The Company (Silversea) requires as a minimum the following types of samples taken and analyzed externally (at accredited labs) for environmental and public health aspects, in order to comply with statutory requirements, best practices and as due diligence:

| **Type** | **Parameters** | **Methods** | **Frequency** | **Remarks** |
| --- | --- | --- | --- | --- |
| **Waste streams** | | | | |
| Treated bilge water (by Oily Water Separator OWS) | Hydrocarbon Oil and Grease | US EPA 1664, sample taken at / downstream of Oil Content Meter (OCM) | annually | To compare vs OCM (Oil Content Meter) reading if within +/- 5ppm; ideally should be de-phased with the annually required OCM verification of calibration with 6 months |
| IMO Sewage Treatment Plans (US Marine Sanitation Device MSD II) and not categorized as Advanced Wastewater Treatment Plant/System AWWTP/AWWTS | fecal coliforms, biological oxygen demand BOD5, total suspended solids TSS, total residual chlorine TRC, pH | ISO 5815 1:2003 for BOD5 without nitrification and ISO 15705:2002 for COD, ISO 29441:2010 for total nitrogen, ISO 6878:2004 for total phosphorus  **or other internationally accepted equivalent test standards.** See also 40 CFR 136 below: <http://bit.ly/US_CFR_wastewater_sampling_methods> | annually | For Alaska going ships (<250 pax capacity) – more samples may be required in and out of state of Alaska |
| Advanced Wastewater Treatment Plant/System AWWTP/AWWTS (e.g. Scanship, Marinfloc) | Influent- Biological Oxygen Demand BOD and Suspended Solids (SS)  Treated Effluent - Biological Oxygen Demand BOD, fecal coliform, suspended solids (SS), pH, total residual chlorine (in µg/l ; <0.1mg/L) , E. coli, total phosphorus (TP), ammonia, nitrate/nitrite, and Total Kjeldahl Nitrogen (TKN) | per 40 CFR 136: <http://bit.ly/US_CFR_wastewater_sampling_methods> | annually 5 sampling events within 30 days, each on a different day, of treated effluent and influent (treated grey mixed with treated black water) | For Alaska going ships (>250 pax) – more samples may be required before the season and when trading there |
| Ballast Water Treatment/ Management System (BWTS / BWMS) when USCG approved | Total heterotrophic bacteria,  E. coli,  Enterococci | SM 9215, ASTM D5465, ISO6222:1999  EPA 1103.1 and 1603, SM 9223B, ASTM D5392 – 93, ISO 9308- 1:2000, Colilert  1106.1 and 1600, SM 9230C, ASTM D5259-  92(2006), ISO 7899-  2:2000, ISO 7899-  2:2000, Enterolert | annually | Follow the type approval conditions by the USCG for your specific BWTS – like min. holding time of ballast onboard (for UV systems might be up to 72 hrs), min UV light intensity, min/max temperatures etc) |
| Incinerator ash (for profiling whether hazardous waste or not) | heavy metals / toxic substances and pH | EPA 1311 | annually |  |
| **Potable water** | | | | |
| [Legionella] potable water system survey | Legionella (min detection level of 0.1 CFU/mL), Aerobic Count or Heterothrophic Plate Count (HPC) /HCC | ISO 11731, ISO 6222  **Or other internationally accepted equivalent test standards** | six months | Potable water system incl. incoming main, tanks, softners, heaters, outlets, evaporate condensers, humidifiers, other sources (decorative fountains, , water sprays, misting systems, hot tubs etc); take min 10-12 samples from the areas above (rotate each time) |
| [Microbiological sampling] potable water | Coliform, enterococci, e. Coli, colony count at 22C, colony count at 37C (HPC) | ISO 9308, ISO 7899, ISO 6222  **Or other internationally accepted equivalent test standards** | annually | Take five samples from a variety of locations (rotate each time): kitchen, bars, accommodation, toilets etc. |
| **Recreational Water Facilities RWF** | | | | |
| RWF (pools, spas, tubs, jacuzzis) **for ships when in EU waters only** | Heterothrophic Plate Count (HPC), E,coli, Pseudomonas aeruginosa, Legionella spp. | **other internationally accepted equivalent test standards** | every two months | Send samples via kit and courier to a pre-advised lab; Compliance limits: HPC < 200 cfu/mL  E.coli, pseudomonas aeruginosa <1/100 mL, Legionella spp. <1/100 mL |
| **Marine Fuel Oil** | | | | |
| Fuel oil | Quality incl. sulphur | Internationally accepted test methods (for Sulphur ISO8754) | after bunkering | For sulphur per ISO 4259 – max acceptable sulphur result – for 0,10%->0.11%, 0.50% -> 0.53%, 1.50% ->1.58%) |
| **Lube Oil** | | | | |
| Main Engines, Auxiliary Engines, Stern Tube, Reduction gear, steering gear | Quality | Internationally accepted test methods | every three months |  |

**Sampling Procedure**

Shipboard commands (as applicable- Chief Engineer, Staff Captain, Environmental Officer and Hotel Engineer):

**Note:** See additional VMS references:

EMM > 6.0 Waste Stream Management Practices and Procedures

Health > 1.0 Hygiene & Sanitation

Fleet Ops > 5.0 Technical Procedures > 5.6 Bunkering Procedures

Fleet Ops > 5.0 Technical Procedures > 5.7 Analysis of Lube Oils, Fuel Oil and Water

1. **Track due dates and plan for the above samples as applicable to your vessel**
2. **If you are approached directly for sampling events by the vendor (e.g. SGS or other) please always copy shoreside- your VOTech fleet cell**
3. **Before and during the sampling (event):**
   1. **Ensure, as applicable, the relevant equipment is in good working order, without overdue maintenance and operating within its type approval / manufacturer recommended limits**
   2. **Do good flushing, at least 10-15 times the amount of sample to be taken**
   3. **For waste streams -disinfect the area of the sampling valve/line- with heat, alcohol etc if applicable**
   4. **Take a sample that best represents the treated waste (if applicable close to the overboard discharge, where acceptable in recirculation, with the proper load of persons onboard, time etc)**
   5. **Use vendor’s kits (where available). Some of them contain dark glass containers with preservative liquid/pill inside. Where possible the qualified technician should take the sample**

**It is important that:**

* + - **Fill the containers as much as possible as otherwise the accuracy of the sample criteria is lesser**

**Do not place bare fingers inside**

**Use PPE as appropriate**

* + - **Use seals and Chains of Custody Forms (CoC)**
    - **For samples with limited holding times (e.g. for fecal coliforms the time to reach the lab is 6 hrs)- have the sample cooled down**

**Ensure that the vendor cools the sample (especially of wastewaters – grey / black) / places it in a cooler box with ice or gel packs**

1. **Advise shoreside (as above) of the sample taken/sent**
2. **Upon receipt of results, request interpretation by shoreside whether in compliance with relevant limits, and any actions to follow up**
3. **File the results onboard and update your plan for next sampling event accordingly**

⬛ ⬛ Completed ⬛ ⬛