Annex M

MARS Biofouling Removal and Disposal Plan

ENGINEERING, PREPARATION, DECOMMISSIONING AND RECYCLE OF FLUMINENSE FPSO

For

the BIJUPIRA AND SALEMA (BJSA) DECOMMISSIONING Project

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VERSION CONTROL

Summary of revisions between this version and previous versions

Rev.	Date	Section	Description
01	28-06-2023		Issue for Information
01	09-06-2023		Issue for Information
A	07-06-2023		Internal discipline check

DOCUMENT HOLDS

Summary of document holds

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References

/1/ M.A.R.S. Europe, A/S Environmental Approval, GEO-2017-02702

/2/ Resolution MEPC.207(62), Adopted on 15 July 2011, "GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BIOFOULING TO MINIMIZE THE TRANSFER OF INVASIVE AQUATIC SPECIES", The Marine Environment Protection Committee

/3/ M.A.R.S. Europe, A/S customs End-Use approval, DKEUS181364375

/4/ BJSA-MAR-000-PM-PLN-0001 Waste Management Plan

/5/ BJSA-MAR-000-PM-PLN-0006 Ship Recycling Plan

Abbreviations

ADR	International convention carriage of dangerous goods and dangerous goods by road
Company	SHELL BRASIL PETRÓLEO LTDA.
Contractor	Modern American Recycling Services Europe A/S
DEPA	Danish Environmental Protection Agency
EHS	Environment, Health, and Safety
EWC	European Waste Code
FPSO	Floating Production Storage and Offloading
HAZMAT	Hazardous Materials
NORM	Naturally Occurring Radioactive Material
PPE	Personal Protective Equipment
SoW	Scope of Work
Subcontractor	Contractor of Contractor
Fluminense FPSO	Vessel
Vessel	Fluminense FPSO

1 Introduction

This Biofouling Removal and Disposal plan is prepared for the FPSO Fluminense project and is integrated part of the Ship Recycling Plan documentation and should be read in conjunction the Waste Management Plan ref. /4/ and Ship recycling Plan ref. /5/. This plan will be updated if needed, once the FPSO have been mapped accordingly at the M.A.R.S. Europe site.

2 Legal requirements

2.1 Environmental Approval

There are no legal requirements for handling biofouling, including invasive exotic species such as the Sun Coral, in Denmark, but Contractor is obligated to follow the terms specified in the environmental approval.

- Term 37: "Handling of hazardous waste may only happen on areas with a seal coating. The areas must be established as delimited areas with an edge and / or a slope towards drainage system with shut-off valves." (Ref. Environmental Approval, GEO-2017-02702, p.9)
- Term 6: "The company must be organized and operated in accordance with the approval terms and terms of the case, including information submitted by the applicant." (Ref. Environmental Approval, GEO-2017-02702, p.3) /1/.
    - Reasoning for the Approval (Ref. Environmental Approval, GEO-2017-02702, p.16), section 2.1 Description of the activities: ".. cleaning is carried out in connection with: a. Cleaning of equipment in the washing area, b. Removing paint containing harmful substances from platforms, rigs or ships while quayed, on quay area or on the ship ramp, c. Removing barnacles/fouling materials from rigs, platforms or ships while quayed, on quay area or on the ship ramp d. Cleaning of tanks in intact hulls while quayed." (Ref. Environmental Approval, GEO-2017-02702, p.19) /1/.

2.2 Internal Marine Organization (IMO)

The Danish Environmental Protection Agency (DEPA) recommends that ship recycling facilities follows the guidelines given by The Internal Marine Organization and adopted by the Marine Environment Protection Committee: *Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines)* in July 2011. (Ref. Resolution MEPC.207) The guidelines represent a decisive step towards reducing the transfer of invasive aquatic species by ships.

The guideline includes a chapter for ship recycling facilities, that recommends ship recycling facilities to adopt measures to ensure that viable biofouling organisms or chemical and physical pollutants are not released into the local aquatic environment. These measures include the following:

1. capturing biological material to minimize the risk of organism survival and establishment and other impacts of biological material being released into the aquatic environment;
2. treating and/or disposing of captured biological material in an environmentally appropriate manner;
3. scheduling of ships' arrival and departure at cleaning and maintenance facilities and at locations where ships are moored while waiting for cleaning and maintenance to minimize the risk of fouled ships contaminating other ships and the surrounding environment;
4. removing biofouling from all underwater surfaces of a ship when in dry-dock, including niche areas; and
5. lowering or extending retractable equipment such as stabilizers, thrusters, transducers and similar when a ship is in dry-dock or slipped, to permit access for the removal of biofouling from the equipment and its housing.

2.3 Danish Environmental Protection Agency (DEPA)

On September 12th, 2022, Contractor submitted a request to DEPA to read the report received from Company describing the "*SURVEY OF FAUNA AND FLORA ENSCRUSTED BENTHIC ON THE HULL OF THE FPSO FLUMINENSE UNIT, BACIA DE CAMPOS"*. Contractor requested DEPA to confirm that it is possible for Contractor to receive the FPSO Fluminense, based on the results from the survey.

DEPA did not find anything immediate in the submitted material that prevents the ship from being imported for decommissioning. Further, it was highlighted that the removed material must be classified by Frederikshavn municipality to find a suitable recovery or disposal method once Fluminense has arrived.

DEPA will provide Contractor with a formal answer once transboundary shipment of waste notification is received in the scope of Basel convention process.

2.4 Customs approval

According to the M.A.R.S. Europe customs End-Use Approval, Contractor has 60 months to complete a project, beginning from handover at the quay side.

3 Process overview

Based on the assessment of the legal requirements, the below process for removal of biofouling, including invasive exotic species such as the Sun Coral, will be followed.

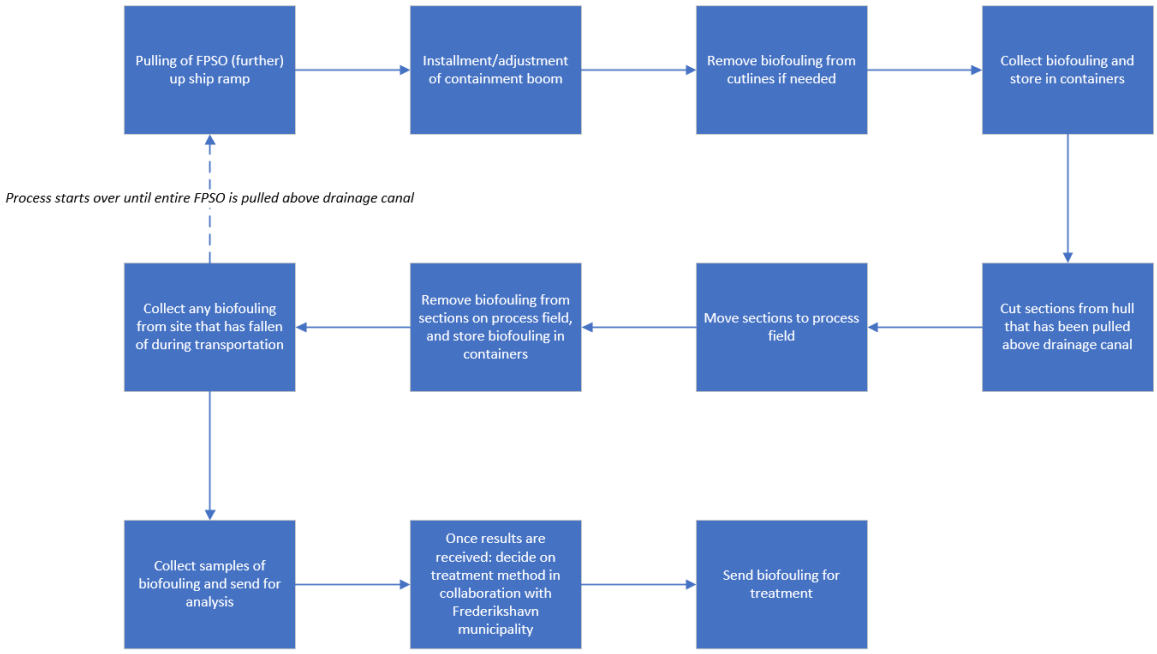

Figure 1 Process overview

3.1 Collecting biofouling

Once the FPSO Fluminense have been pulled to the ship ramp, the ship will be cut into larger sections. Only sections from hull that has been pulled above the drainage canal will be cut, to ensure no spill into the harbor. If needed, biofouling, including invasive exotic species such as the Sun Coral, will be removed from cutlines by scraping or water jetting. The sections are transported to the process area for further cutting. The biofouling, including invasive exotic species such as the Sun Coral, that falls of during the transportation of the sections to the process area will be continuously collected from the ground and stored in containers on-site. Once the sections have been lifted to the process field, the biofouling, including invasive exotic species such as the Sun Coral, will be removed by scraping using the magnet attached to a Fuchs Material Handler or by water jetting, before cutting of sections into smaller pieces. The biofouling will then be collected and stored in the on-site containers as well. The process continues until the entire FPSO Fluminense has been cut and sections lifted to process field, and all biofouling collected. Once the sections have been cut into smaller pieces and before the steel is being transported for recycling, the steel will be inspected once more, and any remaining biofouling will be scraped off. All biofouling, including invasive exotic species such as the Sun Coral, from the process field will be collected into containers before being transported to final treatment. There are no special requirements for license for transporting biofouling, including invasive exotic species such as the Sun Coral, to final treatment. It is estimated that approximate 100 tons of biofouling, including invasive exotic species such as the Sun Coral, will be collected.

3.2 Samples collection and analyzing

Samples will be taken from the collected biofouling and send for analyzing in accredited laboratory AnalyTech Environment Laboratorium A/S. Results from

analysis will be shared with Municipality of Frederikshavn's environmental department and waste management Subcontractor, Marius Pedersen A/S, and treatment of biofouling, including invasive exotic species such as the Sun Coral, will be decided based on the results and input from the external parties. The material will be assigned with proper EWC code (if different from expectations) to select proper treatment method.

3.3 Treatment method

Treatment is expected to be by landfill on land, which is the preferred deposit method in Denmark for waste that cannot be recycled, recovered, or incinerated. If the analysis shows that incineration is possible, it will be the preferred method.

3.4 Reporting

Monthly reports will be shared with updates on biofouling, including invasive exotic species such as the Sun Coral, removal, cleaning, and recovery from each step of hull deconstruction, including photos/evidence, recovery practices, weighting, storage, and transport care. Information about weight, final treatment method and location, and results from laboratory analyses will be shared as well. Al information will be summarized in final cleaning report and shared with Company. Reports and certificates, including ADR waybills, from transport company and final treatment destination will be shared with Company as well.

4 Environmental considerations

The Contractor's site is a closed area, and the ground is covered with a 1-meter-deep surface of gravel on top of layered membrane. Above the membrane, a drainage system of piping is installed which allows surface water and possible spills to percolate through the surface and bottom layers and led to onsite water treatment plant. The surface water is led through sand-traps and oil separators to the main pump well and from here to the water treatment facility. This ensures that in case of rain before the biofouling is collected from the ground, there will be no harm to the environment and ground water below the area. Analyses of the wastewater is taken minimum 8 times a year and before any water is released into the harbour basin. Further, the ship ramp is built with a drainage/sewer system to allow for collection of material, e.g., biofouling. Coating that is scraped off during hauling on ramp is collected and led to direct disposal. A contamination boom will be installed around the ship.

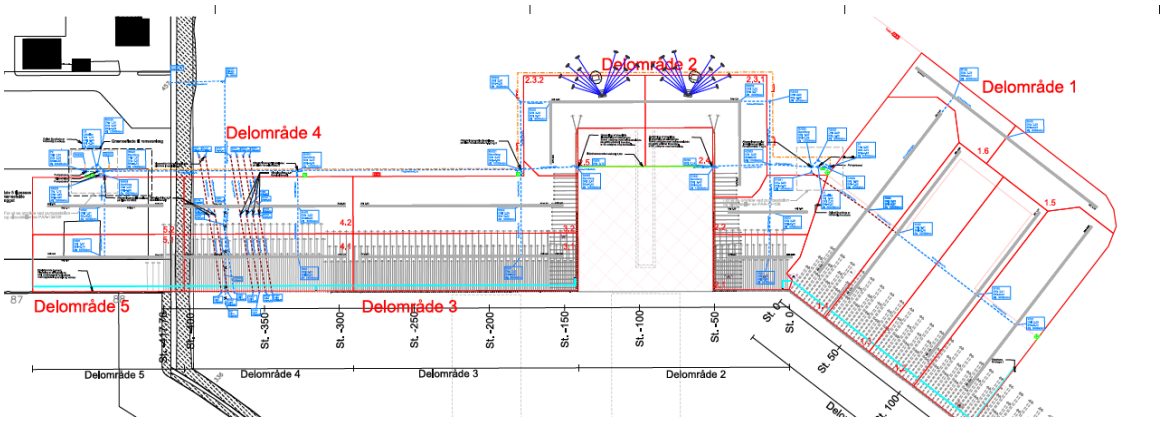

Figure 2 Drainage system below load-in area and ship ramp

Figure 3 Water filtration - buffer tanks

Figure 4 Flocculation and mechanical separation cleaning system