## *Attachment F.1 – Emissions and Abatement*

The emissions from the site are generated by five process areas. These are addressed below:

### Emissions to Atmosphere

- **Emissions from shredders (release points A2-1 and A2-3)**

  Emissions to atmosphere from the shredders consist of air contaminated with airborne organisms and particulate that has been generated by the shredding process. A small quantity of volatile organic compounds may also be present. The air from the shredder is drawn through a HEPA filter to reduce the mass of particulate and organisms present in the gas stream. The HEPA removal efficiency is not less than 99.95% for a maximum particle size of 0.3µm. An interlock prevents the introduction of waste unless the negative pressure system is functional.

- **Emissions from STI Model 2000 (release points A2-2)**

  Emissions to atmosphere from the STI process consist of water vapour and volatile organic compounds. A very small number of organisms may also be present. Both the existing and the proposed new STI Model 2000 treatment processes will be vented to atmosphere via the existing abatement system. The abatement system consists of a single pass condenser, a coalescing vessel and a carbon filter. The condenser acts to reduce the temperature of the gas stream leaving the STI process. As the gases cool, steam is condensed and removed as water. The coalescing vessel acts to remove more water out of the gas stream. The coalescing vessel consists of a large vessel that causes the gas flow to decelerate. As the gas stream is slowed, any droplets of water present fall out of the gas stream, as it no longer has the velocity necessary to keep them suspended. Next, the gas stream passes through a carbon filter that absorbs volatile organic compounds released by the heating of the healthcare waste in the STI process. The effect of the system is to reduce the presence of VOC's (and potential odours) to less than 50 mg/Nm$^3$.

- **Emissions from Natural Gas Fired Packaged Steam Boiler (release point A2-4)**

  Emissions to atmosphere from the boiler predominately consist of carbon dioxide, oxygen, and nitrogen with very low concentrations of oxides of nitrogen and carbon monoxide. The regular servicing of the package boiler and its integral boiler will control the concentrations of oxides of nitrogen and carbon monoxide. No abatement is proposed.

- **Emissions from Bin Washer (release points A2-5)**

  Emissions to atmosphere from the bin wash predominately consist of steam contaminated with very low concentrations of bacteria, fungi, and VOC's. The concentrations of these are monitored on a regular basis as required by Waste Licence 55-1 and meet the requirements of the licence without the need for abatement equipment. Therefore, STI do not propose abatement equipment to control emissions to atmosphere from the bin wash.

- **Emissions from Rotary Drier (release points A2-6)**

  Emissions to atmosphere from the rotary dryer are passed firstly through a cyclone to remove large particulate matter and dust. The gas stream then passes through a reverse jet filter that reduces the concentration of dust in the gas stream to very low levels before it is expelled through the roof of the building by an induced draft fan.

**Emissions to Sewer**

- **Emissions from Unit 430 (release points SE-1)**

  Emissions to sewer from Unit 430 consist of condensate from the condenser and coalescing system attached to the STI Model 2000 treatment process and a purge stream from the bin wash system. The discharge is therefore predominately water mixed with small amounts of particulate, organic matter, and detergent. The bin washer is fitted with a solids sieve to reduce the concentrations of solids prior to discharge.



- **Emissions from Unit 420 (release points SE-2)**

  Emissions to sewer from Unit 420 consist of a purge stream from the water treatment tank. The discharge is therefore predominately water mixed with small amounts of particulate and organic matter. The discharge passes through a solids sieve to reduce the concentration of solids prior to discharge.

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-1 (shredder – existing treatment plant)

| Control parameter | Equipment | Equipment maintenance | Equipment calibration | Equipment backup |
|---|---|---|---|---|
| Pressure drop across HEPA filter | a) HEPA filter media | Replace every six months | N/a | Replacement media kept |
| | b) Magnahelix differential pressure gauge | None | Calibrated every 6 months | Spare kept |
| Bacterial loading of filter | a) HEPA filter media | Replace every six months | N/a | Replacement media kept |
| | b) Accredited laboratory | N/a | Accredited laboratory | N/a |



| Control parameter | Monitoring to be carried out | Monitoring equipment | Monitoring equipment calibration |
|---|---|---|---|
| Pressure drop across HEPA filter | Differential Pressure | Magnahelix differential pressure gauge | Calibrated every six months |
| Bacterial loading of filter | Monthly swab test of filter | Accredited laboratory | Accredited laboratory |

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-2 (STI Model 2000 – both treatment plants)

| Control parameter | Equipment | Equipment maintenance | Equipment calibration | Equipment backup |
|---|---|---|---|---|
| Pressure drop across carbon filter | a) carbon filter media | Replace every six months | N/a | Replacement media kept |
| | b) Magnahelix differential pressure gauge | None | Calibrated every 6 months | Spare kept |
| VOC | a) carbon filter media | Replace every six months | N/a | Replacement media kept |
| | b) Accredited laboratory | N/a | Accredited laboratory | N/a |



| Control parameter | Monitoring to be carried out | Monitoring equipment | Monitoring equipment calibration |
|---|---|---|---|
| Pressure drop across HEPA filter | Differential Pressure | Magnahelix differential pressure gauge | Calibrated every six months |
| VOC | Six monthly extractive test | Accredited laboratory | Accredited laboratory |

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-3 (shredder – proposed treatment plant)

| **Control parameter** | **Equipment** | **Equipment maintenance** | **Equipment calibration** | **Equipment backup** |
|---|---|---|---|---|
| Pressure drop across HEPA filter | a) HEPA filter media | Replace every six months | N/a | Replacement media kept |
| | b) Magnahelix differential pressure gauge | None | Calibrated every 6 months | Spare kept |
| Bacterial loading of filter | a) HEPA filter media | Replace every six months | N/a | Replacement media kept |
| | b)Accredited laboratory | N/a | Accredited laboratory | N/a |



| **Control parameter** | **Monitoring to be carried out** | **Monitoring equipment** | **Monitoring equipment calibration** |
|---|---|---|---|
| Pressure drop across HEPA filter | Differential Pressure | Magnahelix differential pressure gauge | Calibrated every six months |
| Bacterial loading of filter | Monthly swab test of filter | Accredited laboratory | Accredited laboratory |

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-4 (Natural Gas Fired Packaged Steam Boiler)

| Control parameter | Equipment | Equipment maintenance | Equipment calibration | Equipment backup |
|---|---|---|---|---|
| None | Burner | Annual Burner/Boiler Service | None | None |

| Control parameter | Monitoring to be carried out | Monitoring equipment | Monitoring equipment calibration |
|---|---|---|---|
| None | None | None | None |

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-5 (bin washer)

| Control parameter | Equipment | Equipment maintenance | Equipment calibration | Equipment backup |
|---|---|---|---|---|
| None | Exhaust fan | Annual maintenance | None | None |



| Control parameter | Monitoring to be carried out | Monitoring equipment | Monitoring equipment calibration |
|---|---|---|---|
| None | None | None | None |

***Table F.1: Abatement / Treatment Control***

**Emission point reference number:** A2-6 (Rotary dryer)

| Control parameter | Equipment | Equipment maintenance | Equipment calibration | Equipment backup |
|---|---|---|---|---|
| Pressure drop across reverse jet filter | a) filter media | Replace every six months | N/a | Replacement media kept |
| | b) Magnahelix differential pressure gauge | None | Calibrated every 6 months | Spare kept |



| Control parameter | Monitoring to be carried out | Monitoring equipment | Monitoring equipment calibration |
|---|---|---|---|
| Pressure drop across HEPA filter | Differential Pressure | Magnahelix differential pressure gauge | Calibrated every six months |

***Table F.2 to F.8: Emissions Monitoring and Sampling Points***

**Emissions Point Reference No(s):** A2-1, A2-2, A2-3, A2-5, A2-6

| **Parameters** | **Monitoring Frequency** | **Accessibility of Sampling Points** |
|---|---|---|
| VOC | Twice Yearly | Ground level or via permanent platform |
| Biological organisms (as TVC (total viable count)) | Twice Yearly | Ground level or via permanent platform |

***Table F.2 to F.8: Emissions Monitoring and Sampling Points***

**Emissions Point Reference No(s):** SE-1, SE-2

| **Parameters** | **Monitoring Frequency** | **Accessibility of Sampling Points** |
|---|---|---|
| Flow | Monthly | Ground level |
| Temperature | Continuous | Ground level |
| pH | Continuous | Ground level |
| BOD | Monthly | Ground level |
| COD | Monthly | Ground level |
| Suspended Solids | Monthly | Ground level |
| Detergents (as MBAS) | Monthly | Ground level |