Integrated Pollution Prevention & Control Licence Review

Johnson & Johnson Vision Care Ireland

Attachment I

I.1.Assessment of Atmospheric Emissions
I.2. Assessment of Impact on Receiving Surface Water
I.3. Assessment of Impact of Sewage Discharge
I.4 Assessment of Impact on Ground/Groundwater emissions
I.5 Assessment of Noise Impact
I.6 Environmental Considerations and BAT

I.3. Assessment of Impact of Sewage Discharge

I.3.1 Municipal Wastewater Treatment Plant

All foul process wastewaters from the Vistakon plant are discharged to the National Technology Park's foul sewerage system that eventually discharges to the Castletroy Wastewater Treatment Plant (WWTP) operated by Limerick County Council. The WWTP was constructed in the early 1990s and has been upgraded more recently. The new WWTP was designed to accommodate effluent from the University of Limerick, the National Technology Park and residential development in the general Castletroy and adjoining areas.

This plant is of the activated sludge type with full secondary treatment. The plant has been designed to produce an effluent, which is below the BOD5 of 25 mg/l and a Suspended Solids level of 35 mg/l. The plant has recently been granted a wastewater licence by EPA.

I.3.2 Vistakon Foul Process Effluent

Site trade effluent discharges direct to the municipal drainage system without any treatment at the Vistakon site. Ther has been no issues regarding th eVistakon wastewater discharge at the Castletroy Waste water treatment plant.

The wastewater discharge concentrations agreed with Limerick County Council have been ammended over the years to reflect increase in production capabilities at the Vistakon site.

The most recent proposed changes wil involve the inclusion of propylene glycol as the hydration solvent on two existing production lines and revised limits for discharge to the sewer system have been agreed Limerick County Council (See Section 1.3.2.1 below).

Vistakon pays a significant amount of money annually to have the wastewater treated at the Limerick County Council (LCC) Castletroy Wastewater Treatment Plant, primarily based on the flow, BOD and COD load of the wastewater, this year the amount paid to LCC will be in the region of €600,000 - €1,000,000 depending on final load and volumes. LCC are now satisfied that their wastewater treatment plant can deal with an increased load.

The increased load will facilitate the use of propylene glycol in the hydration stage on two production lines. If successful it is likely that propylene glycol (PG) will eventually replace the use of Iso-propyl alcohol with a resultant significant decrease in any solvent emissions as well as the

significant positive process safety implications given that PG is not classified as a flammable liquid.

The increase is required for two upcoming production line conversions which will use propylene glycol in the process hydration stage. In the hydration cell front curves and lens from the lens fabrication cell are flushed with propylene glycol and subsequently flushed with water. The waste propylene glycol is sent for recovery off-site. The wash water containing trace propylene glycol is send to the wastewater stream for treatment ultimately at Castletroy wastewater treatment plant. Each line will generate an estimated wastewater volume of 3.5m3/day and maximum increase in BOD load of 200kg/day and COD load of 300kg/d. Each line will use approximately 400L of propylene glycol per day.

Propylene Glycol USP/EP is a widely used ingredient in pharmaceutical, food, cosmetic, personal care, flavors and animal feed applications. Propylene glycol is not volatile, but is miscible with water. Propylene glycol is not harmful to aquatic organisms. Abundant environmental effect data is available for this material. For example, the inhibition concentration that affects 50% of the studied population of exposed bacteria (IC50) is >> 1000 mg/L (Photobacterium phosphoreum 30 min; activated sludge respiration inhibition 3 h). Similar absence of toxicity is observed for algae (Chlorella pyrenoidosa, LOEC = 92,000 mg/L); crustaceans (e.g., Daphnia magna 48 hEC50 = 34,400 mg/L); and fishes (e.g., Lepomis macrochirus 96 h LC50 > 1,000 mg/L).

Propylene glycol is readily biodegradable. Biodegradation may occur under anaerobic conditions (in the absence of oxygen):

OECD Biodegradation Tests:
Biodegradation Exposure Time Method

- 81 % 28 d OECD 301F Test
- 95.8 % 64 d OECD 306 Test

Propylene glycol is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species):

- **Fish Acute & Prolonged Toxicity**
- LC50, rainbow trout (Oncorhynchus mykiss), 96 h: 44,000 - 51,600 mg/l
- **Aquatic Invertebrate Acute Toxicity**
- EC50, water flea Daphnia magna, 48 h, immobilization: 4,850 - 34,000 mg/l
- **Aquatic Plant Toxicity**
- EC50, green alga Selenastrum capricornutum, biomass growth inhibition: 19,000 mg/l
- **Toxicity to Micro-organisms**

- EC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: > 1,000 mg/l

Vistakon have also commissioned Project Management to identify suitable options and propose a pre-treatment solution to reduce the BOD and COD load of the Vistakon wastewater on-site before discharge to the Local Authority system. As the Vistakon Limerick manufacturing facility continues to grow, we envisage pre-treatment may be a better environmental solution. Follwing review of the report recommendations, pilot plant trials will be intiated on the preferred pre-treatment option. Assuming the pilot plant trials are successful, we hope to have a permanent pre-treatment facility on-site within about six months of the trials completion subject to agreement with the Agency.

In order to facilitate the proposed production changes we are proposing that the IPPC Licence Section B3 is amended as follows:

B.3 Emission to Sewer

Emission Point Reference No.: SE-1

Name of Receiving Waters: Shannon River

Location: 163763E, 158108N

Volume to be emitted: Maximum in any one day:
1450m3

Maximum rate per hour: 145m3

Parameter	Emission Limit Value	
Temperature	40°C (max.)	
pH	6 - 9	
	mg/l	kg/day
BOD	1100	
COD	2000	1600 *Note 1*
Suspended Solids	100	
Total Dissolved Solids	5000	
Total Phosphorous	2	
Fats, oils and grease	35	
Detergents (as MBAS)	20	

Note 1: The emission limit value may be increased on a phased basis to 1600kg/day with the agreement of the Water Services Authority (Limerick County Council). The water services authority may require a decrease in the emission limit value by notification to the licensee subject to available treatment capacity at the Castletroy plant.

1.3.2.1: Correspondence with Limerick County Council

Copies of the relevant correspondence with Limerick County Council is outlined below:

From: Brennan Donal [mailto:dbrennan@limerickcoco.ie]
Sent: 09 July 2009 16:50
To: Stokes, Margaret [VISIE]
Subject: RE: Additional loading at Castletroy Waste Water Treatment Plant.

Margaret

The limits in the Table to you email of 9th July 2009 (see below) are the limits being referred to in my email of 19th June (see also below).

Limerick County Council has no objection to the limits subject to the restrictions outlined in this email and the email of 19th June.

Regards

Donal

From: Stokes, Margaret [VISIE] [mailto:MStoke01@ITS.JNJ.COM]
Sent: 09 July 2009 09:39
To: Brennan Donal
Cc: Magner, John [VISIE]
Subject: RE: Additional loading at Castletroy Waste Water Treatment Plant.

Donal

Water service agreement got delayed in the solicitors, its' back here now and I hope it will be with you tomorrow.

Further to recent discussion with EPA on the proposed changes to our effluent discharge arrangements, they have asked that I get you agreement to the proposed IPPC licence wording below:

B.3 Emission to Sewer

Emission Point Reference No.: SE-1

Name of Receiving Waters: Shannon River

Location: 163763E, 158108N

Volume to be emitted: Maximum in any one day: 1450m3

Maximum rate per hour: 145m3

Parameter	Emission Limit Value	
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	1100	
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Fats, oils and grease	20	
Detergents (as MBAS)		

Note 1: The emission limit value may be increased on a phased basis to 1600kg/day with the agreement of the Water Services Authority (Limerick County Council). The water services authority may require a decrease in the emission limit value by notification to the licensee subject to available treatment capacity at the Castletroy plant.

If you need any further information please let me know.

Yours sincerely,
Margaret Stokes
EHS Manager
Tel: *061 203141*
Email: *mstoke01@its.jnj.com*

From: Brennan Donal [mailto:dbrennan@limerickcoco.ie]
Sent: 19 June 2009 11:58
To: Stokes, Margaret [VISIE]
Cc: Gleeson Cait
Subject: Additional loading at Castletroy Waste Water Treatment Plant.

Margaret

I refer to your email of 27/05/2009 and to our meeting of 29/05/2009.

Temporary improvements were commissioned at Castletroy Treatment Plant yesterday and based on the preliminary operational tests Limerick County Council would be in a position to accept the increased loads for an initial period of twelve weeks.

Limerick County Council may have withdraw this approval at any time *if* the experience of operating with the additional loads leads to operational or other problems at the plant; therefore Limerick County Council reserves the right to withdraw this approval at any time during that period.

The approval will be reviewed at the end of the twelve week period based on the experience of dealing with the loads and the implementation of other improvements at the plant.

Regards

Donal Brennan
Senior Engineer
Limerick County Council

From: Stokes, Margaret [VISIE]
Sent: 05 June 2009 11:41

To: 'Brennan Donal'; Gleeson Cait
Cc: Crowe Paul; Magner, John [VISIE]
Subject: RE: Further revised Agreement; subject to contract

Donal/Cait

As discussed at our meeting last week, the increase is required for two upcoming production line conversions which will use propylene glycol, the first line is due to run on July 15 and the second line is expected to come on line October 15. Each line will generate an estimated maximum increase in BOD load of 200kg/day and COD load of 300kg/d with an estimated maximum PG concentration in the wastewater of 180ppm on July 15 and 360ppm on October 15.

Propylene Glycol USP/EP is a widely used ingredient in pharmaceutical, food, cosmetic, personal care, flavors and animal feed applications.

Propylene glycol is not volatile, but is miscible with water. Propylene glycol is not harmful to aquatic organisms. Abundant environmental effect data is available for this material. For example, the inhibition concentration that affects 50% of the studied population of exposed bacteria (IC50) is >> 1000 mg/L (Photobacterium phosphoreum 30 min; activated sludge respiration inhibition 3 h). Similar absence of toxicity is observed for algae (Chlorella pyrenoidosa, LOEC = 92,000 mg/L); crustaceans (e.g., Daphnia magna 48 hEC50 = 34,400 mg/L); and fishes (e.g., Lepomis macrochirus 96 h LC50 > 1,000 mg/L).

The attached MSDS Section 14 contains relevant ecological information summarised below:

Movement & Partitioning

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 1.2E-8 atm*m3/mole Measured
Partition coefficient, n-octanol/water (log Pow): -0.92 Measured
Partition coefficient, soil organic carbon/water (Koc): < 1 Estimated

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

OECD Biodegradation Tests:
Biodegradation Exposure Time Method
81 % 28 d OECD 301F Test
95.8 % 64 d OECD 306 Test
Chemical Oxygen Demand: 1.53 mg/mg
Theoretical Oxygen Demand: 1.68 mg/mg

ECOTOXICITY

Data for Component: **Propylene glycol**

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

LC50, rainbow trout (Oncorhynchus mykiss), 96 h: 44,000 - 51,600 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, water flea Daphnia magna, 48 h, immobilization: 4,850 - 34,000 mg/l

Aquatic Plant Toxicity

EC50, green alga Selenastrum capricornutum, biomass growth inhibition: 19,000 mg/l

Toxicity to Micro-organisms

EC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: > 1,000 mg/l

I also attach:

- Robust Summaries on it's ecotoxicity from Dow, who are the PG supplier, this study indicates that PG meets current OECD criteria for "ready biodegradability" in the Manometric Respirometry Test.
- Environmental ecotoxicity data from P&G, who use it widely in cosmetic products. This data indicates that PG is a readily biodegradable material in aerobic (e.g., ready biodegradation (CO_2 production), 91.2% in 25 d) and anaerobic (e.g. anaerobic degradation in activated sludge : 85% in 14 d at 380 mg/L). PG is extensively removed during wastewater treatment, primarily due to biological degradation, as indicated by the following data. DOC removal in Semi-continuous activated sludge test (SCAS) was 91.2%. Continuous activated sludge (CAS) tests show that propylene glycol is 100% removed within 24 hrs (UNEP Publications 2001, Verschueren, 1998, P&G internal study data).

As you know, we have an IPPC Licence and from initial discussions with EPA on what they need to grant a licence amendment to include for the use of PG on these two lines, we will need confirmation from yourselves that you can accommodate the increased organic load at Castletroy WWTP.

Meanwhile, we have appointed Project Management to commence work on the identification and conceptual design of an on-site pretreatment solution to reduce the organic load in our wastewater. They are due to report within two weeks after which we be able to indicate the period of time required before we can commission an on-site pre-treatment facility. Currently we expect this to take about six months.

If you need any further information please let me know.

Regards

Margaret Stokes
EHS Manager Vistakon Ireland