

H1 Methodology – CSG Avonmouth

Ref: 189.1205

Introduction

This H1 assessment has been prepared in support of application FP3823PB/A001.

This report presents a discussion of the installation emission sources to air and water, and the impact assessment based on emissions data from a CSG part funded Envirolex Report on air emissions and data from samples taken of effluent for CSG Bristol (Permit AP3336SD) (which will be replaced by this facility).

The impact assessment has been undertaken using the EA Horizontal Guidance Note H1 and reference should be made to the H1 database tables. Version 2.78 (December 2016) of the H1 Assessment Tool was used for this assessment.

Site Activities

CSG have applied to undertake the following activities within the installation:

- Oil Treatment plant – Blending and dewatering of waste oils – gravitational separation of oil contamination from waters and sludges.
- Hazardous Waste storage
- Physico-chemical treatment of non-hazardous liquid wastes

Emissions to Air – Summary

All emissions to air from the facility arise from vents – either tank or road tanker vents. All liquid wastes processed at the installation are off-loaded from road tankers and stored in bulk tanks. For each delivery of waste there is a displacement of air from the receiving tanks, for each transfer between tanks or discharge to a road tanker there is also a displacement of air.

Oily wastes are low in VOC's, however, CSG recognise that the transfer of these wastes into and out of tanks will result in some air emissions. We have calculated the total emissions for the installation for displacement of air and used the H1 tool to assess the installations emissions as though it were a point source.

Quantification and Methodology of Air Emissions Calculations

Displacements (Release Point 1 in the H1 Assessment)

In terms of displacements, air emissions arise from vents from tanks and tankers. In order to gain the necessary data to calculate the VOC's emitted from the installation CSG partially funded a study into emissions from used oil. The study was conducted on four sites belonging to members of the Oil Recycling Association, it was coordinated by Enviro-Lex Ltd who also produced the summary report. The approach was validated with EA national staff responsible for coordinating the Used Oil sector PPC applications.

The study attempted to quantify and identify the VOC species released in the displacement of vapour during transfer of used oil between storage systems at ambient, 70 degrees Celsius and 90 degrees Celsius. However, the results for the ambient emissions were lost due to an instrument failure. CSG have therefore used the data from 70 degrees Celsius (which will be higher) in order to estimate ambient emissions.

VOC data present in this report are speciated: i.e., separated out into individual substances. CSG have continued this approach, and thus the emissions remain speciated.

CSG have applied to receive up to 20000 tonnes of hazardous waste per year at CSG Avonmouth. CSG Bristol, which this new treatment plant will replace, typically received 8000-10000 tonnes of hazardous waste per year. However, this calculation has been carried out on the worst-case scenario that the full throughput of 20000 tonnes has been received.

Therefore, the following calculations have been made: -

All oily waste delivered would lead to one displacement equal to the volume of the delivery;

1. displacement during discharge to the reception vessel (20000 tonnes)

Transfer to the treatment vessels would also lead to displacements equal to the volume of delivery;

1. displacement during discharge into the treatment vessels (20000 tonnes)

There would then be two further displacements equal to the volume of the oil separated from the oily waste (typically 14.5% of all incoming waste is recovered as oil);

1. displacement resulting from transfer to the oil storage vessel (2900 tonnes)
2. displacement during discharge to the tanker for removal from site (2900 tonnes)

Assessment of Potential Impact

In order to assess the impact of the installation emissions to air on the environment, a screening assessment has been carried out for the installation as a whole, using the H1 software tool with reference to Horizontal Guidance Note H1. A copy of the H1 database is provided.

H1 Screening Assessment Methodology

According to the H1 methodology, it is possible to screen out insignificant emissions and those emissions where further assessment is not required, based on the appropriate Environmental Assessment Level (EAL) for each pollutant. Screening of the emissions is achieved using the simplified dispersion factors contained within H1. These factors are applied based on the effective stack height of the emission source and are used to estimate the ground level concentration per unit release of pollutant.

The degree of dispersion – and hence the likely ground level concentration – arising from an elevated pollutant release is affected by the presence of other buildings or structures in the vicinity of the stack. These structures can cause downwash to occur, which increases the ground level concentration arising from the emissions and in effect reduces the effective height of the release.

The effective stack height is calculated by assessment of the buildings close to the stack, which could affect the dispersion of the release. Effective stack heights have been calculated for each source, based on the methodology provided in the Horizontal Guidance Note H1. This states that:

- *Where the point of discharge is less than 3 m above the ground or building on which it is located, or is less than the height of any building within the equivalent of five stack heights,....the effective height of release can be considered to be zero;*

- *Where the height of release is greater than 3 m above the ground or building on which it is located, but less than 2.5 times the height of the tallest adjacent building, the effective height of release can be estimated:*

$$U_{eff} = 1.66 \times H \{(U_{act}/H)-1\}$$

Where H = height of tallest adjacent building within five stack heights

U_{act} = actual release height

U_{eff} = effective release height.

Using this methodology, the effective height of release is 0 for all emissions from the installation.

Using the Table in H1 together with the release conditions, it is possible to estimate the worst-case ground level concentrations arising from each source over short term and long term averaging periods. The predicted process contribution (PC) can then be compared with the appropriate Environmental Assessment Level contained in H1 to determine the significance of the pollutant emission; the total pollutant emission is defined as insignificant where:

- $PC \leq 1\%$ of the EAL for long term releases;
- $PC \leq 10\%$ of the EAL for short term releases;

Calculated estimates of emissions data for releases to air from the installation are detailed in the H1 tables provided in Appendix A.

Emissions to Air – Conclusion

The screening assessment, based on the methodology given, indicates that all emissions are predicted to result in process contributions (PCs) that are screened as insignificant against the Environmental Assessment Levels (EALs).

Therefore, no further assessment of these emissions has been undertaken.

The BAT AEL for TVOCs for treatment of water based liquid chemical waste is 45mg/Nm³ where the load is below 0.5kg/hr.

Taking the TVOC load of 2476.4 mg/m³, at a release rate of 5.22m³/hr, the total load is 12.93g/hr.

The methodology used is conservative and a worst-case scenario for emissions from this plant. In reality, with cold oil and with a lower throughput it is likely that the emissions would be below BAT-AEL levels. In order to ensure this is the case, however, the emissions will be collected and abated. The storage tanks are therefore to be vented through a carbon adsorption unit.

Emissions to Water – Summary

There will be no discharges to surface water or controlled waters directly from the installation. CSG Avonmouth will have a Trade Effluent Consent with Wessex Water that will allow the site to discharge to foul sewer.

CSG work closely with Wessex Water to ensure that water treatment objectives are being met. CSG continues to refine the on-site treatment processes in order to achieve optimum contaminant removal, whilst avoiding excessive use of raw materials.

As discussed later in this report, the existing discharge is not predicted to result in an exceedance of water quality objectives. The use of waste screening, and on-site primary and secondary treatments, which are optimised for the specific effluent being treated, together with off-site tertiary treatment are therefore considered to represent indicative BAT for this process.

Methodology

Sampling and testing of treated wastewater batches is undertaken prior to discharge to sewer and in

accordance with the existing discharge consent. Additional testing has been undertaken on the effluent discharge in order to fully quantify potential pollutants to the water environment. A comprehensive analysis was undertaken on a several effluent samples from CSG Bristol by Wessex Water. These were tested by Wessex water using their own independent processes. The analysis covered all substances relevant to the discharge, any substance found above the limits of detection was assessed using the H1 database.

Point Source Emissions to Water

The installation will discharge wastewater via the public main sewer to Avonmouth Sewage Treatment Works (STW). The effluent is to be sampled and tested prior to discharge of each batch in accordance with the site's monitoring schedule.

It is likely that many of the substances present in the effluent will be removed during treatment at the STW. CSG have, therefore, used these reduction factors in our calculations.

The Receiving Environment

Avonmouth STW discharges to the Severn Estuary. The location of discharge is within the river estuary. CSG have been unable to obtain a dispersion rate for the area around the outflow from the STW so have assumed a worst-case scenario from the data within the H1 guidance.

The H1 guidance gives a dispersion rate (DR_c) under low dilution conditions of $2.4 \text{ m}^2 / \text{s}^{2/3}$ for saline estuaries.

Impact Assessment - Screening

The impact of the installation discharge to water, following treatment at the STW, has been assessed, using H1, in accordance with the EA H1 Guidance.

No short-term EALs are available, therefore this is considered to provide a representative assessment of the long term release from the installation.

According to the methodology outlined in H1, it is possible to screen out insignificant emissions and those emissions where further assessment is not required, based on the appropriate Environmental Assessment Level (EAL) for each pollutant. Screening of the emissions is achieved using simplified sewage treatment reduction factors, contained within H1, which represent the effects of the treatment process on the pollutants. In line with H1 methodology, the assessment takes no account of dilution provided within the sewerage system.

The process contribution (PC) is then calculated using the formula:

$$PC_{water} = \frac{(EFR^{2/3} \times RC) \times 1000}{DR_c}$$

where:

EFR = Effluent flow rate (m^3/s)

DR_c = Dispersion rate ($\text{m}^2 / \text{s}^{2/3}$)

R_c = concentration of pollutant in the effluent (micrograms/litre)

The effluent PCs were compared against EALs to screen out insignificant emissions, using a threshold of 1% of the EAL for both long-term and short-term emissions. For those emissions that are not screened as insignificant, the PCs are added to the background concentrations in the river to give the

Predicted Environmental Concentrations (PECs). The PEC can be compared with the appropriate Environmental Assessment Level to identify whether further assessment of emissions is necessary, taking in the following guidelines:

- *If the predicted Environmental Concentration (PEC) > 70% of the EAL for long term releases;*
- *Where relevant, if the short term PC > 20 % of the short term EAL;*
- *If there is strong seasonal variation in flow;*
- *If there are local receptors or habitats which are sensitive to any of the significant emissions.*

No assessment has been made of the COD release from the installation, as there is no EAL defined for this species in H1, however COD emissions are maintained below the consented discharge limit and will be removed during treatment at the STW.

Predicted Impact

The screening assessment has been undertaken, based on low dilution in the receiving waters and assuming attenuation/treatment as per sewage treatment reduction values.

Although all results are at or lower than the associated BAT AEL's for those substances, five substances failed test 1. However, by test 5, all substances have been screened out using background concentrations found in the Severn Estuary. These figures have been obtained from Little & Smith (1994), a Geotek report from 2007, and Roger Parry (2018).

Emissions to Water - Conclusion

It is considered that emissions from the installation are unlikely to result in significant impacts to the receiving waters. Therefore, no additional control measures are proposed.