

OPPORTUNITY MV18 B.V.

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Annex 07: Waste Management Plan – Complementary Information to Block 12 of the
Notification Document for Transboundary Movements/Shipments of Waste

According to the instructions for filling out Block 12 of the Notification Document for Transboundary Movements/Shipments of Waste, OPPORTUNITY MV18 B.V. hereby provides the Waste Management Plan of FPSO CIDADE DE NITEROI MV18.

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Annex 07

Waste Management Plan

FPSO Cidade de Niteroi MV18



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References

- /1/ Ship Recycling Plan
- /2/ 20231219 IHM report FPSO Cidade de Niteroi
- /3/ AAKTIL-00001178 NORM Approval

Abbreviations

| | |
|---------------|--|
| ADR | International convention carriage of dangerous goods and dangerous goods by road |
| AFFF | Aqueous Film Forming Foam |
| BAT | Best Available Technique |
| Company | MODEC |
| Contractor | Modern American Recycling Services Europe A/S |
| COT | Crude Oil Tank |
| DEPA | Danish Environmental Protection Agency |
| EHS | Environment, Health, and Safety |
| EWC | European Waste Codes |
| FPSO | Floating, Production, Storage and Offloading |
| HAZMAT | Hazardous Materials |
| IHM | Inventory Hazardous Material Report |
| ISPS | International Ship and Port Facility Security Code |
| MARS | Contractor |
| MV18 FPSO | Vessel |
| NORM | Naturally Occurring Radioactive Material |
| Subcontractor | Subcontractor of Contractor |
| SRP | Ship Recycling Plan |
| UHP | Ultra-High Pressure |
| Vessel | MV18 |

1 Introduction

The Waste Management Plan is integrated part of Ship Recycling Plan documentation and should be read together with the Ship Recycling Plan ref./1/.

This Waste Management Plan follows the EU Waste Framework Directive (Directive 2008/98/EC) and are made to ensure that all waste is managed without endangering human health and harming the environment. The Waste Management Plan is in conjunction with the Contractor Environmental and Waste Management Policy, which aim to employ the 3 R's of Environmental Management:

Reuse

- Reuse engines, storage tanks and other merchantable items.
- Reuse containers, boxes, and packaging materials.
- Reuse printed paper for drafts, sketches, and rough copies.

Reduce

- Manage water & electric power economically.
- Reduce water consumption by using storm water for dust prevention.
- Reduce the use of disposable cups and dinnerware.
- Give preference to mugs and washable cups.

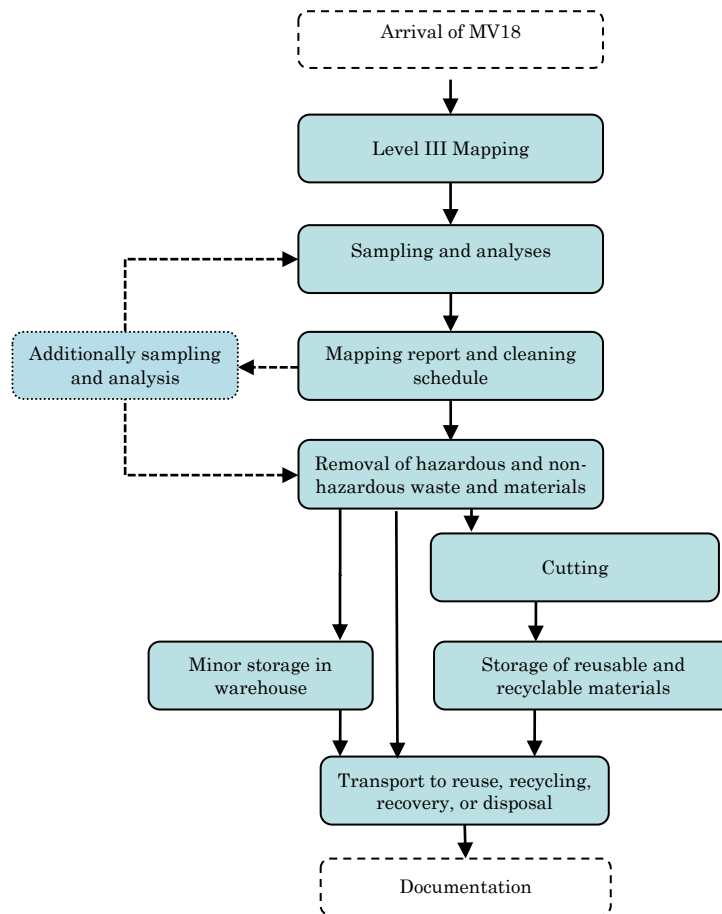
Recycle

- Use recycled product where possible.
- Recycle metals, plastic, paper, and other material.

All waste removed from the MV18 FPSO will be classified in accordance with the European Waste List.

This Waste Management Plan applies to all Contractor employees and Subcontractors, who must familiarize themselves with the plan.

2 Process Overview



The waste and material management process are considered in all Contractor's processes.

In the tendering processes, Contractor have assessed the need for supplementary activities for handling of expected waste. It has been concluded that Contractor is approved to handle all expected waste, and do not need any update on environmental approval.

If any waste is discovered during recycling that is not covered by the environmental approval the competent authorities will be immediately contacted.

2.1 Waste handling Subcontractors

Table 1 Waste Subcontractors

| Subcontractor Name | Address | Scope |
|---------------------|---|---|
| Marius Pedersen A/S | Korinthvej 103 9220 Aalborg, Denmark | transportation and disposal of non-hazardous and hazardous materials. |

2.2 Level III mapping

Contractor and waste Subcontractor will conduct a walkthrough of the FPSO and make a pre-operation hazard assessment. A level III mapping of hazardous materials present on the Vessel will be prepared or updated, and this report, along with the SRP ref./1/, will follow the Vessel throughout the decommissioning and set a basis for work planning and performance. Refer also to Appendix 2: Mapping Protocols.

2.3 Sampling and analysis

If any uncertainties about the classification of waste and hazardous materials occur during the decommission process, Contractor may carry out additionally sampling and analysis.

The results of additional sampling and analysis will be used for classification of the waste and materials in relation to work planning, decommission methods as well as treatment (including final disposal) of waste fractions.

All sampling and analysis will be documented and carried out according to applicable law, Danish Executive Order No. 2512, Annex. Accredited laboratory SGS is used.

The sampling strategy for identifying hazardous waste is divided into five steps:

1. Desk top inspection of the inventory of hazardous materials (IHM) report.
2. Based on the desk top inspection a plan for analysing the hazardous waste on the FPSO is prepared.
3. Walk-through and pre-mapping of FPSO.
4. Assessment: what can be analysed directly on the FPSO by hazmat experts? What needs to be analysed in a laboratory?
5. Analysing.

Contractor is currently using subcontractors Marius Pedersen as hazmat experts, along with internal EHS Team.

3 Work Planning

Risk assessments and job safety analysis will be conducted before any cleaning or removal of hazardous materials or waste to ensure that all possible risks are reduced and safely handled.

- Specific task description - Involved employees will help minimize oversights, ensure a quality analysis, and get workers to participate in developing and implementing the solutions. This will make the employees share ownership in their safety and health program.
- Hazard control - After reviewing list of hazards with the employees, consideration will be given to what control methods will eliminate or reduce them. The most effective controls are engineering controls that physically change a machine or work environment to prevent employee exposure to the hazard. If this is not feasible, administrative controls may be appropriate.

Contractor regularly performs hazard assessments as it is the best way to review the hazards in the workplace and protect employees from those potential hazards. Hazards change as processes change. Therefore, a hazard assessment of our facility is

performed at the beginning of every job task, and shift. Description of handling of specified hazardous materials is attached in Appendices.

3.1 Operations and processes

The following operations and processes will be taken into consideration when planning the work:

- Work permits:
 - o Confined and enclosed spaces.
 - o Hot work.
 - o Working at height.
 - o Competent persons.
 - o Lock Out / Tag Out.
- Atmosphere checks and preparation.

3.2 Expected waste quantities

Based on a thorough review of IHM report ref. /2/ and experience from previous projects, the following waste are expected to be found on the FPSO.

Table 2 Expected waste quantities

| EWC Code | Description | QTY | UOM | Est. tons |
|-----------------|--------------------|--------------|------------|------------------|
| 17 04 07 | Steel | 48446.8 | t | 48446.8 |
| 12 03 01* | Oily water | 3000 | m3 | 3000 |
| 13 04 02* | Grey water | 3400 | m3 | 3400 |
| 16 06 01* | Lead batteries | 166 | pcs | 0.017 |
| 17 06 05* | Asbestos | 30 | kg | 0.03 |
| 13 04 02* | Waste/bilge water | 149.6 | m3 | 150 |
| 13 02 05* | Lubricating oil | 5526 | ltrs | 4.45 |
| 13 01 10* | Hydraulic oil | 15688 | ltrs | 12.55 |
| 16 05 04* | CO2 | 223 | cylinders | 0.5 |
| 16 05 04* | Fire extinguishers | 165 | pcs | 0.3 |
| 16 02 13* | Refrigerator units | 7 | pcs | 0.15 |
| 16 02 14 | Displays | 2 | pcs | 0.03 |
| 16 06 05 | Lithium batteries | 494 | pcs | 0.05 |
| 16 03 05* | AFFF Foam | 6600 | ltrs | 6 |
| N/A | NORM | 5 | t | 5 |
| | | TOTAL | | 55,025.9 |

4 Removal of waste and materials

The removal and cleaning of non-hazardous and hazardous waste and materials, including tank and pipe flushing/cleaning, will be performed by skilled and experienced workers with the necessary training and certificates. All removal and cleaning will be carried out according to applicable laws.

All hazardous waste removed from the FPSO will be delivered to the onsite waste warehouse, under the direction of EHS Management.

As soon as there is any hazardous waste from decommissioning/cleaning it will be packed according to ADR regulations before it is removed from the sealed area. Everything will be safely packed so that it is ready to be transported on the roads outside the area. Some fractions will be transported directly to final disposal. Some fractions will be stored temporarily in a warehouse or secure location at the facility.

4.1 Identification

All identified hazardous waste and materials identified during the Level III Mapping will be recorded by location, type, and amount. Physical locations on the FPSO will be identified by already installed labelling or signage, which will be annotated by the inspector's permanent mark alongside the label, or by permanent labelling by the inspector at the location.

The EHS manager or team leader will inform the workers during the Toolbox Talk about the hazards of the material being used.

4.2 Removal of waste from FPSO

All waste that is removed from the FPSO while it is moored along the quay will be lifted off in closed containers to ensure no spill into the harbour.

Hazardous and non-hazardous waste will be removed from the structure in the following ways:

1. Ballast water

Before the ballast water can be treated for invasive organisms and released into the harbor basin, analysis of the levels of heavy metals in the ballast water must be taken. The levels of heavy metals must be below the following threshold levels.

If the analysis of the ballast water indicates that there are elevated levels of heavy metals in the water, and the levels are above the threshold level, according to the environmental approval, the ballast water must be treated.

To clean the ballast water for the heavy metal contamination, chemicals are added to allow for precipitation of the heavy metals. Afterwards the heavy metal sludge that has settled on the bottom of the tank will be treated/removed separately.

Samples will be done prior to starting up the BAWAT system to ensure that proper levels have been achieved.

Once the levels of Heavy Metals in the ballast water are below the threshold, the BAWAT system will be installed on the ship and the ballast water will be treated in the system before being released into the harbor basin. The system utilizes the pasteurization method. Through heating, this method guarantees a single pass through the mobile ballast water system, effectively removes unwanted invasive species.

The following steps will be taken once the system has been mobilized on the project:

1. The BAWAT-system requires a constant flow of Ballast Water; therefore, a buffer tank is positioned between the BAWAT system and the discharge pumps (either fixed pumps or submersible pumps)
2. The ballast water is fed to the BAWAT-system that will treat the water for microorganisms (invasive species).
3. Once the water has been treated by the system, it meets both IMO and USGC standards and is safe to discharge into the harbor basin

2. Marine growth and biofouling

Once the FPSO 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 will be removed from cutlines by scraping or water jetting. The sections are transported to the process area for further cutting. The biofouling that falls off 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 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 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 from the process field will be collected into containers before being transported to final treatment.

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 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.

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. Oils and contaminated water

In tanks: The oil is sucked up from the tank using vacuum pumps and transferred to approved ISO tanks. The ISO tanks are lifted off the FPSO and transferred to the onsite waste warehouse.

In utility system: the liquid is drained from the system and stored in approved ISO tanks. The ISO tanks are lifted off the FPSO and transferred to the onsite waste warehouse.

4. AFFF Foam

AFFF tank: piping is disconnected, and tank removed directly from installation as a whole unit, and the unit itself (containing AFFF) is shipped for final treatment.

All piping contaminated with AFFF is drained and piping removed and stored in closed containers and transported to waste warehouse.

5. Fire extinguishers, Lead batteries, Lithium batteries, CO2 Cylinders

Will be collected onboard the FPSO by the Hazmat Supervisor and packed for secure transportation of waste from the FPSO to the onsite waste warehouse where it will be further prepared for treatment.

6. Furniture, Paper, Electrical equipment

Will be collected during the initial stripping phase. Containers for proper segregation of non-hazardous waste will be lifted onboard the FPSO, where the non-hazardous waste will be directly segregated.

Cables are transported to the process field, where copper from cables is removed and packed separately.

Containers with non-hazardous waste are lifted off the FPSO continuously during the stripping process and collected by waste handling subcontractor, Marius Pedersen A/S, for final treatment.

7. Materials containing asbestos.

Insulation: Before asbestos removal can begin, the work area must be sealed off to prevent contamination of the surrounding areas. All cracks, joints, holes etc. in or around windows, doors and in masonry must be sealed. Holes or openings on ducts must be sealed with duct tape or polythene film. Removal work is completed by qualified workers and the insulation is packed in sealed special bags. If possible, full asbestos contaminated sections will be lifted off the FPSO and the asbestos sanitation will be conducted in on-site asbestos sanitation tent.

Cord, packing and jointing: The equipment/material is removed from the FPSO and transported to closed approved asbestos workshop on ground level. The equipment/material is then dismantled, and the asbestos removed by qualified workers.

Refer to Appendix 4 for Asbestos procedure.

8. Steel, sandwich plates, cables (included in larger removed modules)

Sections are continuously removed from the FPSO during the demolition phase and transported to the process field, where it is cut into smaller pieces and segregated:

- i. Steel/iron
- ii. Sandwich plates
- iii. Aluminum
- iv. Cables
- v. Copper

vi. Stainless steel

Employees will be instructed on the proper removal and disposal method for materials and waste. This will include general instructions on disposal of non-hazardous waste, trash, or scrap materials. If wastes and materials generated are classified as hazardous, employees will be trained to ensure proper removal. All handling of hazardous waste and materials will be handled on closed and sealed areas with a slope towards drainage systems with shut-off valves.

Requirements:

- Ensure the proper labels are attached, visible, and legible on any container of non-hazardous and hazardous material or waste.
- Use approved packaging material compatible for the waste. Tops of containers and funnels must remain free of debris, trash, and equipment at all times.
- Containers must remain closed (funnel lids down, bungs closed, boxes secured, etc.) at all times.
- Containers must be grounded and bonded if contents are flammable or combustible.
- Excess material spilled on top of the containers must be removed with absorbent material and properly disposed.
- Spills must be reported to the Site Manager and EHS Department.
- Spills resulting from leaking or damaged containers must be reported to the Site Manager and EHS Department.
- Notify the Site Manager immediately of any hazardous waste or trash needing disposal.

4.3 NORM and Mercury in process equipment

In July 2020, Contractor received NORM approval from the Danish Health Authority, Radiation Protection department. The approval was renewed in January 2024. The approval is given for handling of NORM and temporary storage of NORM waste, pursuant to §5, section 1, and Annex 1, paragraph 1.2, in executive order no. 670, ref. /2/.

The approval was given based on the conditions described in Act No. 23, and is valid until otherwise stated by the Danish Health Authority.

The following requirements are specified in the approval:

1. Contractor must at all times have a special competent person at the yard, approved by SIS as Radiation Protection Supervisor (RPS).
 - Contractor currently has two RPS's approved by SIS employed.
2. All NORM waste produced from decommissioning and/or decontamination must be returned to the company that assigned the structure to Contractor. This must be ensured contractually between Contractor and Company.
 - Contractor and Company have agreed to include this agreement in the Interim Operations Contract.

Contractor will first attempt to decontaminate vessels, pipes, and other items in situ at the Vessel, following safety and environmental rules. If the job cannot be conducted in-situ due to safety or physical constraints, the equipment must be packaged and transported to an ex-situ cleaning facility organized on the Contractor facility.

In case of ex-situ cleaning being necessary, the parts shall be packed in a plastic NORM bag and if pipework is used, the open ends must be securely sealed and taped plus labelled. Everything shall be stored in a specially designated area until transport to the NORM/Mercury ex-situ decontamination facility.

When NORM/Mercury contamination exceeds acceptable levels, the cleaning process necessitates the use of a Ultra High Pressure (UHP) water jet system to remove the contaminants from the structures. All cleaning effluent passes through a particle filtration system, containing all hazardous materials in the filter cores. Testing on the contaminated designated structures after cleaning and effluent after passing through the filtration system proves that the contaminants have been removed and are contained in the filter cores. All recovered filter cores are then placed in barrels, catalogued, and given over to Company for final disposal. Refer to section 7.3 for information in disposal of NORM.

In cases where readings are below, yet close to, the acceptability threshold, the cleaning process is performed once more to ensure readings are comfortably below the limit threshold. Cleaning operations do not cease until all measurements are well below limit threshold.

Prior to the start of the activities, designated workplaces are setup in such a way that the Manager can keep a good overview of the personnel working within the area, while also ensuring that these activities disrupt others as little as possible. The RPS must be available at all times and conduct quality checks of the workplaces.

Under RPS supervision, an area in the immediate vicinity of the work location (barriered off area) shall be allocated where the personnel can get changed. Additional protective clothing that is used during the activities must be put on in this area by the operators and stored in this area after use. Disposable PPE is discarded in a labelled waste bin for separate disposal.

Personnel wearing protective clothing are not allowed to leave this area without permission of the RPS. The RPS must ensure that measurements are taken of both personnel and tools before they leave the allocated area.

If a contaminated item from the cleaning plan is found during mapping operations, the item must be measured and tested in a dry state to determine if the cleaning was effective.

Refer to Appendices 3, 5, 7, and 8 for Contractor procedures.

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4.4 Hazardous waste security

The whole facility is ISPS compliant, and only authorized persons are allowed entry. The entrance is controlled.

Hazardous wastes and materials will be stored in a secured warehouses or approved location on site.

NORM or other radioactive material suspected contaminated material is stored in designated and secured locations to prevent personnel exposure and contamination spread.

All working areas will be maintained in a neat and orderly manner. Solid wastes, such as food, wrappings material, dunnage, scrap metal, cigarette butts and packets, Styrofoam cups and plates, and similar wastes will be disposed of in the designated waste receptacle. Any spills or leaks will be cleaned up as expeditiously as possible. Trash will be routinely collected for off-site disposal. Container storage areas will be maintained in a neat and orderly manner.

5 Storage

The different waste fractions will get their own designated, well-marked area. The signs set up ensure acids and bases are divided, there will be no mixing of different waste fractions (both liquid and solids) and safe handling when stored and picked up for transportation. All hazardous waste will be temporary stored in the warehouse.

Materials for recycling either waste or metals, woods etc. will be handled according to waste plan and environmental approval.

Recyclable materials are sub-fractioned and stored on hinterland areas until collection and transportation can take place.

Containers holding hazardous waste will be:

- in good condition and not leaking,
- sealed,
- properly handled so as to avoid release of the contents,
- clearly labeled "Hazardous Waste", with the Accumulation Start Date,
- kept clean and free of debris.

The Container Storage Area will:

- be inspected and logged at least weekly to look for leaking containers and for deterioration of containers and the containment system,
- containers must be stored with the identification labels visible,
- be kept clean and in good repair,
- shall be kept free of spilled waste and/or precipitation.

6 Transportation

Transport of hazardous waste will be done according to ADR regulations.

Only authorized transporters and facilities are used.

Table 3 Transport requirements

| |
|-----------------------------|
| <i>Minimum Requirements</i> |
|-----------------------------|

| | |
|---|---|
| 1 | Employees shall not offer for shipment packages containing hazardous materials until they receive applicable training and ensure that the package complies with regulations. |
| 2 | Hazardous materials shall be packed to prevent spillage, leaks, or escape of product into the environment. |
| 3 | Items for shipment shall be properly identified, marked, and labeled in such a manner that any person handling these materials will be readily aware of the nature of the contents and hazards that may be present. |
| 4 | Shipping papers are required for every hazmat shipment, for all modes of transportation, unless specifically exempted by the Hazardous Material Regulations. |

7 Treatment of waste

7.1 Waste hierarchy

During dismantling, the waste will be classified with the lowest possible waste code. Contractor embraces the life-cycle approach and prioritizes the waste, using the waste hierarchy.



Figure 1 Waste hierarchy

The decision on the final disposal solution will be based on a Best Available Technique (BAT) evaluation. The decision on treatment methods is made in closed collaboration with waste subcontractors.

7.2 Expected treatment methods

Based on a thorough review of IHM report ref. **Error! Reference source not found.** and experience from previous projects, the waste fractions removed from MV18 FPSO is expected to be treated in the following way:

Table 4 Expected treatment methods

| EWC | Description | Treatment Method |
|-----------|-------------------|-----------------------|
| 17 04 07 | Steel | Recycling |
| 12 03 01* | Oily water | Incineration/recovery |
| 13 04 02* | Grey water | Incineration/recovery |
| 16 06 01* | Lead batteries | Recycling |
| 17 06 05* | Asbestos | Landfill |
| 13 04 02* | Waste/bilge water | Incineration/recovery |
| 13 02 05* | Lubricating oil | Refining |

| EWC | Description | Treatment Method |
|------------|--------------------|-------------------------|
| 13 01 10* | Hydraulic oil | Refining |
| 16 05 04* | CO2 | Recycling |
| 16 05 04* | Fire extinguishers | Recycling |
| 16 02 13* | Refrigerator units | Reuse |
| 16 02 14 | Displays | Reuse |
| 16 06 05 | Lithium batteries | Recycling |
| 08 01 15* | AFFF Foam | Incineration/recovery |
| N/A | NORM* | Landfill |

7.3 NORM

Any NORM contaminated materials and NORM scale will be packed in drums and containers, and prepared for shipment back to owner who is responsible for the treatment. Please refer to appendix 7 and 8 for further information on NORM removal and disposal.

8 Waste Flow Diagrams

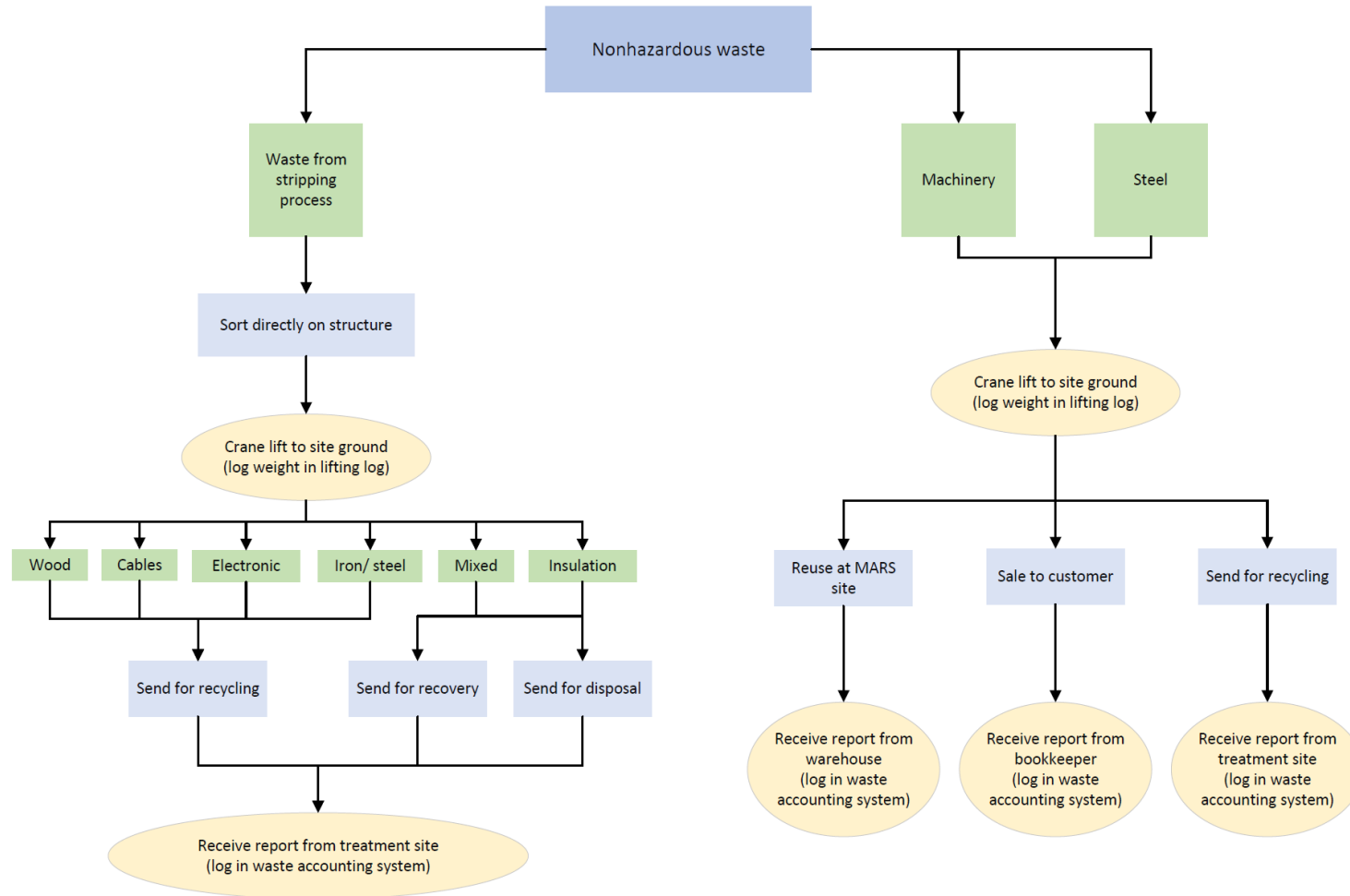


Figure 2 Flow diagram, Non-hazardous waste

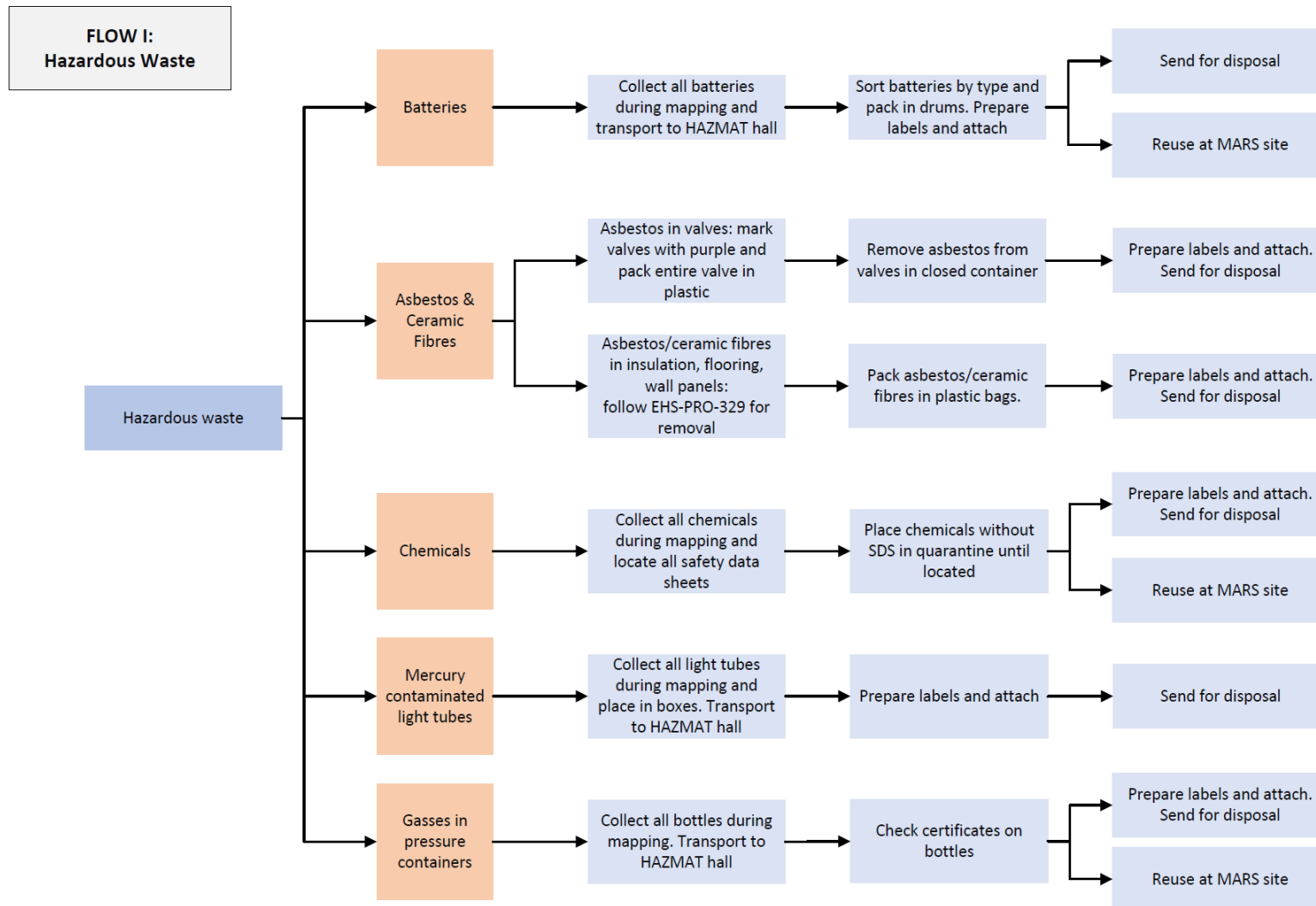


Figure 3 Flow diagram, Hazardous waste

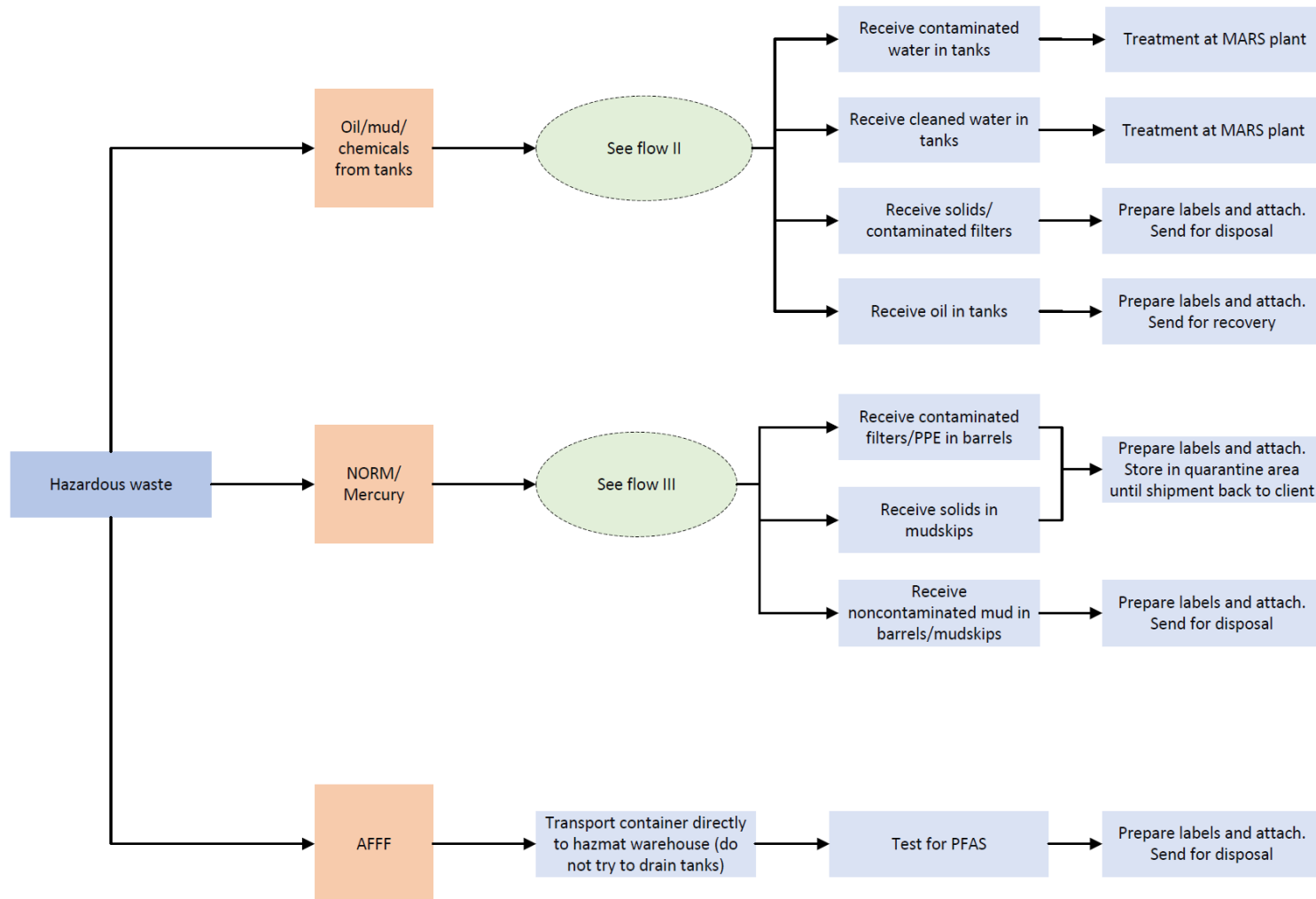


Figure 4 Flow diagram, Hazardous waste

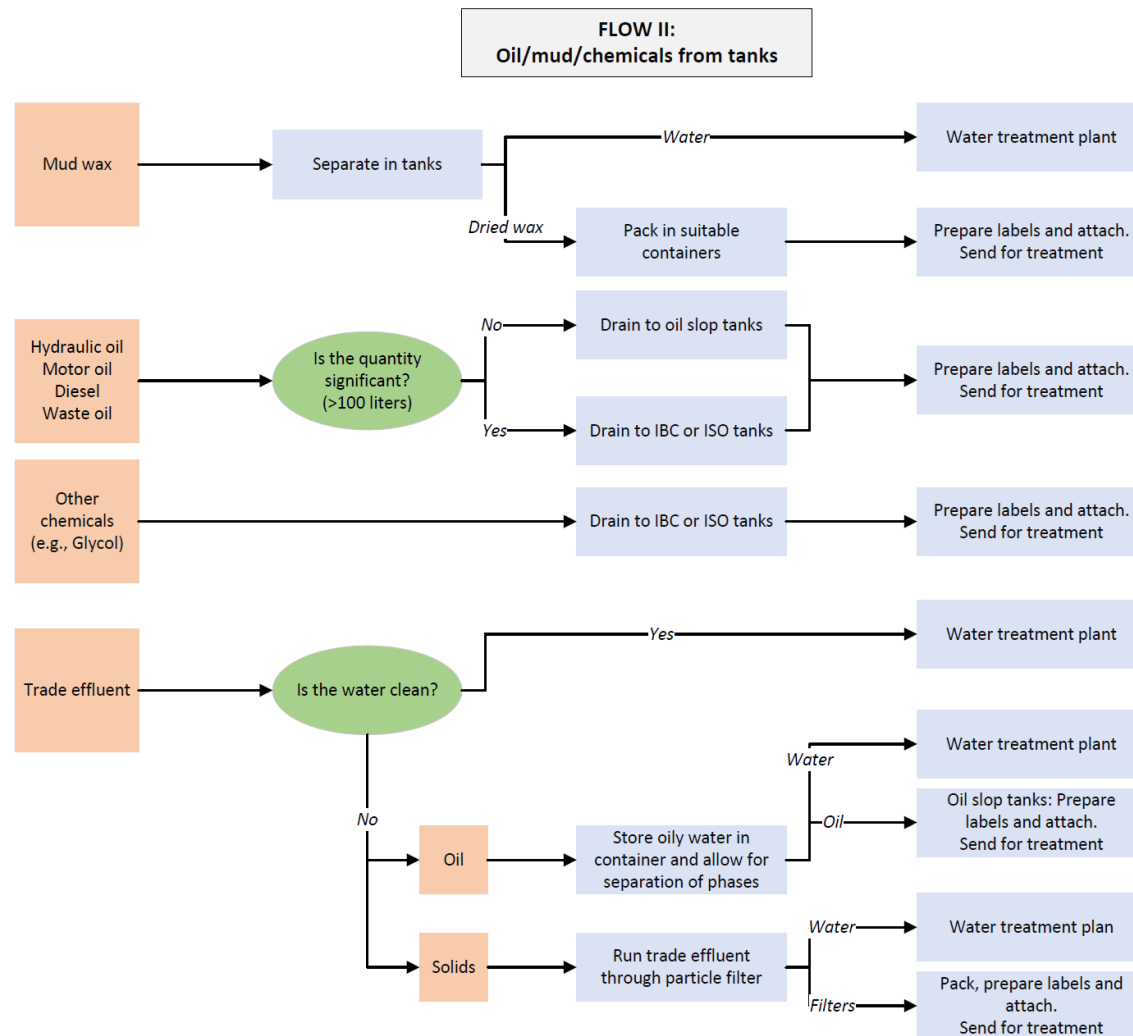


Figure 5 Flow diagram, Oil/Mud/Chemicals

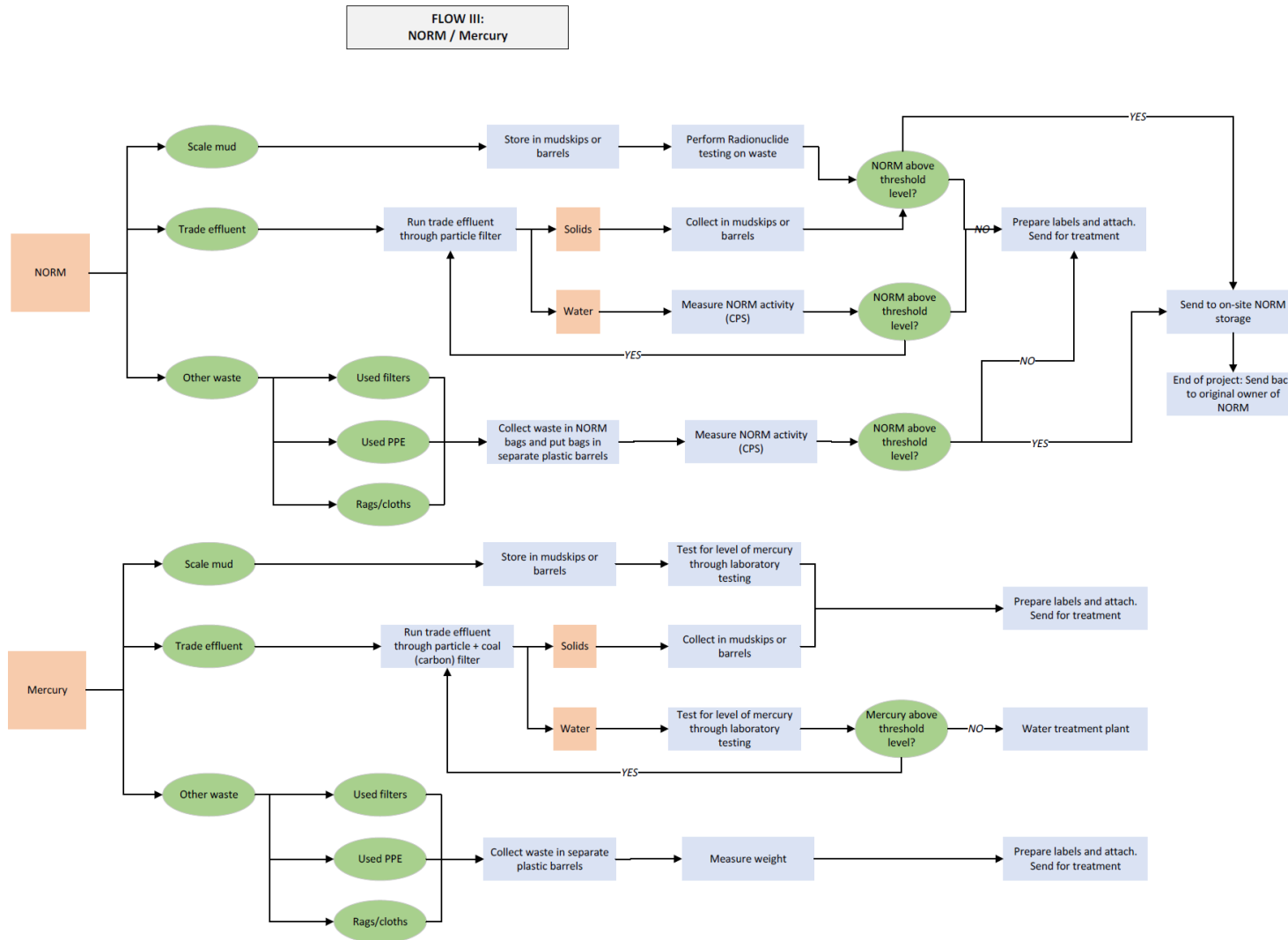


Figure 6 Flow diagram, NORM/Mercury


9 Accounting and Reporting

The following data is logged in the waste accounting system (Refer to Appendix 6 for screenshots of data entry to waste accounting system):

1. Estimated incoming materials, divided by:
 - a. Structural material including cables
 - b. Hazardous materials
 - c. Non-hazardous materials
 - d. Sale
2. Outgoing: structural materials including cables
3. Outgoing: hazardous waste, divided by:
 - a. Disposal
 - b. Recycling
 - c. Recovery
 - d. Reuse
4. Outgoing: non-hazardous waste, divided by:
 - a. Disposal
 - b. Recycling
 - c. Recovery
 - d. Reuse
5. Outgoing: Resale

The weights, EWC codes, treatment method, and final treatment site is extracted from reports received from waste handling subcontractors on a monthly basis. The data from received reports are continuously checked against data from internal logs, e.g., crane lifting log, logs from weigh bridge, and prepared ADR waybills.

A report is automatically created when data is entered into the system showing the total amounts of waste and the recycling percentage.



Waste Report

Project: _____

Project No: _____

Project period _____ to _____

Project duration 0 days

| | Weight (tonnes) |
|---|--------------------|
| <u>Total Incoming Materials</u> | 0 |
| <u>Outgoing</u> | |
| Structural material (metal + cables) | 0 |
| Hazardous waste Disposed | 0 |
| Hazardous waste Recycled | 0 |
| Hazardous waste Recovered | 0 |
| Hazardous waste Reused | 0 |
| Non-hazardous waste Disposed | 0 |
| Non-hazardous waste Recycled | 0 |
| Non-hazardous waste Recovered | 0 |
| Non-hazardous waste Reused | 0 |
| Resale | 0 |
| Total | 0 |
| <i>Difference: expected incoming vs. weighed outgoing</i> | |
| | 0 |
| <u>Waste percentages</u> | |
| | Tonnage Percent |
| Recycling / Recovery / Reuse | 0 ##### |
| Disposed / Landfill | 0 ✓##### |

Figure 7 Waste Accounting Report, Frontpage

10 Environmental Aspects

10.1 Membrane and drainage system

The Contractor site was established in 2018 and was purpose-built for ship recycling. Therefore, layers of membrane were established below a surface of gravel layer and a drainage system of piping were installed above the membrane, 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. The entire area is therefore a closed/fortified area to ensure no risk of environmental spill into the harbor and/or ground water. 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.

Image 1 Membrane layer below gravel layer

Image 2 Onsite water treatment facility

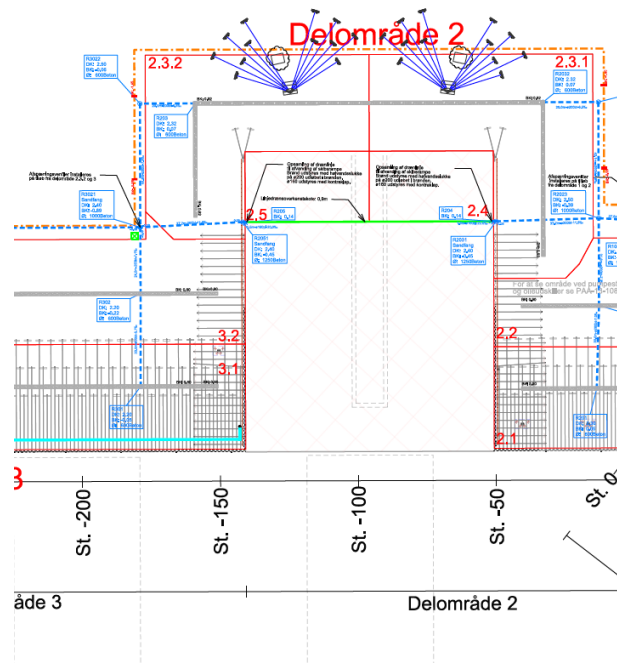


Figure 8 Ship Ramp with drainage system

10.2 Air Pollution

To ensure no dust nuisance outside the site area, the site is continuously sprinkled with water during dry periods. To minimize the amount of air pollution from process field, mobile shear cutting is performed, when possible, instead of flame cutting. Measurements of the air is taken 3-4 times a year, to conclude the quality of the air and determine the level of exposure to dust, fumes and heavy metals.

10.3 Noise

The operation on the Contractor site must not exceed the noise levels in neighbouring areas as listed below. The Contractor site is listed as an area type I – Industrial area.

| | Time | Reference period (hours) | Area Types | | | | |
|----------------------|-------|--------------------------|------------|----------|-----------|----------|---------|
| | | | I dB(A) | II dB(A) | III dB(A) | IV dB(A) | V dB(A) |
| Monday-Friday | 07-18 | 8 | 70 | 60 | 55 | 50 | 45 |
| Saturday | 07-14 | 7 | 70 | 60 | 55 | 50 | 45 |
| Saturday | 14-18 | 4 | 70 | 60 | 45 | 45 | 40 |
| Sundays and holidays | 07-18 | 8 | 70 | 60 | 45 | 45 | 40 |
| All days | 18-22 | 1 | 70 | 60 | 45 | 45 | 40 |
| All days | 22-07 | 0,5 | 70 | 60 | 40 | 40 | 35 |
| Peak value | 22-07 | - | - | - | 55 | 55 | 50 |

Figure 9 Noise limits

Upon requirement from the supervisory authority, Contractor must perform measurement and calculations to document that the limit values in Table 1 are respected.

11 Permits and Approvals

Table 5 Contractor Permits

| Approval/permit/certificate | Issue date | Identification Number |
|---|-----------------|-----------------------------------|
| Environmental Approval | 9 March 2018 | GEO-2017-02702 Doc No. 1955124 |
| Addendum to Environmental Approval | 12 July 2022 | GEO-2021-04617 Doc No. 6770892 |
| EU-list approval | 27 January 2023 | GEO-2022-07138 Doc No. 7016731 |
| NORM approval (Approval to handle and temporary store NORM waste) | 22 July 2020 | AAKTIL-00001035 |
| Pre-approval for import | 21 May 2021 | 2020-64100 |
| ISO 9001:2015 certificate | 4 May 2024 | DK017742 |
| ISO 14001:2015 certificate | 4 May 2024 | DK017740 |
| ISO 45001:2018 certificate | 4 May 2024 | DK017745 |

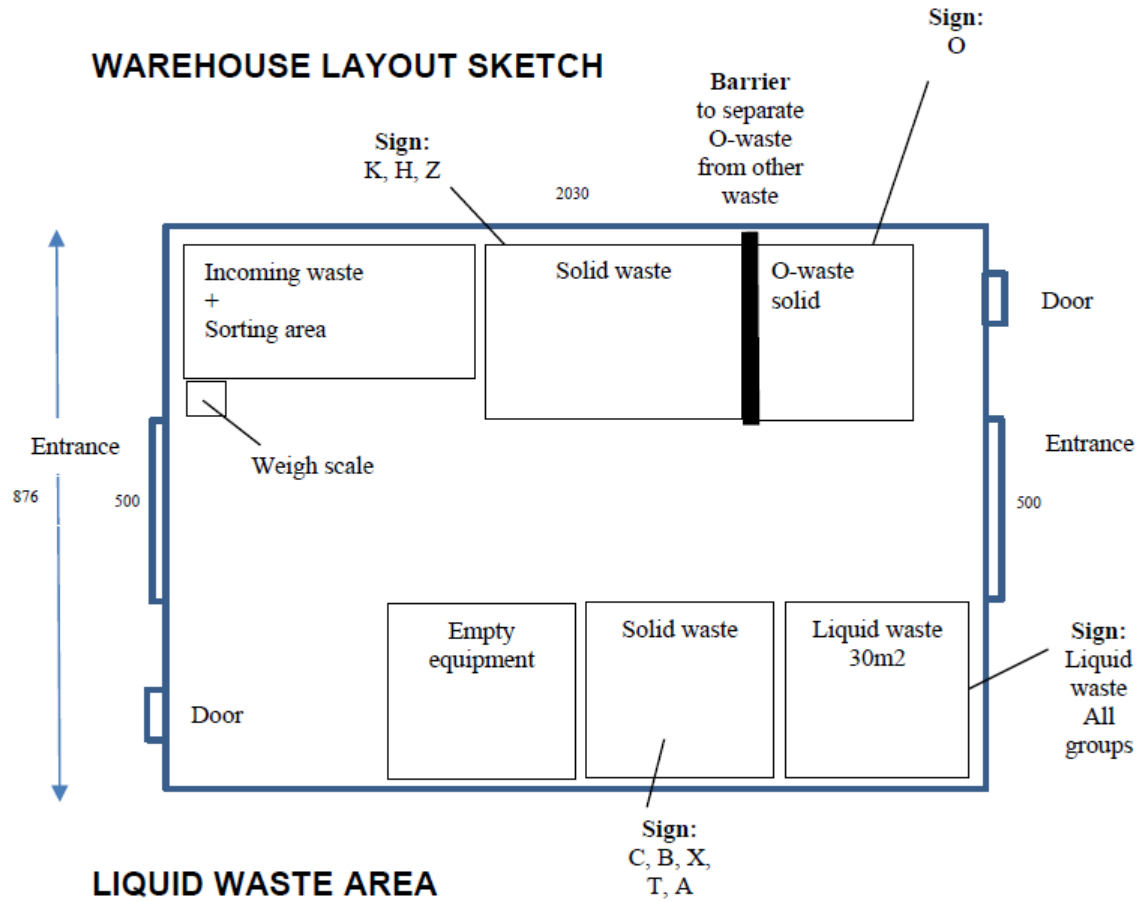
Appendices

Table 6 List of Appendices

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| 1 | Waste Warehouse Plan |
| 2 | Mapping protocols |
| 3 | Mercury Procedure |
| 4 | Asbestos Procedure |
| 5 | UHP and HP water jetting procedure |
| 6 | Data entry, waste accounting and reporting |
| 7 | NORM Procedure |
| 8 | Decontamination of NORM/Mercury |

9 Draining Procedure

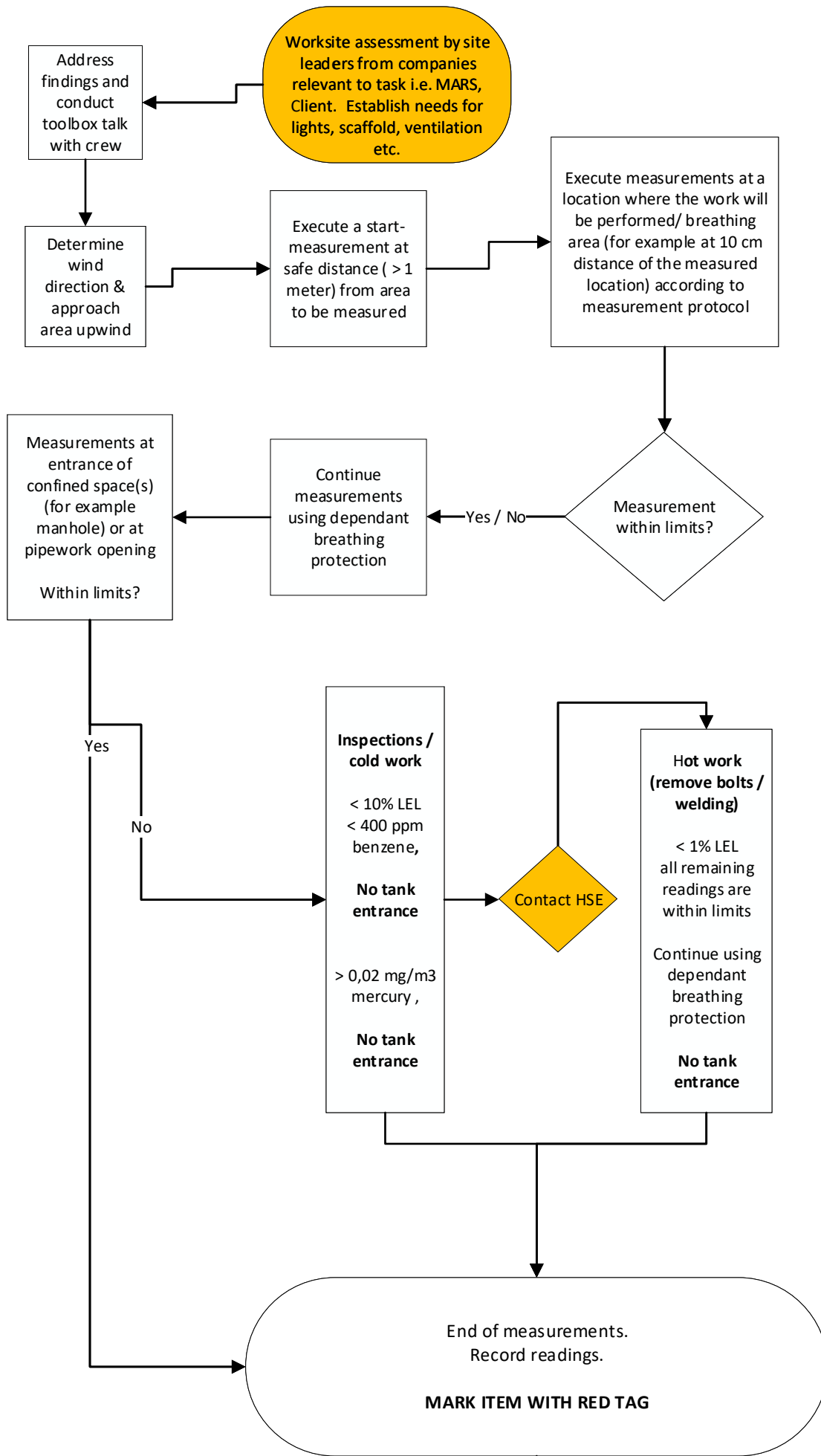
Appendix 1: Waste warehouse plan



Appendix 2: Mapping Protocols



Ventilation protocol - NORM/Mercury



- ⚠ Prepare worksite in a position where it can ventilate
- ⚠ Ensure no potential dropped objects or trip hazards
- ⚠ Hard barrier on openings and leave worksite secure and tidy
- ⚠ Update P&IDs or Mapping Plan, if required

Measurement protocol

- Start measuring H2S < 1,6 ppm (A/C)
- Measure CH4
- Measure O2
- Measure VOC (if to high: measure benzene)
- Sample Mercury
- Measure NORM

Cleanliness threshold

- H2S < 1,6 ppm
- CH4 < 10% LEL inspections / cold work
- CH4 < 1% LEL hot work
- O2 > 20,8 - 20,9% < VOL
- Benzene < 0,2 ppm
- Mercury < 1 mg/kg
- NORM < 2x background

Additional PPE Benzene when risk of (direct) contact

- Disposable chemical proof suit
- Chemical proof gloves and boots
- Active BA equipment

Additional PPE Mercury when risk of (direct) contact

- Disposable chemical proof suit
- Chemical proof gloves and boots
- Active BA equipment

PPE NORM
Note: UHP operations require specialized PPE

- Filter mask for dust particles
- Gloves with rubber lining / cover
- Glasses and safety boots
- Slick.suit approved for dust

Additional PPE above limit-values
Additional PPE required for UHP operations

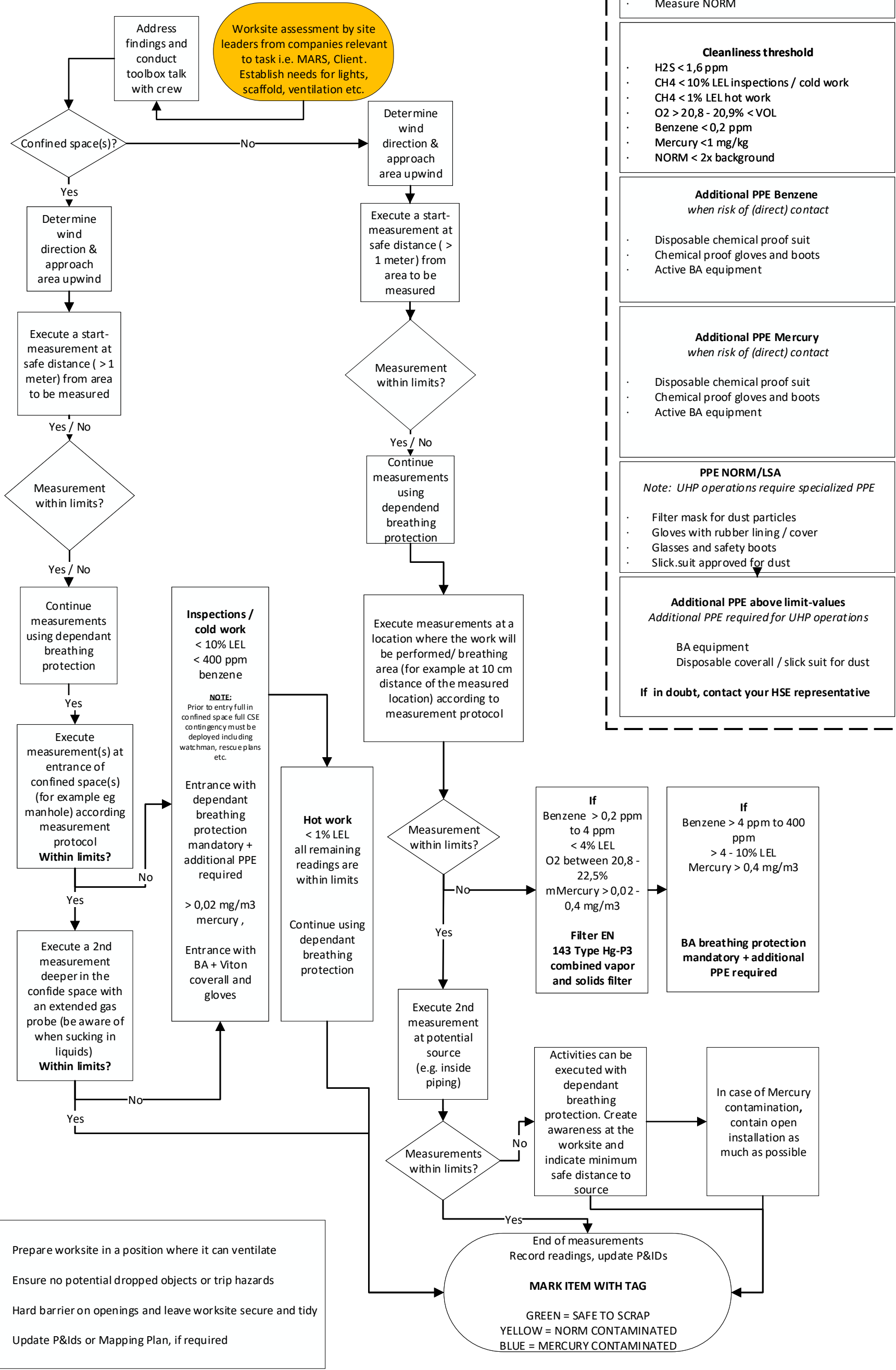
BA equipment
Disposable coverall / slick suit for dust

If in doubt, contact your HSE representative



Mapping protocol - NORM/Mercury

Worksite assessment by site leaders from companies relevant to task i.e. MARS, Client. Establish needs for lights, scaffold, ventilation etc.



- Prepare worksite in a position where it can ventilate
- Ensure no potential dropped objects or trip hazards
- Hard barrier on openings and leave worksite secure and tidy
- Update P&Ids or Mapping Plan, if required

Measurement protocol

- Start measuring H2S < 1,6 ppm (A/C)
- Measure CH4
- Measure O2
- Measure VOC (if to high: measure benzene)
- Sample Mercury
- Measure NORM

Cleanliness threshold

- H2S < 1,6 ppm
- CH4 < 10% LEL inspections / cold work
- CH4 < 1% LEL hot work
- O2 > 20,8 - 20,9% < VOL
- Benzene < 0,2 ppm
- Mercury < 1 mg/kg
- NORM < 2x background

Additional PPE Benzene when risk of (direct) contact

- Disposable chemical proof suit
- Chemical proof gloves and boots
- Active BA equipment

Additional PPE Mercury when risk of (direct) contact

- Disposable chemical proof suit
- Chemical proof gloves and boots
- Active BA equipment

PPE NORM/LSA
Note: UHP operations require specialized PPE

- Filter mask for dust particles
- Gloves with rubber lining / cover
- Glasses and safety boots
- Slick.suit approved for dust

Additional PPE above limit-values
Additional PPE required for UHP operations

BA equipment
Disposable coverall / slick suit for dust

If in doubt, contact your HSE representative

Appendix 3: Mercury Procedure



Procedure

Mercury

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| | | | | | |
| D | 15-Jan-24 | Revised Document | Christina Jørgensen/Mathias Lindgaard | Cecilie Nielsen | Christina Jørgensen |
| C | 16-Feb-21 | Revised Document | Karen Andersen | Carsten Nielsen | Kim Thygesen |
| B | 25-Jan-21 | Revised Document | Karen Andersen | Carsten Nielsen | Kim Thygesen |
| A | 14-Jan-21 | Initial Document | Karen Andersen | Carsten Nielsen | Kim Thygesen |
| REV | DATE | DESCRIPTION | WRITER | CONTROL | APPROVAL |

M.A.R.S. INTERNAL DOC NUMBER: EHS-PRO-388



M.A.R.S. Europe

Environmental, Health, & Safety

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1.0 PURPOSE

The purpose of this procedure is to demonstrate regulations are adhered to in the planned and controlled cleaning for mercury at M.A.R.S. Europe site.

Mapping and cleaning for NORM is described in separate procedure and not in this memo. Cleaning for NORM and mercury may be combined taking demands for both into account.

2.0 MERCURY IN THE OIL/GAS INDUSTRY

Mercury¹ is a naturally occurring metal found in the bedrock in most formations but mostly as mercury sulphide. Reservoirs with a low H₂S/CO₂ content and high temperature/pressure appear to have the highest mercury concentration. Oil and gas production involves complex multiphase flows, which vary substantially because of temperature, pressure, phase, pH, and redox potential as they move through the production system. While mercury chemistry in the system is not fully understood, it is known to be able to move between the various phases in the hydrocarbon system (oil/condensate/gas) when conditions change.

Metallic mercury may particularly occur in the light hydrocarbon fractions (C3-C5) and in sludge. It will normally concentrate at the low points in a process area because of its high density. Scrubbers and separators may contain metallic mercury. Deposition/scale can typically contain mercury, primarily as mercury sulphide but also in metallic form. Mercury generally accumulates in the scale that accumulates on the inside of piping, vessels, etc. And to a lesser extent mercury has been known to penetrate the metal matrix of the pipe/vessel walls, becoming embedded within the metallic structure. This fraction will potentially be non-mobile on site and will be handled according to limit values set by steel-to-steel company. However, under certain conditions, such as elevated temperatures or mechanical disturbances, there could be a risk of mercury vapors being released from the embedded mercury. It's essential to handle materials containing embedded mercury with caution and follow proper safety procedures to prevent the release of harmful vapors.

All production flows (crude oil, condensate, gas and produced water) in petroleum operations should be assumed to contain some mercury, and that this will accumulate in process equipment and waste (see *Figure 1*). Big differences may exist between wells, and differences in mercury content of the individual well can also be expected over time.

¹ Report 132 - Norwegian Oil and Gas recommended guidelines for identification, assessment, control and follow-up of mercury exposure.

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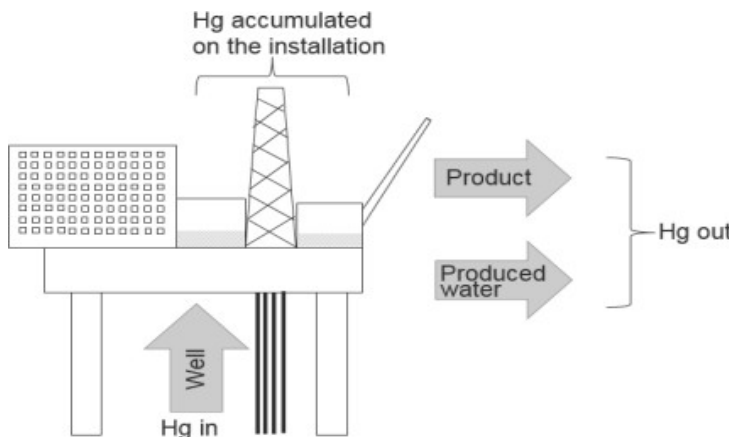


Figure 1 Outline of the mercury mass balance - Upstream Petroleum Industry

2.1 Categorizing of equipment – Upstream Petroleum Industry

The list of systems and equipment below can be used as a basis for installation-specific assessment offshore. This equipment is known to have a high potential for mercury accumulation due to deposition:

- gas systems (tanks, gas dehydrators, amine plants, scrubbers, heat exchangers, demisters, condensate)
- pipeline scraper receivers
- separators
- mercury traps
- drain systems/sludge/waste
- produced water systems (including hydro cyclones).

Associated piping/pipes may also be contaminated with mercury, normally mercury salts. An overview of systems possibly contaminated with mercury is provided in **Figure 2**: Example of mercury polluted system – upstream (source: Norsk Olje & Gas report 132).

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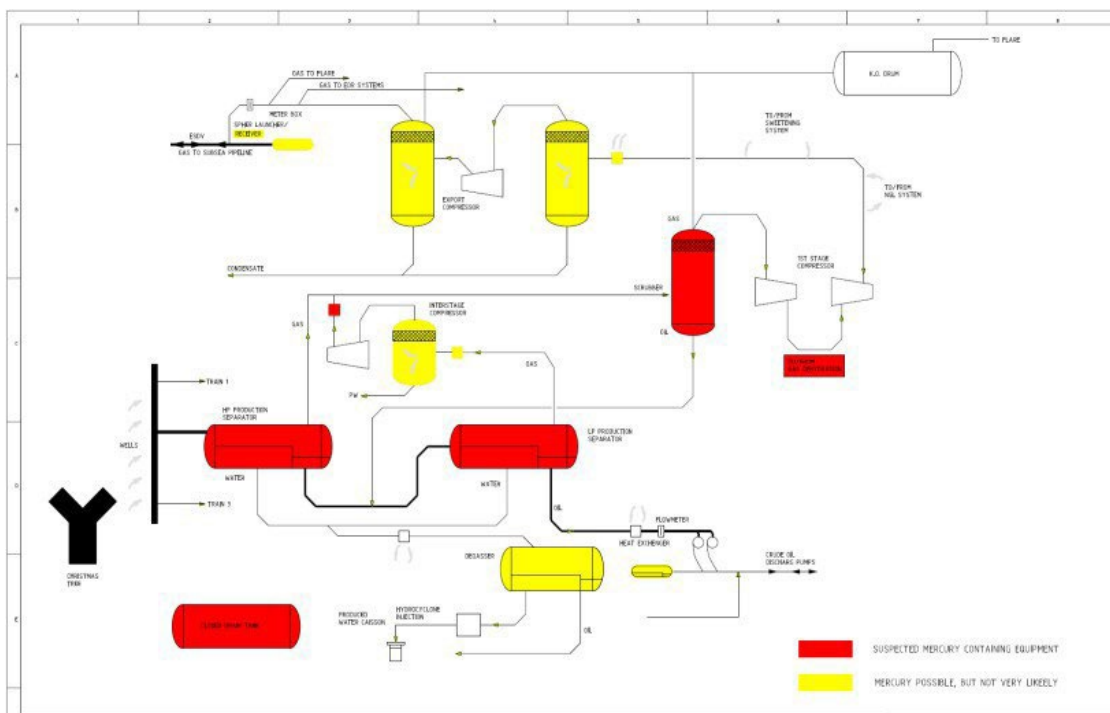


Figure 2 Example of mercury polluted system - upstream

3.1 Hazards of mercury

According to European Chemicals Agency (ECHA) and Danish Environmental Protection Agency (Miljøstyrelsen), mercury (CAS nr. 7439-97-6) is classified:

- **Acute toxicity:** Toxic when inhaled (H330)
- **Accumulation Potential:** Able to accumulate in the body from repeated exposure.
- **Ecotoxic:** Highly toxic for aquatic organisms, may cause undesirable long-term effects in an aquatic environment (mercury is an environmental toxin since it accumulates in the food chain). (H410)

Metallic mercury is absorbed in the body through inhalation, skin contact and swallowing. Inhalation is the primary absorption route (75-80 percent). The rate of absorption through the skin is limited and very low via the digestive system (0,01 percent). Absorption of mercury sulfide via digestion is lower than for metallic mercury because of its low solubility in water and is therefore not regarded as toxic for humans and aquatic organisms. Easily soluble mercury salts (such as mercury chloride, $HgCl_2$) and methyl mercury can be readily absorbed through the digestive system and are highly toxic.

For both classifications Acute toxic (inhalation) (H330) and Ecotoxic (H410) the cut off value is 0,1% (1 g/kg).

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3.0 REGULATION AND M.A.R.S. EUROPE

The main scopes of regulation for M.A.R.S. Europe site concerning mercury are occupational health and safety, environment, and transport.

3.1 Occupational health and safety

The Danish Working Environment Authority (Arbejdstilsynet) mandates that any work involving chemical substances and materials must be meticulously planned and organized at all stages. This is to ensure it can be carried out in a completely safe manner from a health and safety perspective.. The risk of exposure to hazardous substances must be eliminated or minimized, and unnecessary exposure should be avoided.

The Danish Working Environment Authorities additionally specify an air pollution limit value for mercury and inorganic chemical substances, including vapors, set at 0,02 mg Hg/m³ in breathable air.

| | |
|--|-----------------------------------|
| Occupational health and safety - Air pollution | Mean concentration 8-hour workday |
| Limit of airborne mercury in breathing air | 0,02 mg Hg/m ³ |

The mercury cleaning is executed with water pressure washing and according to M.A.R.S. Europe. mercury cleaning procedure, as described in section 4.0. Before the cleaning starts, exploratory measurements of the mercury vapor exposure level in designated working positions are made. No hot work will be performed on mercury contaminated piping or vessels. Cleaning of mercury contaminated piping and vessels are performed wearing full PPE including breathing apparatus, the PPE to be used taking into consideration both the substance that is to be decontaminated for and the equipment used for the operation. After the cleaning has finished follow-up measurements are made. The results are successively assessed according to the occupational health and safety limit value and the risk reducing actions.

3.2 Environment

The municipality of Frederikshavn’s environmental approval states the terms on which M.A.R.S. Europe operates, to adhere to the environmental regulation on list points and discharge. The approval refers to the Environmental Protection Act list point K210: Ship recycling. Additionally, the terms of environmental approval draw inspiration from the requirements set for K212 and K203 in waste management.

The municipality of Frederikshavn has approved M.A.R.S. Europe site for a maximum waste amount of mercury in scale of 10 tons on site and 50 tons per year. The waste code stated by the municipality for mercury in scale is 13 05 02. Revisions of the executive waste order have not changed the waste list as to mercury in scale.

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However, at the time of memo conclusion discussions with the waste company of Frederikshavn and the Municipality are ongoing. The results will be integrated in the final procedures.

The produced wastewater from the mercury cleaning will be collected in a wastewater tank, filtered for mercury, and transferred to a holding tank. The effluent water in the holding tank will then be analyzed and handled according to classifications.

| | | |
|--|-------------------|----------------------|
| Max mercury in scale waste (waste code 13 05 02) | Maximum | 10 tons on site |
| | Per calendar year | 50 tons |
| Max mercury in wastewater discharged to the harbor | - | 0,0014 mg Hg/l (max) |

During the execution of the cleaning, the filtered-out scales containing mercury will successively be weighed and compared to the maximum amounts. The waste will be handled according to the highest classification (e.g. if the waste is both NORM and Mercury contaminated). Hazardous waste is stored under cover and on a sealed surface at M.A.R.S. Europe site. Before the amount of scale waste on M.A.R.S. Europe site reaches the maximum, Marius Pedersen A/S will ship the scale waste to incineration. The total amount per year of mercury in scale waste will be followed in the same process.

The M.A.R.S. Europe wastewater plant includes a water treatment system. With a feed-in concentration of up to 0,005 mg Hg/l, the manufacturer of the water treatment system is guaranteed to discharge water with a mercury concentration below the limit of 0,0014 mg Hg/l stated by the municipality of Frederikshavn.

| | | |
|--|--------------------------------|---|
| Mercury filtering in M.A.R.S. Europe water treatment plant | Inlet to water treatment plant | Resulting outlet to harbor from water treatment plant |
| Max. mercury concentration | < 0,005 mg Hg/l | < 0,0014 mg Hg/l |

3.3 Transport and threshold level

Packing and carriage of dangerous goods is regulated in ADR (Agreement concerning the International Carriage of Dangerous Goods by Road). Marius Pedersen A/S is a supplier to M.A.R.S. Europe within waste handling, and Marius Pedersen A/S handles packing and shipment of mercury in scale (13 05 02 or final categorization as mentioned above) according to ADR. Marius Pedersen A/S handles hazardous waste on site and is skilled for the task.

When the scale has been cleaned out, sample measurements will be taken prior to shipment from M.A.R.S. Europe site to determine the mercury concentration. The scale containing mercury will be stored in closed containers to avoid release into the environment and work environment. Marius Pedersen will make sure that the storing, size, packing and labelling of the shipments will be determined adhering to ADR.

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Normally, if the mercury concentration is less than 2.500 mg Hg/kg scale, the local district heating & waste treatment plant of Frederikshavn will accept receiving the scale waste. The actual limit concentration, however, is under clarification in Frederikshavn. As soon as the actual limit value is concluded, this will be integrated in the procedures.

Following this, waste with mercury concentrations >500 mg/kg TS will most likely be either deposited locally or incinerated if possible. This limit value is normally the limit for building waste suitable for incineration. Otherwise, this waste may be deposited.

All mercury contaminated waste with concentrations below 2,500 mg/kg can be sent for treatment/disposal at Frederikshavn waste treatment site. Otherwise, Marius Pedersen A/S ships the waste to an appropriate disposal site.

Once readings are below 500 mg/kg, the steel can be cut using M.A.R.S. Europe standard PPE for flame cutting, and the steel can be sent for recycling at the steel mill.

Apart from mercury, the waste may also include heavy metals in concentrations that exceed the limits for hazardous waste. As no separation is possible, a cumulative approach will apply to the entire waste fraction.

| Waste Fraction | Concentration | Destination |
|---|-------------------------|---|
| Clean waste – non contaminated | < 1 mg/kg | Can be reused on land (clean) |
| Lightly contaminated waste | >1 to <3 mg/kg | Deposit for lightly contaminated waste, reuse |
| Waste that may be incinerated | >3 - <500 mg/kg | Incineration or reuse |
| Waste that may not be incinerated - Hazardous waste | >500 mg/kg <2.500 mg/kg | Frederikshavn waste deposit |
| Hazardous waste | >/= 2,500 mg Hg/kg | Approved disposal site |

4.0 PROCEDURE

The process of cleaning a vessel/pipe for mercury is:



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4.1 Mapping and starting

The mapping is made according to procedure. Mapping of mercury concentration in the processing systems is made to determine the scope of mercury cleaning.

The process systems within scope are isolated. Access to the area with mapped mercury contamination is limited.

The physical dimensions of the vessel/piping part determine whether the cleaning is to take place in-situ or ex-situ. Accessibility for cleaning the mercury contaminated scales is also an important factor.

Pre-task inspection of PPE: Performing visual examination of respiratory protective equipment (RPE) and inspecting air moving system.

Preparation of toolbox talk that includes mercury awareness information.

4.2 Isolation

Applying PPE in the form of full-face breathing apparatus (BA) or full-face mask with continuous air supply and protective suit.

Measuring and recording mercury content in vapor at the entrance to vessel/pipe (manhole or pipe opening) in question. Measuring short term according to manufacturer guidance. After measurement closing off the entrance and blinding the vessel/pipe. Next measurement is made in the inhalation zone of the cleaner while cleaning.

Sealed vessels/piping to be cleaned ex-situ are moved to a storage area for mercury contaminated objects. The storage area is situated next to the mercury cleaning station. The stored vessels/pipes are then moved into the mercury cleaning station when needed.

4.3 Cleaning Setup

Establishing an in-situ mercury cleaning setup and/or ex-situ mercury cleaning station on M.A.R.S. Europe site is made in advance. The system must guarantee that both generated waste and water are managed in a controlled manner, with strict prevention measures to ensure none of it is released into the environment.

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4.3.1 In-situ mercury cleaning setup

The general setup for cleaning mercury-contaminated piping/vessels is illustrated in Figure 3. In this configuration, the piping/vessel is isolated and connected through hoses and pipes to direct the resulting waste and water to the wastewater filtration process.

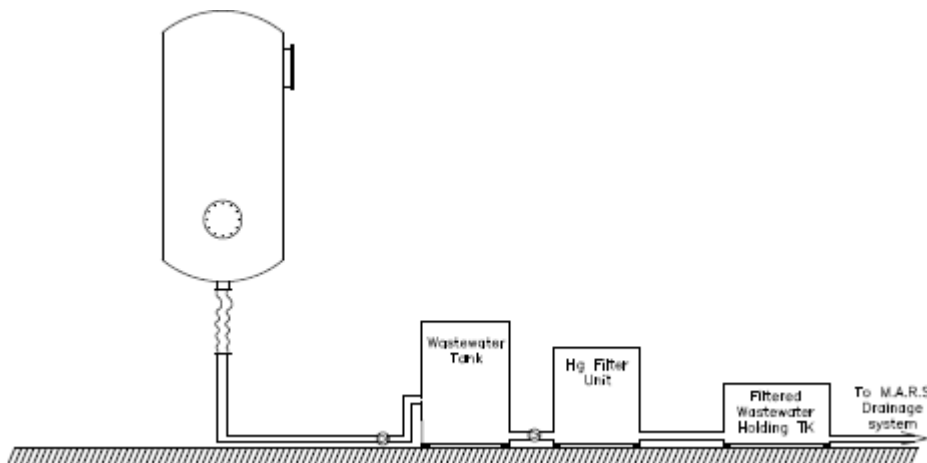


Figure 3 Cleaning setup for mercury in-situ cleaning

Wastewater is transferred to a Mercury Filter Unit by a wastewater collecting tank for mercury filtering.

Cleaned wastewater is transferred to a holding tank for final analysis before transferring to M.A.R.S. Europe spillage system. Depending on mercury content the cleaned wastewater is then transferred for further cleaning in M.A.R.S. Europe waste water treatment plant.

Filtered scales are collected and disposed as HAZ MAT by dedicated waste disposal site or regular waste depending on mercury content.

4.3.2 Ex-situ mercury cleaning station

Simple ventilated building with metal profile wall and roof, established on coated concrete flooring. Exhaust ventilation system designed with particle filter minimum class F7 (EN779) as to protect the up-flow active coal filter suited for filtering out mercury from the vapor. See **Figure 4**.

Following input from filter supplier, the use of CKV Sulfree with 10% impregnation with potassium permanganate is recommended. Under normal situations, this should be able to adsorb about 20% of its own weight, i.e., 1 kg of CKV Sulfree can adsorb 200 g of mercury. The data covers 1.5 and 2% impregnation. However, other parameters/properties will be identical to the proposed 10 % impregnation.

Mercury contaminated equipment and piping enter the building through a service gate and is placed onto a spillage tray.

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Washdown of equipment and piping takes place on an elevated spill tray with minimum 0,5-meter sidewalls and closed drain for collecting wastewater.

As for in-situ mercury cleaning, wastewater is transferred to M.A.R.S. Europe’s Mercury Filter Unit via a wastewater collecting tank for mercury filtering.

Cleaned wastewater is transferred to a holding tank for final analysis before transferring to M.A.R.S. Europe drainage system.

Filtered scales are collected and disposed of as HAZMAT or regular waste depending on mercury content. Used filter cartridges are disposed of as HAZMAT.

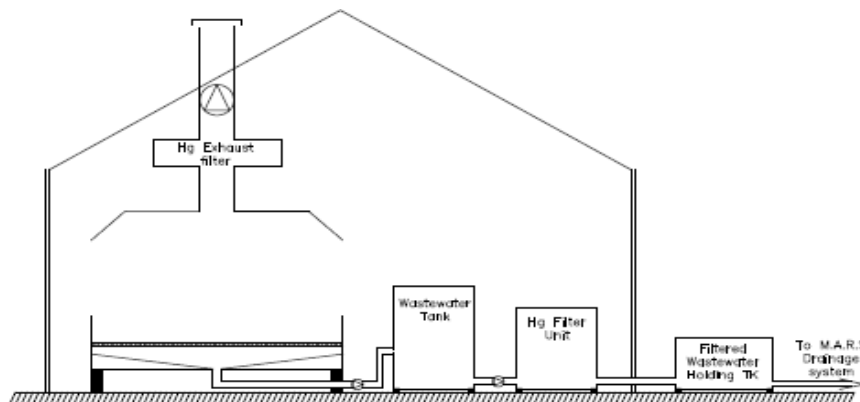


Figure 4 Mercury cleaning station, ex-situ

4.4 Cleaning for mercury

Toolbox talk is held before cleaning start-up. The cleaners wear full-face masks with breathing apparatus supplied with fresh air. The cleaners dress in full cover protective suit.

The cleaning is done by pressure washing surfaces in cold water according to procedure. Both for cleaning in-situ and ex-situ at M.A.R.S. Europe site, wastewater is collected, filtered, and stored for analysis.

The cleaning of the mercury contaminated pipes/vessels will continue until the readings are well below the limit of 500 mg/kg. As mentioned in paragraph 3.1 continuous measurements and testing will be done, to ensure that the cleaning process is completed.

4.5 Verification

The collected and filtered wastewater is analyzed for mercury to verify efficiency of the cleaning. And then assessed for entrance to M.A.R.S. Europe wastewater treatment system.



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Both used air filters and wastewater filters are handled according to waste plan when they have been exchanged. Solids from wastewater filter and exhaust filters are collected and kept in marked closed waste containers. The waste is sorted and disposed of according to M.A.R.S. Europe waste plan.

5.0 AUTHORIZATION

This document is reviewed at least every three years.

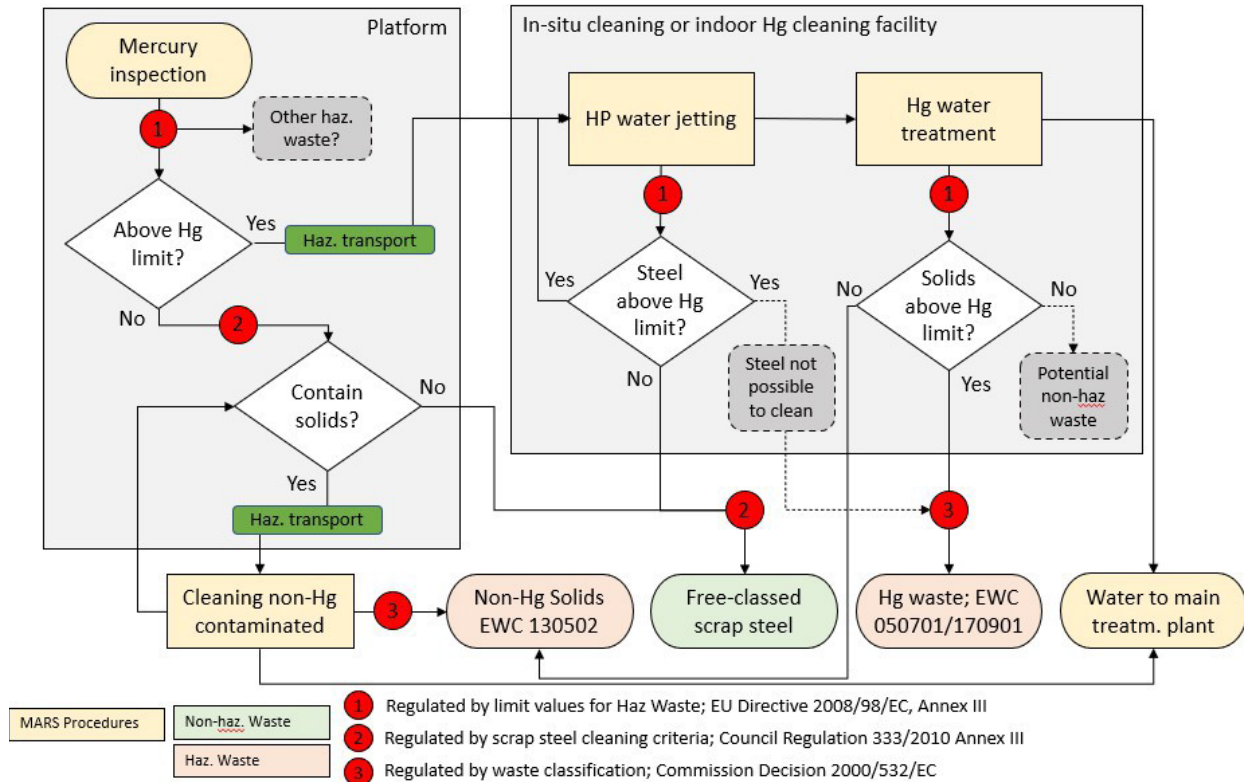
This procedure is approved by M.A.R.S. Europe Cleaning Manager

| | |
|-----------|---------------------|
| Date: | 08-02-2024 |
| Approval: | Christina Jørgensen |

TITLE: Mercury Procedure

Appendix 1: Workflow

Proposed work flow for handling mercury in pipelines and equipment at MARS site



Appendix 4: Asbestos Procedure



Procedure

Asbestos

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| D | 23-Mar-21 | Revised Document | Cecilie Nielsen | Alexandru Simion | Kristian Krebs (Recover) |
| C | 26-Mar-20 | Revised Document | Cecilie Nielsen | Cecilie Nielsen | Kim Thygesen |
| B | 14-Jun-18 | Revised Document | Terry Overland | Cecilie Nielsen | Kim Thygesen |
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PURPOSE

It is the policy of M.A.R.S. Europe to provide and maintain safe, healthy working conditions, safe equipment and safe work procedures for all employees in accordance with the company’s initiative of an Incident and Injury Free Workplace. The purpose of this standard is to establish guidelines and procedures in reference to asbestos containing materials and to protect all employees, contractors, visitors and suppliers from potential health hazards of asbestos related diseases.

1.0 SCOPE

This procedure will apply to all buildings, vessels, and barges at the M.A.R.S. Europe yard, to all employees and subcontractors, and to occupants of Company buildings and to external organizations that may come into contact with or disturb asbestos-containing material. It applies to routine work during which an employee might encounter asbestos, as well as work undertaken to repair or remove asbestos-containing material. This procedure applies to all M.A.R.S. Europe employees and subcontractors.

2.1 Hazard

When working with asbestos and materials that contain asbestos, dust is created that contains fine, needle-like fibers. At the maximum safety limits set, the dust cannot be seen with the naked eye. Because of the structure of asbestos, the fibers can constantly split along their length, ultimately becoming very thin. There is a risk that if inhaled, they can pass all the way down into the most delicate branches of the lungs where they can accumulate. Exposure to asbestos fiber involves the risk of developing asbestosis and various forms of lung and bowel cancer. Asbestos and smoking can amplify the damaging effects of each other, increasing the risk of lung cancer.

2.0 RESPONSIBILITIES

It is a policy of M.A.R.S. Europe that only certified and qualified asbestos removal contractors (3rd party) shall be involved in any asbestos repairs, maintenance, or removal. All unqualified employees shall be protected from exposure to asbestos fibers by isolating and controlling access to all affected areas during asbestos work. All tasks involving the disturbance of asbestos containing material will be conducted only after appropriate work controls have been identified and implemented. A qualified supervisor shall be available at asbestos controlled work sites during all activities. Proper personal protective equipment, vacuums, and High Efficiency Particulate Air (HEPA) filters shall be used and properly maintained. The contractor shall ensure that all contractor employees have been properly trained and have been issued proper equipment and protective gear.

Asbestos consists of thousands of tiny individual fibers that can be spun into threads, woven, or be finely separated. Because asbestos cannot burn and tolerates temperatures up to 900 °C, it is ideal for reinforcement, insulation, and fireproofing, and has therefore been used for years in a number of building materials.



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3.1 Responsibilities of Asbestos Removal Contractor

Management

- Ensure all Asbestos Containing Material (ACM) is identified and labeled
- Ensure training is effective for authorized employees
- Conduct medical surveillance of affected employees
- Establish engineering controls for all work with ACM
- Provide adequate and proper equipment and personal protective gear
- Ensure proper disposal of all ACM

All general contractors on a construction project which includes work covered by this standard shall be deemed to exercise general supervisory authority over the work covered by this standard, even though the general contractor is not qualified to serve as the asbestos "competent person". As supervisor of the entire project, the general contractor shall ascertain whether the asbestos contractor is in compliance with the standard and shall require contractors to come into compliance with this standard when necessary.

Supervisors

Qualified supervisors shall provide effective on-site management during work with ACM. Supervisors will notify the EHS Department immediately upon discovering damaged asbestos material.

Employees

Qualified contractor employees must follow the exact procedures for repair or removal of asbestos containing material, including proper use of containment equipment, clean up equipment and personal protective gear.

Unqualified employees are to stay clear of all asbestos work areas and report any suspected damaged asbestos containing material to their supervisor.

Multi-employer worksites

On multi-employer worksites, an employer performing work requiring the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.

Asbestos hazards at a multi-employer work site shall be abated by the contractor who created or controls the source of asbestos contamination. For example, if there is a significant breach of an enclosure containing Class I work, the employer responsible for erecting the enclosure shall repair the breach immediately.



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In addition, all employers of employees exposed to asbestos hazards shall comply with applicable protective provisions to protect their employees. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of such job, their employer shall either remove the employees from the area until the enclosure breach is repaired; or perform an initial exposure assessment.

All employers of employees working adjacent to regulated areas established by another employer on a multi-employer work site, shall take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to such adjacent areas.



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3.0 PROCEDURE

4.1 Asbestos Safety Plan

4.1.1 Exposure

Every employer shall maintain records of any asbestos exposure of all employees for whom personnel monitoring is required and advise each of his employees of his individual exposure on at least an annual basis.

4.1.2 General Rules

When in doubt, treat all material as containing asbestos and comply with all applicable rules and regulations and protective measures.

All M.A.R.S. Europe employees, sub-contractors, and visitors on a site with ACM or PACM will be instructed in the location or the material, the signs and labels used to identify the material which is present and procedures to notify supervisory personnel of any suspected damage to the material.

All ACM will be handled only by certified and licensed asbestos removal contractor personnel. The friability of the ACM will dictate the type of removal/maintenance required.

Employees who are uncertified and unlicensed will not handle any ACM. This will include encapsulation projects, renovation/removal and/or demolition of any type of structure. This will prevent the potential for accidental exposure from the mishandling of any ACM.

When an uncertified, unlicensed employee question whether they may be handling suspect ACM, the employee will immediately contact their supervisor. The employee shall not resume working at the site until the area has been checked to verify the material is not ACM.

Uncertified, unlicensed employees will not cross over a barrier/containment area where asbestos projects are in progress.

Any employee who discovers ACM or suspects ACM in damaged or poor condition must report it to their supervisor, so the identified material is repaired.

Signs and labels shall identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that Asbestos Containing Material (ACM) and/or Presumed Asbestos Containing Material (PACM) will not be disturbed. M.A.R.S. Europe Supervisors shall ensure that employees working in and adjacent to regulated areas comprehend the warning signs.

No work activity that could disturb suspected ACM in any suspected or known areas shall be carried out without the prior written approval of the EHS Manager and the Site Superintendent under M.A.R.S. Europe's Safety Management System (SMS)



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4.2 Definitions

4.2.1 Asbestos

Asbestos is a generic term describing a family of naturally occurring fibrous silicate minerals. As a group, the minerals are noncombustible, do not conduct heat or electricity and are resistant to many chemicals. Although there are several other varieties that have been used commercially, the most common asbestos mineral types likely to be encountered are chrysotile (white asbestos), amosite (brown asbestos), and crocidolite (blue asbestos). Among these, white asbestos is by far the most common asbestos mineral present in building materials.

ACM - Asbestos Containing Material

PACM - Presumed Asbestos Containing Material

4.2.2 Hazard Control

1. Engineering Controls

Engineering controls include the use of enclosures such as monitoring equipment, glove bags, tenting, negative pressure work areas, HEPA filters, controlled vacuums, water misters and other equipment to ensure containment and clean up of asbestos work areas.

2. Administrative Controls

All qualified workers shall be issued proper personal protective equipment, such as respirators, disposable coveralls, gloves, etc. Written procedures and management authorizations are required for all work dealing with ACM.

3. Training Controls

All qualified employees, supervisors and managers shall receive the proper level of training, as outlined in this program's definitions.

4.3 Before starting the work

1. Registration of asbestos.

Working Environment Authority Executive Order no. 993 of 1 Dec. 1986

2. Drawing up a work plan.

A plan is required to provide brief details of the location, date/time the work is to be performed, its scope, safety precautions taken, methods used for demolition and cleaning. The plan can be the result of the special APV to be performed for asbestos work.



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3. Project review with the developer or his representative.
The plan is submitted to the developer or his representative. The contents of the plan, customer requirements and specifications of invitation to tender documents must be coordinated. Access and external facilities must be shown to the asbestos contractor and agreement reached on access for his personnel to the developer's property. The location of a waste container and sanitation trailer must be agreed, along with where power and water can be connected.
4. Notification to the Working Environment Authority
Notification along with the plan must be sent to the authority. Refer to Dansk Industri's guidelines. <https://www.danskindustri.dk/medlemsforeninger/nedrivningssektionen/vejledninger-og-viden>
5. Notification to local municipal environment offices.
Notification with an application for a permit to deposit asbestos waste at a special depot (depending on waste type) must be sent to the local municipal environment office, and contain all details of quantity, type and whether the waste is packed.
6. Safety personnel and building users must be informed.
The contractor must offer to inform local safety personnel and building users of the scope of the work, and what safety precautions will be in place.
7. Project review with the asbestos contractor.
The contractor will review the work plan and local agreements with his personnel, including informing them on how freestanding items in the work area will be dealt with.
8. Permit to work system
Risk assessment, JSA and toolbox talks will be conducted prior to asbestos operations with all parties involved in attendance. The permit to work system will be considered open when all documents are signed by the site EHS Supervisor.

4.4 Demolition inside buildings

4.4.1 Preparatory work and sealing off the area

Before asbestos removal can begin, the work area must be sealed off to prevent contamination of the surrounding areas.

All cracks, joints, holes etc. in or around windows, doors and in masonry must be sealed. Ventilation plant must be stopped. Any holes or openings on ducts must be sealed with duct tape or polythene film.

The same applies to fixtures and fittings that could be difficult to remove asbestos fiber from later, such as cabinets, radiators, and very rough surfaces. Carpets should be covered by rigid sheets taped along all joints.



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If asbestos is being removed from boiler rooms with oil or gas boilers in use and with air-cooled pump motors, a fresh air supply must be rigged to the boilers and motors via pipes leading outdoors. Contaminated freestanding items should be vacuum cleaned and wiped off with a damp cloth before being removed.

Contaminated fittings, electrical installations, cable trays etc. must be vacuum cleaned and wiped off with a damp cloth before being sealed/enclosed using polythene film.

When construction is complete, tools needed are placed in the sealed of area. An access airlock consisting of 3 compartments is added to the construction.

Asbestos work warning signs will be placed in designated areas around the asbestos work site to prevent unauthorized personnel entering the work space.

4.4.2 Negative air pressure and air purifying

In addition to sealing off the contaminated area, constant negative pressure must be established and maintained to prevent the spread of asbestos fiber.

Negative air pressure is established using one or more air purifiers fitted with 'absolute filters', also known as 'microfilters' or 'HEPA filters'.

The air purifiers, while maintaining negative pressure, will filter the air in the contaminated area and catch the asbestos fibers in the HEPA filters.

If the contaminated area is large, multiple air purifiers will be required to ensure good air circulation, avoiding 'dead' zones with high dust concentration.

An air replacement rate of 10 times per hour for the whole of the contaminated area is the ideal. Polythene sheets on dust walls and air locks must show clear signs of negative air pressure. The sheeting should billow inwards towards the contaminated area.

Exhaust air from the purifiers is conducted outdoors via plastic tube ducts.

Regular checks of the efficiency of all machines must be performed. HEPA filters from the purifiers should be replaced as required and in accordance with the manufacturer's recommendations.

4.4.3 Access to contaminated area

To prevent the spread of asbestos fiber outside the contaminated area and to maintain negative air pressure, access to the area must be strictly via an airlock access system. The structure can consist of a wooden frame covered with thick polythene sheeting. The air lock is normally divided into 3 chambers separated by polythene curtains weighted at the bottom by lengths of wood. Hinged doors can also be



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used. If existing building elements such as walls form part of the air lock system, they must be properly covered. Carpeted floors must be covered with rigid sheets taped at the joints.

If the air lock can be exposed to external mechanical forces, the polythene walls must be protected with hard sheeting.

The air lock can be built and used in 2 different ways: 1) with a shower 2) without shower.

- 1) If it has a shower, a shower tray and hand-held shower head are fitted in chamber 2. Dining, personnel and changing facilities should be provided elsewhere according to the rules in force.
- 2) If an airlock has no shower, 2 changing rooms for work clothes and one for personnel clothing should be provided in the immediate proximity of the contaminated area, separated by a shower room. These facilities could be provided in a special mobile shower/changing unit with dining and personnel facilities.

4.4.4 Preliminary work

Asbestos contractors should always wear suitable respirator and special work clothes when working inside the contaminated area. The removal of asbestos-containing materials should be performed carefully to reduce dust (avoid the materials breaking up).

Air purifiers and recirculation machines should be placed as close to where the work is being performed as possible. Materials that have been removed should be placed directly in polythene sacks or boxes lined with polythene sheets. Sharp edged waste should be double-bagged or put in polythene-lined cardboard boxes. Nails and screws should be removed or doubled over.

The contaminated area and air lock should be continuously kept clean by vacuuming. All materials removed that cannot be cleaned should be treated as asbestos waste and taken to a special depot for disposal. Polythene sacks or sheeting used in the contaminated area for packing waste should be minimum 170 µ thick. Sacks should be sealed by folding the neck over, taped and vacuumed before being moved to air lock chamber 3 and placed in another thick polythene sack sealed and cleaned as above before being taken out through the air lock.

Polythene sacks and packaging must be clearly marked "ASBESTOS"

A transit air lock can be placed on the side of chamber 3 through which waste can be removed, depending on the volume and type. All asbestos containing waste removed from the contaminated area must be stored in a locked room or container marked "ASBESTOS".

Preliminary work should be concluded by thoroughly vacuuming the entire contaminated area. Tools and materials used are vacuumed and wiped off. Visual inspection should be performed before detailed work or final cleaning is started.



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4.4.5 Final cleaning

Contractors should use the same personal protection as used for preliminary work.

Before cleaning, the area must go through a purification period of 24 hours.

After the purification period the area should be thoroughly cleaned by vacuuming and wiping off all surfaces.

Joints and cracks that appear during preliminary work should be thoroughly cleaned by vacuuming. All tools and material not used for cleaning should be cleaned thoroughly.

Once cleaning is completed, a visual inspection of the area should be performed. Negative air pressure should be maintained until the final inspection has been performed and approval given.

4.4.6 Final inspection

The standard of cleaning is approved by a visual inspection that can be supplemented by taking gel tape samples if required. The inspection method should be agreed before starting work in each instance between developer and contractor.

- Visual inspection:
Once work is completed, the contaminated area should be inspected by the parties involved. No dust should be found in the area during inspection.
- Gel tape samples:
A piece of rectangular polythene sheet with an adhesive gel applied is used for this method. When applied to surfaces, dust is picked up and the tape can be analyzed under a microscope to determine the amount of asbestos fiber present.

4.5 Demolition outside buildings

The demolition of asbestos materials outdoors can be roughly divided into two types of work:

1. Work that creates less dust - demolishing roofing and facade sheets made of asbestos cement.
2. Work that creates a lot of dust - demolishing roof tile sheets containing asbestos or asbestos cement sheets of which a high proportion are broken.

The following rules must be observed:

- A plan must be devised for the work. Contractor personnel must have been trained and received special instruction.



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- The contaminated area must be sealed off to prevent unauthorized access, and warning signs set up.
- Where scaffolding is necessary, box screens must be erected according to the scaffold rules, supplemented by polythene to catch any falling debris.
- Windows and external doors should be kept closed. Grilles, ducts etc. must be covered. Ventilation plant should be shut down.

During work that can create asbestos dust, contractor personnel should wear suitable suits and masks. Every effort must be made to avoid damaging ACMs. It can be necessary to dampen the materials for work that creates a lot of dust.

Once removal work is complete, the exposed surfaces and covering materials must be cleaned.

Cleaning should be performed as follows:

- A. Vacuuming (with HEPA filter fitted)
- B. Wet-wiping down if possible.

Shower and personnel facilities will be provided for the contaminated area.

All asbestos-containing waste must be collected and placed in sealed, lockable containers. The waste is delivered to a special depot.

If new materials are to be mounted on top of asbestos-containing cladding, the above precautions must be observed, as asbestos fiber will be released by drilling or other mechanical work.

4.6 Registration

According to the Danish Work Authorities' Executive Order No. 993 it is required that all companies that detect asbestos in buildings, ships, etc. registers the discovery.

1. According to §1 all damaged asbestos must be registered, and the necessary removal or encapsulation shall be initiated.
2. According to §2 repairer, craftsmen, workers, etc. must have a register of where all asbestos or asbestos contaminated material is found.

4.7 Training

The personnel undertaking indoor removal of asbestos-containing materials must have undergone special training approved by the Working Environment Authority.



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Examples of such work:

- Encapsulation and enclosure of asbestos containing materials that are in poor condition
- Dismantling water pipes made of asbestos cement in the ground, a significant amount of which are broken.
- Taking down flat cement sheeting (tile sheets) containing asbestos
- Clearing up large amounts of crushed asbestos-containing materials after a fire or serious storm damage
- Clearing up after demolition work
- Outdoor demolition of a building behind partial/total enclosure

New rules also came into force on 15 April 2006 on the training and instruction of personnel involved in non-indoor demolition of asbestos-containing materials if they can be exposed to asbestos dust. They must undergo a training and instruction course on prevention and safety (unless they have taken a special course approved by the Working Environment Authority).

Training or instruction must contain details of:

1. The properties of asbestos and its implications for health, including the fact that smoking exacerbates the hazardous effects of asbestos
2. Materials that can be expected to contain asbestos
3. Activities that can imply exposure to asbestos and the importance of preventive measures to reduce such exposure
4. Safe working methods and personal protection
5. The purpose of and correct choice of respirator, their respective limitations and correct use
6. Emergency measures
7. Cleaning procedures
8. Disposal of refuse
9. Health checks.

4.8 Personal Protective Equipment

4.8.1 Indoor work creating a lot of dust

A fresh air-supplied respirator connected to a compressor must always be worn for demolition work that creates a lot of dust. No more than 4-6 hours per day can be worked wearing such a respirator with regular breaks, depending on type of work. Special suits and footwear must be worn at all times. Reusable suits must be washed as frequently as the type of work requires. Disposable suits must be treated as asbestos-contaminated waste and disposed of after use. Disposable suits used must be approved for asbestos removal.



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4.8.2 Indoor work creating minimum dust

A full-face mask with air supplied by a battery-driven turbo unit must be worn for work that creates less dust, such as cleaning. Such masks should be fitted with P3 filters. No more than 4 hours per day can be worked with regular breaks. The use of filtered respirators must be limited to 3 hours unless fitted with a turbo unit. Special suits and footwear must be worn at all times.

4.8.3 Indoor repair and encapsulation work

Half masks with a P3 filter and approved disposable suits should be worn for work that creates little dust.

4.8.4 Outdoor demolition

Half masks with a P3 filter and approved disposable suits should be worn for work that creates very little dust outdoors, such as dismantling/demolition. More stringent precautions should be taken for work that creates a lot of dust. Safety equipment in general. Safety equipment (suits, masks, machinery etc.) should not be removed from the work - area and airlock doors before it has been thoroughly cleaned or packed in airtight polythene sacks.

4.0 Asbestos Waste

The Ministry of the Environment recommends that asbestos-containing materials that can create any level of dust should be classified as hazardous waste, whilst any such materials that do not create dust should be classified as non-hazardous waste. According to the ministry's recommendations, examples of hazardous asbestos waste will be asbestos dust (fiber), filters, soft ceiling, and wall sheets, broken, damaged or cut roofing sheets that contain asbestos. Whole and undamaged roofing sheets can be categorized as non-dust creating, and thus non-hazardous waste.

However, individual assessment in each situation will always be required. Joined asbestos sheets that do not create dust can be considered as non-hazardous waste.

Type 1: Asbestos waste that creates severe levels of dust, filters and the like should be kept damp in sealed packaging marked "ASBESTOS". The waste should be delivered to an approved collection station.

Type 2: Waste containing asbestos that can create dust, e.g., electrical/mechanical insulation, soft ceiling and wall sheets, crushed Eternit and the like must be stored and transported whilst damp and packed in double polythene sacks or film to prevent dust being released to the environment. Such waste must be delivered to an approved special depot.



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Type 3: Asbestos waste that does not create dust, or in which the asbestos is contained, e.g. large pieces of Eternit sheets and the like. Can be delivered to a special depot approved for handling waste of this type.

5.1 Sealing

Sealing asbestos materials can only be considered as a temporary measure. All asbestos materials should be removed in the long term.

5.2 Bagging

The removal of asbestos-containing materials by bagging is only permitted to a limited extent, e.g., in the event of damage and minor removal in houses and boiler houses.

Drawing up a work plan. Notification to the Working Environment Authority (and for members of the association, to the control function) is mandatory.

Special bags must be used. The contaminated area must be screened off and warning signs set up.

Contractor personnel must have undergone mandatory training and instruction on use of the bagging method. Dustproof suits and respirators with P3 filters must be worn. Before and after removal, the building elements around the contaminated area must be thoroughly vacuumed.

5.0 AUTHORIZATION

This document is reviewed at least every three years.

This procedure is approved by Asbestos Removal Subcontractor, Recover Nordic

Appendix 5: UHP and HP Water Jetting



Procedure

Ultra-High Pressure and High-Pressure Water Jetting

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ABBREVIATIONS

| | |
|----------|---|
| UHP | Ultra High Pressure |
| HP | High Pressure |
| M.A.R.S. | Modern American Recycling Services |
| EHS | Environment, Health, and Safety |
| NORM | Naturally Occurring Radioactive Material |
| ERT | Emergency rescue team |
| Company | Modern American Recycling Services Europe Yard (M.A.R.S.) |
| COSHH | Control of Substances Hazardous to Health |
| PPE | Personal Protective Equipment |
| RPE | Respiratory Protective Equipment |

1.0 PURPOSE

The purpose of this procedure is to cover the safe working standards to be adopted by M.A.R.S. Europe, personnel and all its subcontractors, when operating all types of high pressure, and ultra-high pressure water jetting applications.

2.0 SCOPE

This procedure applies to all work at the M.A.R.S. Europe site where water jetting and water abrasive cold cutting is used performed.

The procedure applies to all high pressure and ultra-high pressure water jetting applications as defined above, where there is a risk of injury.

There is a serious potential for accidents relating to the direct impact of a water jet on the body. The pressure required to penetrate the skin is in the region of 7 bar (100 PSI).

Prior to conducting any work using HP or UHP pressure applications a risk assessment must be carried out. Making all workers aware of the risks and how to mitigate them.

Once at the level of 7 bar (100 PSI) safety precautions have to be adapted in regard to the water pressure potentially penetrating the skin and to the potential aerosols being released from the washing¹.

When operating UHP units, with pressure above 1500 bar, certified UHP PPE needs to be used.

¹ <https://at.dk/regler/at-vejledninger/brug-vandtryk-d-2-20/> (Paragraph 6.1)



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3.0 RESPONSIBILITIES

3.1 Cleaning Manager

The Cleaning Manager is responsible for the review and approval of this procedure.

The Cleaning Manager shall:

- Ensure that all its employees have undergone the training and instructions. Training platform shall be provided covering how to operate all equipment safely and accident prevention.
- Ensure that all employees involved are familiar with the contents of this procedure.
- Be aware of all EHS requirements at the M.A.R.S. Europe yard
- Confirm that all required equipment for these tasks is on site and in good working order.

3.2 M.A.R.S.' EHS Manager

- Shall ensure that this procedure is issued to locations where appropriate.
- Shall make sure that this procedure is always followed by the M.A.R.S. personnel
- Shall ensure that the M.A.R.S. supervisor is aware of the contents of this procedure prior to any work scope commencing.
- Shall ensure that rescue teams operating on site have received training in first aid for injuries related to UHP operations.

3.3 M.A.R.S. Site Supervisor

Must ensure that the procedure is available on location and that he/she is familiar with its content and requirements.

Ensure that all employees, under their supervision, are aware of the contents of the procedure including correct PPE, equipment, associated risks, etc., by means of PPE risk assessment, site risk assessments and regular toolbox talk briefings before commencement of any work.

Only competent trained personnel can operate the equipment and carry out the work scope.

Shall monitor working conditions to ensure compliance with the procedure.

Report to the EHS Manager, any situation which may arise that is not covered by this procedure.

3.4 HR Department

Responsible for ensuring that personnel involved in high pressure and ultra-high pressure water applications are trained and have all valid certifications.

3.5 M.A.R.S. Employees

Must ensure that they are aware of the provisions of this procedure and its requirements to effectively control the inherent risks associated with the working arrangements of the procedure.

Have a duty to themselves and others not to contravene, or allow to be contravened, the safeguards of this procedure and to ensure that the requirements of the permit to work are met in full.



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Shall report to their Supervisor of any damaged or inadequate PPE / RPE equipment and/or work practice not in line with this procedure.

4.0 PROCEDURE

4.1 Definitions

Within this procedure, the term high pressure water jetting will include all pressures up to 1400 bar, while pressures above 1400 bare are referred to as ultra-high pressure (ISO 8501-4:2020). The procedure is applicable to all high-pressure water jetting applications in which hot or cold water is mechanically/hydraulically propelled at pressures from 0-1400 bar. High pressure water jetting covers all water jetting processes including those using additives or abrasives where there is an energy input to increase the pressure applied to water.

Ultra-high-pressure water applications operates at pressures more than 21,000 PSI (1,00 bar) to 60,000 PSI (4,000 bar). Most ultra-high-pressure machines operate in the 2,000-2,800 bar range (30,000-40,000 PSI) which delivers ultra-high-pressure water at volumes ranging from 16 liters per minute to 25 liters per minute. The water is delivered to the tool via purpose designed ultra-high-pressure hoses. Potable water shall be used with all ultra-high-pressure machines.

High pressure and ultra-high pressure water applications are used to carry out a various range of tasks, quickly and efficiently. At M.A.R.S., the range of applications include:

Surface preparation of steel prior to recycling

- Removal of coating
- Tube bundle cleaning/decontamination
- Pipe cleaning/decontamination (including internal retro-jetting and the internal rotating pipe cleaning system)
- Tank/vessel cleaning
- Decontamination and extraction of naturally occurring radioactive material (NORM) and Mercury.
- Simple washdown for cleaning

4.2 Routine Maintenance

All HP and UHP jetting equipment shall be electrically bonded and earthed before work starts and throughout the whole operation to prevent the “Build Up” of electrostatic discharges between the lance, cutting head and the workpiece. Units which are containerized, the container must be electrically bonded to the installation or site superstructure. Any equipment found to be defective must be reported to the Site Manager immediately.



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4.3 PPE and RPE

1. Eye Protection

Regardless of pressure, flow rate or application, COSHH regulations require at bare minimum for the jetting operator to wear helmet with visor, but best work safety practices recommend a full-face mask with visor integrated when operating UHP. Additionally, a risk assessment should also be completed, and this will highlight if any further eye protection is required, i.e., safety goggles to be worn along with the full-face mask with visor.

2. Respirator Protection

Covered in the risk assessment for the scope, where COSHH regulations requires a minimum of a respirator filter masks with P2-filter, but best work safety practices recommend using a fresh air supply through a full face mask or full face mask with turbo-unit.

3. Head Protection

Adequate head protection shall be worn as a combined unit, i.e. helmet, safety goggles and fullface visor.

4. Ear Protection

Most HP water jetting operations produce noise levels in excess of 90dB (Higher in a confined space). Nozzles working at UHP can generate noise levels in excess of 120dB (Higher in a confined space). Hearing protection capable of protecting against these noise levels should be selected i.e., ear plugs, and ear protection shall be worn.

5. Body Protection

There is a serious potential for accidents relating to the direct impact of a water jet on the body. The pressure required to penetrate the skin is in the region of 7 bar (100 PSI). Once at the level of 7 bar (100 PSI) PPE requirements are to be evaluated according to the work scope ahead.

It is the responsibility of the EHS supervisor to identify a solution (perhaps an alternative suit) that will mitigate safety concerns that may arise for particular assignments as a result of the protective suit. A new suitable and sufficient risk assessment must follow in this event and be delivered to EHS department for review.

All operators shall wear suitable waterproof protective clothing having regard to the type of hazards identified by the risk assessment i.e., 2-piece waterproofs, chemical all in one waterproof suit or just waterproof bottoms.

6. Breathing apparatus

Where necessary breathing apparatus protection which conforms to an approved standard shall be worn. It shall be selected and used in accordance with the requirements of the Control of Substances Hazardous to Health (COSHH) Regulations. All personnel using breathing apparatus must be trained and be competent in the use of selected breathing apparatus. It is mandatory that an assessment of breathing air quality is carried out as per Danish Regulations. This is to ensure that any compressed air used for breathing does not contain any contaminants harmful to health. The



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initial test shall be carried out on completion of initial set-up, further retest shall be conducted annually regardless of if system changed, moved, serviced or if there is any doubt as to the quality of the air. It is essential that lines are tagged particularly the supply point with notice to state that it is a breathing air system and must not be disconnected. All tests shall be carried out by a competent person and shall be recorded.

4.4 Worksite preparations

- Risk Assessment and environmental impact assessment
- Job Safety Analysis
- Permit to Work
- Toolbox Talks

Safety barrier and notices during UHP Operation

Areas relevant to the work scope shall be barriered off to prevent access by unauthorized personnel. Barriers shall be red/white chain or red/white warning tape as a minimum. No entry signs shall be displayed and always clearly visible. They should state No Unauthorised Entry – “High Pressure Water Jetting in Progress” or “Ultra High Pressure Water Jetting in Progress”. The onsite M.A.R.S. Supervisor shall ensure that access to any such areas are prohibited without knowledge and approval from the barrier owner.

Electrical Equipment, and fire and gas detectors e.g., smoke, gas and ultraviolet detectors will be required to be protected from water ingress prior to commencing the work scope. The protection of the above equipment should be inspected by a competent authority prior to the work scope commencing.

4.5 Teams

Regardless of the nature of the activity, at least two roles must be assigned during operations, while best practices tell us that three roles offer significant time savings.

A site survey and risk assessment is used to establish the number of people assigned to each role and number of equipment.

The working teams must consist of and never fall below 50% ratio of experience to inexperienced operatives. Before commencing the task, the team members must agree a code of signals to be used so that instructions may be passed while the equipment is in use. Team members shall work strictly to a pre-arranged work plan and the division of duties between the members.

The operator that uses the HP and UHP cleaning lance is responsible for the primary role of cleaner.

The “watchman”, who fills the secondary role, is responsible for the following tasks:

- If necessary, use the foot pedal or switch to activate safety controls.
- Keep an eye out for signs of distress, such as the cleaner's tiredness. To prevent fatigue from building up on both, the cleaner and the watchman should alternate tasks.
- Must forbid anyone else from entering the work area.



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- If the HP/UHP machine is close by, the watchman can manage it. However, if there is a break in the line of sight between the watchman and cleaner, the watchman must instruct the cleaner to leave the cleaning area or confined space.
- The watchman's travel to check the HP/UHP unit and the cleaner's exit from the cleaning area/confined spaces both take time, which is why best practice suggests having a third role, the “fitter”. During operations, the person in this position keeps an eye on all HP/UHP units. If all HP/UHP units are located together, this function can be given to just one person since this person can manage numerous machines at once.

4.6 Use of Lances and Nozzles (Jets)

Lances which are rigid or semi-rigid having nozzles (Jets) fitted to them with any combination of forward, backward or 90 angle jets, must be used with a safety shut off device. If necessary, the workpiece entry point should be cleared by other methods e.g. by using the HP or UHP gun. With restricted visibility, the lance, hose must be clearly marked in a manner which enables the operator to judge how far the nozzle is in the workpiece before pressure is applied and, conversely, so that pressure is released before the apparatus is completely withdrawn from the workpiece. The length of a rigid lance or combination of lances must be such that the operator can maintain control at all times.

The minimum recommended exposed length of a lance or barrel (excluding the hand hold coupling) is one meter. In a very restricted work area where it is necessary to use a lance or barrel that is shorter than one meter, a trigger operated handgun shall be attached to the lance or barrel and a safe system of work established to overcome any increase in risk, in such circumstances, operators shall receive further specific training to this effect.

The correct nozzle and minimum operating pressure must be selected by the operators to allow for a safe, effective, and efficient water jetting operations to be carried out.

Note: Where reasonably practicable automatic jetting systems should be used.

4.7 Work in Confined Space

Entry of personnel into confined spaces for HP and UHP water jetting shall only be allowed when there is no reasonably practicable alternative. HP and UHP water jetting will only be permitted within a confined space after consideration has been given to the possibility that harmful materials might accumulate in the atmosphere as deposits are dislodged during the work scope process. This applies to operators working within and outside the space.

The wearing of approved full-face mask with fresh air supply and additional precautions may be necessary against the developments of hazardous atmosphere.

Ideally the operator(s) inside an enclosed space should be able to verbally communicate (with or without using a radio) with the watchman in addition to a direct line of sight, but in the unideal



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situation where verbal communication is not possible a system of signals or light cues must be introduced to cover an emergency where all members must leave the confined space.

Work Must Stop in Confined Spaces If:

- Leaks or damage to the equipment and hoses becomes apparent.
- Any person becomes aware of any change in conditions, or any hazards be introduced or exist.
- The platform/site emergency alarms are sounded.
- Refer to the M.A.R.S. procedure EHS-PRO-324 Confined Space Entry

5.0 TRAINING

Manual HP and UHP water applications if not handled competently, is a potentially hazardous process due to the power of the jet and the proximity of the operator to the jetting equipment.

Only personnel trained in accordance with these procedures shall operate HP and UHP water jetting equipment, for which they are trained on.

Any involvement with water jetting operations regardless of the activity, the EHS department must be consulted in the first instance.

Training must cover, in addition to applicable safety requirements, the principles and correct operation of all HP/UHP equipment, in addition to knowing how to proceed in an emergency.

A register of training of each operator, including all refresher courses, shall be kept by the company (Human Resources Department) and be available for inspection on request. Only a recognized body and instructor will carry out all training requirements.

The supervisor of any water jetting activities must also be competent in water jetting.

6.0 REFERENCES

International Organization for Standardization. (2020). ISO 8501-4. *Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting*. Retrieved from <https://www.iso.org/obp/ui/#iso:std:iso:8501:-4:ed-2:v1:en>

7.0 AUTHORIZATION

This document is reviewed at least every 3 years.

This procedure is signed by the company EHS Manager.

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| Approved By: | |
| Date: | |

Appendix 7: NORM Procedure

Procedure

Naturally Occurring Radioactive Material (NORM)

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| M | 05-Feb-24 | Revised Document | Cecilie Nielsen | Christina Jørgensen / Mathias Lindgaard | Kim Thygesen |
| L | 27-Oct-23 | Revised Document | Cecilie Nielsen | Christina Jørgensen | Kim Thygesen |
| K | 11-Aug-23 | Revised Document | Cecilie Nielsen | Christina Jørgensen / Alexandru Simion | Kim Thygesen |
| J | 17-Mar-22 | Updated appendix | Niras | Fabio Silva, Semco | Kim Thygesen |
| I | 14-Dec-20 | Revised Document | Niras | Cecilie Nielsen | Kim Thygesen |
| H | 25-May-20 | Revised Document | Niras | Cecilie N. Nielsen | Kim Thygesen |
| G | 19-May-20 | Revised Document | Niras | Cecilie N. Nielsen / Dan T. Christensen | Kim Thygesen |
| F | 23-Apr-20 | Revised Document | Niras | Cecilie N. Nielsen | |
| E | 14-Feb-20 | Revised Document | Niras | Cecilie N. Nielsen | |
| D | 19-Sep-19 | Revised Document | Niras | Pawel Serafinski | |
| C | 29-Aug-19 | Revised Document | Lene Larsen | Pawel Serafinski | |
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1.0 PURPOSE

It is the policy of M.A.R.S. Europe to provide and maintain safe, healthy working conditions, safe equipment and safe work procedures for all employees and subcontractors in accordance with the company’s initiative of an Incident and Injury Free Workplace.

This procedure is established to obtain a standard for identifying, labeling, maintaining, storage and disposing of equipment contaminated with Naturally Occurring Radioactive Material (NORM) during NORM handling activities undertaken at M.A.R.S Europe site in Frederikshavn.

Further, this procedure is established to ensure that the requirements from the Danish authorities; Danish Health Authorities as well as Municipality of Frederikshavn are met and that handling is in compliance with approvals issued by the Danish Health Authority (SIS).

2.0 SCOPE

This Procedure applies to M.A.R.S. Europe location at the Port of Frederikshavn, employees and subcontractors handling NORM.

Work with NORM will be continually supervised by the Radiation Protection Supervisor (RPS – “Strålebeskyttelseskoordinator”), who will ensure that the given procedures and instructions and all further statutory requirements are complied with. The RPS will be responsible for all work related to NORM by M.A.R.S. Europe employees and subcontractors.

This procedure covers process systems cleaning, descaling, desludging, contaminated equipment, transportation, decontamination, storage, and service activities carried out by M.A.R.S Europe.

This procedure ensures adherence to relevant regulations covering Radiation prevention issued by SIS, which can be found here: <https://www.sundhedsstyrelsen.dk/da/Fagperson/Retningslinjer-og-procedurer/Str%C3%A5lebeskyttelse/Myndighedsopgaver/Lovgivning-om-straalebeskyttelse>.

This procedure is supplied with a number of Appendices. These are to be found in section 6.0.

3.0 RESPONSIBILITIES

3.1 Cleaning Manager

The Cleaning Manager will ensure that handling of possible NORM waste contained in client assets that are decommissioned by M.A.R.S is carried out according to procedures and approvals.

The Cleaning Manager will ensure compliance to both EU rules (EU clients) and outside EU rules (non-EU clients) covering waste handling of any NORM waste attained from client assets.

The Cleaning Manager will ensure, that radioactive waste (NORM) resulting from decommissioning and decontamination will be returned to the company that transferred the platform / ship to M.A.R.S. This will be included in the contracts between M.A.R.S. and the company transferring the asset (platform/ship) to M.A.R.S. If applicable, regulatory requirements for the transfer of NORM to non-

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EU company will be included. Hence, NORM waste cannot be directly transferred to third parties by M.A.R.S. Europe but needs to be transferred by the company.

3.2 EHS Manager

It is the responsibility of the EHS Manager to:

- Maintain a plan for follow up on work carried out regarding requirements given in approvals issued by authorities (SIS and The Municipality of Frederikshavn).
- Conduct an annual review and approve the handling of NORM waste substances handled on the Site at Port of Frederikshavn during M.A.R.S decommissioning operations.
- Review and render decisions on matters where responsibilities and authority may be uncertain.
- Ensure that any employee operating on behalf of a subcontractor at the Port of Frederikshavn site conform to the instructions given in this procedure.

3.3 Radiation Protection Supervisor (RPS)

The Radiation Protection Supervisor (RPS) is appointed by M.A.R.S. Europe as Mr. Kim Thygesen. The appointed RPS has been approved as RPS by SIS and will maintain this approval throughout the operation or until a new RPS is approved by SIS, whichever comes first.

3.4 All Workers

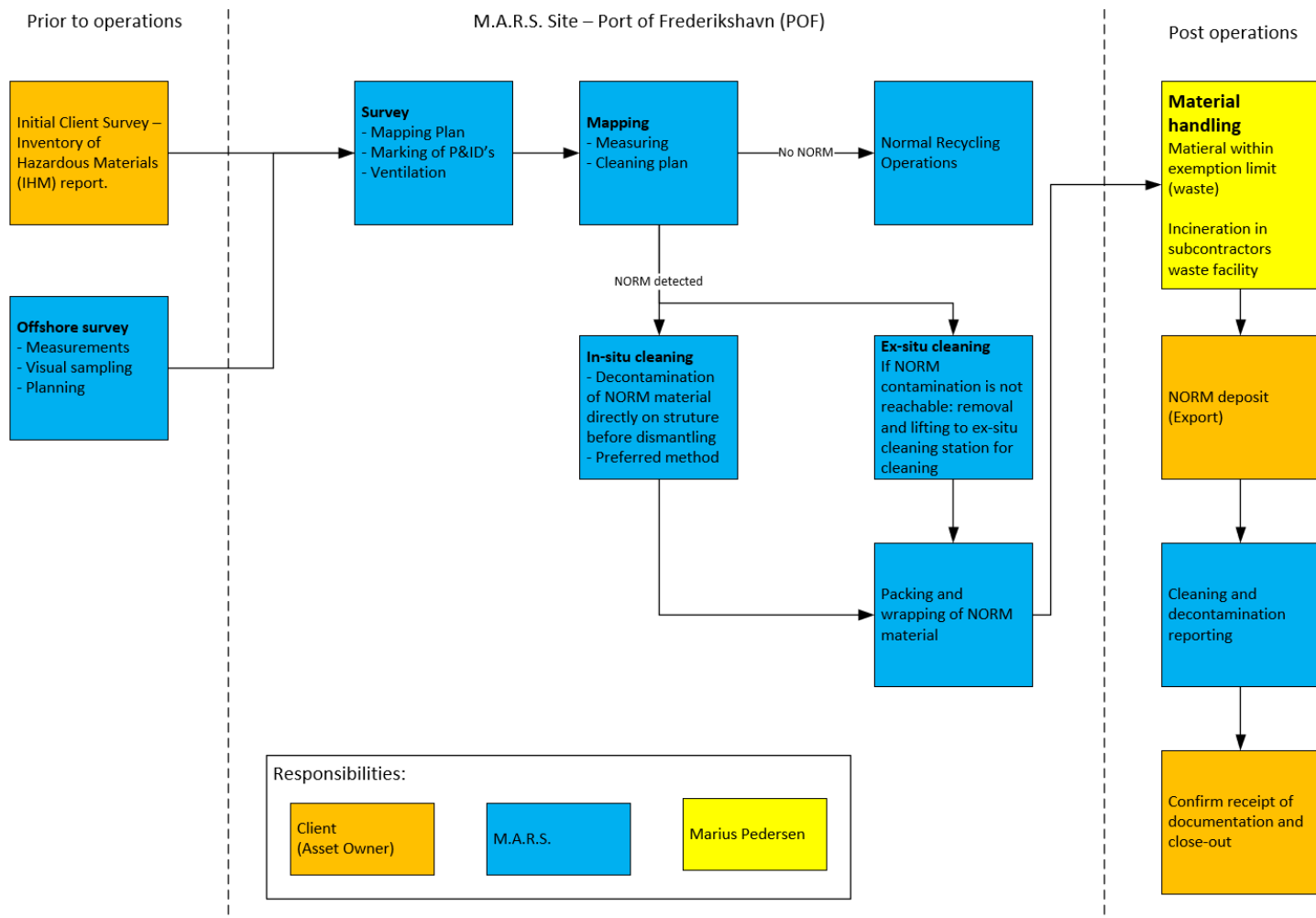
It is the responsibility of all workers employed by M.A.R.S or taken on by any subcontractor operating on the Site to:

- Follow and respect the signage at the working and storage areas assigned for Naturally Occurring Radioactive Material (NORM).
- To report any incidents, accidents, or near misses, in accordance with the Company's Incident Reporting Procedure that may occur while working alone.
- To report unsafe conditions or faulty equipment to the EHS or Site Manager.
- Obligated to report any kind of uncertainties regarding NORM to the RPS

TITLE:

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4.0 PROCEDURE



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M.A.R.S. Europe survey and handles any NORM contaminated material at the M.A.R.S. Europe site. Any NORM matter will be stored at the designated storage area ([Appendix 1](#)). The area will be fenced and marked as monitored area according to regulation (governmental order 669, 2019 - §49). Following survey, assets/matters possibly containing NORM will be dismantled by relevant method (manual dismantling, cutting or shearing) and wrapped securely. Relevant shielding/habitats will be used, and areas marked during NORM operations. NORM Material will be lifted ashore to Load off area (green marked area ref. [Appendix 1](#)) or handled exclusively on this area (including heavy lift area).

4.1 Decontamination

NORM decontamination will as far as possible be done as in-situ cleaning on the ship/platform. The decontamination will be carried out in the safest and most efficient way possible, e.g., by means of high-pressure water jetting. Water jetting will always be conducted in a close environment.

In case in-situ cleaning is not possible, NORM decontamination will be carried out as ex-situ cleaning at a designated ex-situ cleaning area/facility for NORM and Mercury decontamination located at the M.A.R.S. Europe site and approved by SIS.

Refer to M.A.R.S. Europe work instruction for more details on method for decontamination (EHS-WIN-418).

4.2 Assessment of Hazards

Assessment of Hazards is the responsibility of the M.A.R.S. EHS department.

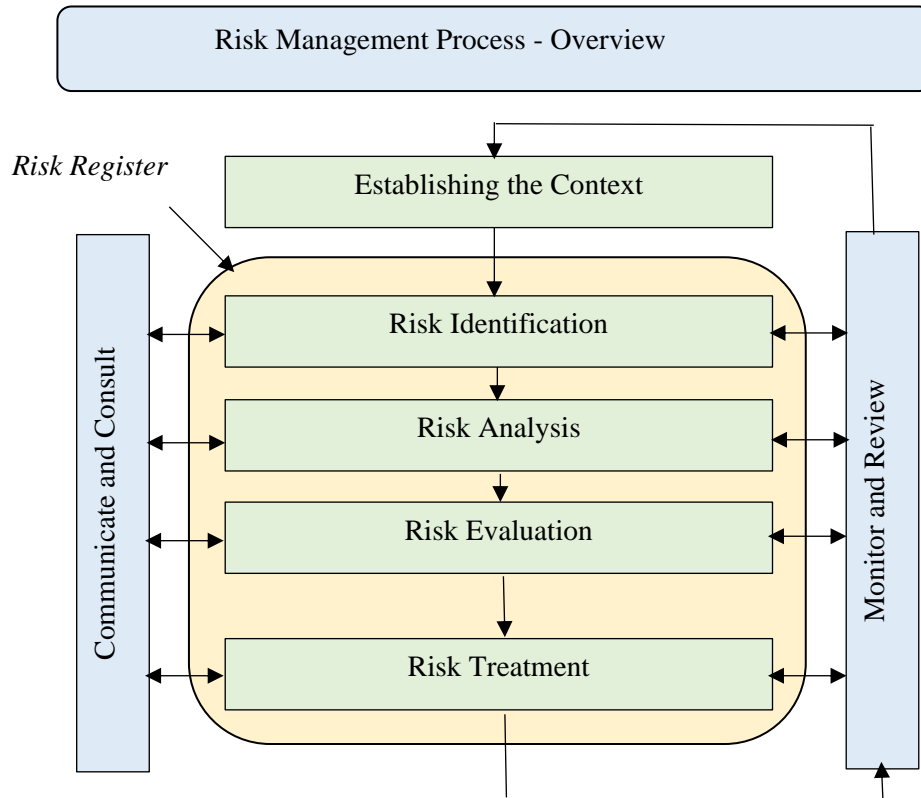


Figure 1 Risk Management Process

Hazard assessment includes the following:

1. **Risk Assessment:** Prior to work commencing a written risk assessment shall be carried out for the proposed work scope. Without prejudice to other relevant procedures involving risk assessment, it is important that a risk assessment is undertaken with all relevant parties for any activity involving Ionising Radiation. The assessment shall identify all activities and recognize the hazards and risks associated with these activities, where there is potential for a radiation incident/accident to exist. The assessment will also be based on measurements taken as further described in section 4.6.1. It is essential to focus on the safety of personnel with regard to Radiation Activities, but also to ensure that plans are put in place to prevent or reduce the consequences from an accident, if it should occur. The Risk Assessments are also required to identify the need for any “Controlled Working Areas”. After identifying the risks associated with Radiation Activities, there will be a requirement to apply precautions to mitigate these risks. The precautions will remain in force for the duration of the work scope.
2. **Work permit:** A permit to work must be approved and signed by a competent EHS supervisor or manager before any NORM related work can commence. Work permit is given in accordance with M.A.R.S. permit to work procedure (EHS-PRO-322).
3. **Toolbox talk:** Prior to any work a toolbox talk is held between the Site Manager, site supervisor and production workers.

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4.3 Monitoring Equipment

All detection monitors will only be used by trained and competent personnel.

Monitors used by M.A.R.S. employees will only occur following RPS instruction.

All radiation monitors must be tested and calibrated every 12 months by a qualified person. Valid certification will accompany all monitors. The test certificate will be retained for a minimum of two years from the date of testing.

4.4 Designated Areas

Works site in Frederikshavn are divided into three areas:

- Areas Without restrictions
- Monitored/Supervised area
- Controlled area

4.4.1 Without restrictions

The area around M.A.R.S worksite is ISPS secured and prohibited for non-authorized population to enter. The general areas are without restrictions.

4.4.2 Monitored/Supervised area

Wherever NORM contamination exists and there is a risk of spreading significant radioactive contamination outside the working area; exposure is possible through inhalation or ingestion and a “Monitored/Supervised Area” should be established.

Fenced areas for storage of NORM in Frederikshavn are monitored and supervised according to Regulation 669 of The Ionizing Protection Regulations 2019. Warning signs are placed on all entrances to the monitored/supervised areas, and the area is closed by fence/gates.

All workers entering a controlled area must be classified persons and wearing Personal Monitoring Badges (TLD). Persons entering the area will wear Respiratory Protective Equipment (RPE) as per IRR 2019 Regulations

4.5 Point NORM Check

4.5.1 Background Radiation Survey

A Site background Radiation Survey has been performed to ensure the background radiation measurement in Frederikshavn.

The survey covered a study of the NORM points. The results of the study can be found in Appendix 4.

A sample test of the area has been conducted to analyze and determine the radionuclide composition. The sample was collected in the load-off area and the skidding area and analyzed by Force Technology. Results are shown in Appendix 4.

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4.5.2 Point NORM Check Frederikshavn

Point NORM Check will be done monthly by RPS trained employees at M.A.R.S. Check points according to Appendix 2.

All measurements from Point NORM Check must be presented to RPS for approval.

Control measurements are conducted around temporary storage of NORM at M.A.R.S. Europe areas in Frederikshavn, at a minimum once a month. These measurements are conducted by RPS trained employee, who is familiar with the use of the M.A.R.S. Europe Tracerco NORM Monitor-IS with GM-probe and Scintillator Probe.

Cf. Appendix 2: measurements must be conducted at several points around the M.A.R.S. Europe site in Frederikshavn.

- X1-X20, X39-X46 Cutting/decommissioning area
- N1-N8 NORM storage area
- X21-X28 Outer areas with adjacent buildings

The dose limit for radiation on M.A.R.S. Europe personnel is shown in Appendix 3 and applies to the sum of a calendar year.

Doses from natural radiation are not included in the calculation of the total dose of a person.

The hourly calculation factor for each measuring point is as follows:

- X1-X20, X39-X46 1600 hours equivalent with a year
- N1-N8 500 hours equivalent with 2 hours daily for 250 days
- X21-X28 1600 hours equivalent with a year

In the case of measurements that exceeds the limit of effective dose Danish Health Authority, SIS is contacted (open 24h/day +45 44 94 37 73)

Further, Surveys have been conducted at the NORM seclusion area and the Ex-situ storage and cleaning area.

4.5.3 Sample test

Once a year a sample test of the area will be conducted to analyze and determine the radionuclide composition. The sample is collected in the load-off area and the skidding area and sent to Force Technology for analysis.

4.6 **Control of Exposure**

4.6.1 Screening Process

Both dose rate ($\mu\text{Sv}/\text{hour}$) and radiation activity (CPS) should be measured to evaluate if the equipment / material is contaminated and to evaluate area classification.

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Screening prior to decontamination to identify potential NORM infected items can be done by M.A.R.S. employees under the instruction of the RPS.

Screening process should be done only to identify assets possibly containing NORM. If measurements indicate NORM contamination –the RPS will assess the situation before any further decontamination can commence.

Opening Process Systems (Breaking containment)

NORM screening shall be carried out before and after opening any process system. If above the NORM contamination limits (above 1.6 CPS), measurements shall hereafter be carried out at the beginning at every shift until the job has been completed.

Make sure measurements are taken in different spots on the equipment when breaking containment, as NORM concentrations can be different (Downstream vs upstream of a valve, water phase vs oil phase area in a separator, etc.).

Opening of process systems

The surfaces must be thoroughly screened and the highest recorded measurement is the applicable.

Prior to opening

- Measure the dose rate (µSv/hour)

After opening

- Measure the dose rate (µSv/hour)
- Measure radiation activity (CPS)

When dealing with wet material (Sludge, wet scale, etc.), ensure readings are precise, by taking a small sample and spreading it on a flat surface such as a wood or metallic board (Where it can be washed off afterwards, without spreading contamination, and with the appropriate PPE), and then measure for NORM. This is because NORM readings are more precise when the contaminated material is dry.

Drilling, Workover Fluids and Well Returns

All fluids from wells being worked over are potentially contaminated (e.g. drilling mud, cuttings, swarf, etc.). If samples of drilling fluids, cuttings, etc. are to be analyzed or worked with onshore, they must be checked for NORM contamination.

Measurements for NORM should be done on the PIN END also measuring on the parts of the inside immediately accessible, keeping the instruments as close to the surface as possible, but avoiding touching the surface.

- Measure the dose rate (µSv/hour)
- Measure radiation activity (CPS)

| | | |
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The first five joints must be tested. If they are clear, testing can be reduced to every tenth (10) joint. If a contaminated joint is found, the previous nine joints must be tested, and every joint from then on.

Where a string contains well equipment such as mandrels, gas lift valves, safety valves or crossovers, each item should be tested at both ends.

4.6.2 Contamination tests of employees

Contamination tests of employees that handle NORM contaminated material at M.A.R.S. Europe site is conducted with Personal Dosimeters that are approved by the Danish Health Authority, cf. §89 of the [Executive Order no. 669](#) on ionizing radiation and radiation protection. The laboratory that performs the statutory dose monitoring is accredited by DANAK, registration no. 503, and is in compliance with ISO/IEC 17025.

M.A.R.S will constantly employ optimization of radiation protection measures in accordance with regulations set in chapter 5 of the Executive Order no. 669.

4.7 **Personal safety**

The employee who is handling NORM must be educated and trained for it. Training and education must be continuously refreshed according to given procedures and instructions. Radiation Protection Supervisor can be consulted.

4.8 **Requirements of PPE**

General requirements of PPE:



Anywhere on worksite on M.A.R.S. it is mandatory to use safety goggles, safety helmet, safety shoes (minimum class S3) and high visible clothing.

Specific requirements of PPE:



Special protective work clothes and gloves, that protect against the transfer of contaminated material to the body and hands, must be worn. Respiratory protection that protects against fire-grained airborne particles must be worn. If the person is exposed for more than 3 hours, an air-supplied respirator must be worn.

All PPE/RPE requirements are according to Risk Assessment / Work Permit / Toolbox Talk done by Radiation Protection Supervisor and EHS Manager.

4.8.1 General Precautions

- Stay near contaminated subjects for as short a time as possible.
- Keep as far a distance as possible to contaminated subjects.
- Stay outside any areas marked NORM work area / habitat etc.

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4.8.2 Personal hygiene



Smoking, eating, drinking, or applying lotion in the work area is forbidden, because this will cause an increased risk of transferring radioactive material to the face during work.

After performing work, and at the exit of the work area, the work clothes must be changed (the protective suit must be taken off). By the end of the workday the employees must take a bath in a separate area and change to their private clothes – separate areas for work clothes and private clothes.

4.8.3 Barriers and signage



The area where the NORM is handled and stored must have signs and barriers. The area around M.A.R.S. Europe denies access to unauthorized people, and the storage facility for NORM is further shielded with fences and gates with locks.

The storage area is clearly marked with warning signs on the four sides of the fence. Signs for ionized radiation supplied with the text “Radioactivity” is according to Danish Standard 734.1 and 734.2, and in adherence to §§37 and 38 in the governmental order no. 670/2019.

4.9 **Storage, Handling, Packaging and Transport of NORM**

The NORM material will be shipped from the M.A.R.S. Europe site by road in compliance with ADR rules. Upon shipment, the material will be handled and sealed according to section 4.9.2 and 4.9.3 and stored in the storage area ([Appendix 1](#)). M.A.R.S. site is covered by ISPS regulations. Containers with NORM must be stored within the enclosed and locked designated NORM storage area until it can be returned to the company that transferred the platform to M.A.R.S.

NORM storage at M.A.R.S site in Frederikshavn refers to NORM infected materials (e.g. tubes, pumps, tanks etc.). M.A.R.S. will forward the concentrated NORM waste to the company that transferred the platform to M.A.R.S as soon as possible after decontamination. It will be ensured, that the receiving company holds a designated and accepted area.

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4.9.1 Storage

NORM Waste at the NORM yard is secured against rain and corrosion. Smaller waste will be stored in plastic containers and bigger parts in open containers with a tarpaulin or closed containers.

Materials (i.e. Tubes/pumps etc.) that cannot be contained in a container will be stored outside the container within the designated storage area if they are not contaminated on the outside and the ends will be solid and tightly closed with plastic stoppers or double layers of strong plastic attached with correspondingly strong tape. If the pipe is contaminated on the outside ($\mu\text{Sv/h}$ or CPS over double background level) and cannot be removed, the whole pipe will be packed in double layer of strong plastic for storage.

To prevent direct NORM contact with the surroundings, all material must be packed according to the instructions below:

- All radioactive material is to be packed in UN approved packaging (clamping-lid drums, plastic bags, or plastic wrapping). The size of the packaging shall be appropriate to cover entirely the material, liquid or object concerned.
- After packing the radioactive material, the packaging shall be sealed.
- The exterior of the packaging is to be checked for radiation activity
- If the radiation activity cannot be brought down to below 2 x background radiation, the packaging shall be packed in another layer of plastic, ensuring the new layer does not get contaminated in the process.

All containers and barrels containing NORM shall be clearly marked with:

- Symbol for Ionizing Radiation – included with “Radiation.”
- Activity levels and data
- Physical and chemical form of the NORM
- Relevant contact person

4.9.2 Packaging

On tubings, pin and box end caps shall be fitted to prevent scale from coming in contact with the surroundings.

The radiation activity on the exterior of the tubing must not be above twice the background radiation (Bq/cm^2 / CPS).

If the radiation activity cannot be lowered below twice the background radiation (Bq/cm^2 / CPS) by cleaning/washing down, the tubing shall be wrapped with heavy duty polythene sheet (1.000 gauge 250 micron).

4.9.3 Transport

In connection with the transport of radioactive materials, the finished packaging shall be measured and then classified to ensure correct labelling and documentation.

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All shipments must carry transport documentation (Shipping Manifest), which must include UN number, class, if present radionuclide, physical/chemical form, transport index, and Proper Shipping Name (PSN).

M.A.R.S. HAZMAT Supervisor and Radiation Protection Supervisor (RPS) is responsible for correct packaging for transport and to ensure correct measurements and information to the preferred transport company.

4.10 Accidents and Incidents

M.A.R.S. Europe is obligated to inform the Danish Health Authority immediately if there is an accident, incident or other occurrence. Occurrences such as significant discoveries of radiation, theft, loss, fire, flooding etc. must also be informed as soon as possible.

Precautions for employees in case of fire during the handling of radioactive substances:

- Stop the work and leave the fire.
- Rescue the injured.
- General First Aid.
- Both injured persons and the rescue party shall be washed immediately by showering or pouring water over them. Water can never come before general first aid.
- Report the fire (1-1-2)
- Keep unauthorized personnel away and barricade the area.
- Contact Sundhedsstyrelsen, Strålebeskyttelse (SIS) (open 24h/day +45 44 94 37 73)
- Tidying up by calculate the measurements of radiation activity and radiation doses, and contact Sundhedsstyrelsen, Strålebeskyttelse (SIS) for instructions on cleaning.

Contact for Emergency Response Center:

Emergency Response Center Nordjylland
Simons Bakke 25
7700 Thisted
Tlf.: 97 92 32 22
Fax: 97 92 29 03
Email: brcnj@beredskabsstyrelsen.dk

Precautions for drivers and others in case of accident during the transportation of radioactive substances:

- Report the accident (1-1-2)
- Keep unauthorized people away from the accident.
- Contact Sundhedsstyrelsen, Strålebeskyttelse (SIS) (open 24h/day +45 44 94 37 73)

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- Tidying up by calculate the measurements of radiation activity and radiation doses, and contact Sundhedsstyrelsen, Strålebeskyttelse (SIS) for instructions on cleaning.

Precautions for minimizing the spread of radioactive material and collection of waste at the M.A.R.S. waste area in Frederikshavn is secured against discharge to the groundwater with a membrane connected to the water treatment facility.

4.11 Record Keeping

M.A.R.S. Europe shall maintain results of NORM Screening and Confirmatory Survey for a period of at least 10 years.

M.A.R.S. Europe shall maintain NORM Manifests or Material Transfers for any movement of contaminated equipment or NORM waste within or exceeding exemption levels.

4.12 Training

All employees to be employed by M.A.R.S Europe to undertake work on site at Port of Frederikshavn will be made aware of the Requirements given in this Procedure during new Employee orientation. Training will be documented by M.A.R.S EHS.



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5.0 AUTHORIZATION

This document is reviewed at least every third year following issue or when there are any regulatory changes to the procedure.

This procedure is signed by the CEO of M.A.R.S.

| | |
|--------------|--|
| Approved By: | |
| Date: | |

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6.0 APPENDIX

M.A.R.S. Europe

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Appendix 1: NORM handling and storage area at M.A.R.S. Europe site



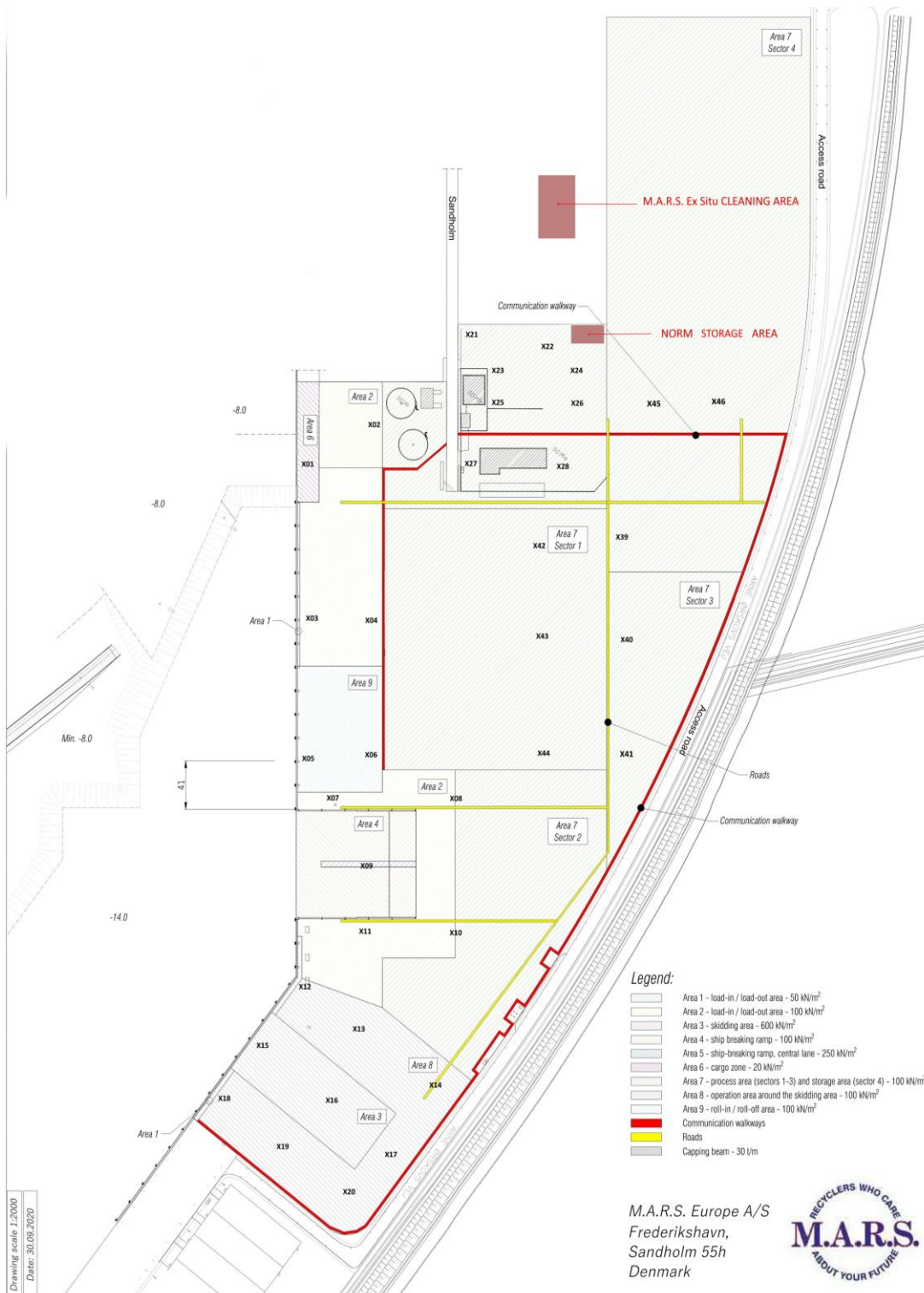
The purple square is dedicated for NORM storage, Green areas annotate NORM handling area

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Appendix 2: Site survey check points

General map:



M.A.R.S. Europe

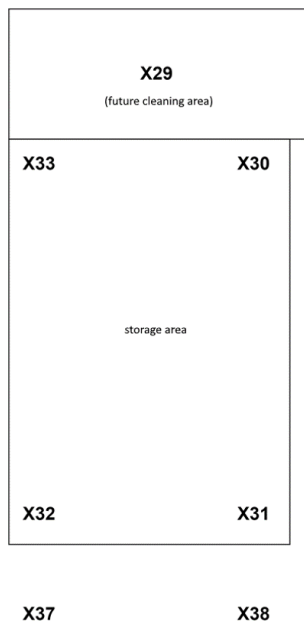
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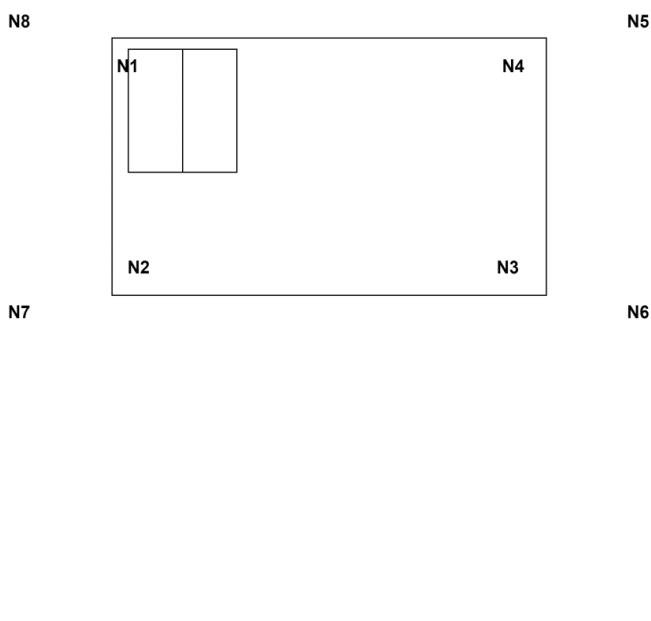
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Ex-Situ Cleaning Area:



NORM Storage Area:



Check report.

| Check point | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 |
|--------------------------------------|----|----|----|----|----|----|----|----|----|-----|
| Background Radiation | | | | | | | | | | |
| Activity (cps) | | | | | | | | | | |
| Radiation $\mu\text{Sv}/\text{hour}$ | | | | | | | | | | |
| Accumulated radiation per year | | | | | | | | | | |
| Yearly dose limit mSv/year | | | | | | | | | | |
| Yearly hourly rate | | | | | | | | | | |
| Yearly radiation | | | | | | | | | | |

| Check point | X11 | X12 | X13 | X14 | X15 | X16 | X17 | X18 | X19 | X20 |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Background Radiation | | | | | | | | | | |
| Activity (cps) | | | | | | | | | | |
| Radiation $\mu\text{Sv}/\text{hour}$ | | | | | | | | | | |
| Accumulated radiation per year | | | | | | | | | | |
| Yearly dose limit mSv/year | | | | | | | | | | |
| Yearly hourly rate | | | | | | | | | | |
| Yearly radiation | | | | | | | | | | |

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| Check point | X21 | X22 | X23 | X24 | X25 | X26 | X27 | X28 | X29 | X30 | X31 |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Background Radiation | | | | | | | | | | | |
| Activity (cps) | | | | | | | | | | | |
| Radiation $\mu\text{Sv}/\text{hour}$ | | | | | | | | | | | |
| Accumulated radiation per year | | | | | | | | | | | |
| Yearly dose limit mSv/year | | | | | | | | | | | |
| Yearly hourly rate | | | | | | | | | | | |
| Yearly radiation | | | | | | | | | | | |

| Check point | X32 | X33 | X34 | X35 | X36 | X37 | X38 | X39 | X40 | X41 | X42 |
|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Background Radiation | | | | | | | | | | | |
| Activity (cps) | | | | | | | | | | | |
| Radiation $\mu\text{Sv}/\text{hour}$ | | | | | | | | | | | |
| Accumulated radiation per year | | | | | | | | | | | |
| Yearly dose limit mSv/year | | | | | | | | | | | |
| Yearly hourly rate | | | | | | | | | | | |
| Yearly radiation | | | | | | | | | | | |

| Check point | X43 | X44 | X45 | X46 | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 |
|--------------------------------------|-----|-----|-----|-----|----|----|----|----|----|----|----|----|
| Background Radiation | | | | | | | | | | | | |
| Activity (cps) | | | | | | | | | | | | |
| Radiation $\mu\text{Sv}/\text{hour}$ | | | | | | | | | | | | |
| Accumulated radiation per year | | | | | | | | | | | | |
| Yearly dose limit mSv/year | | | | | | | | | | | | |
| Yearly hourly rate | | | | | | | | | | | | |
| Yearly radiation | | | | | | | | | | | | |

Ex: Radiation $0,2 \mu\text{Sv}/\text{hour} \times 1600 \text{ hours} = 320 \mu\text{Sv}/\text{year} \gg 0,32 \text{ mSv}/\text{year}$
 The above measurements are without natural radiation.

| | | |
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Appendix 3: Dose Constraints

Executive Order no. 669 of 01/07/2019 on ionizing radiation and radiation protection, chapter 5:

§21. A company’s use of radioactive sources or radiation exposure is on the same geographical area subject to a dose constraint for effective dose on maximum 0.1 mSv/year for individuals in the population, however cf. (2)

(2) Where several companies use of radioactive sources or radiation exposure can affect the same individual in the population on the same geographical location, the Danish Health Authority can for each of the concerned company’s determine a lower dose constraint than specified in (1).

§22. A company’s use of radioactive sources or radiation exposure is subject to a dose constraint for effective dose on maximum 0.3 mSv/year for other employees in the company.

§23. Occupational exposure must be subject to the dose limits for the effective dose and equivalent dose set out in below table

The dose limits for occupational and public exposure from the use of radiation sources and exposure by undertakings are shown in the table below:

| Category of individual | Effective dose limit [mSv/year] | Equivalent dose limit [mSv/year] | | |
|--|---------------------------------|----------------------------------|--------------------|---------------------------|
| | | Lens of the eye | Skin ¹⁾ | Extremities ²⁾ |
| Exposed worker, aged 18 years or over | 20 | 20 | 500 | 500 |
| Individual aged between 16 and 18 years, pursuing a programme of vocational education of at least two years' duration which is governed by or pursuant to legislation and in which the use of radiation sources or exposure are necessary components of that programme | 6 | 15 | 150 | 150 |
| Member of the public | 1 | 15 | 50 | - |

1) The dose limit for the skin applies to any surface of 1 cm².

2) Extremities means the hands, forearms, feet and ankles.

The doses will however be subject to the optimization measures given in Section 4. Hence, M.A.R.S. will constantly employ optimization of radiation protection measures in accordance with regulations set in chapter 5 and dose constraints set in chapter 6 of the Executive Order no. 669.

The maximum dose exposure for employees directly involved in the decontamination of NORM-contaminated equipment at M.A.R.S. Europe is determined by the following calculation:

$$0.0075 \text{ mSv/h} * 100 \text{ h} = 0.75 \text{ mSv/year.}$$

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This constraint represents the potential maximum exposure and is derived from experience on previous and future projects. It is not anticipated that the decontamination workers will reach or surpass this full exposure, as the dose constraint is designed for a worst-case scenario. The average dose rate is expected to be lower. Additionally, decontamination workers are not anticipated to experience prolonged exposure to high dose rates. The 100 hours per year is not projected to be reached by individual workers.

The projected exposure for other employees within the company is as follows:

$$0.090 \mu\text{Sv/h} * 1600 \text{ hours} = 144 \mu\text{Sv/year} = 0.144 \text{ mSv/year.}$$

This calculated dose exposure is derived from the average background radiation dose rate at M.A.R.S. Europe Frederikshavn, established through the Background Radiation Survey conducted in January 2024. It's important to note that a full-time annual workload on site at M.A.R.S. Europe, is considered to be equivalent to 1600 hours per year c.f. section 4.5.2.

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Appendix 4: Site background radiation survey

Checkpoints refer to Appendix 2

| AREA | Radiation | |
|---------------|----------------|----------------------------|
| | Activity [CPS] | Dose Rate [μ Sv/hour] |
| Load-off Area | | |
| X1 | 0,5 | 0,5 |
| X2 | 0 | 0 |
| X3 | 0,5 | 0 |
| X4 | 0 | 0 |
| X5 | 0,75 | 0,5 |
| X6 | 0,25 | 0 |
| Ship Ramp | | |
| X7 | 0,5 | 0 |
| X8 | 0 | 0 |
| X9 | 0,25 | 0,5 |
| X10 | 0,25 | 0 |
| X11 | 0,25 | 0 |
| Skidding Area | | |
| X12 | 0,25 | 0 |
| X13 | 0,5 | 0 |
| X14 | 0,5 | 0 |
| X15 | 0 | 0 |
| X16 | 0,75 | 0,5 |
| X17 | 0,5 | 0 |
| X18 | 0,5 | 0 |

| |
|-------------------------|
| Median |
| 0,375 \approx 0,4 CPS |
| 0 μ Sv/hour |

| |
|-----------------|
| Median |
| 0,25 CPS |
| 0 μ Sv/hour |

| |
|-----------------|
| Median |
| 0,5 CPS |
| 0 μ Sv/hour |

| |
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| | | |
|-----------------------|------|-----|
| X19 | 0,25 | 0,5 |
| X20 | 0,25 | 0 |
| Storage Area | | |
| X21 | 0,25 | 0 |
| X22 | 0,5 | 0,5 |
| X23 | 0,5 | 0 |
| X24 | 0 | 0 |
| X25 | 0,25 | 0,5 |
| X26 | 0,25 | 0 |
| X27 | 0,5 | 0 |
| X28 | 0,5 | 0 |
| Ex Situ Cleaning Area | | |
| X29 | 0,5 | 0 |
| X30 | 0,25 | 0 |
| X31 | 0,25 | 0 |
| X32 | 0,25 | 0 |
| X33 | 0,25 | 0,5 |
| X34 | 0,25 | 0 |
| X35 | 0,5 | 0,5 |
| X36 | 0,5 | 0 |
| X37 | 0,25 | 0 |
| X38 | 0 | 0 |
| Process Area | | |
| X39 | 0,25 | 0 |
| X40 | 0,75 | 0,5 |
| X41 | 0,5 | 0,5 |

| |
|---------------|
| Median |
| 0,375~0,4 CPS |
| 0 μSv/hour |

| |
|------------|
| Median |
| 0,02 CPS |
| 0 μSv/hour |

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| | | |
|----------------|------|------|
| X42 | 0,25 | 0,5 |
| X43 | 0,5 | 0 |
| X43 | 0,5 | 0,5 |
| Left-over Area | | |
| X45 | 0,9 | 0,2 |
| X46 | 0,6 | 0,07 |

| AREA | Radiation | |
|-----------|----------------|----------------------------|
| | Activity [CPS] | Dose Rate [μ Sv/hour] |
| NORM Area | | |
| N1 | 0,5 | 0,5 |
| N2 | 0,25 | 0,5 |
| N3 | 0,25 | 0 |
| N4 | 0,5 | 0,5 |
| N5 | 0,5 | 0 |
| N6 | 0,75 | 0,5 |
| N7 | 0,25 | 0 |
| N8 | 0,5 | 0 |

| |
|-------------------|
| Median |
| 0,5 CPS |
| 0,5 μ Sv/hour |

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FORCE Technology
Dept. Plastics, Composites and Surface characterization
Radioactivity analysis group
Park Alle 345, 2605 Brøndby, Denmark
<http://forcetechnology.com>, phone: (+45) 43 25 00 00

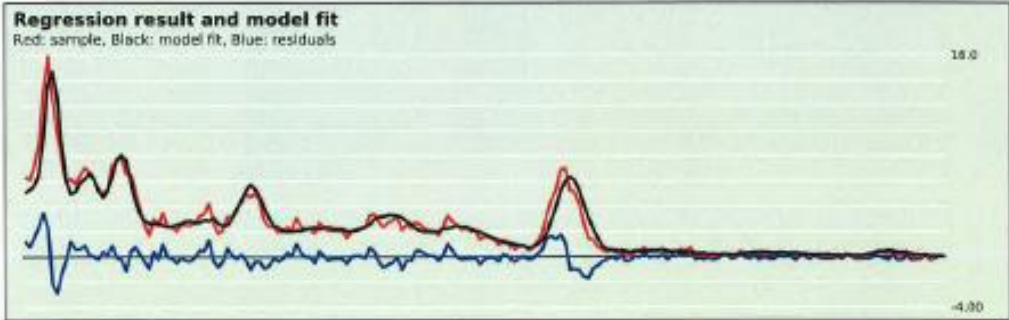
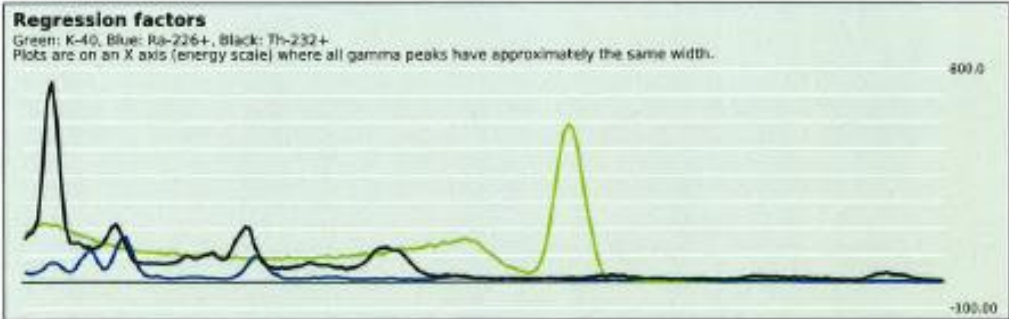
Gamma spectroscopic analysis
K-40, Ra-226+ and Th-232+ by spectral regression

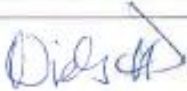
Material received : 2020-01-30
FORCE material number : 012829

Customer : Modern American Recycling Services Europe
FIT# : -
Text1 : Skærver, gråt ler, fugtigt
Text2 : Overfladebelægning af plads
Text3 : -

Material analyzed : 2020-02-10
Protocol : 3
Spectrum Id : 003958

K-40 : 1000 Bq/kg
Ra-226+ : 135 Bq/kg
Th-232+ : 68 Bq/kg



Signed: 
2020-02-10 Niels Hald Pedersen

Pooled sample

Appendix 8: Work Instruction, Decontamination of NORM and Mercury

Work Instruction

Decontamination of NORM/Mercury

| REV | DATE | DESCRIPTION | WRITER | CONTROL | APPROVAL |
|-----|------------|------------------|--|------------------|---------------------|
| D | 03-05-2024 | Revised Document | Cecilie Nielsen | Alexandru Simion | Christina Jørgensen |
| C | 20-03-2024 | Revised Document | Cecilie Nielsen | Alexandru Simion | Christina Jørgensen |
| B | 15-01-2024 | Revised Document | Cecilie Nielsen | Alexandru Simion | Christina Jørgensen |
| A | 19-10-2023 | Initial Document | Cecilie Nielsen | Alexandru Simion | Christina Jørgensen |
| | | | M.A.R.S. INTERNAL DOC NUMBER: EHS-WIN-418 | | |

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1.0 PURPOSE

This document is a work instruction for in-situ and ex-situ decontamination of NORM/Mercury from pipe systems and vessels, in platforms or floating structures at the M.A.R.S Europe site in Frederikshavn.

Work with NORM will be under continuous supervision by a M.A.R.S. Radiation Protection Supervisor (RPS) who will ensure that all statutory requirements are complied with. The M.A.R.S. RPS will be responsible for all work carried out by M.A.R.S. employees.

2.0 SCOPE

This work instruction applies to all M.A.R.S Frederikshavn employees and subcontractors involved in NORM/ Mercury decontamination.

All decontamination of NORM and/or Mercury contaminated pipe systems and vessels is to be done according to relevant M.A.R.S. Procedures.

No M.A.R.S. employee or sub-contractor of M.A.R.S. is to begin any decontamination work with NORM or Mercury before receiving Awareness training for both NORM and Mercury.

3.0 RESPONSIBILITIES

Cleaning Manager

- Responsible for preparing cleaning plan based on measurements and analyses taken during mapping process.
- Responsible for presenting and informing cleaning/decontamination team about locations that need decontamination work.
- Responsible for organizing teams for decontamination work.
- Responsible for activating work instruction.
- Responsible for monitoring safety of workers, and that this procedure is followed.
- Assist with risk assessment, and responsible for permit to work system.

EHS Manager

- Responsible for monitoring safety of workers, and that this procedure is followed.
- Assist with risk assessment, and responsible for permit to work system.
- Responsible for occupational health and safety, including tests of employees.

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4.0 PROCEDURE

4.1 Definitions

NORM Naturally Occurring Radioactive Materials

RPS Radiation Protection Supervisor

4.2 Introduction

NORM can occur as scale, sludge or produced water. Current decontamination projects will primarily comprise cleaning of scale, which is hard radioactive deposits on the inside of pipes, tubes, valves and other production equipment from the oil and gas industry. The scale settles on the inside of the equipment during the production of oil.

Mercury generally accumulates in the scale that accumulates on the inside of piping, vessels, etc.

Other substances including hydrocarbon (PAH) and heavy metals may also be occurrent in the scale in lower concentrations.

It is not possible to separate Mercury and NORM if they are both present in scale, however the cleaning process will be the same. In case both NORM and Merucry is present, the scale will be treated as NORM scale.

4.3 Mapping Report / Cleaning Plan

During the mapping process at M.A.R.S. Europe vessels in utility systems will be opened and measurements for NORM and Mercury will be taken.

4.3.1 NORM

All measurements which are above 2 x background radiation shall be decontaminated until values can be brought below the limit. According to NORM Policy EHS-POL-105, the average background radiation is 0.8 CPS, thus measurements above 1.6 CPS is categorized as NORM waste. A dose rate monitor ($\mu\text{Sv/h}$) is used to detect and quantify the dose rate around (potentially) contaminated installation parts/equipment or material. Dose measurements must be made as close to the surface as possible but avoiding contact with the surface. The surfaces must be thoroughly searched, and the highest recorded measurement is the applicable one.

Before using, instruments shall be visually inspected, ensuring that they are in working order. In particular the measurement heads of the contamination monitors should be inspected thoroughly and it should be ensured that the metal film covering the measurement head is intact, undamaged, and clean.

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4.3.2 Mercury

To test for Mercury, scrapes of minimum 2 g will be taken of the settlements and send for analyses. If the analysis indicate mercury above 500 mg/kg, the pipes/vessels must be cleaned in accordance with this work instruction.

The Cleaning Manager is responsible for analyzing the results from the mapping process and using these to prepare a mapping report / cleaning plan. The cleaning plan must be a detailed plan including an overview of the needed pipe systems and vessels that need decontamination work. The Cleaning Manager must, once the plan is ready and approved, present the plan to the decontamination team and EHS team in a cleaning kick-off meeting.

4.4 **Cleaning**

NORM/Mercury decontamination will as far as possible be done as in-situ cleaning on the ship/platform/installation. The decontamination will be carried out in the safest and most efficient way possible, e.g., by means of high-pressure water jetting. Water jetting will always be conducted in a closed and controlled environment. During decontamination the area will be barriered off, to ensure that no outsiders are contaminated. After decontamination, the area will be checked for any residues, if there are any present, the area will be vacuumed to collect the residues.

4.4.1 In-situ cleaning

In-situ cleaning will be conducted by opening vessels at each end of the contaminated pipe system. From one end, high-pressure water will be used to flush the pipe system, while the other end is connected to a holding tank for the contaminated washing water. Following this, the water undergoes filtration through a filtration system. This process will continue until the pipe system is cleaned and all scales are captured by the filter system. This process ensures that the decontamination is conducted in a closed and secure environment, without risking any spread to the surroundings. Trade effluent from the filtration unit is transferred to a holding tank for final analysis before being transferred to disposal. A concept drawing of the cleaning configuration is shown in Figure 1. In case of NORM, the filtered scales are collected and returned to the owner of the ship/installation for final disposal. If only Mercury is present, the filtered scales will be sent to waste handling subcontractor for disposal.

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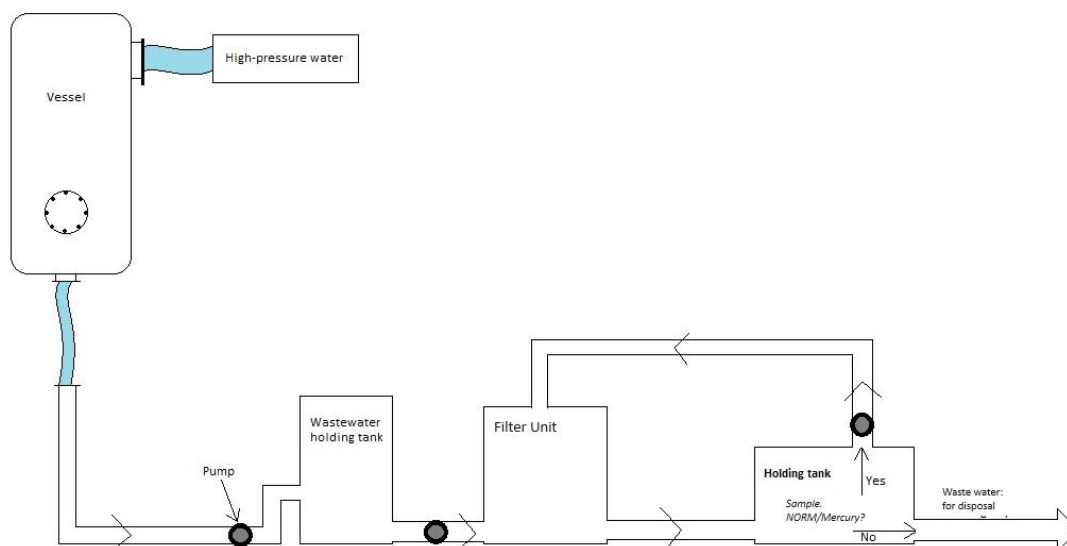


Figure 1 Concept drawing of cleaning process.

4.4.2 Ex-situ Cleaning

In case in-situ cleaning is not possible, the decontamination will be carried out as ex-situ cleaning at a designated ex-situ cleaning area/facility located at the M.A.R.S. Europe site.

The pipe/vessel will be removed from the structure and open ends are secured with flanges or plastic. It will then be transported to the ex-situ cleaning facility, where a closed environment will be established, and the cleaning will be carried out in the same manner and adherence to requirements as those applied in-situ cleaning.

4.4 **Wastewater from decontamination**

Once the decontamination is completed, the filtered scales must be packed and sent for disposal. Depending on the content of the filters, they will be packed for returning to original owner (in case of NORM) or waste handler will be ordered to collect the filters and the waste will be transported to disposal (in case of no NORM).

The wastewater must be analyzed to ensure that there are no heavy metals above the threshold level before being sent for disposal. In Table 1 the threshold levels of heavy metals in the wastewater are shown.

For NORM the threshold level is associated to the activity concentration index (I_{AK}) based on requirements from Executive Order No. 670 of 01/07/2019 (Appendix 4). The criteria for exemption or release are met when I_{AK} is equal or below 1.

The trade effluent from the cleaning process will be collected in closed tanks to undergo further treatment for potential reuse or sent for disposal. Disposal of wastewater is either by sending the water

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through the local sewage system to the local cleaning facility on site (approval pending) or by sending the collected water to waste handling subcontractor for treatment and/or disposal.

Table 1: Expected threshold levels of mercury and other substances potentially contained in filtrated water from decontamination.

| Parameter | Threshold level |
|--------------|-----------------|
| Lead | 280 µg/l |
| Cadmium | 9 µg/l |
| Chromium VI | 340 µg/l |
| Chromium III | 2,840 µg/l |
| Copper | 40 µg/l |
| Nickel | 680 µg/l |
| Zink | 168 µg/l |
| Mercury | 1.4 µg/l |
| Arsenic | 22 µg/l |
| Tributyltin | 0.03 µg/l |
| Benz(a)pyren | 0.54 µg/l |

OBS! Wastewater cannot be sent through the local sewage treatment system before the approval is in place. Until then, all collected wastewater must be send to approved waste handling subcontractor Marius Pedersen.

4.5 Radiation Protection Supervisor (RPS)

The Radiation Protection Supervisor (RPS) is appointed by M.A.R.S. Europe as Mr. Kim Thygesen and Mrs. Christina Jørgensen. The appointed RPS has been approved as RPS by SIS and will maintain this approval throughout the operation or until a new RPS is approved by SIS, whichever comes first.

5.0 RECORDS

6.0 AUTHORIZATION

This document is reviewed at least every third year.

This procedure is signed by the company Cleaning Manager.

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| Approved By: | Christina Jørgensen |
| Date: | 07-05-2024 |

Appendix 9: Draining Procedure



Procedure

Draining Operations

| REV | DATE | DESCRIPTION | WRITER | CONTROL | APPROVAL |
|-----|------------|------------------|---------------------------------|---------------------------------------|-----------------------------------|
| E | 10-01-24 | Revised Document | Christina Jørgensen | Alexandru Simion / Cecilie Nielsen | Christina Jørgensen |
| D | 25-09-23 | Revised Document | Christina Jørgensen | Alexandru Simion / Cecilie Nielsen | Christina Jørgensen |
| C | 24-11-21 | Revised Document | Fabio Silva (Semco Maritime) | Cecilie Nielsen | Tonny Popescu (Semco Maritime) |
| B | 09-11-21 | Revised Document | Fabio Silva (Semco Maritime) | Cecilie Nielsen | Tonny Popescu (Semco Maritime) |
| A | 08-01-2024 | Initial Document | Fabio Silva (Semco Maritime) | Cecilie Nielsen | Tonny Popescu (Semco Maritime) |
| REV | DATE | DESCRIPTION | WRITER | CONTROL | APPROVAL |

M.A.R.S. INTERNAL DOC NUMBER: EHS-PRO-384



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Abbreviations

- EHS Environment, Health and Safety
- PTW Permit to work
- QEHS Quality, Environment, Health, and Safety
- TBT Toolbox Talk

1.0 PURPOSE

The purpose of this document is to provide instructions and directions on how to proceed when draining operations are required within the scope of the work at M.A.R.S. Europe yard.

The information contained within this document is generic; when a situation arises where specific drained fluids are unfamiliar or unknown to the team performing draining operations then the QEHS department must be consulted.

2.0 SCOPE

This procedure applies to all work at the M.A.R.S. Europe yard where draining operations are conducted.

3.0 RESPONSIBILITIES

3.1 Cleaning Manager

Cleaning Manager is responsible for the review and approval of this procedure.

The Cleaning Manager shall:

- Ensure that all its employees have undergone the training and instructions. Training platform shall be provided covering how to operate all equipment safely and environmental pollution prevention and control exercises.
- Ensure that all employees involved are familiar with the contents of this procedure.
- Be aware of all QEHS requirements at the M.A.R.S. Europe yard
- Confirm that all required equipment for these tasks is on site and in good working order.
- Shall impose a system to separate equipment that are used for different fluids to reduce the risk of cross contamination of fluids.
- Shall confirm that all required equipment for these tasks is on site and in good working order. Shall retain a record of all equipment inspections, maintenance, and certifications on a regular basis.

3.2 QEHS Manager

- Shall ensure that this procedure is issued to locations where appropriate.
- Shall make sure that this procedure is followed at all times by the M.A.R.S. personnel and subcontractors.



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- Shall ensure that the M.A.R.S. supervisor is aware of the contents of this procedure prior to any work scope commencing.
- Shall ensure that rescue teams operating on site have received training in first aid for injuries related to draining operations.
- Shall ensure that all environmental protection measures are being conducted by employees.
- Shall schedule periodic exercises to ensure all personnel involved is well-versed and trained on how to act

3.3 M.A.R.S. Site Supervisor

Must ensure that the procedure is available on location and that he is familiar with its content and requirements.

Ensure that all employees, under their supervision, are aware of the contents of the procedure including correct PPE, equipment, associated risks, etc., by means of PPE risk assessment, site risk assessments and regular toolbox talk briefings before commencement of any work. Only competent trained personnel will operate the equipment and carry out the work scope.

Shall monitor working conditions to ensure compliance with the procedure.

Report to the QEHS Manager, any situation which may arise that is not covered by this procedure.

Shall ensure that employees are aware of their obligation to report any problems.

Shall ensure that all environmental protection measures are being conducted by employees.

3.4 HR Department

Responsible for ensuring that personnel involved in draining operations are trained and have all valid certifications.

3.5 M.A.R.S. Employees

- Shall undergo all training programs deemed necessary by the company.
- Shall disclose any information which may adversely affect their health or performance in carrying out their duties.
- Shall take reasonable care of their own health and safety.
- Shall make full and proper use of PPE and equipment provided ensuring it is maintained in condition and any observed or notable defects are reported immediately.
- Shall promptly report any complication to a supervisor/Project Manager.
- Shall act promptly in the event of an error during operations to either correct or mitigate the situation.

4.0 PROCEDURE

An effective system's draining operations avoids the complication of the presence of fluids and other foreign materials that potentially might pose a risk to workers and the environment during

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scrapping/recycling performed by M.A.R.S. A thorough cleaning of the vessels and pipes and other elements throughout the whole installation for the work is always essential.

A systematic approach is to be adopted prior to decommissioning when the tanks, pipe work and other components are flushed and proved clear by observation and physical inspection.

All tanks are to be inspected and cleaned to remove all build-up-of-residues. The pipes used for different systems on the installation are to be drained separately.

4.1 Preparation before draining

Planning and preparing for the whole operation prior to draining is vital because lack of planning can result in delays, increased costs and technical difficulties.

The following are some items to consider during the planning stage:

- Ensure all people in the vicinity and others who may be affected, are aware of the draining operations.
- Fluid type
- The need to dismantle or cut an opening to access the fluid
- Right equipment for the job
- Pumping duration
- Control of the pumping rate
- Frequency of checking the level of volume of fluid in destination tank.
- Discharge of fluid (if possible)
- Collection of samples for control analysis

A permit-to-work (PTW) document must be issued before any action (other than planning) is performed, which should cover the need for cutting and dismantling if it is applicable to the job at hand.

After the PTW has been issued and all involved parties are informed during the Toolbox Talk (TBT) then all personnel must check if all equipment is installed correctly and secured before starting operation. It is highly recommended to ensure all hoses are well fitted and secured and that all valves are open to ensure correct control of the fluid.

Before starting any draining operations, scupper plugs or other suitable devices are to be checked for installation, if not installed, then it is to be done prior starting any draining operation to prevent any fluids/deposits spilling into the environment.

In environments where there is an elevated risk of fires, any tool that can produce a spark (e.g. Angle Grinder) is forbidden so alternative means are required.



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4.2 Start-up procedure

After planning and toolbox talk has happened, all staff should know all the steps that are planned and the duties for each employee.

Hoses used for draining operations are to be secured from detaching during operation, according to the below two points:

- Air hoses to be secured with safety wire.
- Hoses for liquids are to be secured with safety wire and safety pin.
- Hoses to be arranged in a manner that prevents them from blocking walkways.
- Hoses that are going over the side are to be secured with cargo straps.

If dismantling or cutting is required to access the fluid, then it shall be done before proceeding with pumping. It must be done in the most organized way possible to keep the workplace controlled and to avoid any spillage. Before opening systems/pipes/flanges an assessment of the system, either by visual inspection and/or checking P&ID's, must be done, to find the best suitable drain spot where the liquids can be drained in the safest way possible.

If opening must be done by disconnecting a flange or valve, two points of fastening must be maintained, so that it is possible to close the flange or valve again in case anything unexpected happens.

If any cutting is required, using a tool that can/will create a spark, a Hot-work Permit is needed.

Before any possible spillage might happen, the personnel shall have access to spill kits and possibly a vacuum cleaner for fluids.

For the pumping procedures, start the pump either by opening air or by turning on its power supply. The pump should be started gradually, not at full rotational speed initially.

When filling/pumping into tanks/containers, a watchman with a means of communication (e.g. radio) is to be posted at the receiving tank to monitor the level in the tank and check for any leakages on the discharge hose.

In the event of the hoses getting clogged, then the lines must be flushed with the aid of a pressure washer to help loosen any foreign matter that may be present. All hoses used during the operation must be inspected and possibly cleaned periodically to ensure the operation is able continue without any issues arising.

In the event of a filtration system being connected to the equipment before discharging the effluent into a designated tank, then periodically the content inside the filters must be cleaned, which is where dirt and other elements will also accumulate.

Periodic control of the volume in the tank accumulating the effluent must be done by the watchman.



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Tanks used for draining can be ISO tanks, Tote tanks, IBC tanks, drums, or other suitable containers. When filling ISO tanks with Diesel Oil (meant for storage), tanks are not to be filled more than 90 % due to thermal expansion.

In case the operators are not able to connect a suction hose directly to the source of the fluid, then a clean intermediary container must be used where the fluid will accumulate and later be pumped out of location. Intermediary containers used during draining operations (e.g., drip trays, buckets etc.) where liquids are either dripping into or flowing into are not to be left unattended.

4.3 Shutdown procedure

The shutdown procedure shall be the reverse of the start-up procedure, which will start by gradually closing the inlet air valve powering the pump or reducing the rotational speed of the pump until it is no longer rotating. If the pump is electrically powered then the power supply must be switched off and in case the pump is pneumatic, then the compressor must be powered off.

Valves to be closed, if possible, otherwise hoses are to be secured so that liquids are not spilling out unintended.

All equipment, including angle grinder, hoses and pumps must be cleaned and made ready for future operations in a way that there will not be any possible contaminants in the gear.

A full account of fluids drained shall be recorded and kept for future reference. Samples may be collected for testing.

4.4 Special precautions

Special precautions should be taken with AFFF systems, if the AFFF contains PFAS.

Tanks / pipes are to be marked clearly according to the color coding mentioned below in paragraph 6, so that they are easily distinguished from other tanks/pipes.

Pipes are to be drained to suitable containers and tanks. Where applicable, tanks can be plugged/closed off and removed from the installation in one full unit.

4.5 Inspection and storage of equipment

A system for keeping all equipment in a prime and healthy state must be implemented to ensure a constant state of readiness for all gear.

Having all the gear cleaned and separated based on the fluids they are used for, while keeping a record of the inspection, largely minimizes the possibility of problems occurring. Problems can lead not only to delays in operations but also to possible leaks that might lead to environmental problems or even cross contamination of fluids.

Equipment displaying severe wear which might lead to failure must be separated and replaced.



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An easy way to ensure a good control system with the equipment is by using color coded strips to know when the last time was the equipment inspected. Please see appendix A for reference.

5.0 MARKING OF PIPES / SYSTEMS

To ensure that there is a clear understanding of what is drained and what is not and to indicate what is or has been contained in the system, a color coding system has been established for marking the pipes/systems.

Here is a list of which colors have been designated for the purpose:

| | |
|---------------------------|--|
| FLOURESCENT GREEN: | Drained and / or dry |
| ORANGE: | Systems containing AFFF either concentrate or mix |
| WHITE: | Drain points, cut/drilled holes, open valves, or open-ended pipes etc. |
| RED: | Mercury contaminated / "Not Clean" item |
| BLUE: | NORM Contaminated item |

6.0 SAFETY

6.1 PPE and RPE

All employees, visitors and third-party subcontractors shall wear appropriate PPE and clothing when on company property including transportation on site to and from jobs. The minimum required PPE when working in areas other than offices is Hard Hat, Safety Glasses, Hi-Viz long sleeved Jacket/Blouse, Gloves and Steel-toed Footwear.

Excessively worn or damaged PPE is not to be used and will be replaced by the company.

Additional PPE must be used while draining hazardous substances / chemicals / solvents / paints / oil / gases. This PPE will be evaluated prior to the operations start during the risk assessment / permit to work / toolbox talk. The safety data sheets for the substance must be available and consulted prior to any draining operations.

Examples of additional PPE: chemical suits, rubber boots, rubber gloves, safety goggles, breathing apparatus, gas detectors, but not limited to the above listed. The safety data sheets refer to the needs of PPE and the chemical risk assessment will highlight the PPE for the task.

6.2 Worksite preparations

- Risk Assessment and environmental impact assessment
- Job Safety Analysis
- Permit to Work
- Toolbox Talks



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6.3 Safety barrier and notices

The working area will use the barrier management system. No unauthorized personnel are allowed inside of the barriers. The barrier needs to be clearly marked and labelled and with the owner of the barriers must be in place. If bigger areas need to be barriered, such as a vessel, then the entire site will be notified during the morning toolbox talk.

6.4 Work in Confined Space

Refer to the M.A.R.S. procedure EHS-PRO-324 Confined Space Entry

Entry of personnel into confined spaces for draining operations shall only be allowed when there is no reasonably practicable alternative. The EHS department must be notified in advance to prepare the rescue plan, in case of emergency, and being ready to assist. Draining will only be permitted within a confined space after consideration has been given to the possibility that harmful materials might accumulate in the atmosphere as deposits are dislodged during the work scope process. This applies to operators working within and outside the space.

The wearing of approved full-face masks with fresh air supply and additional precautions may be necessary against the development of hazardous atmosphere.

Ideally the operator(s) inside an enclosed space should be able to verbally communicate (with or without using a radio) with the watchman in addition to a direct line of sight, but in the unideal situation where verbal communication is not possible a system of signals or light cues must be introduced to cover an emergency where all members must leave the confined space.

Work Must Stop in Confined Spaces If:

- Leaks or damage to the equipment and hoses becomes apparent.
- Any person becomes aware of any change in conditions, or any hazards be introduced or exist.
- The platform/site emergency alarms are sounded.

7.0 TRAINING

All personnel working with draining operations at the M.A.R.S. Europe yard must have received proper training for draining operations as per Training Matrix.

Draining procedure must be read, understood, and followed prior to any operation. The draining team must be trained in containing spills and being able to assist in case of spills/leaks/pollution as per emergency response plan.

Familiarization with the equipment will be performed by team supervisor.

All training must be documented and delivered to the HR department. (attendance list)



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8.0 AUTHORIZATION

This document is reviewed at least every 3 years.

This procedure is signed by the company Cleaning Manager.

| | |
|--------------|---------------------|
| Approved By: | Christina Jørgensen |
| Date: | 10-1-24 |