 2013 and in the Final Decision issued on the 20th December 2013.

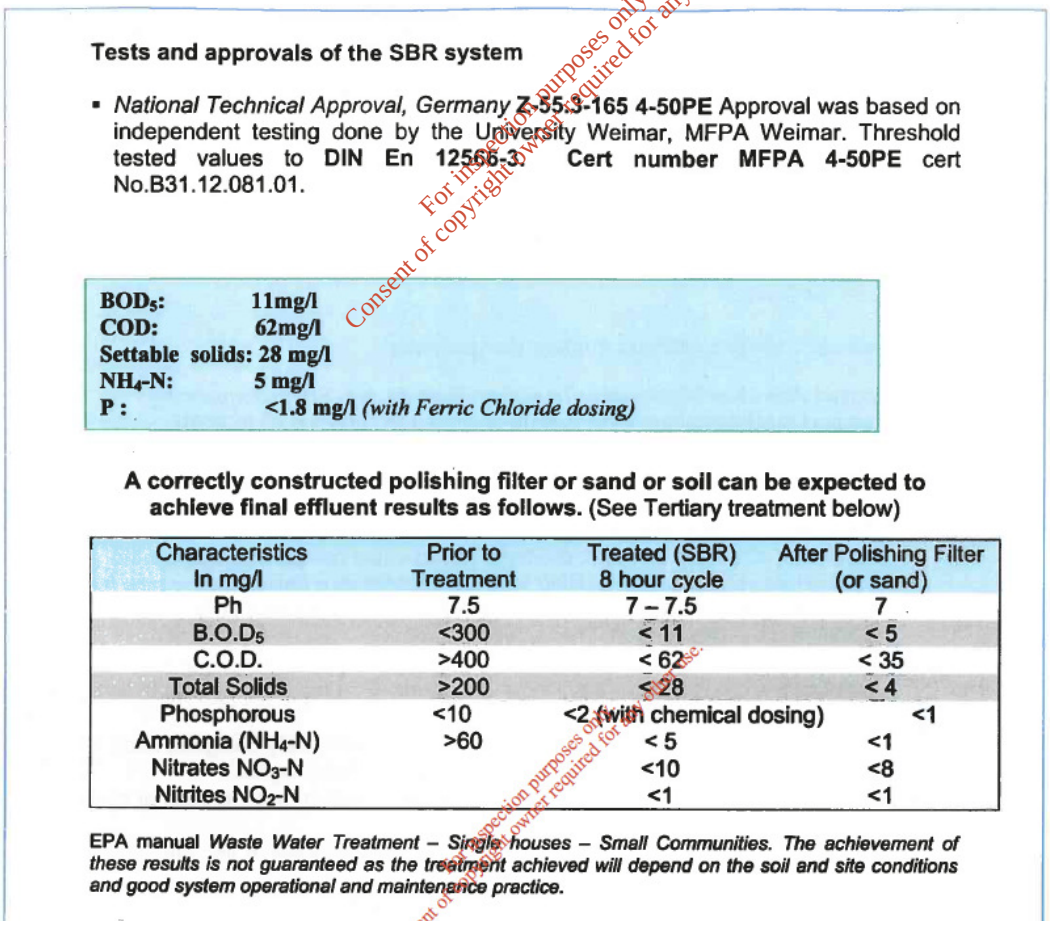
The new treatment system was fully installed and commissioned on-site in November 2013.

3. Reason for Licence Amendment Request

The new treatment system has been monitored at Emission point ref. F. since March 2014. As of this date the treatment system has not performed to the standards specified by the manufacturer and has been in continual breach of emission limit values (ELV's) for Total Phosphorous and/ or Ammonia on every monitoring event since installation. See Appendix 1 for Summary Graph of F Results. Since the initial ELV exceedances in 2014 the treatment system manufacturers, Molloy Precast Products Ltd., have tried to adjust the settings of the treatment system but this has been to no avail. Following high levels of Total Phosphorus in the discharge in 2014 Molloy Precast Products Ltd. increased the ferric chloride dosing in the system to reduce Total Phosphorous. However, this resulted in an increase in Ammonia levels in Q1 2015 as can be seen on the graph in Appendix 1. A delicate balance of ferric chloride dosing was then practiced for the remainder of 2015, however this was not effective at maintaining both Ammonia and Total Phosphorous within license limit values.

Notwithstanding the continual breach of ELV's from the treatment system since installation in 2013, Molloy Precast Products Ltd. have also declared in email correspondence of 03rd November 2014 to KMK Metal Recycling (email included in Appendix 2) that the ELV's for the discharge are unrealistic and that it is *'nigh impossible to achieve <1mg/l Total Phosphorous'* and that *'there will be continual failures to meet the unrealistic figure'.* Furthermore, on review of the manufacturer's specifications for the new treatment system which was included in Appendix 12 of the EIS which accompanied the Waste Licence Review Application (see Figure 1) it is clear that the manufacturer's (Molloy Precast Products Ltd.) referenced the optimum treatment standards of the system when specifying the treatment standards to KMK Metal Recycling. The manufacturer's specifications states that *'A correctly constructed polishing filter or sand or soil can be expected to achieve final effluent results as follows'* (see Figure 1 below) and *'The achievement of these results is not guaranteed as the treatment achieved will depend on the soil and site conditions and good system operational and maintenance practice.'* Therefore, it is clear that Molloy Precast Products Ltd. did not err on the side of caution when specifying treatment standards of 5mg/l BOD, 1mg/l Ammonia, and 1mg/l Phosphorous for the new treatment system.

In summary, it is clear from the continual breach of ELV's since the installation of the treatment system in 2013, and from email correspondence from Molloy Precast Products Ltd. and review of the manufacturer's specifications, that the emission limit values applied to Emission point ref. F are unrealistic and will result in the continual breach of emission limit values for Total Phosphorous and/ or Ammonia if they remain as set out in Schedule B.2. of licence W0113-04.



Tests and approvals of the SBR system

- *National Technical Approval, Germany* **Z-55.3-165 4-50PE** Approval was based on independent testing done by the University Weimar, MFPA Weimar. Threshold tested values to **DIN En 12566-3. Cert number MFPA 4-50PE** cert No.B31.12.081.01.

BOD_5: 11mg/l
COD: 62mg/l
Settable solids: 28 mg/l
NH_4-N: 5 mg/l
P : <1.8 mg/l *(with Ferric Chloride dosing)*

A correctly constructed polishing filter or sand or soil can be expected to achieve final effluent results as follows. (See Tertiary treatment below)

Characteristics In mg/l	Prior to Treatment	Treated (SBR) 8 hour cycle	After Polishing Filter (or sand)
Ph	7.5	7 – 7.5	7
$B.O.D_5$	<300	< 11	< 5
C.O.D.	>400	< 62	< 35
Total Solids	>200	< 28	< 4
Phosphorous	<10	<2 (with chemical dosing)	<1
Ammonia (NH_4-N)	>60	< 5	<1
Nitrates NO_3-N		<10	<8
Nitrites NO_2-N		<1	<1

EPA manual Waste Water Treatment – Single houses – Small Communities. The achievement of these results is not guaranteed as the treatment achieved will depend on the soil and site conditions and good system operational and maintenance practice.

Figure 1: manufacturer's specifications for the new treatment system

4. Proposed Licence Amendment Description

The proposed licence amendment relates to the parameters and the Emission Limit Values set in Schedule B.2 for Emission Point Reference No: F (treated sanitary waste water). The following tables show the current and proposed Schedule B.2 for Emission Point Reference No: F (treated sanitary waste water). Table 1 shows the current Schedule B.2 for Emission Point Reference No: F and Table 2 shows the proposed Schedule B.2 for Emission Point Reference No: F.

Table 1. Current Schedule B.2 for Emission Point Reference No: F

Emission Point Reference No:	**F (treated sanitary waste water)**
Receiving Water:	**Land drain adjacent to facility**
Parameter	**Emission Limit Value**
BOD	5 mg/l
Ammonia	1 mg/l
Total phosphorous	1 mg/l

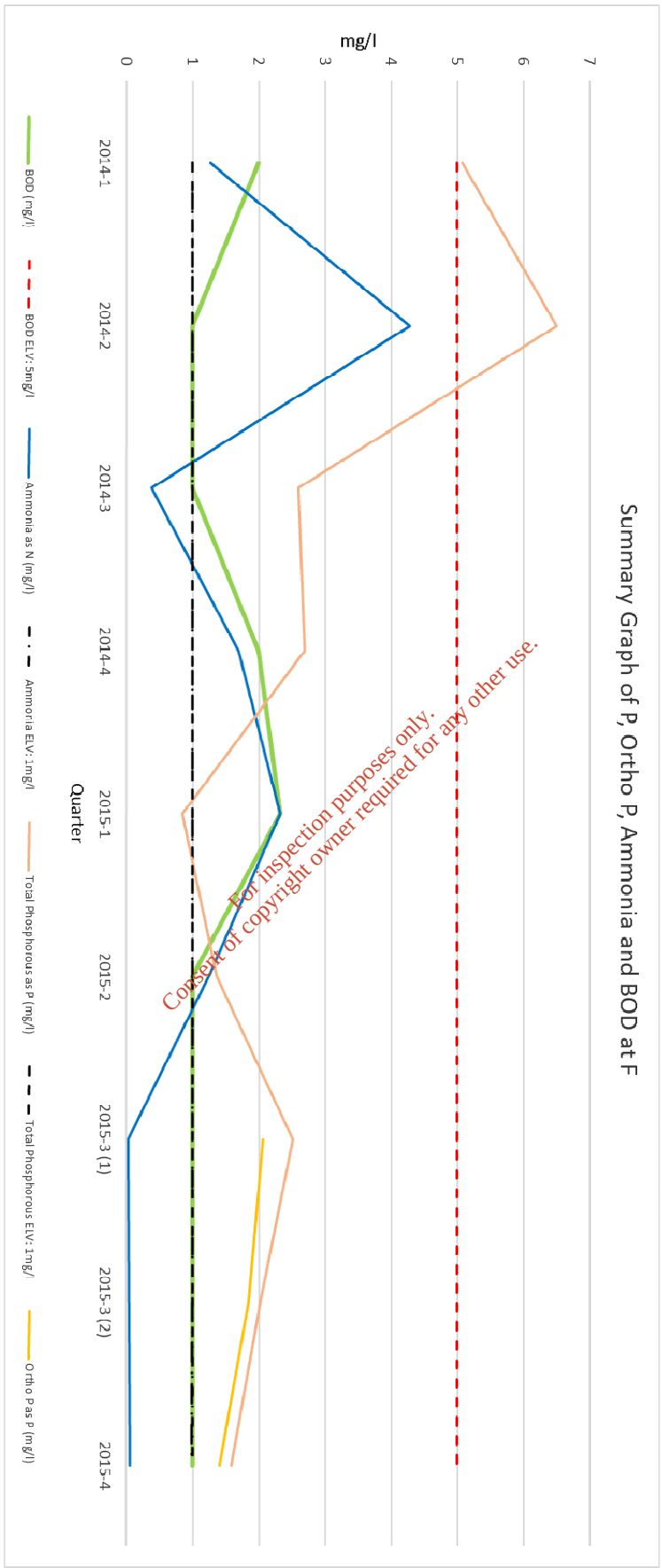
Table 2. Proposed Schedule B.2 for Emission Point Reference No: F

Emission Point Reference No:	**F (treated sanitary waste water)**
Receiving Water:	**Land drain adjacent to facility**
Parameter	**Emission Limit Value**
BOD	10 mg/l
Ammonia	3.2 mg/l
Orthophosphate (as P)	2 mg/l

Firstly, the licence amendment proposes a change to the monitoring parameters listed in Schedule B.2 for Emission Point Reference No: F. The change is to monitor for Orthophosphate (as P) instead of Total Phosphorous. The significance of phosphorus is principally in regard to the phenomenon of eutrophication in receiving waters and it is considered that Orhtophosphate is the most readily available form of phosphorous for the growth of algae. Orthophosphate (as P) has been listed in Schedule B.2 of numerous other waste licences (i.e. licence W0275-01 for a discharge from a waste water treatment plant), and there are also surface water Environmental Quality Standards (EQS) available for Orthohosphate, whereas there are none available for Total Phosphorous.

Secondly, the licence amendment proposes a change to the Emission Limit Values in Schedule B.2 for Emission Point Reference No. F of licence W0113-04. The reasons for this amendment are clearly outlined in Section 3. The proposed emission limit values were calculated using the mass balance calculation and the report on these calculations is included in Appendix 3. The proposed Emission Limit Value for Ammonia, Ortho-Phosphate and BOD are set as a result of the mass balance calculations, and they aim to ensure an adequate level of protection for the receiving waterbody.

Appendix 1: Summary Graph of F Results.



Appendix 2: Molloy Precast Products Ltd. email correspondence to KMK Metal Recycling

Nally Environmental

From: Michael Cahill <michael.cahill@molloyprecast.com>
Sent: 03 November 2014 18:08
To: Amy Jackson
Cc: Nally Environmental
Subject: Results WWT System final Effluent results.
Attachments: 236701.pdf

Importance: High

Amy & Niall,
The P_{tot} results from WWT System final Effluent are excellent by any standards.
It is nigh impossible to achieve <1mg/P_{tot} from a small packaged treatment system combined with a biological tertiary treatment unit.

Any biological system needs Phosphorous to operate, the Biomass will not grow without it and consequently will not treat anything.
The golden ratio is C100:N5:P1 that is basically to have any biomass growth you need 100mg Carbon, BOD equiv, and 5mg Nitrogen and 1mg Phosphorus.
(The practical ratios for treating Domestic Sewage to a reasonable level is C100:N12:P1)

In KMK, and any other similar small treatment system, excess phosphorous can only be treated in the Secondary Treatment component of the system, where the Phosphorous could conceivably be reduced to virtually zero by dosing enough. However this would deprive the Tertiary System of any Phosphorous input and biomass would fail. So a balance has to be achieved where enough is let through to ensure a healthy biomass in the Tertiary System. A tertiary system, like the Sand Filter, is dependent on a steady feed of nutrients to maintain a biomass that will not bulk enough to clog the system but still do its job. To achieve this situation the biomass has to die off at a rate that will allow this balance to be achieved. The die off is reabsorbed by the live bacteria, during which process, it disintegrates into water and gas. This process releases a small amount of P back into the liquid effluent.

The only significant P, that is of ecological concern, is that which is likely to cause Eutrophication in the receiving waters and that is essentially Ortho Phosphates.
This is what we should be measuring here and not an unrealistic Total P figure. Less than 2mg/l of Ortho P is consistently achievable and <1mg/l Ortho P some of the time.

As long as the licence continues to ask for the unrealistic figure of <1mg/l total Phosphorous there will be continual failures to meet the unrealistic figure causing unnecessary annoyance and continual re-testing.

Regards,
Michael Cahill.
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Appendix 3: Mass Balance Calculations

Mass Balance Calculations of WWTP Discharge F based on Proposed Amended ELV's

for

KMK Metals Recycling Ltd.
Cappincur Industrial Estate,
Daingean Road,
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by

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February 2016

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1. Introduction

The Mass Balance Calculation is used to calculate the concentration of a parameter in the receiving water downstream of the discharge point. This downstream concentration may then be compared directly with the water quality standard (EQS) to determine whether the discharge will cause an exceedance of the EQS value.

Mass balance Equation:

$$T = \frac{FC + fc}{F + f}$$

where:

- F is the river flow upstream of the discharge (95%ile flow m3/sec);
- C is the concentration of pollutant in the river/lake upstream of the discharge (mean concentration in mg/l);
- f is the flow of the discharge (m3/sec);
- c is the maximum concentration of pollutant in the discharge (mg/l);
- T is the concentration of pollutant downstream of the discharge.

2. Data Source

2.1 Background upstream concentration of receiving water (land drain at F)

The background upstream concentration of the receiving water was taken from the *Drain Impact & Assimilative Report Based on a Proposed Waste Water Treatment System (WWTS)*, which was included in Appendix 12 of the EIS which accompanied the Waste Licence Review Application. The background upstream concentration from this report are shown in Figure 1.

In accordance with the *Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters, Groundwater and to Sewer for Local Authorities, Volume 1,* where conditions in the receiving river upstream of the discharge are failing to achieve Good status, regardless of how well treated the effluent being discharged is, the target EQS cannot be met. In such instance, the theoretical impact of the discharge may be determined by utilising an "adjusted background concentration" in the mass balance calculation. The 'adjusted background concentration" may be taken as the midpoint between the Good Status EQS and High Status EQS. The use of a theoretical or "adjusted resultant concentration" will give an indication of the likely impact the discharge would have if the waterbody was returned to good status. Accordingly, an adjusted background concentration for total ammonia (as N) of 0.115mg/l, orthophosphate (as P) of 0.06mg/l, and BOD of 2.4mg/l was used for the assimilative capacity calculations.

KMK
July 2012

Drain Impact & Assimilative Report
for a proposed new WWTS

Table 1.1 shows the baseline parameter loadings for the land drain- Upstream (US) of the proposed discharge outlets (E Drain)

Parameter	River Flow (m^3/s)	US Concentration measured (mg/l)	Estimated loadings* (kg)
Total Suspended Solids	0.0026	70	0.00018
pH	0.0026	6.95	-
Total Ammonia	0.0026	0.28	0.0000007
Orthophosphate	0.0026	0.13	0.0000003
BOD	0.0026	14	0.000036
COD	0.0026	48	0.000125
Nitrate (NO3)	0.0026	1.33	0.0000034

*Figures based the calculated flow rate of the drain: 0.0026 m^3/s and using water quality analysis data taken upstream of the proposed discharge point. See Appendix 2 for analysis results

Figure 1: Background upstream concentration of receiving water

2.2 Concentration of pollutant in the discharge

The figures used in the Mass Balance calculations are the proposed Emission Limit Values to be amended in Schedule B.2 for Emission Point Reference No. F of licence W0113-04. The proposed emission limit values were calculated using the mass balance calculation and the final figures chosen are below the maximum concentration permissible to ensure that the receiving water downstream of the discharge point falls under the Environmental Quality Standards (EQS) for Surface Waters. The proposed emission limit values are as follows:

Proposed Emission Limit Values for Emission Point Ref. F	
Parameter	**Emission Limit Value**
BOD	10 mg/l
Ammonia	3.2 mg/l
Orthophosphate	2 mg/l

2.3 95%ile flow in the receiving water (land drain at F)

The 95%ile flow value of the receiving water was calculated from average flow data taken from the *Drain Impact & Assimilative Report Based on a Proposed Waste Water Treatment System (WWTS)*, which was included in Appendix 12 of the EIS which accompanied the Waste Licence Review Application. The land drain flow rate was measured at 3 transects across the drain and the average flow values are shown in Figure 2 below. The 95%ile flow value based on the average flow values is 0.00279 m^3/s.

Table 1.0 – Flow rate field work June 2012

Transect	Average Cross Sectional Area (m^2)	Average Velocity (m/s)	Average Flow (m^3/s)
A	0.19	0.013	**0.0025**
B	0.14	0.019	**0.0027**
C	0.16	0.018	**0.0028**
Average			**0.0026**

Figure 2: Average flow values of receiving water

2.4 Flow of the discharge

The flow rate of effluent discharged from Emission Point Reference No. F to the land drain is 1.79m^3/day or 0.000021m^3/sec.

3. Calculations

3.2 Mass Balance Calculations

KMK Mass Balance Calculations of WWTP Discharge F based on Proposed Amended ELV's

Mass Balance Calculation T = (FC + fc)/ (F+f)

	US flowrate	Adjusted US Background	F Discharge Flow	Proposed max discharge conc. (i.e. proposed ELV's)	DS Concentration		SW regulation limits
Parameter	**F m3/s 95%**	**C mg/l**	**f m3/sec**	**c mg/l**	**T Conc. DS mg/l**		**EQS**
Ammonia	0.00279	0.115	0.00002	**3.2**	0.137		0.14
Ortho-Phosphate	0.00279	0.06	0.00002	**2**	0.074		0.075
BOD	0.00279	2.4	0.00002	**10**	2.454		2.6

4. Conclusion

Environmental Quality Standards (EQS) as outlined in the European Communities Environmental Objectives (Surface Water) Regulations 2009, S.I. No. 272 of 2009, are available for Ammonia, Ortho-Phosphate, and BOD.

The Mass Balance calculations show that, in respect of Ammonia, Ortho-Phosphate, and BOD, the receiving water land drain has the capacity for the discharge as concentrations downstream of the discharge point will fall under the Environmental Quality Standards (EQS) for Good Status Surface Waters. The proposed Emission Limit Value for Ammonia, Ortho-Phosphate and BOD are set as a result of the mass balance calculations, and they aim at ensuring an adequate level of protection for the receiving waterbody.