

C3.5 Emissions to Air

Reference is made to Annex 2: Updated version of Appendix 1 May 2010 submission which contains the updated data in relation to air emissions of the plant under different operational conditions.

Estimated CO emission levels for diesel and natural gas:

Estimated levels for CO emission on diesel (gasoil) are assumed to be at a similar level as those of HFO firing.

On natural gas operation, CO should be at a level of 30-380mg/Nm³ @15% O₂ in order to represent BAT.

Please refer to Annex 59: BREF.

Ammonia emissions in all cases is 2.6 mg/Nm³ @ 15% O₂.

Abatement measures:

- a. **HFO:** FGD & SCR both in use
- b. **Diesel:** Only SCR in use
- c. **Gas:** only SCR in use.

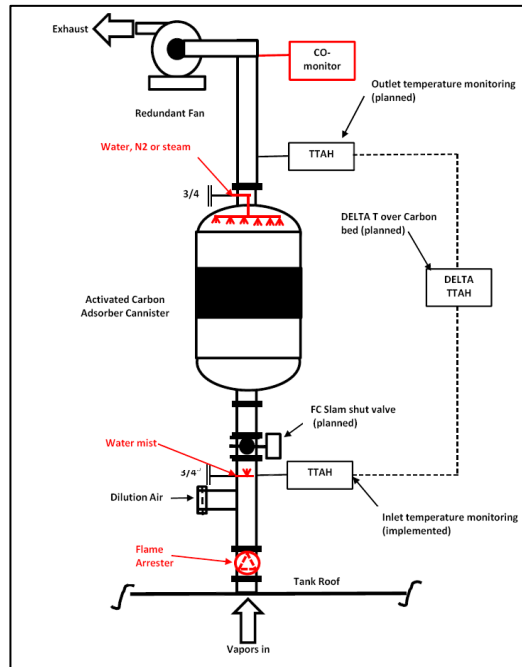
The reactant used for SO₂ and particle reduction:

Flue Gas Desulphurisation: Sodium bicarbonate (BICAR® TEC): please note that MSDS has already been submitted under section C2.2.

Existing Tank Farm:

Current practice as for the existing tank farm will be followed. Appropriate VOC filters FM or UL approved for the intended applications are presently being considered for use on the HFO buffer and service tanks.

BWSC has supplied a storage tank system to Enemalta for storage of Heavy Fuel Oil (HFO) and Diesel (DO). In order to comply with Volatile Organic Carbon (VOC) emission standards, each tank is fitted with an emission abatement system, consisting of an activated carbon canister, situated remotely and a redundant extraction fan, as shown below:



Please refer to diagram 'VOC units for HFO tanks 2010.11.10.pdf' (refer to Annex 60) and sketches Remote installation of VOC units 'VOC screendumps'.pdf (refer to Annex 61) and 'CBI technical proposal.pdf' (refer to Annex 62) and 'CBI design basis Delimara plant.pdf' and (refer to Annex 63), 'Data Sheet - Adsorption filter Ny.pdf' (refer to Annex 64) and 'Norit Material safety datasheet.pdf'(refer to Annex 65).

The extraction fan in service continuously extracts air from the tanks under normal operating conditions. The redundant fan serves as a standby to the fan in service. This would ensure that air speed will be maintained > 5 cm/s at all times.

Emission levels of VOCs with this proposed system:

Hydrocarbon concentrations should be less than < 50 grams of Hydro Carbon / m³. It is expected Absorption capacity of H₂S 0.15g/ml and that of mercaptans is shown in Annex 66: 41_1_NEW%20ORLEANS_03-96_0389. in table 2.

Please refer to Norit activated carbon ROZ 3 properties data sheets and typical activated carbon study in:

- Annex 67: ROZ3_rev8
- Annex 68: MSDS111_REV02
- Annex 66: 41_1_NEW%20ORLEANS_03-96_0389
- Annex 69: Activated Carbon Filters O&M

The measured hydrocarbon content from the tank vapours is expected to be within the specification of 50 g/m³. The measures in Annex 64 (referring to the pressure relief valve) are being implemented as additional precautionary.

Please refer to Annex 69: "Activated Carbon Filters O&M" to view the VOC model actually being installed on site. The air baffle does not feature in the installed equipment. The quoted document Annex 64: Data Sheet - Adsorption filter Ny. is a general information document offered by the manufacturer. Water mist is installed below the filter bed to allow moisture to be introduced during startup and shut down of the VOC filter. Please refer to Annex 69: "Activated Carbon Filters O&M".

The quoted document Annex 64: Data Sheet - Adsorption filter Ny. is a general information document offered by the manufacturer. An addition of a spring loaded shut-off valve for each HFO tanks for immediate isolation of the active

Carbon filter from the tank in case of extraction fan power failure is implemented and installed on the tanks. The tank will vent atmosphere when this occurs. This will eliminate any possible risk in the event that the fans fail to operate due to electrical power failure. Please refer to the updated P&I diagram attached Annex 70: 2970.M2.F13.001.

A water system is being installed for firefighting purposes. Options 1 (shut off valve) and Option 3 (Flame arrestor) have been implemented on each VOC unit.

The following tanks will be fitted with this abatement system:

- 2 x HFO buffer tanks
- 2 x HFO service tanks
- 1 x diesel service tank
- (as labelled in Annex 71: Drawing 2970. D2.601.001 in the submission made in May 2010).

This system will be attached to the tank vents only but are located remotely at ground level. Only the flame arrestors and pipework are placed on top of the Fuel tanks. Please refer to Annex 72: 2970.D2.601.001 VOC units. It is to be noted that the pressure relief valve is a safety feature and therefore VOC abatement is not required.

The manufacturer's recommendation (Annex 62, Note 1) to pump fresh air to mix exhaust air from the tank with ambient air will be implemented. The temperature specifications in Annex 62 will also be respected.

Replacement of spent VOC filters:

Please refer to Annex 73: "saturation control of activate carbon" as a reply to replacement criteria. Frequency of change will be identified in due course "on condition basis" according to the specified parameters in the above mentioned document (see attached).

Spare Norit activated carbon ROZ 3 20kg bags will be kept as spares.

Disposal of spent VOC filters:

Each VOC filter is expected to house 50kg of activated carbon in the installed 5 VOC filter units for a total of 250 kg. The spent filters will be disposed of in a certified hazardous waste facility.