DRAFT Inspection, Maintenance, and Testing Plan for Hoses from SPM to VLCC

TGTI will follow recommended operation and maintenance guidance from the Oil Companies International Marine Forum (OCIMF) for the hoses connecting SPMs to VLCCs. The OCIMF has published the Single Point Mooring Maintenance and Operation Guidance (SMOG) which contains technical recommendations and guidance for the operation and maintenance of SPMs. The most recent publication of this guidance is from 2015 and is the version referenced throughout this reponse unless otherwise noted.

Trafigura will develop, maintain, and follow a documented hose inspection and testing program specific to their operations but will base the details of the program on the recommendations set forth in Section 5 of SMOG. It should be noted that SMOG provides recommendations and guidance for developing an inspection plan but the final plan is a site specific document that must be developed on a case-by-case basis taking into consideration details of the particular SPM. As such, the summary below only represents possible considerations. The final hose maintenance and inspection plan is subject to change and may include only some of the points noted below and may also include components not listed below. A summary of the recommendations is provided below:

- Floating Hose Inspection
  - An inspection of the floating hose should be conducted prior to the bearthing of any vessel to the SPM or at designated intervals (i.e., weekly or monthly). This inspection consists of a visual inspection of the floating hose to look for the following items:
    - Visual signs of hose leaks and oil seepage.
    - Inspection of the double carcass leak detection systems to ensure functionality and integrity.
    - Integrity of flange bolts.
    - Damage from external impact.
    - External deformation.
    - Blistering of the hose cover.
    - Abrasion, scuffing, cuts or tears to the hose cover.
    - Tangled or crossed hose trings.
    - Corrosion and pitting of flanges and end fittings.
    - Buoyancy of hoses.
    - Marine growth.
    - Deterioration in the condition of any ancillary equipment connected to the floating hose string.
- Submarine Hose Inspection
  - An inspection of the submarine hoses should be conducted at an established interval on the order of three months. This inspection consists of a visual inspection of the submarine hoses to look for the following items:
    - Visual signs of hose leaks and oil seepage.
    - Inspection of the double carcass leak detection systems to ensure functionality and integrity.
    - Integrity of flange bolts.
    - Damage from external impact.
    - External deformation.
    - Abrasion, scuffing, cuts or tears to the hose cover.

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        - Tangled or crossed hose strings.
        - Corrosion and pitting of flanges and end fittings.
        - Buoyancy tanks.
        - Hose floats.
        - Umbilical lines and fixings.
        - Marine growth.
- Hydrostatic Pressure Testing of Hose Strings
    - The hose string should be hydrostaticly tested to check the integrity following installation and when hose changes have been made. Depending on conditions, hydrostatic testing at regular intervals may be warranted. During the hydrostatic test, the floating hose string should be inspected as depicted above.
- On-shore Testing of Hose Sections
    - Periodically (3-5 years recommended) the hose sections should be disassembled and closely inspected on-shore. The on-shore inspection allow for a closer inspection of the hose components and may include the following tests:
        - Thorough visual inspection
        - Hydrostatic pressure test
        - Vacuum test
        - Electrical test
        - Minimum bend radius test
        - Weight test
- Testing of hoses after retirement
    - SMOG recommends a small sample of hoses be tested to determine failure modes and establish data to determine hose service life and retirement criteria. These tests may include the following:
        - Burst tests
        - Material tests
        - Hose dissection

In addition to the hose maintenance and inspection guidance mentioned above, TGTI will perform inspections on the other equipment at the SPM prior to berthing of any ships. TGTI will develop a standard operating procedure for pre-berthing activities that is based on Table 4.1 of Section 4.3 in SMOG. TGTI will also develop a maintenance schedule for all equipment associated with the SPM operation based on the recommendations in Tables 4.2 – 4.8 of SMOG. As with the hose inspections described above, the final plan developed by TGTI may only include some components of the recommendations and may include components not discussed in SMOG pending site-specific considerations.

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