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07-31-2017

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
CENTRAL OFFICE
Manila

27 JUL 2017

DEPARTMENT ORDER)
)
NO. 94)
Series of 2017 07.31.17)

SUBJECT: **Preventive Maintenance Manual for All DPWH Cutter Suction Dredge (CSD) and its Support Vessel**

In order to reduce maintenance costs, improve the reliability and availability of all the Department's Cutter Suction Dredge (CSD) including its Support Vessels, as well as to reduce hazard to both personnel and equipment in the practice of Preventive Maintenance (PM), the *Cutter Suction Dredge Preventive Maintenance Manual (CSD-PMM)* as herein attached to form part of this Department Order, is hereby issued to all concerned personnel and offices to serve as a guide in the planning, execution and control of the CSDs' maintenance programs. The manual has been developed based on the maintenance schedule recommended by the Original Equipment Manufacturer (OEM) combined with the years of experience of engineers in the field of dredge maintenance. With the adoption of this manual, the Department expects to achieve a standardized Preventive Maintenance Program, thus, avoiding confusion and any delays in achieving the goals of Dredging Program.

Prior to scheduled dry-docking and major repair of dredges which is done every two and a half years as indicated in D.O. 160, Series of 2015 or the "Guidelines for the Dry-docking and Repair of DPWH Dredges and Other Floating Equipment," all CSD Dredge Masters are required to perform preventive maintenance activities regularly either based on calendar time or service hours. This order applies to all *Cutter Suction Dredges and Support Vessels*. Funding shall be charged to the Maintenance and Other Operating Expenses (MOOE) of the Bureau of Equipment (BOE).

Please be guided by the attached Monthly Checklist Form for CSD, PM Sticker Compliance Guide, PM Work Order, Corrective Maintenance (CM) Work Order, Post-Repair Inspection, Deadline Order, and History of Maintenance. Instructions of filling up and submission of these forms are listed in the manual.

This Department Order shall take effect immediately.

MARK A. VILLAR
Secretary

Department of Public Works and Highways
Office of the Secretary
WIN7T01629

Encl: Annex "A": CSD Preventive Maintenance Manual
Annex "B": Pre-Approved PM Work Order Form
Annex "C": PM Main Work Order Form
Annex "D": Deadline Order Form
Annex "E": Pre-Approved CM Work Order Form
Annex "F": CM Main Work Order
Annex "G": Request for Post-Repair Inspection Form
Annex "H": Post-Repair Inspection Report Form
Annex "I": History of Maintenance Form
Annex "J": CSD Monthly Checklist Form
Annex "K": PM Sticker Compliance Guide

Preventive Maintenance Manual for All DPWH Cutter Suction Dredge (CSD) and its Support Vessel

Annex "A"

CUTTER SUCTION DREDGE PREVENTIVE MAINTENANCE MANUAL

FOREWORD

The Department's Fleet of Cutter Suction Dredges (CSD) and support vessels play a major role in the nation's flood control and mitigation programs. Proper care and effective maintenance not only extend the serviceable life of the CSD but also ensure its availability and reliability to meet our current needs, thru their dredging operations, in a safe, economical and environmentally effective manner.

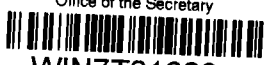
In line with this, this Department, through the Bureau of Equipment, developed a Cutter Suction Dredge Preventive Maintenance Manual (CSD-PMM) based on existing international standards.

All Implementing Offices and Dredge Personnel are responsible for the proper operation and maintenance of their respective dredges. The overall appearance and condition of the CSD reflects the crew's concern towards their vessels and ultimately the performance of their duties.

This manual and its prescribed forms shall be used as a guide on the proper and systematic upkeep, service and inspection of all CSD deployed nationwide.

MARK A. VILLAR
Secretary

Department of Public Works and Highways
Office of the Secretary



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INTRODUCTION

The **Cutter Suction Dredge Preventive Maintenance Manual (CSD-PMM)**, prepared by the Floating Equipment Division of Bureau of Equipment, is composed of set of minimum maintenance measures activities. Each activity includes labor, tool, material, safety, health and environmental requirements. Activities are numbered and named by group classifying the maintenance interval schedule on when the activities shall be performed. Maintenance intervals are determined either by the dredge's service hours or calendar time.

Activities that require replacement of parts/components shall follow the recommended intervals as determined by the service hours of the dredge while activities that require visual inspections, cleaning, functional tests, measurement of operating quantities, and lubrication are done on a regular interval or based on the calendar time.

The purpose of this Manual is to familiarize all concerned Dredge Crew with the Preventive Maintenance (PM) Procedure of all DPWH Cutter Suction Dredges and support vessels, including corrective maintenance, emergency repairs and adjustments.

Daily walk-around inspections are required to ensure that dredges and support vessels are still with maintainable configuration, safe, and functional.

Forms are attached which shall serve as reference to ensure that PM stages and corresponding PM activities are consistently performed.

Further, this manual has been compiled to help concerned crew get the most from your equipment particularly the engine. It contains minimum information needed in order to operate and maintain the engine component and critical structure safely and correctly.

EXECUTIVE SUMMARY

Preventive Maintenance is a set of activities maintenance performed regularly, either on-condition or time being on an asset to minimize the likelihood of failure. It improves the equipment's reliability, decreases the costs due to unwanted repair, minimizes the system downtime, increases the safety of operation and prolongs the useful life of the equipment

Thus, to ensure that services are efficiently provided to the public at all times, all Cutter Suction Dredge and Support Vessels are hereby required to have PM performed by concerned on-board Dredge Crew and EMD Personnel. This order shall be strictly implemented and any end-user who shall not comply herewith shall face sanctions accordingly.

Preventive Maintenance activities listed in this manual include inspection, cleaning, testing, oil top-ups, calibration, adjustment/alignment, removal and replacement of some parts, and other safety and precautionary measures. Any irregularities encountered during the PM servicing which require major repairs or any maintenance activities which are not included in this manual should prompt the Chief, Equipment Management Division (EMD) to conduct ocular inspection, prepare the detailed Equipment Deadline Order, furnishing the Bureau of Equipment, Manila for evaluation and appropriate action.

This Manual only provides an overview of the minimum/basic procedures and requirements needed in the conduct of the PM program and open to any corrections or modifications, if necessary.

ACKNOWLEDGMENT

The Bureau of Equipment (BOE), wishes to express our gratitude and appreciation to all Dredge Crew and Equipment Management Division (EMD) Personnel from different Regional Offices (RO) who supplied information from their experiences and who allotted time and services to make this Manual available for the water-based equipment of DPWH deployed nationwide:

PDDP IV

- Engr. Micron S. De Torres and all Crews on board

PINATUBO II-B

- Engr. Alma P. Robles and all Crews on board

VISAYAS I

- Engr. Jaime P. Silen and all Crews on board

DREDGE 8-2

- Engr. Restituto I. Regaspi and all Crews on board

BOE JOB ORDER PERSONNEL

- Engr. Rochelle Ann M. Del Rosario
- Engr. Justin Patrick S. Mendoza
- Engr. Apple Jane B. Conti

Likewise, this Bureau would like to extend its appreciation to the engineers and staff of Floating Equipment Division (FED,) Maintenance and Dry-docking Services Section (MDSS) who rendered their time and expertise as well.

TORIBIO NOEL L. ILAO
Director IV, Bureau of Equipment

AMADOR A. ANDRADA
OIC, Assistant Bureau Director

FERDINAND R. FUGABAN
Chief, Floating Equipment Division

VICTOR J. JAVIER
Chief, Maintenance and Dry-docking Services Section

I. DEFINITION OF TERMS

1. **Activity -** Type of Work performed with enough frequency to produce a significant impact on the resource requirements of a work program.

2. **Maintenance** - Ensuring that physical assets continue to do what their intended users wanted them to do. It is a function of keeping physical assets in or restoring them to serviceable condition.

3. **Preventive Maintenance (PM)** - Proactive approach of maintaining equipment on a regular schedule based on elapsed time or meter readings. The purpose of PM is to prevent maintenance problems or failures before they take place.

4. **Corrective Maintenance (CM)** - Type of maintenance done to take corrective action in the event of a breakdown of the equipment, and shall be coursed thru the Bureau of Equipment (BOE), Attention: Floating Equipment Division (FED) for evaluation and approval. The equipment is repaired, calibrated to its serviceable condition.

    4.1. Emergency Maintenance (EM) - Type of repair which is carried out after failure detection which aims to immediately restore all dredging equipment and support vessels to a condition in which it can perform its intended function.

        4.1.1. In-house EM - Maintenance done in the field performed by the dredge crew on-board and the EMD personnel wherein the needed parts, tools, materials, and supplies shall be provided by the Implementing Office. The total cost of emergency maintenance for parts and materials alone shall not exceed:

            - PhP50,000.00 - for Support Vessels
            - PhP100,000.00 – for Cutter Suction Dredge

        4.1.2. Outside EM - Maintenance performed on site done by a qualified private shop (e.g.: Latest Business Permit and VAT registered, with existing shop, proof of ownership, complete tools and shop equipment with TESDA accreditation and certified mechanics/technicians). The total cost of emergency maintenance for *Parts, materials and labor* shall not exceed:

            - PhP50,000.00 – for Support Vessel
            - PhP100,000.00 – for Cutter Suction Dredge

    4.2. Major Corrective Maintenance[1] - A mode of corrective maintenance wherein the estimated cost is in excess of the amount prescribed for Emergency Maintenance, and subject to bidding/shopping as the method of procurement.

    In view of the foregoing definition of terms, reimbursement of expenses for equipment maintenance shall only be applicable for Corrective Maintenance and not for Preventive Maintenance.[1]

[1]For Major Corrective Maintenance Activities, on which cost of repair/spare parts exceed P50, 000.00 for support vessel/AMPHEX, and P100,000.00 for MPAD/CSD, it will undergo a bidding process. The winning bidder would be awarded the contract through the Bids and Awards Committee. The End-user would not be entitled for reimbursement.

5. **Maintenance Plan** - Plan which is developed for each activity and contains the following:

    - Maintenance activity
    - PM scheduling and interval group.
    - Pre-PM Work Order approved by the BOE Bureau Director
    - PM Main Work Order duly signed by the concerned Regional Office based on the PM Pre-Approved Work Order
    - Deadline Order
    - Pre-CM Work Order approved by the BOE Bureau Director
    - CM Main Work Order duly signed by the concerned Regional Office based on the PM Pre-Approved Work Order
    - Request for Post-Repair Inspection
    - Post-Repair Inspection Report for Outside Repair
    - PM Sticker compliance Guide and Monitoring
    - Materials, Tools and Parts needed
    - History of Maintenance
    - Waste Material Disposal Report
    - Work Method, Crew composition and estimated duration; and
    - List of safety hazards, environmental compliance and precautionary measures needed.

6. **Cutter Suction Dredge –** refers to a non-propelled Cutter Suction Pipeline Dredge.

7. **Support Vessel -** a self-propelled heavy duty, push and tug type workboat.

8. **Maintenance Personnel -** People who will perform the maintenance activities which includes employees of this Department whether Regular, Co-Terminous with the Incumbent (CTI) or Job Order employees (mechanics, operators and Laborers).

9. **End-user -** refers to the accountable officer who was assigned with equipment and its support vessel covered by a Property Acknowledgment Receipt (PAR).

II. ORGANIZATION

1. DUTIES AND RESPONSIBILITIES

Maintenance personnel are assigned according to the work and activity to be performed but are not permanently assigned to a specific activity. However, they are strategically utilized in the most efficient and effective combinations for the work scheduled.

In order to apply preventive maintenance management, the dredge maintenance personnel must be organized to perform the required services for the equipment. The assignment of maintenance personnel based on the activity to be performed is necessary to fulfill the preventive maintenance plan and schedule. It should be noted that any capable personnel can perform the duties of the absent personnel in order to avoid delay in operations or shorten maintenance time, provided that consent is given by the Dredge Master (DM).

Every CSD shall have the following personnel who will be assigned and ensure the implementation of these activities prescribed in this manual:

a. Marine Engineman (ME)

- Ensures the proper operation of engine by performing scheduled preventive maintenance works, engine check-ups, oil top-ups, changing filters, cleaning the engine room, etc.
- Cleans and paints corroded portion in the engine room to ensure safe and rust-free maintenance programs are being observed and implemented on-board
- Logs-in and Reports any observations from the daily inspections to the DM for his appropriate action; and
- Performs other duties assigned by the DM

b. Dredgeman Foreman (DF)

- Checks the condition of equipment parts and components.
- Takes charge of the lubrication of parts and components.
- Cleans and paints corroded portion of the dredge to ensure safe and rust-free maintenance programs are being observed and implemented on-board.
- Records and Reports any observations from the daily inspections to the DM for his appropriate action; and
- Performs other duties assigned by the DM.

c. Dredge Master (DM)

- Supervises the execution of PM activities and ensure that such activities are within the schedule
- Conducts walk-around inspections to identify any defects and document maintenance needs by using the CM Work Order Form
- Conducts monthly equipment inspection using the prescribed checklist form
- Assigns work to foremen

- Conducts inspection of unpredicted failures and come up with a conclusion
- Prepare the necessary documents prescribed for Emergency Maintenance by using the Post-Repair Form
- Directs work-in-progress appropriately and effectively until completed and test
- Submits monthly maintenance accomplishment reports
- Supervises the installation/replacement of CM/EM materials
- Ensures that PM schedule are observed and strictly implemented accordingly; and
- Performs related work as assigned by EMD Chief, BOE Bureau Director and his representative

d. Chief, Equipment Management Division (EMD)

- Directs the crew of each dredge assigned in his area of jurisdiction to ensure that the PM/CM program as scheduled is being implemented properly
- Reviews and submits maintenance plan estimates
- Reviews and submits monthly report to the Bureau Director, Bureau of Equipment, Manila, Attn.: Chief, Floating Equipment Division
- Ensures resources are timely procured, properly allocated and assigned for maintenance work
- Directs the Dredge Master relative to PM activities performed as in accordance to specified PM stages; and
- Performs related work as directed by BOE Bureau Director and Chief, Floating Equipment Division

e. Chief, Floating Equipment Division

- Ensures resources are optimized to achieve Department objectives and priorities
- Assigns staff to conduct field inspection and ensures corrective measures and reports are accurate and submitted on time
- Ensures review and analysis monthly reports submitted by the DM and EMD chief
- Ensures the timely preparation of annual PM Program of Work (POW) and the corresponding Project Procurement Management Plan (PPMP) for approval of the BOE Director to adequately support the various PM activities
- Coordinate with Equipment Planning Division of BOE in the timely preparation and procurement of these PM parts in accordance with the Annual Procurement Program (APP) and the PPMP approved by the BOE Bureau Director at least 3 months before the succeeding year. BOE, thru FED, and EMD shall be represented in the Pre-qualifications, Bidding, and Award Committee (PBAC) and the supply delivery Inspection Team whenever the subject PM parts are under procurement
- Ensures timely preparation of the Purchase Request (PR) based on the approved APP and PPMP, for PM/CM initiated by BOE; and

- Ensures the cost of parts, materials, supplies and labor being procured under CM/EM Work Order are reviewed, evaluated, and shall be within the range of BOE pricelist database or Abstract of Canvass from at least 3 different accredited suppliers

III. PM DOCUMENTATION AND REPORTING

Reports act as the source of information and data upon where PM Program Success and applicability depends. These inform the management about the maintenance needs and concerns required to be addressed. The objectives of the PM Plan cannot be attained without adequate and accurate reports.

1. PM Sticker Compliance Guide

- The Dredge Master shall ensure the timely and completion of the posted PM sticker and affix signature on the space/box provided as their guide to keep track of the PM stages and take photo, thru mobile phone, and send to the Office of the Director, Bureau of Equipment, Manila, Attn.: Chief, Floating Equipment Division for proper printing. These shall be considered official as part of the CSD/AMPHEX/MPAD Monthly PM Compliance Reports.

2. Monthly Equipment Checklist Form

- The equipment checklist form for CSD shall be used as part of the monthly PM compliance reports to check the physical condition of the equipment and submitted to DPWH Regional Office and Bureau of Equipment for proper recording and monitoring purposes;
- Findings, observations and recommendation from inspections shall be listed in the section provided in the form;
- All written reports indicated in this form shall be considered Official and part of a Request that shall be acted by the concerned Regional Office and BOE to avoid failure or damage to property; and
- A regular inspection shall be conducted by the BOE Inspectorate Team to validate the CHECKLIST submitted by the concerned Dredge Master

3. PM Pre-Approved Work Order

- The PM Pre-Approved Work Order shall be prepared by the concerned FED personnel based on PM schedule and interval
- Shall be submitted to the BOE Bureau Director for review, evaluation and approval
- Shall be forwarded to concerned Dredge Master and/or Head of Implementing Office in preparation for the Purchase Request and/or Purchase Order.
- Shall also be considered as benchmark for funding of BOE

4. CM Pre-Approved Work Order

- Deadline Order and/or Request for CM shall be submitted by the Dredge Master thru the Head of the implementing Office (e.g. Regional Office, RO)
- Shall include cost of parts, supplies and materials needed
- Shall be supported with BOE pricelist database and/or Abstract of Canvass duly signed by three (3) different accredited suppliers and BOE/RO authorized canvasser in that Region
- Shall be supported with 3 years History of Maintenance
- Shall be prepared by the FED personnel based on the failures indicated in the Deadline Order/Request for CM and same shall be submitted to the BOE Bureau Director for review, evaluation and approval
- Shall be forwarded back to concerned Dredge Master and/or Head of Implementing Office in preparation for the Purchase Request and or Purchase Order
- The following typical failure mode description can be used to address such failures, to wit:

Abrasion	Damaged	Lack of ___
Arcing	Defective	Leak
Backward	Delaminated	Loose
Out of balance	Deteriorated	Lost
Bent	Disconnected	Melted
Binding	Dirty	Missing
Blown	Disintegrated	Nicked
Broken	Ductile	Notched
Buckled	Embrittlement	Open
Burned	Eroded	Overheat
Chafed	Exploded	Overtemp
Chipped	False indication	Overload
Clogged	Fatigue	Overstress
Collapsed	Fluctuates	Overpressure
Cut	Frayed	Overspeed
Contaminated	Intermittent	Pitted
Corroded	Incorrect	Plugged
Cracked	jammed	Punctured

Table 1 Typical Failure Modes.

5. PM Main Work Order

- Issued by the implementing office to execute the PM Pre-Approved Work Order
- To withdraw the parts, supplies, and materials being purchased
- The Dredge Master shall affix his signature on the lower-right portion of the approved PM Main Work Order for confirmation that the PM-stage is already performed and completed

- A duplicated copy of which shall be sent to BOE, Manila, Attn.: Chief FED, for recording and updating of History of Maintenance; and
- Any rescheduling of PM Program shall be submitted to BOE for notification, evaluation, and appropriate action.

6. CM Main Work Order

- Issued by the implementing office in order to execute the CM Pre-Approved Work Order
- To withdraw the parts, supplies, and materials being purchased
- The Dredge Master Shall affix his signature on the lower-right portion of the approved CM Main Work Order for confirmation that the corrective maintenance recently performed is already completed
- A duplicated copy of which shall be sent to BOE, Manila, Attn.: Chief FED, for recording and updating of History of Maintenance.

7. Additional PM/CM Work Order

- Additional PM Work Order generated under the PM Main Work Order due to upgrading shall be coordinated to the EMD Chief and with the approval of the Regional Director, furnishing the Bureau of Equipment for their concern, information and PM Program adjustment; and
- Additional CM Work Order generated under the CM Main Work Order due to unforeseen defect shall be coordinated to the EMD Chief and with the approval of the Regional Director, furnishing the Bureau of Equipment for their concern, information and History of Maintenance updating.

8. Deadline Order (DLO)

- Shall only apply under Corrective Maintenance activities in the event of a breakdown of the equipment, which require immediate action to prevent loss of life or damage to property
- Shall be submitted to concerned Implementing Office and BOE, Manila, for appropriate action
- Shall be supported with Parts Pricelist Database and/or Abstract of Canvass duly signed by three (3) different accredited suppliers and BOE/RO authorized canvasser in that Region

9. Post Repair Inspection Report (PRIR) for Emergency Maintenance

- A Duplicate copy of Post Repair Inspection Report shall be submitted to BOE Manila for recording and updating purposes
- Shall be supported with three (3) years History of Maintenance
- Shall be supported with Parts Pricelist Database and/or Abstract of Canvass duly signed by three (3) different accredited suppliers and BOE/RO authorized canvasser in that Region
- Shall be a pre-requisite for reimbursement of Parts installed to all DPWH water-based equipment EM activities.

10. History of Maintenance (HOM)

- History of Maintenance shall always be attached to all Corrective and Emergency Maintenance Activities only as part of the request or report
- Shall show exact details of parts and materials being used/installed, cost, failure frequency, reliability, and craft.

10. Waste Material and Disposal Report (WMADR)

- The Waste Material and Disposal Report shall be submitted annually to BOE, Manila, Attn.: Chief, FED, for recording, updating, and appropriate action.

IV. SAFETY INFORMATION

1. Daily Checklist

Make a habit of checking the engine and engine compartment visually before operating (before the engine is started) and after operating (after the engine has been stopped). This will help you to quickly detect fuel, coolant or oil leaks and spot anything else unusual that has happened or is about to happen.

2. Refuelling

When refueling, there is a danger of fire and explosion. Smoking is forbidden and the engine must be switched off.

Never overfill the tank. Close the fuel tank filter cap properly.

Only use the fuel recommended by the Bureau of Equipment. The wrong grade of fuel can cause operating problems or cause the engine to stop. On a diesel engine, poor quality fuel may cause the fuel injection pump to seize and the engine to exceed the maximum revolution per minute (rpm), with a possible resultant risk of damage to the engine and personal injury.

3. Carbon monoxide poisoning

Start the engine only in a well-ventilated area. If operating the engine in an enclosed space, ensure that there is proper ventilation in order to remove exhaust gases and crankcase ventilation emissions from the working area.

4. Operation

The engine must not be run in areas where there are explosive materials or gases. Not all electrical and mechanical components are non-sparking. **Warning!** Approaching a running engine is dangerous. Loose clothing, hair, fingers or a dropped tool may catch in the rotating parts of the engine and cause serious personal injury.

5. Maintenance and service

- **Knowledge**. This Manual contains instructions on how to carry out general maintenance and service operations safety and correctly. Read the instruction carefully before starting work.
- **Stop the engine**. Stop the engine before opening or removing hatches. Unless otherwise specified, all maintenance and service must be carried out with the engine stopped. To prevent accidental starting, remove the ignition key, turn off the power supply of the engine at the main switches and lock them in the OFF position before starting work. Approaching or working on a running engine is a risk. Loose clothing, hair, fingers or a dropped tool may be caught by the rotating parts of the engine and may cause serious personal injury.
- **Lifting the engine.** When lifting the engine, use the lifting eyes installed on the engine. Always check the lifting equipment is in good condition and is strong enough for the lift (engine weight plus any extra equipment). For safety's sake, lift the engine using an adjustable lifting beam. All chains and cables should run parallel to each other and as perpendicular as possible in relation to the top of the engine. Bear in mind that extra equipment installed on the engine may alter its centre of gravity. Special lifting equipment may then be required in order to maintain the correct balance and make the engine suspended on a hoist.
- **Before starting the engine.** Reinstall all guards removed during service operations before starting the engine. Ensure that no tools or other items have been left on the engine. Never start a turbocharger engine without installing the air filter. The rotating compressor in the turbocharger can cause serious personal injury. Foreign objects can also be sucked in and cause mechanical damage to the unit.

6. Fire and explosion

- **Fuel and lubrication oil.** All fuel, most lubricants and many chemicals are inflammable. When carrying out work on the fuel system, make sure the engine is cold. A fuel spill onto a hot surface or electrical components can cause fire. Store fuel-soaked rags and other flammable material so that there is no danger of them catching fire. In certain conditions oil-soaked rags spontaneously ignite. Do not smoke when filling fuel or oil, or in proximity of a filling station or in the engine room. Replacement parts and under specs components used in the fuel and electrical systems are risky and can result to fire or explosion.
- **Batteries.** The batteries contain and give off oxy-hydrogen gas, especially during charging. This gas is easily ignited and highly flammable. Do not under any circumstances smoke or use naked flame or allow sparks in the vicinity of the batteries or battery compartment. Incorrectly connecting a battery terminal cable or jump-start cable can cause a spark which in turn can cause explosion.
- **Start spray.** Never use start spray or similar agents to start an engine equipped with air pre-heating (Glow plugs / starter element). The starter element may cause explosion in the inlet manifold. Danger of personal injury.

7. Hot surfaces and fluids

There is always a risk of burns when working with a hot engine. Beware of hot surfaces. For example: the exhaust pipe, turbocharger (TC), oil pan, charge air pipe, starter element, hot coolant and hot oil in oil lines and hoses.

8. Chemicals

Most chemicals such as anti-freeze, rustproofing agent, inhibiting oil, degreasing agent, etc. are hazardous to health.

Some chemicals such as inhibiting oil are inflammable and also dangerous if inhaled. Ensure good ventilation and use a protective mask when spraying.

Store chemicals and other hazardous materials out and please dispose of used or leftover chemicals in a proper designated disposal point as prescribed in the existing policies, rules and regulations regarding environmental protection of this Department.

9. Lubrication system

Hot oil can cause burns. Avoid skin contact with hot oil. Ensure that the lubrication system is not under pressure before commencing work on it. Never start or operate the engine with the oil filter cap removed, as oil can spray out.

10. Cooling system

Avoid opening the coolant filler cap when the engine is hot. Steam or hot coolant can spray out and cause burns.

If work must be carried out with the engine at operating temperature and the coolant filler cap or a cock open or a coolant hose disconnected, open the coolant filler cap carefully and slowly to release pressure before removing the cap completely. Note that the coolant may still be hot and can cause burns.

11. Fuel injection system

Always use protective gloves when tracing leaks. Liquids ejected under pressure can penetrate body tissue and cause serious injury. There is a danger of blood poisoning.

Always cover the generator if it is located under the fuel filter. The generator can be damaged by spilled fuel.

12. Electrical system

- **Cutting off power.** Always stop the engine and break the current using the main switches before working on the electrical system. Isolate external power to the engine block heater, battery charger, or accessories mounted on the engine.
- **Batteries.** The batteries contain an extremely corrosive electrolyte. Protect your skin and clothes when charging of handling batteries. Always

use protective goggles and gloves. If battery electrolyte comes into contact with unprotected skin, wash off immediately using plenty of water and soap. If battery acid comes into contact with the eyes, flush immediately with plenty of water and obtain medical assistance without delay.

13. Welding

Remove the positive and negative leads from the batteries. Then remove all leads to the generator.

Always connect the weld clamp to the component to be welded and as close to the welding point as possible. The clamp should never be connected to the engine or in such a manner that the current is able to pass cross any bearings.

- **When welding is complete.** Always connect the leads to the generator **before** replacing the battery leads.

Please refer to Department Order no. 162 series of 2015: Guidelines of Hot Work Operation (HWO) and Lock-Out/Tag-Out (LOTO) for land and water based equipment

14. Environmental Protection

We all want to live in a clean and healthy environment where we can breathe clean air, see healthy trees, have clean water in our lakes and oceans and enjoy the sunshine without worrying about our health. Unfortunately, this is no longer something we can take for granted. We must work hard together for the environment.

As the arm of DPWH's mandates to mitigate flooding in Metro Manila and other area nationwide, the Bureau of Equipment has a particular responsibility with regard to the dredging equipment and its operation. This is the reason why concern for the environment is one of the cornerstones of our priorities.

We hope that you will take a good care of it to maintain these properties. Always follow the advice in this Manual about fuel grades, operation and service and you will avoid unnecessary damage to the environment. If you notice changes such as increased fuel consumption or exhaust smoke, please refrain from operation and corrective maintenance on the equipment is highly recommended.

Always dispose environmentally harmful waste such as engine and transmission oil, coolant, old batteries in a proper disposal points or to any DENR-accredited waste disposal entity.

It is understood that provision of portable oil-water separator is existing to each dredge as of this point in time.

Together we can work to make a valuable contribution for a clean environment.

15. Fuel and oil types

Only use fuel and oils recommended in this Manual. Using other grades of fuel and oil can cause operating problems, increased fuel consumption and, in the long term, a shorter engine service life. Always change oil, oil filters and fuel filters at the recommended intervals.

RESERVOIR	KIND OF FLUID	OIL TO BE USED
Engine oil Pan	Engine Oil	SAE 40
Swing Drive Case	Gear Oil	SAE 90 and API GL5
Final Drive Case	Gear Oil	SAE 140 and API GL5
Hydraulic Oil Tank	Hydraulic Oil	ISO VG. 68 and SAE 10
Fuel Tank	Diesel Fuel	ASTM D975 No. 2
Grease Fitting	Grease	Multipurpose Lithium Grease NLGI No. 2
Cooling System	Coolant	30% anticorrosion – 70% distilled water

Table 2 Recommended Fuel, Oils and Lubricants.

API: American Petroleum Institute.
ASTM: American Society of Testing and Materials.
ISO: International Organization for Standardization.
NLGI: National Lubricating Grease Institute.
SAE: Society of Automotive Engineers.

V. ENGINE PM GUIDELINES AND ADJUSTMENT

This is to describe how to carry out the above maintenance program. Read the instructions carefully before starting work.

1. Air filter, check/replace

The air filter should be replaced when the indicator remains in the red field when the engine has stopped.

The filter should not be touched until the indicator displays the red field.

Scrap the old filter. Do not clean and reuse.

In continuous operation, the air cleaner should be checked daily. When running in extremely dirty environment, special air cleaner is required.

2. Air lines leakage, check

Check the air lines for cracks or other damage. Replace if required. Check all hose clamps.

3. Idling speed adjustment

First ensure that the air filter is not clogged and that the throttle arm:

- On the fuel injection pump is against the idling speed stop.
- When the throttle mechanism is in idling position, ensure also that the throttle arm presses against the max stop.
- When the throttle control is in wide open throttle (WOT) position, adjust the control if necessary.

Idling speed must only be checked and adjusted when the engine has reached normal operating temperature. **WARNING!** Approaching or working on a running engine is dangerous. Watch out for rotating components and hot surfaces.

4. Governor, engine

- Allow the engine to operate at low idling speed.
- If necessary, adjust the engine speed by removing the domed nut, slackening off the locknut and adjusting the engine speed with the screw

If the engine speed is uneven, the idle speed damping should be adjusted as follows:

- Remove the domed nut and slacken off the locknut. Carefully turn the damping screw clockwise until the engine speed stabilizes.
- Check that the high idling speed has not changed. If it has changed, the damping screw has been screwed in too far
- Lock the damping screw and install the domed nut when the adjustment is complete.

5. Drive belts, checking and adjusting

- Inspection and adjustment should be carried out after running the engine when the belts are warm.

- Undo the screws before tensioning the generator belts. It should be possible to depress the belts 10mm between the pulleys. Worn belts which work in pairs should be replaced at the same time.

- The fan belts have an automatic belt tensioner and do not need adjusting. However, the condition of the belts must be checked. Replace if required.

VI. LUBRICATION SYSTEM

Oil change intervals can vary depending on the operating time, quality of the lubricant and the sulphur content of the fuel. **Note!** The oil change interval should never be longer than 12 months.

If longer intervals are required, the condition of the oil must be tested regularly by the oil manufacturer.

1. Check Oil level

- Ensure that the level lies between MIN and MAX markings. **Important:** In continuous use the oil level should be checked every 8 hours.

- When checking the oil level on a stationary engine, read off the side of the dip stick marked "STOP" (at earliest 3 minutes after engine stop).

- A check can also be carried out when the engine is running. Read off the dip stick side marked "OPERATING". **WARNING!** Approaching or working on a running engine is dangerous. Watch out for rotating components and hot surfaces.

2. Replace Oil and oil filter

Always follow the recommended oil change interval and always replace the oil filter at the same time. On stationary engines, do **not** remove the bottom plug. Use an oil draining pump to suck up the oil.

- Clean filter mountings so that the dirt will not fall in when the new filter is installed.
- Run engine to normal operating temperature.
- Remove the bottom plug. Drain out engine oil.
- Install the bottom plug together with a new gasket.
- Remove the filters and the by-pass filter (when applicable). Ensure that the gaskets do not remain on the engine.
- Fill the new filters with engine oil and spread oil on the gaskets. Screw the filter into place by hand until the gasket touches,then twist a further half time. **No more!**
- Top up oil to correct level. **Do not fill above the MAX level.**
- Start the engine and let it idle. Ensure that the oil pressure is normal.
- Stop the engine, ensure that there is no oil leakage around the filter. Top up if required.
- Collect the old oil and oil filter and dispose them in a proper disposal point.

VII. COOLING SYSTEM

The cooling system must be filled with a coolant that protects against internal corrosion and from freezing if the climate requires it. **Never use water alone.**

The anti-corrosion additives become less effective over time. The coolant must therefore be replaced. On the condition that coolant recommendations are followed, the following replacement intervals apply.

COOLANT	Replacement Intervals
Glycol mixture **with** coolant filter	Every 4 years or at least every 10,000 hours
Glycol mixture **without** coolant filter	Every 2 years or at least every 5,000 hours
Anti-corrosion agent	Every year

Table 3. Coolant Replacement Interval.

IMPORTANT! The cooling system must be flushed through when the coolant is replaced. The coolant filter must not be changed at the same time as the coolant. It must be replaced 6 months after the first coolant replacement and then every six months.

1. Water quality

Always use clean water which fulfills the requirements in ASTM D4985. If these requirements are not fulfilled, the cooling system will blocked again with diminished cooling effect as a direct result. If water cannot be cleaned, distilled water or ready mixed coolant must be used.

2. Risk of Freezing Condition

Use a mixture of 50% antifreeze coolant (glycol) and 50% pure water (e.g. ratio 1:1). This mixture will protect against freezing to a temperature of approx. -40ºC and should be used all year round.

Even if the temperature is never as low as -40°C, the above mixture ratios must be used. This is to ensure maximum anti-corrosion protection.

Mix the glycol with the water in a separate container before filling the cooling system. Glycol is harmful to health. Dangerous if ingested.

Alcohol must not be used in the cooling system.

3. If there is no risk of freezing

When there is never a risk of freezing, water may be used as coolant with the addition of the anti-corrosion agent. However, it is recommended that a mixture of glycol coolant and pure water is used throughout the year, regardless of the climate.

Mixture ratio 1:3 is allowed. Run the engine to operating temperature after filling. This is to allow the additive to work as efficiently as possible.

If the operation time exceeds 5000 hours per annum, the anti-corrosion agent for the coolant must be complemented with 1/2 liter anti-corrosion agent every 500 hours.

Anti-corrosion agents are harmful to health. Dangerous if ingested. **IMPORTANT!** Never mix anti-freeze (glycol) and anti-corrosion agents. The two combined can produce foam and drastically reduce the coolant's effectiveness.

4. Coolant. Checking and topping up

Check the coolant level daily before starting. Top up coolant if necessary. Fill up to 5 cm below the filler cap sealing surface or between the MIN and MAX markings if a separate expansion tank is installed. **Warning!** Except in an emergency, do not open the engine coolant system filler cap when the engine is still hot. Steam or hot coolant may spray out. When topping up, use the same coolant mixture as it is already in the cooling system.

5. Filling an empty system

- Ensure that all the **drain cocks** and **drain plugs** are closed. The engine must be stopped when filling. Fill slowly so that air is able to stream out through the **bleed cock** and the **filler opening.**

- If a heater system is connected to the engine's cooling system, the heater control valve must be opened and the unit vented during filling.

- Fill with coolant to the correct level. The engine must not be started until the system has been vented and completely filled.

- Start the engine and run it until the thermostat opens (this takes approximately 20 minutes). After start, open any bleed cocks briefly. This releases any trapped air. Check the coolant level and top up if necessary.

6. Coolant draining

Before draining the coolant, the engine must be stopped and the filler cap must be unscrewed. Open the drain cocks and remove the drain plugs. Unscrew and remove the coolant filter if one is installed. There may be deposits inside the cocks/plugs. These must be removed. Ensure that all the coolant has drained out.

7. Coolant flushing

Cooling performance is reduced by deposits in the radiator and cooling channels. The cooling system must therefore be flushed through when the coolant is replaced.

- Drain the coolant as above
- Insert a hose in the radiator filler opening and rinse out with freshwater until the water which runs out is completely clear
- Close the drain cock and plugs.
- Fill with new coolant according to the instructions in the section "Coolant Checking and topping up".

8. Cooler (charge air cooler). External cleaning

- Remove the required guards to access the radiator.
- Clean with water and a mild cleaning agent.
- Use a soft brush. Take care not to damage the cooling wanes.
- Do not use a high pressure.
- Reinstall components.

9. Coolant filter replacing

- Remove the filter with a suitable filter puller.
- Dampen the gasket and screw on new filter by hand.
- Tighten by ½ turn once the gasket is tight.

VIII. FUEL INJECTION SYSTEM

Only use recommended quality fuels according to the specifications. Always observe strict cleanliness when refueling and working on the fuel injection system.

All work on the engine injection pump or injectors must be carried out at an authorized workshop. If the injection pump lead seal is broken, all warranties are invalid. **WARNING!** When carrying out work on the fuel system, make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause fire. Store fuel-soaked rags so that they cannot cause a fire.

1. Fuel Specification

Fuel must meet national and international standards for marketed fuel. EN590 (with national environmental and cold weather standards). ASTM-D975-No 1-D, 2-D.

Sulfur content: According to relevant national statutory requirement, if the sulfur content exceeds 0.5% by weight the **oil change interval** should be changed.

Fuel with extremely low sulfur contents (urban diesel and city diesel) may cause a drop in output of 5% and an increase in fuel consumption of 2-3%.

2. Fuel filter, replace

Cleanliness! No dirt or contaminants may enter the fuel injection system.

Remove the filters. Moisten the new filter gasket with little oil. Screw the filter into place by hand until the gasket touches. And then a further half turn is enough for tightening, but no more! Bleed fuel system. Take the old filter to a suitable disposal point.

Start the engine and check for leaks. **WARNING!** Fuel filter replacement should be carried out on a cold engine to avoid the risk of fire caused by fuel spilling onto hot surfaces.

3. Fuel pre-filter, Drain water

The fuel filter is an optional extra. Position a container under the fuel filter. Drain off water and contaminants using the cock/plug at the bottom of the glass. Wait a few hours after the engine has been turned off before draining the filter.

4. Fuel pre-filter, filter insert replacement

- Close fuel cock at the fuel tank.
- Position a container under the fuel filter.
- Unscrew the screw to remove the cover.
- Replace insert and reinstall cover. Open fuel cock. Bleed fuel system.
- Take the old filter to a suitable disposal point.
- Start the engine and check for leaks.

5. Fuel system venting

The fuel must be vented after fuel filters have been replaced or after refilling the fuel tank after it has been run dry.

Venting engines with stop solenoid/fuel shut-off valve connected to supply voltage at stop.

Ensure that the engine is in operational mode. Open the bleed screw. Pump with hand pump until fuel containing no air flows out. Close screw while fuel is flowing out.

Then pump a further 15-20 times. Check for leaks.

IX. ELECTRICAL SYSTEM

1. Fuses

The engine has automatic fuses located in the junction box. The fuses break the current when there is an overload in the electrical system.

If the engine cannot be started or the instruments stop operating during operation, the fuse may have tripped. Reset the fuse by pressing on the bottom on the fuse. **Important!** Always investigate the cause of an overload before resetting the fuse.

2. Main switch

The main switch must never be turned off before the engine has stopped. If the circuit between the generator and the battery is cut off when the engine is running, the generator can be seriously damaged. **Important!** Never break the circuit with the main switch while the engine is running.

3. Electrical Connection

Ensure by checking that all electrical connections are dry and free of oxidation and that there are no loose connections. If necessary, spray these connections with a water-repellant spray.

X. BATTERY MAINTENANCE AND CARE

1. Connecting and disconnecting

First connect the red battery lead + to the battery + terminal. Then connect the black battery lead – to the battery – terminal.

When disconnecting the battery, disconnect the – lead (black) first and then the + lead (red).

2. Cleaning

Keep batteries dry and clean. Oxidation or dirt on the battery and battery terminals can cause short-circuits, voltage drop and discharge especially in damp weather. Clean the battery terminals and leads to remove oxidation using a brass brush. Tighten the cable terminals well and grease them with terminal grease or petroleum jelly.

3. Topping up

The electrolyte shall be 5-10 mm over the plates in the battery. Top up using **distilled water** if necessary. Charge the battery after topping up for at least 30 minutes by running the engine at fast idle. NOTE! Certain maintenance-free batteries have special instructions which must be followed.

XI. MAINTENANCE FOR SAND PUMP GEARBOX WITH VERTICALLY OFFSET SHAFT AND HYDRAULIC CLUTCH

1. Oil Change

- The Oil shall be changed at operating temperature, if possible. The first oil change is due after approximately 650 running hours.
- All further oil changes shall be made after running hours of 2000 to 4000 hours.
- Independent of operating periods, an oil change is due at least every 12 months. In case of extended oil change intervals of more than 12 months, the oil has to be analyzed for full lubricity.
- Fill the oil through a finely meshed strainer.
- For longer idle periods, the gearbox must be rust protected by applying rust inhibiting oil internally. When cleaning the filter element, always clean and empty the filter housing. Depending on type of filter, the filter housing can either be unfastened or taken off or it has a drain hole through which to drain the residual oil. Dirt particles remaining in the filter housing can lead to trouble in the hydraulic system.

2. Water hazards

Water entry into the lubricating oil is very hazardous. Even though a bearing may operate for a short time with a limited amount of water in the oil, gear do not, as water, even in smallest quantities, causes immediate pitting. In order to avoid condensation in the housing during operation and especially during idle periods, the casing is aerated. The air in the gear unit warms up and cannot absorb humidity.

Attention must be observed that after switching off, no machine room ventilator blows on to the casing. This applies in particular to warmer climates, where a considerable temperature differential can be expected especially at night.

3. Separation of the lube oil

If common separators are to be used for engine- and gearbox, attention must be paid that these different oils are not mixed.

In general, it must be noted, that EP lubricating oils for gear units are not warmed up too much.

After separating, the oil has to be analyzed for full lubricity by a specialized company or if available facility in BOE.

4. Lubricating oil

Age resisting and non-demulsifying, pure mineral gear oils should shall be used. They shall be free from vegetable and animal oils and fats, and non-foaming, inhibit rust, must be able to be purified repeatedly without becoming unstable and lose their lubricating properties.

The lubricating oil must be without any mechanical impurities and be completely soluble in gasoline.
It is urgently requested to obtain this oil from specific suppliers with longstanding experience of mineral oils.

The use of oil with ISO viscosity VG 100 according to the lube oil specification is recommended for operation.

5. Servicing

Bearings – During operation, all rolling bearings must be monitored at interval of 2000-3000 hours for running noise. A change points to a malfunction. Watch this bearing closely and replace it as soon as possible.

Gearing – Correct lubricating oil supply and regular gear inspection for tooth flank condition are the best preventive maintenance procedure to avoid gear failure. During visual inspection check tooth flanks and tooth contact. In case of any changes, careful watch must be kept to see whether the areas increase in size. If in doubt, please contact the Bureau of Equipment for review, evaluation and appropriate action.

When carrying out any type of work inside the gearbox, always make sure that the oil nozzles for force lubrication and cooling of the meshing teeth are in good condition, pointing in the proper direction.

6. Preservation

In order to prevent rust formation during idle periods of several days, the steel surfaces of journal bearings, thrust collars and gear teeth should be protected by an oil film. To apply and maintain this oil film, the lube equipment should be operated every 2 days for a short period. During oil circulation, the gearbox should be turned over so that all teeth are covered by an oil film and the shaft are brought into another stationary position.

For a conservation period up to approx. 3 months we recommend the use of a rust preventive oil, with which all internal parts are sprayed and which is soluble in lubricating oil:

- Tectyl 873, SAE 30
- Tecto 6, SAE 10 W
- Tectyl 846 K 19
- Shell Ensis Fluid SDC

After using of preventive oil, the gear has to be flushed before next operation, because some preventive oils tend to foaming after mixing with lube oil.

XII. MAINTENANCE AND LUBRICATION OF WINCHES

1. Maintenance

- Check periodically tightness of all external nuts/bolts and the frame fixing bolts and that the good alignment between gear, winch and skid is kept.
- Gearbox - Maintain the oil level in the gearbox and check for oil leakage, replacing any seals that found defective.
- Brakes - Check half yearly the lubrication level; dry running means torque increase and shorter disc life, while too much oil is not allowed by the cylinder that squeezes it out of the first operation.
- Greasing – At prescribed PM intervals, charge grease nipple at non-drive and bearing of the drum.
- General – Unless the equipment generates excessive heat or vibration no other maintenance should be necessary.

2. Lubrication

- The first oil change of the gearbox should be made after running up time i.e. 50-100 working hours. The same oil can be used again, provided that it is carefully filtered (use filter 10 my max.) because the oil certainly contains small iron particles. Before filling up the gear case again, wash it with mineral oil. Other oil changes should be made every 2500 working hours, and at least once a year.

XIII. HOW TO APPLY MARINE PAINT

Painting the entire Dredge and its major components shall be done annually or every month of December.

Materials and Supplies needed:

- Industrial solvent / paint remover
- Primer
- Rags
- Marine paint
- Roller
- Revolving power sander

- Epoxy glue
- Sponge
- Gloves
- Paint brush
- Marine anti-corrosive paint

A poorly painted hull will easily strip away. If foreign materials in the sea don't get to it, simple water pressure will eventually destroy a poo paint job. Even worse, improper painting can eventually result to not just discoloration of the hull, but actual weakening of the hull. Knowing how to paint a hull isn't just a great way to give the vessel a vibrant appearance, it can also extend the lifespan of your dredge.

Painting a hull requires a lot of time and effort. Here are some steps that will enable you to effectively paint your hull.

Step 1 – Protect Your Skin

Throughout the preparation and painting process, wear gloves to reduce the contact between your skin and the substances you'll be using. This is not only a neat way to limit messes, but also protects your skin from any irritants or allergens that may be in the materials.

Step 2 – Prepare

Even though you will be using specialized marine paint for this job, you'll still need to prepare the hull's surface for it to stick properly. In this case, that means a layer of industrial solvent.

Dip a sponge into the industrial solvent and apply it to the hull surface. In addition to prepping the surface for paint, this step also removes any wax that may be present from your regular hull maintenance.

Step 3 – Sand

After applying the solvent, clean the hull further by using a revolving power sander. This device strips away previous traces of paint from your hull. Be thorough with your sanding, as painting on an improperly sanded hull will result to paint discoloration of removal.

Step 4 – Repair

Before applying the paint, make any necessary repairs to the hull. Apply epoxy glue to any holes of abrasions and smooth it out carefully to prevent any epoxy lumps from forming on the hull. Lumps will make it harder for you to paint the hull.

Step 5 – Apply the Primer

Once the boat hull is fully repaired, it's time to apply the primer paint by using a roller. Roll the primer over the hull as evenly as possible.
After priming, sand the hull for a second time. Apply another layer of primer after sanding and let it dry again for hours. This back and forth of sanding and priming create a fortified foundation for your paint job.

Then apply anti-corrosive paint.

Step 6 – Paint

Once you've created a strong base with your repeated sanding and priming, it's time to paint. Use a roller and paint brush to color your boat hull with marine paint. Brush the hull carefully, especially on areas where bubbles form up. When the painting job is done, let your hull dry for several hours.

Step 7 – Finishing Touches

Apply thinner layers of paint in order to smooth out your newly painted hull. Continue applying paint until you've achieved a thoroughly smooth, even paint job.

XIV. ENGINE SHUTDOWN

Inhibition should be carried out to ensure that the engine and other equipment are not damaged while shut down. It is important that this is done properly and that nothing is forgotten.

Before shutting down for a long period, the Dredge Master should inspect the engine and other equipment. Have any necessary repairs or service work carried out so that the equipment will still be in good condition for the next time it is started.

XV. PM PROGRAM EXECUTION AND STAGE INTERVAL (In General)

To achieve maximum operating safety and service life, it is vital that the engine is regularly serviced. By following the service recommendations, engine quality is retained and unnecessary environmental damage avoided.

1. PM 1: Before starting the engine

a. Inspect Daily

- Oil pressure and temperature of engines, gearboxes, pumps, tanks, etc. (temp. about 50^{O}C, pressure 0.8 – 1.5 bar)
- Driving belts as to correct pretension, damage and wear
- Engine oil level check
- Coolant level checks
- Radiator, external check and cleaning
- Air filter check
- Engine leak check
- Clean all battery surfaces of dust and/or dirt accumulations
- Clean and tighten all terminal connections
- Clean Battery studs and cable ends. On stranded cable, if ends are corroded, cut off ends or separate strands and clean internally

b. Inspect Weekly

- As to wear: housing + impeller of dredge pump as well as cutter. Hard-face, if necessary, in accordance with the instruction manuals (not applicable to so-called "wear resistant" pumps) or provide cutter with new teeth or knives. The term can be prolonged or shortened in accordance with the situation
- Pipelines, as to leakage
- Replenish accumulator (till about 15mm above the plates) with distilled water. Dependent on the circumstances, this term can be prolonged or shortened.
- Keep accumulator clean and dry
- Keep connection clamps clean and grease them with accumulator grease
- Fuel pre-filter, drain water
- Battery, check electrolyte level
- Disengagement bearing, lubricating
- Check and clean cable and trays for excessive wear or deterioration, check cables for wear at support points, inspect for mechanical damage from vibration
- Examine raceway and bus duct joints for clean and tight connections
- Thermal Scanning of cables (Online)

c. Inspect Monthly

- Gearings of gear boxes and winches
- Drive belts, checking and adjusting
- Fuel Tank, sludge collector, drain
- Disengage clutch, lubricate
- Disengage clutch, adjustment
- Coolant, anti-corrosion mixture, add
- Cleaning of electrical panels and tightening of loose terminals
- Check and replace of damaged control switches, buttons, lamps, and control fuses

d. Early symptoms detection on the Engine

1. Starter motor not turning (or turning slowly)
2. Engine will not start
3. Engine starts but stops again
4. Engine difficult to start
5. Engine does not reach correct speed at wide open throttle WOT
6. Engine knocks
7. Engine runs unevenly
8. Engine vibrates
9. High fuel consumption
10. Black exhaust smoke
11. Blue or white exhaust smoke
12. Low oil pressure
13. Engine coolant temperature too high
14. No or poor charging

d.1. Action shall be taken (based on the reasons or faults listed hereafter)

1. Check the following: 1,2,3,21,22,23,24
2. Check the following: 4,5,6,7,25,26,30
3. Check the following: 4,6,7,8,25,26
4. Check the following:4,5,6,7,25,26,30
5. Check the following: 4,5,6,7,8,9,16,17,18,29,30
6. Check the following: 4,5,6,7
7. Check the following: 4,5,6,7,8,9,30
8. Check the following: 13,14
9. Check the following: 8,10
10. Check the following: 8,28
11. Check the following: 10,19,28
12. Check the following: 11,12
13. Check the following: 15,16,17,18,27,28
14. Check the following: 2,20

d.2 List of Possible reasons or faults

1. Discharged battery
2. Loose connection / open circuit
3. Fuse stripped
4. Lack of fuel
5. Fouled fuel filter
6. Air in the fuel injection system
7. Water / contaminants in the fuel
8. Insufficient air supply
9. Engine coolant temperature too high
10. Engine coolant temperature is too low
11. Lubricating oil level too low
12. Blocked fuel filter
13. Defective engine mounting
14. Worn clutch
15. Too little coolant
16. Radiator blocked
17. Circulation pump defective
18. Defective / incorrect thermostat
19. Lubricating oil level too high
20. Generator drive belt slipping
21. Defective ignition switch / starter button
22. Defective start relay
23. Defective starter motor / solenoid
24. Water in the engine
25. Preheating insufficient
26. Starter element defective/not connected
27. Defective temperature gauge/sensor
28. Faulty injection timing
29. Engine overload
30. Fault in the generating set engines

2. PM 2: Every 4 months (667 running hours)

- Perform PM 1
- Engine oil and oil filter, replace
- Monitor temperatures of Panels using Thermal Scanner (Online)
- Conduct line resistance test, insulation test and power quality test (Offline)

3. PM 3: Every 8 months (1334 running hours)

- Perform PM 1 and 2
- Valve clearance, adjustment
- Fuel filter, replace
- Fuel pre-filter, replace
- Air filter, clean
- Air lines leakage, check
- Coolant filter, replace
- Visual inspection of motors. Check for signs of mechanical wear and performance abnormalities. Check the terminal of power supply if in proper condition (Online)
- Monitor temperatures of motor beatings and winding using Thermal Scanner (Online)
- Motor vibration monitoring using analyzer (Online)

4. PM 4: Every 12 months (2000 hours of operations)

- Perform PM 1 and 2
- Air filter for supercharger, replace
- Coolant, anti-corrosion mixture, replace

a. Inspect

- All bearings on wear; clean them and provide them with new grease.
- All shaft couplings.
- All impellers of centrifugal pumps on wear.
- All lube oil pumps on wear.
- All valves on working and sealing.
- All greases on eating and wear.
- All hydraulic pumps and motors. Have them overhauled by dealer (if necessary).
- All hydraulic cylinders on scratching or eating and sealing
- All hoses on damage.
- Of cutter bearing: the bronze bush round the shaft, the rubber bearing. Minimum greasing groove depth in rubber: 4mm for 552kw cutter drive B. 3800.
- All sheaves and drums on damage by steel wires.
- All steel wires on unraveling and corrosion.
- Suction mouth and ladder head on wear. Hard-face if necessary.
- Wall thickness of suction pipeline on wear. Turn it 180^{O} if necessary.
- Suction hose on wear; turn it 180^{O} if necessary.
- Wall thickness of discharge pipeline on board.
- Fuel tanks on fouling; clean them.

- Water ballast tanks on painting; restore painting if necessary.
- Painting; restore if necessary. The part below the water line must be wire-brushed and then be tarred twice.
- All electrical wiring/cable work on damage/rupture isolation material.
- Injector, check
- Turbocharger, check
- Engine and equipment, general check
- Check motor running current (Offline)
- Conduct motor Insulation Resistance Test (Offline)
- Conduct motor Winding Resistance Test (Offline)

5. PM 5: Every 16 months (2667 hours of operation)

- Perform PM 1, 2, and 3
- Replace Battery

6. PM 6: Every 2 years (4000 hours of operation)

- Perform PM 1, 2, 3, and 4
- Coolant, glycol mixture, replace

7. PM 7: DRY-DOCKING AND REPAIR (Twice every 5 years)

- Please refer to D.O. 160 series of 2015: Guidelines for the Dry-Docking and Repair of DPWH Dredges and other Floating Equipment

XVI. PM INTERVAL FOR ALL DREDGE 8-2 TYPE, CSD

PM 1: Walk-around Inspection

Before starting the diesel engine, following actions should be taken:

1. Top-up engine oil level (AE/DPE)
2. Check fresh cooling water level in Radiator tank of engine
3. Inspect fuel supply from fuel tanks, i.e. position of fuel cocks.
4. Check alarm system. The control lamp should burn when the alarm system is put in service.
5. Open the outboard valve(s)
6. Open suction and discharge valves of gland pump and cover pump, which are connected to the dredge pump (when mounted)
7. Open suction and discharge valve of cutter bearing flushing pump (if mounted)
8. Check air inlets.
9. Top-up battery with distilled water.
10. Start engine(s) by opening the valves for supply of compressed air. In case of electric starting motors, the start button is pushed.
11. When the engine starts, the speed has to be reduced to the minimum unloaded speed. Let the engine run warm during 5 minutes.

Check immediately after engine started

1. Oil pressure

2. Whether gland and cover pump deliver water to dredge pump.

This can be done:

a. By opening drain valves in discharge piping of pumps
b. By reading pressures on pressure gauges in control cabin

Stopping the engine

1. Before stopping the engine, flush the dredge pump suction and discharge pipelines so as to avoid plugging.
2. The engine manufacturers strongly recommend to have run the engine at slow speed for some time to cool it, before stopping.
3. Put alarm out of action by pressing appropriate button on general alarm panel.

Greasing

1. Foreside wire tumbling sheaves
2. Ladder hoisting wire sheaves on the ladder
3. Ladder hoisting wire sheaves in the ladder gantry
4. Center of rotation of ladder
5. Swivel bend for discharge pipeline (if any)
6. Spud ram ball joint
7. Spud hoisting wire sheaves

Dredge Pump Major Component and Winch System

DAILY

1. Inspection of swing line wire, spud hoist wire, and ladder hoist wire
2. Inspection and cleaning of suction and discharge pipes and dredge pump

WEEKLY

3. Greasing of pillow block and grease fittings

Parts and Supplies Needed:

Item	Qty.	Unit	Description of item needed
3.	1	lbs.	Grease

4. Greasing of counter bearing

4.	1	lbs.	Grease

MONTHLY

5. Greasing of cutter gear mechanism

5.	2	lbs.	Grease

6. Greasing of winch gear mechanism

6.	2	lbs.	Grease

7. Greasing of roller chain

7.	2	lbs.	Grease

PM 2: Every 4 months (667 running hours)

Auxiliary Engine (AE)

1. Perform PM 1
2. Perform engine change oil

Parts and Supplies Needed:

Item	Qty.	Unit	Description of item needed
2a.	1	pail	Oil, engine SAE 40, AE
2b.	1	pc	Filter, Oil, AE
2c.	1	pc	Filter, Fuel, AE

Dredge Pump Engine (DPE)

3. Perform PM 1
4. Perform engine change oil

Item	Qty.	Unit	Description of item needed
4a.	4	pails	Oil, engine SAE 40, DPE
4b.	1	pc	Filter, Oil, DPE
4c.	1	pc	Element, fuel filter, DPE

Dredge Pump Major Component and Winch System

5. Perform PM 1
6. Greasing of steel cables

Item	Qty.	Unit	Description of item needed
5a.	2	lbs.	Grease, pillow block and grease fittings
5b.	2	lbs.	Grease, counter bearing
5c.	2	lbs.	Grease, cutter gear mechanism
5d.	2	lbs.	Grease, winch gear mechanism
5e.	2	lbs.	Grease, roller chain
6.	4	lbs.	Grease, steel cables

PM 3: Every 8 months (1334 running hours)

Auxiliary Engine (AE)

1. Perform PM 1 and 2
2. Perform engine change oil
3. Replace all belts
4. Cleaning of air filter
5. Recondition alternator assy.
6. Recondition starter motor assy.

Parts and Supplies Needed:

Item	Qty.	Unit	Description of item needed
2a.	1	pail	Oil, engine SAE 40
2b.	1	pc	Filter, Oil
2c.	1	pc	Filter, Fuel
3a.	2	pcs	Belt, water pump
3b.	2	pcs	Belt, alternator
3c.	2	pcs	Belt, Fan, 9.5x1000LA
5.	1	lot	Parts & service, Alternator assy. reconditioning
6.	1	lot	Parts & service, Starter assy. reconditioning

Dredge Pump Engine (DPE)

7. Perform PM 1 and 2
8. Cleaning of air filter
9. Check and replace defective part of service pump
10. Replace Fan belts
11. Recondition alternator assy.
12. Recondition starter motor assy.

Item	Qty.	Unit	Description of item needed
7a.	4	pails	Oil, engine SAE 40

7b.	1	pc	Filter, Oil
7c.	1	pc	Element, fuel filter
10.	2	pcs	Belt, fan
11.	1	lot	Parts and service, Alternator assy. reconditioning
12.	1	lot	Parts and service, Starter assy. reconditioning

Dredge Pump Major Component and Winch System

13. Perform PM 1 and 2

Item	Qty.	Unit	Description of item needed
13a.	2	lbs.	Grease, pillow block and grease fittings
13b.	2	lbs.	Grease, counter bearing
13c.	2	lbs.	Grease, cutter gear mechanism
13d.	2	lbs.	Grease, winch gear mechanism
13e.	2	lbs.	Grease, roller chain
13f.	4	lbs.	Grease, steel cables

PM 4: Every 12 months (2000 hours of operations)

Auxiliary Engine (AE)

1. Perform PM 1, and 2
2. Check water pump assy.
3. Perform valve clearance adjustment
4. Recondition of radiator assy.
5. Check and replace defective parts of clutch system
6. Replace air cleaner element
7. Drain and refill radiator tank

Item	Qty.	Unit	Description of item needed
1a.	1	pail	Oil, engine SAE 40
1b.	1	pc	Filter, Oil
1c.	1	pc	Filter, Fuel
3a.	1	lot	Service only, Valve clearance adjustment
3b.	1	pc	Gasket, valve cover
4a.	5	pcs	Hose, Radiator
4b.	10	pcs	Clamp, radiator hose
5a.	1	no.	Clutch assy.
5b.	1	pc	Bearing, clutch release
6.	1	pc	Element, air cleaner
7a.	7	li	Fresh cooling water
7b.	3	li	Coolant, anticorrosion

Dredge Pump Engine

8. Perform PM 1, and 2
9. Perform valve clearance adjustment

10. Check and replace defective parts of clutch system
11. Recondition radiator assy.
12. Replace air cleaner element

Item	Qty.	Unit	Description of item needed
8a.	4	pails	Oil, engine SAE 40
8b.	1	pc	Filter, Oil
8c.	1	pc	Element, fuel filter
8d.	2	pcs	Belt, fan
9a.	1	lot	Service only, Valve clearance adjustment
9b.	1	tube	Tri-bond, Sealant
9c.	1	set	Gasket, valve cover
10a.	1	no.	Clutch assy.
10b.	1	pc	Bearing, clutch release
11a.	2	pcs	Hose, radiator
11b.	4	pcs	clamp, hose
11c.	1	pc	Hose, bypass, radiator
11d.	2	pcs	Clamp, bypass hose
11e.	20	li	Fresh cooling water
11f.	10	li	Coolant, anticorrosion
12.	1	pc	Element, air cleaner

Paint the Entire Dredge

13. Painting of all deck house, "A" Frame, Engine Room, and other accessories

Item	Qty.	Unit	Description of item needed
13a.	20	li	Paint, red lead primer
13b.	48	li	Thinner, lacquer
13c.	6	pcs	Brush, paint 2", 1"
13d.	6	pcs	Brush, steel
13e.	12	li	Paint Remover
13f.	10	kilo	Rags
13g.	200	pcs	Sandpaper # 120 & 240, each
13h.	14	li	Paint, White, acrylic (marine)
13i.	14	li	Paint, Gray, acrylic (marine)

Dredge Pump Major Component and Winch System

14. Perform PM 1, and 2
15. Changing of bolts and nuts of discharge pipes
16. Changing of Rubber gaskets, discharge pipe
17. Changing of dredge pump liner

Item	Qty.	Unit	Description of item needed
14a.	2	lbs.	Grease, pillow block and grease fittings
14b.	2	lbs.	Grease, counter bearing
14c.	2	lbs.	Grease, cutter gear mechanism

14d.	2	lbs.	Grease, roller chain
14e.	4	lbs.	Grease, steel cables
15.	100	pcs	Bolts and nuts, 5/8" x 5" half-thread
16.	1	roll	Gasket, rubber, 1x10 m
17.	2	pcs	Liner, DP, Front & Rear

Other Accessories

18. Recondition of all onboard service pumps
19. Servicing of all onboard air-conditioner units, if mounted
20. Recondition of all onboard electric/electronic instruments

Item	Qty.	Unit	Description of item needed
18.	1	lot	Service pumps, parts and service
19.	1	lot	Air-conditioner units, parts and service
20.	1	lot	Electric/Electronic instruments, parts and service

PM 5: Every 1 year and 4 months (2667 hours of operation)

Auxiliary Engine

1. Perform PM 1, 2, and 3
2. Replace defective battery and voltage regulator

Item	Qty.	Unit	Description of item needed
1a.	1	pail	Oil, engine SAE 40
1b.	1	pc	Filter, Oil
1c.	1	pc	Filter, Fuel
1d.	2	pcs	Belt, water pump
1e.	2	pcs	Belt, alternator
1f.	2	pcs	Belt, Fan, 9.5x1000LA
1g.	1	lot	Parts and service, Alternator assy. Reconditioning.
1h.	1	lot	Parts and service, Starter assy. Reconditioning.
2a.	2	pcs	Battery 2D
2b.	4	pcs	Clamp, battery, AE
2c.	4	pcs	Log, battery terminal, AE
2d.	1	pc	Regulator, voltage, 24v, AE
2e.	8	m	cable, battery, 1/2", AE

Dredge Pump Engine

3. Perform PM 1,2, and 3
4. Replace defective battery and voltage regulator

Item	Qty.	Unit	Description of item needed
3a.	4	pails	Oil, engine SAE 40

3b.	1	pc	Filter, Oil
3c.	1	pc	Element, fuel filter
3d.	2	pcs	Belt, fan
3e.	1	lot	Parts and service, Alternator assy. reconditioning
3f.	1	lot	Parts and service, Starter assy. reconditioning
4a.	2	pcs	Battery 4D
4b.	4	pcs	Log, battery terminal
4c.	4	pcs	Clamp, battery
4d.	4	m	cable, battery, 1/2"

Dredge Major Component and Winch System

5. Perform PM 1, 2 and 3

Item	Qty.	Unit	Description of item needed
5a.	2	lbs.	Grease, pillow block and grease fittings
5b.	2	lbs.	Grease, counter bearing
5c.	2	lbs.	Grease, cutter gear mechanism
5d.	2	lbs.	Grease, winch gear mechanism
5e.	2	lbs.	Grease, roller chain
5f.	4	lbs.	Grease, steel cables

PM 6: Every 2 years (4000 hours of operation)

Auxiliary Engine

1. Perform PM 1, 2, 3, and 4
2. Replace radiator cap
3. Replace all gauges

Item	Qty.	Unit	Description of item needed
1a.	1	pail	Oil, engine SAE 40
1b.	1	pc	Filter, Oil
1c.	1	pc	Filter, Fuel
1d.	2	pcs	Belt, water pump
1e.	2	pcs	Belt, alternator
1f.	2	pcs	Belt, Fan, 9.5x1000LA
1g.	1	lot	Parts and service, Alternator assy. reconditioning
1h.	1	lot	Parts and service, Starter assy. reconditioning
1i.	1	lot	Service only, Valve clearance adjustment
1j.	1	pc	Gasket, valve cover
1k.	5	pcs	Hose, Radiator
1l.	10	pcs	Clamp, radiator hose
1m.	1	no.	Clutch assy.
1n.	1	pc	Bearing, clutch release
1o.	1	pc	Element, air cleaner

1p.	7	li	Fresh cooling water
1q.	3	li	Coolant, anticorrosion
2.	1	pc	Cap, Radiator
3a.	1	pc	Gauge, Oil
3b.	1	pc	Gauge, Temperature
3c.	1	pc	Gauge, Ampere

Dredge Pump Engine

4. Perform PM 1, 2, 3, and 4

Item	Qty.	Unit	Description of item needed
4a.	4	pail	Oil, engine SAE 40
4b.	1	pc	Filter, Oil
4c.	1	pc	Element, fuel filter
4d.	2	pcs	Belt, fan
4e.	1	lot	Parts and service, Alternator assy. reconditioning
4f.	1	lot	Parts and service, Starter assy. reconditioning
4g.	1	lot	Service only, Valve clearance adjustment
4h.	1	tube	Tri-bond, Sealant
4i.	2	pcs	Hose, radiator
4j.	4	pcs	clamp, hose
4k.	1	pc	Hose, bypass, radiator
4l.	2	pcs	Clamp, bypass hose
4m.	20	li	Fresh cooling water
4n.	10	li	Coolant, anti-corrosive
4o.	1	pc	Element, air cleaner

5. Reconditioning of cooling fresh water pump
6. Replace radiator cap
7. Replace all gauges
8. Replace gear oil of dredge pump bearing

Item	Qty.	Unit	Description of item needed
5.	1	lot	Parts & service, Fresh water pump reconditioning
6.	1	pc	Cap, radiator
7a.	1	pc	Gauge, temperature
7b.	1	pc	Gauge, Oil
7c.	1	pc	Gauge, Ampere
8.	40	li	Oil 90, Dredge pump bearing

Dredge Pump Major Component and Winch System

9. Perform PM 1, 2, 3, and 4
10. Changing of defective steel cables
11. Change oil of differential for DPE
12. Change oil of differential for AE

13. Change of clutch lining
14. Change of brake lining

Item	Qty.	Unit	Description of item needed
9a.	2	lbs.	Grease, pillow block and grease fittings
9b.	2	lbs.	Grease, counter bearing
9c.	2	lbs.	Grease, cutter gear mechanism
9d.	2	lbs.	Grease, winch gear mechanism
9e.	2	lbs.	Grease, roller chain
9f.	4	lbs.	Grease, steel cables
9g.	100	pcs	Bolts and nuts, 5/8" x 5" half-thread
9h.	1	roll	Gasket, rubber, 1x10 m
9i.	2	pcs	Liner, DP, Front & Rear
10.	200	m	Cable, steel, 5/8"Ø galvanized
11.	20	li	Oil, gear, 90, DPE differential
12.	40	li	Oil, gear, 90, AE differential
13.	10	pcs	Pad, clutch lining
14.	10	pcs	Pad, brake lining

Paint the Entire Dredge

15. Painting of all deck houses, "A" Frame, engine room and other Accessories

Item	Qty.	Unit	Description of item needed
15a.	20	li	Paint, red lead primer, DPE
15b.	48	li	Thinner, lacquer, DPE
15c.	6	pcs	Brush, paint 2", 1", DPE
15d.	6	pcs	Brush, steel, DPE
15e.	12	li	Solvent, industrial / Paint Remover
15f.	10	kilo	Rags
15g.	200	pcs	Sandpaper # 120 & 240, each
15h.	14	li	Paint, White, acrylic (marine)
15i.	14	li	Paint, Gray, acrylic (marine)

Other Accessories

16. Recondition of all onboard service pumps
17. Servicing of all onboard air-conditioner units, if mounted
18. Recondition of all onboard electric/electronic instruments

Item	Qty.	Unit	Description of item needed
16.	1	lot	Service pumps, parts and service
17.	1	lot	Air-conditioner units, parts and service
18.	1	lot	Electric/Electronic instruments, parts and service

XVII.PM INTERVAL FOR ALL PDDP TYPE, CSD

PM 1: Walk-around Inspection

Before starting the diesel engine, following actions should be taken:

1. Top-up, oil level (reduction gear/turbo charger/governor/push rod)
2. Top-up level in hydraulic tank
3. Top-up engine oil level (auxiliary/MGE/DPE)
4. Check fresh cooling water level in expansion tanks of engines on deck (well cooling)
5. Check whether air pressure in starting air vessel is about 285 psi (if mounted)
6. Inspect three-way cocks of lube Oil and fuel filters.
7. Inspect fuel supply from fuel tanks, i.e. position of fuel cocks.
8. Check whether engine has previously been stopped with emergency stop button in control cabin or due to over-speed, if so, rectify.
9. Check alarm system. The control lamp should burn when the alarm system is put in service.
10. Open the valves on the hydraulic tank
11. Open the outboard valve(s)
12. Open suction and discharge valves of gland pump and cover pump, which are connected to the dredge pump (when mounted)
13. Open suction and discharge valve of cutter bearing flushing pump (if mounted)
14. Open air inlets.
15. Desecrate the pumps mentioned sub 12 and 13.
16. Desecrate engine-mounted fresh cooling water pump(s).
17. Desecrate fuel filters; pump in the meantime fuel in the system by means of a hand pump.
18. Pre-lubricate the engines with the hand pump (if mounted).
19. Top-up battery with distilled water.
20. Disconnect current of the electrically controlled hydraulic valves (the switch is on the control desk).
21. Start engine(s) by opening the valves for supply of compressed air. In case of electric starting motors, the start button is pushed.
22. When the engine starts, the speed has to be reduced to the minimum unloaded speed. Let the engine run warm during 5 minutes.
23. Drain water from air-compressor tank

Item	Qty.	Unit	Description of item needed
1.	1	li	Gear oil
2.	1	li	Hydraulic oil VG. 68
3.	1	li	Engine Oil SAE 40
19.	0.25	li	Electrolyte

Check immediately after engine starting

1. Oil pressure
2. Whether gland and cover pump deliver water to dredge pump.

This can be done:

a. By opening drain valves in discharge piping of pumps
b. By reading pressures on pressure gauges in control cabin

3. Check if the water of the dredge shaft sealing "liquidyne" (if mounted) always flows overboard (abt. 1 bar).
4. Whether flushing water is supplied to cutter shaft bearing.

Stopping the engine

1. Before stopping the engine, flush the dredge pump suction and discharge pipelines so as to avoid plugging.
2. The engine manufacturers strongly recommend to have run the engine at slow speed for some time to cool it, before stopping.
3. Put alarm out of action by pressing appropriate button on general alarm panel.

Greasing

1. Foreside wire tumbling sheaves
2. Ladder hoisting wire sheaves on the ladder
3. Ladder hoisting wire sheaves in the ladder gantry
4. Center of rotation of ladder
5. Swivel bend for discharge pipeline (if any)
6. Spud ram ball joint
7. Spud hoisting wire sheaves

Dredging Side

DAILY

1. Inspection of swing hoist wire
2. inspection of ladder hoist wire
3. Inspection of rest wire
4. Inspection of swing block assy
5. Inspection of spud wire

WEEKLY

6. Greasing of ladder hoist wire
7. Greasing of swing hoist wire
8. Greasing of spud wire
9. Inspection and cleaning of pneumatic lines
10. Draining of water from the electric air compressor
11. Inspection of sealing pump motor
12. Inspection and cleaning of suction and discharge pipes and dredge pump
13. Cleaning of cutter head and teeth
14. Inspection of shackles
15. Inspection of ladder pin
16. Inspection of sheave pin

17. Greasing of rest wire
18. Greasing of ladder sheer back stay
19. Greasing of swing block assembly
20. Greasing of cutter bearing and coupling
21. Greasing of ladder cable rollers
22. Greasing of spud sheave
23. Greasing of spud pulley

Parts and Supplies Needed:

Item	Qty.	Unit	Description of item needed
6.	1	kg	Grease (NLGI No. 2)
7.	2	kg	Grease (NLGI No. 2)
8.	0.5	kg	Grease (NLGI No. 2)
17.	0.5	kg	Grease (NLGI No. 2)
18.	1.5	kg	Grease (NLGI No. 2)
19.	0.2	kg	Grease (NLGI No. 2)
20.	1	kg	Grease (NLGI No. 2)
21.	0.6	kg	Grease (NLGI No. 2)
22.	0.2	kg	Grease (NLGI No. 2)
23.	0.2	kg	Grease (NLGI No. 2)

PM 2: Every 4 months (667 running hours)

Auxiliary Engine w/ generator

1. Perform PM 1
2. Check electrical parts/components
3. Check air filter, DC generator

Item	Qty.	Unit	Description of item needed
2a.	1	job	Magnetic conductor, cleaning
2b.	1	job	Circuit breaker, cleaning
2c.	1	job	Fuses, Cleaning
3.	1	job	Air filter, DC generator, cleaning

Main Engine w/ Generator

4. Perform PM 1
5. Check DC generator air filter, primary fuel filter, cooling sea water filter, sea water leak and turbo-charger air filter.
6. Perform engine change oil.
7. Check oil cooler
8. Check cooling sea water pump
9. Check induction motor

Item	Qty.	Unit	Description of item needed
5.	1	job	Clean all filters (air, fuel, sea water)
6a.	2	drums	Oil, engine SAE # 40

6b.	2	pcs	Filter, oil
7.	1	job	Oil cooler, cleaning
8a.	1	job	Impeller, cleaning
8b.	1	job	Ball bearing, 2pcs, cleaning
8c.	1	job	Coupling shaft, cleaning
9.	1	lot	Induction motor, cleaning

Dredge Pump Major Component and Winch System

10. Perform PM 1

Item	Qty.	Unit	Description of item needed
10.	7.7	kg	Grease (water and acid resistant)

11. Cleaning of Wavi Floats
12. Inspect and report corroded portion of cutter ladder, sea water and lube oil pipelines
13. Inspect the spud and report corroded parts

PM 3: Every 8 months (1334 running hours)

Auxiliary Engine w/ generator (AE)

1. Perform PM 1 and 2
2. Perform engine change oil.
3. Recondition 2 pcs fuel filter (primary/secondary)

Item	Qty.	Unit	Description of item needed
2a.	40	li	Oil, engine SAE 40, AE
2b.	2	pcs	Filter, oil, AE

Main Engine w/ Generator (MGE):

4. Perform PM 1 and 2
5. Check and replace defective 12 pcs thermometer device, if any
6. Replace sea water lines zinc anode
7. Check/adjust/re-torque Connecting Rod Bearing
8. Check/adjust/re-torque Main Bearing, valve clearance
9. Cleaning of fuel day tank
10. Reconditioning of Air starter (vane-leaf)

Item	Qty.	Unit	Description of item needed
4a.	2	drums	Oil, engine SAE # 40
4b.	2	pcs	Filter, oil
6.	4	pcs	Zinc anode

Dredge Pump Engine (DPE):

11. Reconditioning of oil pressure and water temperature sending unit

12. Cleaning of Fuel Day Tank
13. Reconditioning of cooling sea water pump Impeller
14. Reconditioning of 12 pcs Thermometer (intake/exhaust)
15. Reconditioning of 2 assy. DPE oil cooler
16. Replace zinc anode of reduction gear
17. Replace zinc anode of oil cooler

Item	Qty.	Unit	Description of item needed
16.	4	pcs	Zinc anode, reduction gear, DPE
17.	4	pcs	Zinc anode, oil cooler, DPE

Dredge Pump Major Component and Winch System

18. Changing of oil of the air compressor
19. Cleaning and greasing of sealing pump motor
20. Cleaning of pneumatic solenoid valves
21. Greasing of ladder winch pulley and recondition of winch brake
22. Inspection of dredge pump liner

Item	Qty.	Unit	Description of item needed
18a.	1	li	Oil, # 40
18b.	1	pc	Filter, oil
18c.	1	pc	Filter, fuel
19.	0.25	kg	Grease, NLGI No. 2
21.	0.5	kg	Grease, NLGI No. 2

PM 4: Every 12 months (2000 hours of operations)

Auxiliary Engine w/ generator

1. Perform PM 1, and 2
2. Replace fuel filter (primary/secondary)
3. Replace 2 pcs Battery 12v, 8D
4. Check, adjust, retightening of Main and Con Rod bearings
5. Replace zinc anode
6. Replace Mechanical seal for water pump
7. Recondition vane leaves for air starter
8. Replace air filter of turbo-charger
9. Reconditioning of Injector Tip
10. Calibration of Injection pump assy
11. Reconditioning of AC/DC generator
12. Replace bulbs and fuses of electric control panel

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40
1b.	2	pcs	Filter, oil
2.	2	pcs	Filter, fuel, (primary/secondary)
3.	2	pcs	Battery, 8D, system
5.	2	pcs	Zinc Anode

6.	1	kit	Seal, Water pump
8.	1	pc	Filter, air turbo-charger
10.	1	job	Injection pump, calibration
12a.	30	pcs	Bulb, 36v 2w, socket type
12b.	6	pcs	Fuse, 250v 10A, control panel

Main Engine w/ Generator

13. Drain/clean/refill fresh cooling water tank
14. Cleaning of fuel filter
15. Replace sea water lines zinc anode
16. Perform engine change oil

Item	Qty.	Unit	Description of item needed
13a.	25	li	Water, fresh
13b.	10	li	Coolant, engine
15.	4	pcs	Zinc anode
16a.	2	drums	Oil, engine SAE # 40
16b.	2	pcs	Filter, oil

Dredge Pump Engine

17. Perform Engine Change Oil
18. Drain/clean/refill fresh cooling water tank

Item	Qty.	Unit	Description of item needed
17a.	14	drums	Oil, engine SAE 40
17b.	1	job	Cleaning of 2pcs oil filter
18a.	200	li	Water, fresh
18b.	40	li	Coolant, engine

Dredge Pump Major Component and Winch System

18. Greasing of spud DC motor
19. Changing of oil of dredge pump bearing and winches
20. Reconditioning of steel cables
21. Cleaning of fuel day tank
22. Cleaning of fuel tank
23. Changing of rubber gasket, wavi float and discharge pipe
24. Changing of dredge pump liner (front & rear)
25. Changing of mouth ring

Item	Qty.	Unit	Description of item needed
18.	0.5	kg	Grease (water and acid resistant)
19.	80	li	Oil, gear 90
20.	1	job	Cable, reconditioning
21.	1	pc	Gasket, manhole
22.	1	pc	Gasket, manhole

23.	70	pcs	Gasket, rubber 16"Ø
24.	2	pcs	Liner, dredge pump
25.	1	pc	Ring, mouth

Paint the Entire Dredge

26. Painting of all decks, bunkhouses, pilot house, spud ladder, winch room, and engine room

Item	Qty.	Unit	Description of item needed
26a.	15	pails	Paint, marine red lead primer (1-coat)
26b.	5	pails	Paint, marine gray (1-coat)
26c.	10	pails	Paint, marine white (1-coat)
26d.	4	can	Epoxy, hardener
26e.	4	can	Epoxy, adhesive
26f.	30	pails	Paint, lacquer thinner
26g.	4	pcs	Brush, steel cup
26h.	4	pcs	Brush, steel
26i.	4	pcs	Roller, paint brush 12"
26j.	8	pcs	Brush, paint 4"
26k.	20	kg	Rags
26l.	4	pails	Paint remover
26m.	200	pcs	Sand paper #120
26n.	200	pcs	Sand paper #220

Other Accessories

27 Recondition of all onboard service pumps
28 Servicing of Air-conditioner units, if mounted
29 Recondition of all electric/electronic instrument

Item	Qty.	Unit	Description of item needed
27	1	lot	Service pumps, parts and service
28	1	lot	Air-conditioner unit, parts and service
29	1	lot	Electric/Electronic instrument, parts and service

PM 5: Every 1 year and 4 months (2667 hours of operation)

Auxiliary Engine

1. Perform PM 1, 2, and 3
2. Drain/clean/refill cooling fresh water tank

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40, AE
1b.	2	pcs	Filter, oil, AE

2a.	15	li	Water, fresh, AE
2b.	5	li	Coolant, engine, AE

Main Generator Engine

3. Perform PM 1, 2, and 3
4. Check governor lube oil, replace if necessary

Item	Qty.	Unit	Description of item needed
3a.	2	drums	Oil, engine SAE # 40
3b.	2	pcs	Filter, oil

Dredge Pump Engine

5. Perform PM 1, 2, and 3
6. Replace zinc anode of reduction gear
7. Replace zinc anode of oil cooler

Item	Qty.	Unit	Description of item needed
6.	4	pcs	Zinc anode, reduction gear
7.	4	pcs	Zinc anode, oil cooler

Dredge Pump Major Component and Winch System

8. Perform PM 3:

   a. Changing of oil of the air compressor
   b. Cleaning and greasing of sealing pump motor
   c. Cleaning of pneumatic solenoid valves
   d. Greasing of ladder winch pulley
   e. Inspection of dredge pump liner

Item	Qty.	Unit	Description of item needed
8a.	1	li	Oil, # 40
8b.	1	pc	Filter, oil
8c.	1	pc	Filter, fuel
8d.	0.25	kg	Grease NLGI No. 2, seal pump
8e.	0.5	kg	Grease NLGI No. 2, winch pulley

PM 6: Every 2 years (4000 hours of operation)

Auxiliary Engine

1. Perform PM 1, 2, 3, and 4
2. Replace fuel filter (primary/secondary)
3. Replace 2 pcs Battery 12v, 8D
4. Replace zinc anode
5. Replace Mechanical seal for water pump
6. Replace air filter of turbo-charger

7. Calibration of Injection pump assy.
8. Replace bulbs and fuses of electric control panel

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40
1b.	2	pcs	Filter, oil
2.	2	pcs	Filter, fuel, (primary/secondary)
3.	2	pcs	Battery, 8D, system
4.	2	pcs	Zinc Anode
5.	1	kit	Seal, Water pump
6.	1	pc	Filter, air turbo-charger
7.	1	job	Injection pump, calibration
8a.	30	pcs	Bulb, 36v 2w, socket type
8b.	6	pcs	Fuse, 250v 10A

Main Generator Engine (MGE)

9. Perform PM 1, 2, 3, and 4
10. Drain/clean/refill fresh cooling water tank
11. Replace sea water lines zinc anode

Item	Qty.	Unit	Description of item needed
9a.	2	drums	Oil, engine SAE # 40
9b.	2	pcs	Filter, oil
10a.	25	li	Water, fresh
10b.	10	li	Coolant, engine
11.	4	pcs	Zinc anode

Dredge Pump Engine (DPE)

12. Perform Engine Change Oil
13. Drain/clean/refill fresh cooling water tank
14. Replace zinc anode of reduction gear
15. Replace zinc anode of oil cooler

Item	Qty.	Unit	Description of item needed
12a.	14	drums	Oil, engine SAE 40
12b.	1	job	Cleaning of 2pcs oil filter
13a.	200	li	Water, fresh
13b.	40	li	Coolant, engine
14.	4	pcs	Zinc anode, reduction gear
15.	4	pcs	Zinc anode, oil cooler

Dredge Pump Major Component and Winch System

16. Greasing of spud DC motor
17. Changing of oil of dredge pump bearing
18. Changing of steel cables
19. Cleaning of fuel day tank

20. Cleaning of supply fuel tank
21. Changing of rubber gasket, wavi float and discharge pipe
22. Changing of dredge pump liner (front & rear)
23. Changing of mouth ring

Item	Qty.	Unit	Description of item needed
16.	0.5	kg	Grease (water and acid resistant)
17.	80	li	Oil, gear 90
18.	460	m	Cable, galvanized steel, 1 1/8"Ø
19.	1	pc	Gasket, manhole
20.	1	pc	Gasket, manhole
21.	70	pcs	Gasket, rubber 16"Ø
22.	2	pcs	Liner, dredge pump
23.	1	pc	Ring, mouth

Paint the Entire Dredge

24. Painting of all decks, bunkhouses, pilot house, spud ladder, winch room, and engine room

Item	Qty.	Unit	Description of item needed
24a.	15	pails	Paint, marine red lead primer (1-coat)
24b.	5	pails	Paint, marine gray (1-coat)
24c.	10	pails	Paint, marine white (1-coat)
24d.	4	can	Epoxy, hardener
24e.	4	can	Epoxy, adhesive
24f.	30	pails	Paint, lacquer thinner
24g.	4	pcs	Brush, steel cup
24h.	4	pcs	Brush, steel
24i.	4	pcs	Roller, paint brush 12"
24j.	8	pcs	Brush, paint 4"
24k.	20	kg	rags
24l.	4	pails	Paint remover

Other Accessories

25 Recondition of all onboard service pumps
26 Servicing of Air-conditioner units, if mounted
27 Recondition of all electric/electronic instrument

Item	Qty.	Unit	Description of item needed
25	1	lot	Service pumps, parts and service
26	1	lot	Air-conditioner unit, parts and service
27	1	lot	Electric/Electronic instrument, parts and service

XVIII. PM INTERVAL FOR ALL TYPES OF SUPPORT VESSEL, PDDP-CSD

PM 1: Walk-around Inspection (Daily/Weekly/Monthly)

Before starting the diesel engine, following actions shall be taken:

1. Top-up level in hydraulic tank
2. Top-up engine oil level
3. Check fresh cooling water level in expansion tanks of engine
4. Clean sea water filter
5. Inspect fuel supply from fuel tanks, i.e. position of fuel cocks.
6. Open the valves on the hydraulic tank
7. Check air cleaner
8. Check engine-mounted fresh cooling water pump
9. Top-up battery with distilled water.
10. When the engine starts, the speed has to be reduced to the minimum unloaded speed. Let the engine run warm during 5 minutes.

Item	Qty.	Unit	Description of item needed
1.	0.25	li	Oil, Hydraulic
2.	0.25	li	Oil, Engine SAE 40
9.	0.2	li	Electrolyte

Greasing

11. Greasing of Tail shaft
12. Greasing of propeller shaft bearing

Item	Qty.	Unit	Description of item needed
11.	1	lb.	Grease, Tail Shaft
12.	1	lb.	Grease, propeller shaft bearing

Check immediately after engine starting

13. Oil pressure
14. Water temperature
15. Ammeter
16. Hydraulic pressure

Stopping the engine

17. Have run the engine at slow speed for some time to cool it, before stopping.

PM 2: Every 4 months (667 running hours)

Main Engine

1. Perform PM 1
2. Check electrical parts/components

3. Perform engine change oil.
4. check cooling sea water pump

Item	Qty.	Unit	Description of item needed
3a	40	li	Oil, engine SAE 40
3b	2	pcs	Filter, oil
3c	1	pc	Filter, fuel

PM 3: Every 8 months (1334 running hours)

Main Engine

1. Perform PM 2
   - Check electrical parts/components
   - Perform engine change oil.
   - Check the cooling sea water pump
2. Clean air cleaner
3. Replace belts

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40
1b.	2	pcs	Filter, oil
1c.	1	pc	Filter, Fuel
3.	2	pcs	Belts, water pump

PM 4: Every 12 months (2000 hours of operations)

Main Engine

1. Perform PM 2
   - Check electrical parts/components
   - Perform engine change oil.
   - check cooling sea water pump
2. Replace Air Cleaner
3. Replace Fuel Filter

Item	Qty.	Unit	Description of item needed
1a	40	li	Oil, engine SAE 40
1b	2	pcs	Filter, oil
2	1	pc	Cleaner, air
3	1	pc	Filter, fuel

Paint the Entire Support Vessel

4. Painting of corroded hull, pilot house and mast

Item	Qty.	Unit	Description of item needed
4a.	2	gal	Paint, marine red lead primer (1-coat)

4b.	3	gal	Paint, anti-corrosive (3-coat)
4c.	2	gal	Paint, marine gray (2-coat)
4d.	2	gal	Paint, marine white (2-coat)
4e.	1	can	Epoxy, hardener
4f.	1	can	Epoxy, adhesive
4g.	10	gal	Paint, lacquer thinner
4h.	2	pcs	Brush, steel cup
4i.	2	pcs	Brush, steel
4j.	1	pcs	Roller, paint brush 12"
4k.	3	pcs	Brush, paint 4"
4l.	5	kg	rags
4m.	50	pcs	Sandpaper #120 and #220 (each)

PM 5: Every 1 year and 5 months (2667 hours of operation)

Main Engine

1. Perform PM 2 to 3
   - Check electrical parts/components
   - Perform engine change oil.
   - check cooling sea water pump

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40
1b.	2	pcs	Filter, oil
1c.	1	pc	Filter, fuel

2. Replace Defective battery

Item	**Qty.**	**Unit**	**Description of item needed**
2a.	2	pcs	Battery, 8D
2b.	4	pcs	Log, battery
2c.	4	pcs	Clamp, battery

PM 6: Every 2 years (4000 hours of operation)

Main Engine

1. Perform PM 2, 3, 4
2. Drain, clean and replace hydraulic oil in the tank
3. Drain, clean and replace cooling water in the tank
4. Drain and replace transmission gear oil
5. Changing of hydraulic cylinder oil seals
6. Changing of hydraulic hoses

Item	**Qty.**	**Unit**	**Description of item needed**
1a.	40	li	Oil, engine SAE 40
1b.	2	pcs	Filter, oil
1c.	1	pc	Filter, air

1d.	1	pc	Filter, fuel
2.	220	li	Oil, Hydraulic ISO VG.68
3a.	200	li	Fresh cooling water
3b.	100	li	Coolant, anti-corrosion
4.	18	li	Oil, gear, Transmission SAE 90
5a.	4	set	Seal, oil, hydraulic cylinder
5b.	1	pc	Filter, hydraulic
6a.	13	pcs	Hose, hydraulic, 1/2"Ø
6b.	6	pcs	Hose, hydraulic, 3/8"Ø
6c.	6	pcs	Hose, hydraulic, 1/4"Ø

Paint the Entire Support Vessel

7. Painting of corroded hull, pilot house and mast

Item	Qty.	Unit	Description of item needed
7a.	2	gal	Paint, marine red lead primer (1-coat)
7b.	3	gal	Paint, anti-corrosive (3-coat)
7c.	2	gal	Paint, marine gray (2-coat)
7d.	2	gal	Paint, marine white (2-coat)
7e.	1	can	Epoxy, hardener
7f.	1	can	Epoxy, adhesive
7g.	10	gal	Paint, lacquer thinner
7h.	2	pcs	Brush, steel cup
7i.	2	pcs	Brush, steel
7j.	1	pcs	Roller, paint brush 12"
7k.	3	pcs	Brush, paint 4"
7l.	5	kg	rags
7m.	50	pcs	Sandpaper #120 and #220 (each)

XIX. PM INTERVAL FOR ALL PINATUBO TYPE, CSD

PM 1: Walk-around Inspection (Daily/Weekly/Monthly)

Before starting the diesel engine, following actions shall be taken:

1. Top-up oil level (reduction gear/turbo charger/governor/push rod)
2. Top-up level in hydraulic tank
3. Top-up engine oil level (auxiliary/MGE/DPE)
4. Check fresh cooling water level in expansion tanks of engines on deck (well cooling)
5. Check whether air pressure in starting air vessel is about 185psi (if mounted)
6. Inspect three-way cocks on lub. Oil and fuel filters.
7. Inspect fuel supply from fuel tanks, i.e. position of fuel cocks.
8. Check whether engine has previously been stopped with emergency stop button in control cabin or due to over speed, if so, rectify.
9. Check alarm system. The control lamp should burn when the alarm system is put in service.
10. Open the valves on the hydraulic tank
11. Open the outboard valve(s)

12. Open suction and discharge valves of gland pump and cover pump, which are connected to the dredge pump (when mounted)
13. Open suction and discharge valve of cutter bearing flushing pump (if mounted)
14. Open air inlets
15. Drain water from air-compressor tank
16. Manual priming of reduction gear by means of hand pump (if mounted)
17. Top up DPE Rocker arm by oil SAE40
18. Pre-lubricate the engines with the hand pump (if mounted)
19. Top up and put the battery charging switch of the auxiliary set at "off" (if mounted).
20. When the engine starts, the speed has to be reduced to the minimum unloaded speed. Let the engine run warm during 5 minutes

Item	Qty.	Unit	Description of item needed
1.	1	li	Gear oil
2.	1	li	Hydraulic oil VG. 68
3.	1	li	Engine Oil SAE 40
19.	0.25	li	Electrolyte

Check immediately after engine starting

21. Oil pressure
22. Whether gland and cover pump deliver water to dredge pump.

    This can be done:
    a. By opening drain valves in discharge piping of pumps
    b. By reading pressures on pressure gauges in control cabin
23. Check if the water of the dredge shaft sealing "liquidyne" (if mounted) always flows overboard (abt. 1 bar).
24. Whether flushing water is supplied to cutter shaft bearing.

Stopping the engine

25. Before stopping the engine, flush the dredge pump suction and discharge pipelines so as to avoid plugging.
26. The engine manufacturers strongly recommend to have run the engine at slow speed for some time to cool it, before stopping.
27. Put alarm out of action by pressing appropriate button on general alarm panel.

Greasing

28. Foreside wire tumbling sheaves
29. Ladder hoisting wire sheaves on the ladder
30. Ladder hoisting wire sheaves in the ladder gantry
31. Center of rotation of ladder
32. Swivel bend for discharge pipeline (if any)
33. Spud ram ball joint
34. Spud hoisting wire sheaves

Item	Qty.	Unit	Description of item needed
28.	1	lb	Grease, NLGI no. 2
29.	1	lb	Grease, NLGI no. 2
30.	1	lb	Grease, NLGI no. 2
31.	1	lb	Grease, NLGI no. 2
32.	1	lb	Grease, NLGI no. 2
33.	1	lb	Grease, NLGI no. 2
34.	1	lb	Grease, NLGI no. 2

PM 2: Every 4 months (667 running hours)

Auxiliary Engine w/ generator

1. Perform PM 1
2. Check electrical parts/components
3. Top-up Battery solution level
4. Perform engine change oil.
5. Perform engine cleaning

Item	Qty.	Unit	Description of item needed
2a.	1	job	Magnetic conductor, cleaning
2b.	1	job	Circuit breaker, cleaning
2c.	1	job	Fuses, Cleaning
3.	1	li	Distilled water
4a.	2	pails	Oil, engine SAE # 40
4b.	1	pc	Filter, oil
4c.	1	pc	Filter, fuel
5.	1	kg	Rags

Dredge Pump Engine

6. Perform PM 1
7. Check oil cooler
8. Check sea water leak
9. Clean the air cleaner of turbo-charger
10. check cooling sea water pump
11. Perform engine change oil
12. Check solenoid valve harness
13. Perform engine cleaning

Item	Qty.	Unit	Description of item needed
7.	1	job	Oil cooler, cleaning
11a.	9	pails	Oil, engine SAE # 40
11b.	4	pcs	Filter, oil
11c.	1	pc	Filter, fuel
13.	1	kg	Rags

Dredge Pump Major Components and Winch System

14. Cleaning of dredge pump, suction and discharge pipes
15. Inspection of rubber sleeve of wavi floats
16. Check discharge pipe leaking
17. Greasing of swing block pulley
18. Greasing of ladder bolt and ladder pin
19. Greasing of winch pulley
20. Greasing of spud pulley and cables
21. Draining of water from the hydraulic oil tank

Item	Qty.	Unit	Description of item needed
17.	200	grams	Grease (water and acid resistant)
18.	200	grams	Grease (water and acid resistant)
19.	200	grams	Grease (water and acid resistant)
20.	400	grams	Grease (water and acid resistant)

PM 3: Every 8 months (1334 running hours)

Auxiliary Engine w/ generator

1. Perform PM 1 and 2
2. Replace worn-out belts of the alternator
3. Replace worn-out belt of the gland pump

Item	Qty.	Unit	Description of item needed
1a.	1	job	Magnetic conductor, cleaning
1b.	1	job	Circuit breaker, cleaning
1c.	1	job	Fuses, Cleaning
1d.	1	li	Distilled water
1e.	2	pails	Oil, engine SAE # 40
1f.	1	pc	Filter, oil
1g.	1	kg	Rags
1h.	1	pc	Filter, fuel
2.	2	pcs	Belts, Alternator
3.	1	pc	Belt, Gland pump

Dredge Pump Engine

4. Perform PM 1 and 2
5. Replace worn-out belt of gland pump

Item	Qty.	Unit	Description of item needed
4a.	1	job	Oil cooler, cleaning
4b.	9	pails	Oil, engine SAE # 40
4c.	4	pcs	Filter, oil
4d.	1	kg	Rags

4e.	1	pc	Filter, fuel
5.	1	pc	Belt, Gland pump

Dredge Pump Major Components and Winch System

6. Checking of hydraulic filter
7. Inspection of oil seal in the hydraulic cylinder of spud pulley

PM 4: Every 12 months (2000 hours of operations)

Auxiliary Engine w/ generator

1. Perform PM 1, 2
2. Replace fuel filter
3. Replace magnetic fuel filter
4. Replace air filter
5. Replace hydraulic filter

Item	Qty.	Unit	Description of item needed
1a.	1	job	Magnetic conductor, cleaning
1b.	1	job	Circuit breaker, cleaning
1c.	1	job	Fuses, Cleaning
1d.	1	li	Distilled water
1e.	2	pails	Oil, engine SAE # 40
1f.	1	pc	Filter, oil
1g.	1	kg	Rags
2.	1	pc	Filter, fuel
3.	1	pc	Filter, fuel, Magnetic
4.	1	pc	Filter, air
5.	1	pc	Filter, hydraulic

Dredge Pump Engine

6. Replace corroded zinc anode, DPE cooling system
7. Perform PM 1, 2
8. Replace fuel filter
9. Replace air filter
10. Replace liquidine seal kit
11. Replace current fuses

Item	Qty.	Unit	Description of item needed
6.	2	pcs	Zinc anode, cooling system
7a.	1	job	Oil cooler, cleaning
7b.	9	pails	Oil, engine SAE # 40
7c.	4	pcs	Filter, oil
7d.	1	kg	Rags
8.	4	pcs	Filter, fuel
9.	2	pcs	Filter, air
10.	1	kit	Seal, liquidine, DPE (6pcs)

11a.	2	pcs	Fuse, 80A
11b.	2	pcs	Fuse, 63A

Dredge Pump Major Components and Winch System

12. Inspection of flexible rubber hose (suction/discharge)
13. Check and replace defective dredge pump liner (front/back), if any
14. Check and replace defective ladder bolts, if any
15. Check and replace defective rubber gasket, if any
16. Check and replace defective hydraulic hose, if any
17. Check and replace defective steel cables, if any
18. Check and replace defective swing block pulley, if any
19. Reconditioning of dredge pump impeller
20. Turn stand pipe to 180^{O} & Replace worn-out discharge pipe elbow
21. Changing of cutter teeth
22. Check & replace defective hydraulic pipe elbow at the ladder
23. Check and replace defective spud pulley, if any
24. Check & replace defective oil seal of spud pulley hydraulic cylinder
25. Check and replace defective solenoid valves, if any

Item	Qty.	Unit	Description of item needed
20.	1	pc	Pipe, elbow, discharge, 18"Ø
21.	1	set	Teeth, cutter

Paint the Entire Dredge

26. Painting of entire hull

Item	Qty.	Unit	Description of item needed
26a.	2	gal	Paint, marine red lead primer (1-coat)
26b.	2	gal	Paint, anti-corrosive (3-coat)
26c.	1	gal	Paint, marine gray (2-coat)
26d.	1	can	Epoxy, hardener
26e.	1	can	Epoxy, adhesive
26f.	5	gal	Paint, marine thinner
26g.	1	pcs	Brush, steel cup
26h.	1	pcs	Brush, steel
26i.	1	pcs	Roller, paint brush 12"
26j.	1	pcs	Brush, paint 4"
26k.	5	kg	rags
26l.	30	pcs	Sand paper #120
26m.	30	pcs	Sand paper #220
26n.	1	gal	Solvent, industrial

27. Painting of main deck, bunkhouses,
pilot house, spud ladder, winch room, and engine room

Item	Qty.	Unit	Description of item needed
27a.	4	gal	Paint, marine red lead primer (1-coat)

27b.	6	gal	Paint, anti-corrosive (3-coat)
27c.	2	gal	Paint, marine gray (2-coat)
27d.	8	gal	Paint, marine white (2-coat)
27e.	1	can	Epoxy, hardener
27f.	1	can	Epoxy, adhesive
27g.	20	gal	Paint, marine thinner
27h.	2	pcs	Brush, steel cup
27i.	2	pcs	Brush, steel
27j.	2	pcs	Roller, paint brush 12”
27k.	2	pcs	Brush, paint 4"
27l.	10	kg	rags
27m.	30	pcs	Sandpaper #120 and #220 each
27n.	4	gal	Solvent, industrial

Other Accessories

28. Recondition of all onboard service pumps
29. Servicing of Air-conditioner units, if mounted
30. Recondition of all onboard electric/electronic instruments

Item	Qty.	Unit	Description of item needed
28	1	lot	Service Pumps, parts and service
29	1	lot	Air-conditioner units, parts and service
30	1	lot	Electric/Electronic Instruments, parts and service

PM 5: Every 1 year and 4 months (2667 hours of operation)

Auxiliary Engine w/ generator

1. Perform PM 1,2, and 3
2. Replace Battery

Item	Qty.	Unit	Description of item needed
1a.	1	job	Magnetic conductor, cleaning
1b.	1	job	Circuit breaker, cleaning
1c.	1	job	Fuses, Cleaning
1d.	1	li	Distilled water
1e.	2	pails	Oil, engine SAE # 40
1f.	1	pc	Filter, oil
1g.	1	kg	Rags
1h.	2	pcs	Belts, Alternator
1i.	1	pc	Belt, Gland pump
1j.	1	pc	Filter, Fuel
2a.	2	pcs	Battery, 8D
2b.	4	pcs	Clamp, battery
2c.	4	pcs	Log, battery
2d.	1	ft.	Cable, battery

Dredge Pump Engine

3. Perform PM 1,2, and 3

Item	Qty.	Unit	Description of item needed
3a.	1	job	Oil cooler, cleaning
3b.	9	pails	Oil, engine SAE # 40
3c.	4	pcs	Filter, oil
3d.	1	kg	Rags
3e.	1	pc	Belt, Gland pump
3f.	1	pc	Filter, Fuel

Dredge Pump Major Components and Winch System

4. Checking of hydraulic filter
5. Inspection of oil seal in the hydraulic cylinder of spud pulley

PM 6: Every 2 years (4000 hours of operation)

Auxiliary Engine w/ generator

1. Perform PM 1, 2, 3, and 4
2. Replace cooling water
3. Recondition Starter motor and replace defective parts
4. Recondition Alternator assy and replace defective parts

Item	Qty.	Unit	Description of item needed
1a.	1	job	Magnetic conductor, cleaning
1b.	1	job	Circuit breaker, cleaning
1c.	1	job	Fuses, Cleaning
1d.	1	li	Distilled water
1e.	2	pails	Oil, engine SAE # 40
1f.	1	pc	Filter, oil
1g.	1	kg	Rags
1h.	2	pcs	Belts, Alternator
1i.	1	pc	Belt, Gland pump
1j.	1	pc	Filter, fuel
1k.	1	pc	Filter, fuel, Magnetic
1l.	1	pc	Filter, air
1m.	1	pc	Filter, hydraulic
2a.	140	li	Water, distilled
2b.	60	li	Coolant, anti-corrosion
3a.	1	lot	Labor + materials, starter motor reconditioning
3b.	1	pc	Switch, solenoid, starter
4.	1	job	Labor + materials, Alternator Reconditioning

Dredge Pump Engine

5. Perform PM 1, 2, 3, and 4
6. Replace oil of the gear box
7. Replace hydraulic oil of the system
8. Recondition 2-assy. Starter motor and replace defective parts

Item	Qty.	Unit	Description of item needed
5a.	2	pcs	Zinc anode, cooling system
5b.	1	job	Oil cooler, cleaning
5c.	9	pails	Oil, engine SAE # 40
5d.	4	pcs	Filter, oil
5e.	1	kg	Rags
5f.	1	pc	Belt, Gland pump
5g.	4	pcs	Filter, fuel
5h.	2	pcs	Filter, air
5i.	1	kit	Seal, liquidine (6pcs)
5j.	2	pcs	Fuse, 80A
5k.	2	pcs	Fuse, 63A
6.	5	pails	Oil, Gear, (Hydrotur 100)
7.	4	drums	Oil, Hydraulic ISO VG.68
8a.	2	jobs	Labor + materials, DPE starter motor reconditioning
8b.	2	jobs	Switch, solenoid, reconditioning

Dredge Pump Major Components and Winch System

9. Perform PM 1, 2, 3, and 4
10. Changing of Hydraulic filter
11. Check and replace defective dredge pump liner (front/back), if any
12. Check and replace defective ladder bolts, if any
13. Check and replace defective rubber gasket, if any
14. Check and replace defective hydraulic hose, if any
15. Check and replace defective steel cables, if any
16. Check and replace defective swing block pulley, if any
17. Replace worn-out discharge pipe elbow and stand pipe
18. Changing of cutter teeth
19. Check & replace defective hydraulic pipe elbow at the ladder
20. Check and replace defective spud pulley, if any
21. Replace defective oil seal of spud pulley hydraulic cylinder
22. Check and replace defective solenoid valves, if any

Item	Qty.	Unit	Description of item needed
10.	1	pc	Filter, hydraulic
17a.	1	pc	Pipe, elbow, discharge, 18"Ø
17b.	1	pc	Pipe, stand, discharge, 18"Ø
18.	1	set	Teeth, cutter
21.	2	pcs	Seal, oil, hyd. Cylinder Spud pulley

Paint the Entire Dredge

23. Painting of entire hull

Item	Qty.	Unit	Description of item needed
23a.	2	gal	Paint, marine red lead primer (1-coat)
23b.	2	gal	Paint, anti-corrosive (3-coat)
23c.	1	gal	Paint, marine gray (2-coat)
23d.	1	can	Epoxy, hardener
23e.	1	can	Epoxy, adhesive
23f.	5	gal	Paint, marine thinner
23g.	1	pcs	Brush, steel cup
23h.	1	pcs	Brush, steel
23i.	1	pcs	Roller, paint brush 12"
23j.	1	pcs	Brush, paint 4"
23k.	5	kg	rags
23l.	30	pcs	Sand paper #120
23m.	30	pcs	Sand paper #220
23n.	1	gal	Solvent, industrial

24. Painting of main deck, bunkhouses, pilot house, spud ladder, winch room, and engine room

Item	Qty.	Unit	Description of item needed
24a.	4	gal	Paint, marine red lead primer (1-coat)
24b.	6	gal	Paint, anti-corrosive (3-coat)
24c.	2	gal	Paint, marine gray (2-coat)
24d.	8	gal	Paint, marine white (2-coat)
24e.	1	can	Epoxy, hardener
24f.	1	can	Epoxy, adhesive
24g.	20	gal	Paint, marine thinner
24h.	2	pcs	Brush, steel cup
24i.	2	pcs	Brush, steel
24j.	2	pcs	Roller, paint brush 12"
24k.	2	pcs	Brush, paint 4"
24l.	10	kg	rags
24m.	30	pcs	Sandpaper #120 and #220 each
24n.	4	gal	Solvent, industrial / Paint remover

Other Accessories

25 Recondition of all onboard service pumps
26 Servicing of Air-conditioner units, if mounted
27 Recondition of all onboard electric/electronic instruments

Item	Qty.	Unit	Description of item needed
25	1	lot	Service Pumps, parts and service
26	1	lot	Air-conditioner units, parts and service
27	1	lot	Electric/Electronic Instruments, parts and service

XX. PM INTERVAL FOR ALL TYPES OF SUPPORT VESSEL, PINATUBO-CSD

PM 1: Walk-around Inspection (Daily/Weekly/Monthly)

Before starting the diesel engine, following actions shall be taken:

1. Top-up level in hydraulic tank
2. Top-up engine oil level
3. Check fresh cooling water level in expansion tanks of engine
4. Inspect three-way cocks on fuel filters.
5. Check dashboard/panel gauges
6. Open the valves on the hydraulic tank
7. Open suction and discharge valves of gland pump
8. Open air inlets.
9. When the engine starts, the speed has to be reduced to the minimum unloaded speed.
10. Let the engine run warm during 5 minutes.
11. Check battery solution level and terminal
12. Greasing of hydraulic cylinder and propeller system

Item	Qty.	Unit	Description of item needed
1.	1	li	Oil, hydraulic # 10
2.	1	li	Oil, engine SAE 40
11.	1	li	Distilled water / electrolyte
12.	1	lb.	grease

Check immediately after engine starting

13. Oil pressure
14. Hydraulic pressure
15. Cooling water temperature
16. Ampere gauge
17. Fuel level indicator

Stopping the engine

18. Run the engine at slow speed for some time to cool it, before stopping.

PM 2: Every 4 months (667 running hours)

Two (2) Main Engine

1. Perform PM 1
2. Check electrical parts/components
3. Check air filter
4. Check Fuel filter
5. Check sea water leak
6. Perform engine change oil of two (2) engines
7. Check oil cooler
8. check pump of cooling sea water

9. Check heat exchanger clogged
10. Top up battery to level
11. General cleaning of engine room

Item	Qty.	Unit	Description of item needed
6a.	4	pails	Oil, engine SAE# 40
6b.	2	pcs	Filter, oil
10.	1	li	Distilled water/ electrolyte
11.	1	kg	rags

PM 3: Every 8 months (1334 running hours)

Two (2) Main Engine

1. Perform PM 1 and 2
2. Clean air cleaner
3. Replace belts, if necessary
4. Check / correct all onboard service pumps, if necessary
5. Check battery charging system and replace defective parts
6. Check/correct starter motor assy.

Item	Qty.	Unit	Description of item needed
1a.	4	pails	Oil, engine SAE# 40
1b.	2	pcs	Filter, oil
1c.	1	li	Distilled water / electrolyte
1d.	1	kg	Rags
3.	2	pcs	Belt, Alternator #35
5.	1	lot	Alternator assy. reconditioning, parts and service
6.	1	lot	Starter motor assy. reconditioning, parts and service

PM 4: Every 12 months (2000 hours of operations)

Two (2) Main Engine

1. Perform PM 1 to 2
2. Replace filters

Item	Qty.	Unit	Description of item needed
1a.	4	pails	Oil, engine SAE# 40
1b.	2	pcs	Filter, oil
1c.	1	li	Distilled water
1d.	1	kg	Rags
1e.	1	pail	Grease
2a.	2	pcs	Filter, fuel
2b.	2	pcs	Filter, hydraulic
2c.	2	pcs	Filter, air

Paint the entire Support Vessel

3. Painting of corroded hull, pilot house, mast and engine room

Item	Qty.	Unit	Description of item needed
3a.	3	gal	Paint, marine red lead primer (1-coat)
3b.	3	gal	Paint, anti-corrosive (3-coat)
3c.	2	gal	Paint, marine gray (2-coat)
3d.	2	gal	Paint, marine white (2-coat)
3e.	1	can	Epoxy, hardener
3f.	1	can	Epoxy, adhesive
3g.	10	gal	Paint, marine thinner
3h.	2	pcs	Brush, steel cup
3i.	2	pcs	Brush, steel
3j.	1	pcs	Roller, paint brush 12"
3k.	3	pcs	Brush, paint 4"
3l.	5	kg	rags
3m.	50	pcs	Sandpaper #120 and #220 (each)

PM 5: Every 1 year and 4 months (2667 hours of operation)

Two (2) Main Engine

1. Perform PM 1 to 3
2. Replace Defective battery
3. Clean air cleaner
4. Replace belts, if necessary
5. Check / correct all onboard service pumps, if necessary

Item	Qty.	Unit	Description of item needed
1a.	4	pails	Oil, engine SAE# 40
1b.	2	pcs	Filter, oil
1c.	1	li	Distilled water
1d.	1	kg	Rags
1e.	1	pail	Grease
2a.	2	pcs	Battery, 8D
2b.	4	pcs	Log, battery
2c.	4	pcs	Clamp, battery
2d.	1	pc	Voltage regulator, 24v

PM 6: Every 2 years (4000 hours of operation)

Two (2) Main Engine

1. Perform PM 1 to 4
2. Replace worn out alternator assy
3. Replace worn out starter motor
4. Drain, clean and replace hydraulic oil in the tank
5. Drain, clean and replace cooling water in the tank
6. Drain and replace transmission gear oil

Item	Qty.	Unit	Description of item needed
1a.	4	pails	Oil, engine SAE# 40
1b.	2	pcs	Filter, oil
1c.	1	li	Distilled water
1d.	1	kg	Rags
1e.	1	pail	Grease
1f.	2	pcs	Filter, fuel
1g.	2	pcs	Filter, hydraulic
1h.	2	pcs	Filter, air
1i.	2	pcs	Belt, Alternator #35
1j.	1	pc	Voltage regulator, 24v
2.	1	assy	Alternator, 24v, 90A
3.	1	assy	starter motor, 24v
4.	5	pails	Oil, Hydraulic ISO VG.68
5a.	200	li	Fresh cooling water
5b.	100	li	Coolant, anti-corrosion
6.	1	pail	Oil, gear SAE 90

Paint the entire Support Vessel

7. Painting hull, pilot house, Deck house and engine room

Item	Qty.	Unit	Description of item needed
7a.	3	gal	Paint, marine red lead primer (1-coat)
7b.	3	gal	Paint, anti-corrosive (3-coat)
7c.	2	gal	Paint, marine gray (2-coat)
7d.	2	gal	Paint, marine white (2-coat)
7e.	1	can	Epoxy, hardener
7f.	1	can	Epoxy, adhesive
7g.	10	gal	Paint, marine thinner
7h.	2	pcs	Brush, steel cup
7i.	2	pcs	Brush, steel
7j.	1	pcs	Roller, paint brush 12"
7k.	3	pcs	Brush, paint 4"
7l.	5	kg	rags
7m.	50	pcs	Sandpaper #120 and #220 (each)

8. Changing of Hydraulic hoses
9. Changing of hydraulic cylinder oil seals

Item	Qty.	Unit	Description of item needed
8a.	20	pcs	Hose, hydraulic, 1/2" Ø
8b.	1	pc	Hose, hydraulic, 3/4" Ø
8c.	1	pc	Hose, hydraulic, 1" Ø
9.	6	pcs	Seal, oil, hydraulic cylinder

XXI.PM INTERVAL FOR ALL VISAYAS TYPE, CSD

PM 1: Walk-around Inspection (Daily/Weekly/Monthly)

Before starting the diesel engine, following actions shall be taken

1. Top-up, oil level (reduction gear)
2. Top-up engine oil level (AE/MGE/DPE/PCE)
3. Check fresh cooling water level in expansion tanks of engines on deck (well cooling)
4. Check whether air pressure in starting air vessel is about 294 psi/20 ksca (if mounted)
5. Inspect three-way cocks on lub. Oil and fuel filters.
6. Inspect fuel supply from fuel tanks, i.e. position of fuel cocks.
7. Check whether engine has previously been stopped with emergency stop button in control cabin or due to over-speed, if so, rectify.
8. Check alarm system. The control lamp should burn when the alarm system is put in service.
9. Open the outboard valve(s)
10. Open suction and discharge valves of gland pump and cover pump, which are connected to the dredge pump (when mounted)
11. Open suction and discharge valve of cutter bearing flushing pump (if mounted)
12. Open air inlets.
13. Manual priming of reduction gear by means of hand pump (if mounted)
14. Top up DPE Rocker arm by oil SAE40
15. Pre-lubricate the engines with the hand pump (if mounted).
16. Top-up battery with Electrolyte
17. Disconnect current of the electrically controlled hydraulic valves (the switch is on the control desk).
18. Start engine(s) by opening the valves for supply of compressed air
19. When the engine starts, the speed has to be reduced to the minimum unloaded speed. Let the engine run warm during 5 minutes.
20. Drain water from air-compressor tank

Item	Qty.	Unit	Description of item needed
1.	1	li	Gear Oil
2.	1	li	Engine oil, SAE 40
14.	1	li	Oil, SAE 40
16.	1	li	Electrolyte

Check immediately after engine starting

21. Oil pressure
22. Whether gland and cover pump deliver water to dredge pump.

    This can be done:

    a. By opening drain valves in discharge piping of pumps
    b. By reading pressures on pressure gauges in control cabin

23. Check if the water of the dredge shaft sealing "liquidyne" (if mounted) always flows overboard (abt. 1 bar).
24. Whether flushing water is supplied to cutter shaft bearing.

Stopping the engine

25. Before stopping the engine, flush the dredge pump suction and discharge pipelines so as to avoid plugging.
26. The engine manufacturers strongly recommend to have run the engine at slow speed for some time to cool it, before stopping.
27. Put alarm out of action by pressing appropriate button on general alarm panel.

Dredge Pump Major Components and Winch System

DAILY

28. Inspection of swing hoist wire
29. inspection of ladder hoist wire
30. Inspection of rest wire
31. Inspection of swing block assy.
32. Inspection of spud wire

WEEKLY

33. Greasing of ladder hoist wire
34. Greasing of swing hoist wire
35. Greasing of spud wire
36. Inspection and cleaning of pneumatic lines
37. Draining of water from the electric air compressor
38. Inspection of sealing pump motor
39. Inspection and cleaning of suction and discharge pipes and dredge pump
40. Cleaning of cutter head and teeth
41. Inspection of shackles
42. Inspection of ladder pin
43. Inspection of sheave pin
44. Greasing of rest wire
45. Greasing of ladder sheer back stay
46. Greasing of swing block assembly
47. Greasing of cutter bearing and coupling
48. Greasing of ladder cable rollers
49. Greasing of spud sheave
50. Greasing of spud pulley

MONTHLY

51. Foreside wire tumbling sheaves
52. Ladder hoisting wire sheaves on the ladder
53. Ladder hoisting wire sheaves in the ladder gantry
54. Center of rotation of ladder
55. Swivel bend for discharge pipeline (if any)

56. Spud ram ball joint
57. Spud hoisting wire sheaves

Item	Qty.	Unit	Description of item needed
33.	1	kg	Grease, NLGI no. 2
34.	2	kg	Grease, NLGI no. 2
35.	0.5	kg	Grease, NLGI no. 2
44.	0.5	kg	Grease, NLGI no. 2
45.	1.5	kg	Grease, NLGI no. 2
46.	0.2	kg	Grease, NLGI no. 2
47.	1	kg	Grease, NLGI no. 2
48.	0.6	kg	Grease, NLGI no. 2
49.	0.2	kg	Grease, NLGI no. 2
50.	0.2	kg	Grease, NLGI no. 2
51.	0.5	kg	Grease, NLGI no. 2
52.	0.5	kg	Grease, NLGI no. 2
53.	0.5	kg	Grease, NLGI no. 2
54.	0.5	kg	Grease, NLGI no. 2
55.	0.5	kg	Grease, NLGI no. 2
56.	0.5	kg	Grease, NLGI no. 2
57.	0.5	kg	Grease, NLGI no. 2

PM 2: Every 4 months (667 running hours)

Auxiliary Engine

1. Perform PM 1

Main Generator Engine

2. Perform PM 1
3. Check & clean primary fuel filter, cooling sea water filter, sea water leak and turbo-charger air filter
4. Perform engine change oil
5. Check oil cooler
6. check cooling sea water pump

Item	Qty.	Unit	Description of item needed
3.	1	job	Clean all filters (air, fuel, sea water)
4a.	3	pails	Oil, engine SAE # 40
4b.	1	pc	Element, Filter, oil
4c.	1	job	Cleaning of oil filter, secondary

Dredge Pump Engine

7. Perform PM 1
8. Check & clean primary fuel filter, cooling sea water filter, sea water leak and turbo-charger air filter
9. Perform engine change oil

Item	Qty.	Unit	Description of item needed
8.	1	job	Clean all filters (air, fuel, sea water)
9a.	1	drum	Oil, engine SAE # 40
9b.	1	pc	Filter, Fuel

Dredge Pump Major Components and Winch System

10. Perform PM 1

PM 3: Every 8 months (1334 running hours)

Auxiliary Engine (AE)

1. Perform PM 1 and 2
2. Perform engine change oil.
3. Recondition of starter motor assy.

Item	Qty.	Unit	Description of item needed
2a.	2	pails	Oil, engine SAE 40
2b.	1	pc	Filter, oil

Main Generator Engine (MGE)

4. Perform PM 1 and 2
5. Check and replace defective 12 pcs thermometer device, if any
6. Replace fuel filter element
7. Replace all belts
8. Cleaning of secondary oil filter

Item	Qty.	Unit	Description of item needed
4a.	3	pails	Oil, engine SAE # 40
4b.	1	pc	Element, Filter, oil
6a.	1	pc	Element, filter, fuel, primary
6b.	1	pc	Element, filter, fuel, secondary
7a.	1	pc	Belt, water pump, #6480
7b.	2	pcs	Belt, fan, #8480

Dredge Pump Engine (DPE)

9. Perform PM 1 and 2
10. Perform engine change oil.
11. Cleaning of magnetic oil filter (primary/ secondary)
12. Recondition of water pump and replace defective shaft seal
13. Valve clearance adjustment
14. Check and replace busted pilot bulb 0.11A, if necessary
15. Check and replace defective Thermometer (intake/exhaust), if necessary

Item	Qty.	Unit	Description of item needed
10a.	1	drum	Oil, engine SAE 40
10b.	1	pc	Filter, Fuel

Dredge Pump Major Components and Winch System

16. Perform PM 1 and 2

PM 4: Every 12 months (2000 hours of operations)

Auxiliary Engine

1. Perform PM 1, 2
2. Check/replace defective parts of AC generator
3. Cleaning of heat exchanger
4. Check and replace defective parts of cooling water pump
5. Check and replace defective manifold thermometer (in/ex)
6. Check and replace defective parts of starter motor assy.

Main Generator Engine

7. Perform PM 1, 2
8. Replace air filter element
9. Check and replace defective parts of starter motor assy.
10. Check and replace defective parts of water pump assy
11. Check and replace defective parts of alternator assy
12. Perform valve clearance adjustment
13. Drain/clean/refill fresh cooling water tank

Item	Qty.	Unit	Description of item needed
7a.	3	pails	Oil, engine SAE # 40
7b.	1	pc	Element, Filter, oil
7c.	1	pc	Element, filter, fuel, primary
7d.	1	pc	Element, filter, fuel, secondary
7e.	1	pc	Belt, water pump, #6480
7f.	2	pcs	Belt, fan, #8480
8.	1	pc	Element, air filter
12.	1	set	Gasket, cylinder head
13a.	4	pails	Water, fresh
13b.	2	pails	Coolant, engine

Dredge Pump Engine

14. Perform PM 1, 2
15. Drain/clean/refill fresh cooling water tank
16. Cleaning of heat exchanger (oil and cooling fresh water)

Item	Qty.	Unit	Description of item needed
14.	1	Drum	Oil, engine SAE40

14b.	1	pc	Oil filter
15a.	200	li	Water, fresh
15b.	40	li	Coolant, engine

Dredge Pump Major Components and Winch System

18. Perform PM 1,2 and 3
19. Top up oil of winch gear mechanism
20. Change oil of air compressor
21. Top up oil of dredge pump reduction gear
22. Greasing of ladder winch pulley
23. Top up oil of dredge pump bearing
24. Cleaning of fuel day tank and fuel tank
25. Changing of suction discharge rubber gasket
26. Changing of Dredge pump liner
27. Changing of mouth ring
28. Changing of clutch lining and brake lining of winch mechanism
29. Changing of counter bearing
30. Changing of Dredge pump impeller

Item	Qty.	Unit	Description of item needed
19.	1	li	Oil 40, Gear, winch gear
20.	4	li	Oil 40, Gear, air-compressor
21.	1	li	Oil 40, Gear, Reduction gear
22.	1	lb	Grease
23.	1	li	Oil, gear #40, dredge pump bearing
25.	70	pcs	Gasket, rubber, 12"Ø, discharge pipe
26.	2	pcs	Liner, dredge pump
27.	1	pc	Ring, mouth
28a.	10	pc	Pad, clutch
28b.	10	pc	Pad, brake
29.	7	pcs	Bearing, counter
30.	1	pc	Impeller, dredge pump

Paint the entire Dredge

31. Painting of Pilot House, Deck House, "A" Frame, and Engine Room

Item	Qty.	Unit	Description of item needed
31a.	15	pails	Paint, marine red lead primer (1-coat)
31b.	5	pails	Paint, marine gray (1-coat)
31c.	10	pails	Paint, marine white (1-coat)
31d.	4	can	Epoxy, hardener
31e.	4	can	Epoxy, adhesive
31f.	30	pails	Paint, lacquer thinner
31g.	4	pcs	Brush, steel cup
31h.	4	pcs	Brush, steel
31i.	4	pcs	Roller, paint brush 12"
31j.	8	pcs	Brush, paint 4"
31k.	20	kg	rags

31l.	4	pails	Paint remover
31m.	1	pc	Chipping hammer
31n.	200	pcs	Sand paper # 120, 240

Other Accessories

32 Recondition of all on-board service pumps
33 Servicing of air-conditioner unit, if mounted
34 Recondition of all on-board electric/electronic instruments

Item	Qty.	Unit	Description of item needed
32	1	lot	All Service Pumps, Parts and Service
33	1	lot	Air-conditioner unit, parts and service
34	1	lot	Electric/Electronic instruments, parts and service

PM 5: Every 1 year and 4 months (2667 hours of operation)

Auxiliary Engine

1. Perform PM 1,2, and 3
2. Replace defective battery

Item	Qty.	Unit	Description of item needed
1a.	2	pails	Oil, engine SAE 40
1b.	1	pc	Filter, oil
2a.	2	pcs	Battery 2D
2b.	4	pcs	Log, battery terminal
2c.	4	pcs	Clamp, battery
2d.	1	pc	Voltage regulator 24v

Main Generator Engine

3. Perform PM 1,2, and 3
4. Replace defective battery

Item	Qty.	Unit	Description of item needed
3a.	3	pails	Oil, engine SAE # 40
3b.	1	pc	Element, Filter, oil
4a.	2	pcs	Battery 4D
4b.	4	pcs	Log, battery terminal
4c.	4	pcs	Clamp, battery
4d.	3	m	Cable, battery 1/2'
4e.	1	pc	Voltage regulator 24v

Dredge Pump Engine

5. Perform PM 1,2, and 3
6. Cleaning of magnetic oil filter (primary/ secondary)

7. Recondition of water pump and replace defective shaft seal
8. Valve clearance adjustment
9. Check and replace busted pilot bulb 0.11A
10. Check and replace defective Thermometer (intake/exhaust)

Item	Qty.	Unit	Description of item needed
5a.	1	Drum	Oil, engine SAE40, DPE
5b.	1	pc	Filter, oil

Dredge Pump Major Components and Winch System

11. Perform PM 1,2, and 3

PM 6: Every 2 years (4000 hours of operation)

Auxiliary Engine

1. Perform PM 1, 2, 3, and 4
2. Replace battery cable

Item	Qty.	Unit	Description of item needed
1a.	40	li	Oil, engine SAE 40, AE
1b.	1	pc	Filter, oil, AE
2.	3	m	Cable, battery 1/2", AE

Main Generator Engine

3. Drain/clean/refill fresh cooling water of radiator
4. Perform PM 1, 2, 3, and 4

Item	Qty.	Unit	Description of item needed
3a.	4	pails	Fresh cooling water
3b.	2	pails	Coolant, anti-corrosion, MGE
3c.	2	pcs	Hose, Radiator, upper/lower, MGE
3d.	1	pc	Cap, Radiator, MGE
4a.	2	pails	Oil, engine SAE # 40, MGE
4b.	1	pc	Element, Filter, oil, MGE

Dredge Pump Engine

5. Perform PM 1, 2, 3, and 4
6. Drain/clean/refill fresh cooling water tank
7. Cleaning of heat exchanger (oil and cooling fresh water)

Item	Qty.	Unit	Description of item needed
5a.	1	Drum	Oil, engine SAE40, DPE
5b.	1	pc	Oil Filter

6a.	200	li	Water, fresh, DPE
6b.	40	li	Coolant, engine, DPE

Dredge Pump Major Components and Winch System

8. Perform Pm 1 to 4
9. Change oil of winch gear mechanism
10. change oil of air compressor
11. change oil of dredge pump reduction gear
12. Changing oil of dredge pump bearing
13. Replace defective discharge pipe gaskets
14. Replace Dredge Pump Liner
15. Replace Ring Mouth
16. Replace worn out parts of winch system
17. Replace worn out Dredge pump impeller blade

Item	Qty.	Unit	Description of item needed
9.	40	li	Oil, gear, SAE 40, Winch gear mechanism
10.	4	li	Oil 40, air-compressor
11.	60	li	Oil, gear, SAE 40, DP reduction gear
12a.	2	lb	Grease
12b.	60	li	Oil, gear, SAE 40, DP bearing
13.	70	pcs	Gasket, rubber, 12"Ø, discharge pipe
14.	2	pcs	Liner, dredge pump, front/rear
15.	1	pc	Ring, mouth
16a.	10	pc	Pad, clutch
16b.	10	pc	Pad, brake
16c.	7	pcs	Bearing, counter
17.	1	assy	Blade, Impeller, dredge pump

Paint the Entire Dredge

18. Painting of Pilot House, Deck House, "A" Frame, and Engine Room

Item	Qty.	Unit	Description of item needed
18a.	15	pails	Paint, marine red lead primer (1-coat)
18b.	5	pails	Paint, marine gray (1-coat)
18c.	10	pails	Paint, marine white (1-coat)
18d.	4	can	Epoxy, hardener
18e.	4	can	Epoxy, adhesive
18f.	30	pails	Paint, lacquer thinner
18g.	4	pcs	Brush, steel cup
18h.	4	pcs	Brush, steel
18i.	4	pcs	Roller, paint brush 12"
18j.	8	pcs	Brush, paint 4"
18k.	20	kg	rags, all decks
18l.	4	pails	Paint remover
18m.	1	pc	Chipping hammer
18n.	200	pcs	Sand paper # 120, 240

Other Accessories

19 Recondition of all on-board service pumps
20 Servicing of air-conditioner unit, if mounted
21 Recondition of all on-board electric/electronic instruments

Item	Qty.	Unit	Description of item needed
19	1	lot	All Service Pumps, Parts and Service
20	1	lot	Air-conditioner unit, parts and service
21	1	lot	Electric/Electronic instruments, parts and service

XXII. SOURCE OF FUNDS

Funds shall be charged to Maintenance and Other Operating Expenses (MOOE) of the Bureau of Equipment.

N.B.: As to the execution of the maintenance work and the way of acting in case of failures and replacement of parts, please refer to the relevant instruction in this CSD-PMM and the usage of corresponding forms prescribed herein.

-End-

Annex "B"

Republic of the Philippines
Department of Public Works and Highways
BUREAU OF EQUIPMENT
Manila

PM PRE-APPROVED WORK ORDER

NAME OF DREDGE:		ENGINE MAKE & MODEL	DPWH NO.	Date of ARE	Date Started	Date Completed	NATURE OF WORK (PM Interval)
CAPACITY:		**LABOR**			MECHANIC/ ELECTRICIAN/ WELDER/ SERVICEMAN		WORK ORDER NO. / DATE
UNIT SERIAL NO.:							
LOCATION:		Rate / Hour	Service Hours	COST	NAME		

Item No.	WORK DESCRIPTION	Rate / Hour	Service Hours	COST	NAME

PARTS / SUPPLIES NEEDED

Item No.	Qty.	Unit	ITEM DESCRIPTION (DPR: date)	Part No.	Estimated Cost	%R
			SUMMARY OF MAINTENANCE EXPENSES:			
			2015			
			2016			
			2017		**TOTAL:**	

A C K N O W L E D G M E N T

This is to acknowledge that Materials, Parts, Oil and lubricants listed above shall be taken from BOE-MOOE. Maintenance services shall be done by Crew onboard and concerned EMD personnel, unless specified under LOT category which require Parts and Servicing from accredited private shop or supplier.

HEAD OF IMPLEMENTING OFFICE

PREPARED BY:

JOVALE E. DELGADO
BOE Inspector

CHECKED & VERIFIED BY:

VICTOR J. JAVIER
Chief, Maintenance and Dry-docking Service Section

RECOMMENDING APPROVAL:

FERDINAND R. FUGABAN
Chief, Floating Equipment Division

APPROVED:

TORIBIO NOEL L. ILAO
Director IV, Bureau of Equipment

PARTS/SUPPLIES P
OIL/ LUBE
LABOR
TOTAL

REMARKS:

Annex "C"

Republic of the Philippines

Department of Public Works and Highways

DPWH Regional Office No. ____

(Implementing Office)

PM MAIN WORK ORDER

NAME OF DREDGE:		ENGINE MAKE & MODEL	DPWH NO.	Date of ARE	Date Started	Date Completed	NATURE OF WORK (PM Interval)
CAPACITY:		**LABOR**			MECHANIC/ ELECTRICIAN/ WELDER/ SERVICEMAN		
UNIT SERIAL NO.:							WORK ORDER NO. / DATE
LOCATION:		Rate / Hour	Service Hours	COST	NAME		

Item No.	**WORK DESCRIPTION**
	Copy furnished:
	BOE, Manila

PARTS / SUPPLIES NEEDED

Item No.	Qty.	Unit	ITEM DESCRIPTION (DPR: date)	Part No.	Estimated Cost	%R
	SUMMARY OF MAINTENANCE EXPENSES:					
	2015					
	2016					
	2017					
				TOTAL:		

REQUESTED BY:

Dredge Master III

RECOMMENDING APPROVAL:

Chief, Equipment Management Division

APPROVED:

Regional Director

PARTS/SUPPLIES	P
OIL/ LUBE	
LABOR	
TOTAL	

CERTIFIED WORK ACCOMPLISHED:

Dredge Master III

REMARKS:

Materials, Parts, Oil and lubricants needed shall be taken from BOE-MOOE and maintenance shall be done by the Dredge Crew onboard and concerned EMD personnel. Unless specified under LOT category which require Parts and Servicing from accredited supplier.

DPWH REGIONAL OFFICE NO. ____
(Implementing Office)

Annex "D"

Date

MEMORANDUM

FOR: **TORIBIO NOEL L. ILAO**
BOE Bureau Director

Attention: **FERDINAND R. FUGABAN**
Chief, Floating Equipment Division

SUBJECT: **(e.g.: Equipment Deadline Order/Request for Corrective Maintenance)**

This pertains to the above-mentioned subject wherein the equipment listed hereunder is hereby requested to be deadlined/repaired and the following Corrective Measures be immediately implemented to avoid loss of life, damage to property and public service detriment, to wit:

Equipment (type) _____ Make: _____ Model: _____
DPWH Number: _____ Date of ARE: _____ Unit Serial No.: _____
Engine (Make) _____ Engine Serial No.: _____
Hourmeter Rdg.: _____ Latest PM Performed: _____ Date: _____
Place of Inspection: _____
FINDINGS: _____
_____
Source of Failure: _____
_____

Proposed Corrective Maintenance:

Item no.	WORK DESCRIPTION	Qty.	Unit	PARTS/SUPPLIES NEEDED	ESTIMATED COST

For the Bureau Director's information and appropraite action.

_____
Dredge Master III / End-user

NOTED:

_____
Head of Implementing Office

Annex "E"

Republic of the Philippines
Department of Public Works and Highways
BUREAU OF EQUIPMENT
Manila

CM PRE-APPROVED WORK ORDER

NAME OF DREDGE:		ENGINE MAKE & MODEL	DPWH NO.	Date of ARE	Date Started	Date Completed	NATURE OF WORK (PM Interval)	
CAPACITY:		**LABOR**			**MECHANIC/ ELECTRICIAN/ WELDER/ SERVICEMAN**			
UNIT SERIAL NO.:		Rate / Hour	Service Hours	COST	NAME		WORK ORDER NO.	DATE
LOCATION:								

Item No.	WORK DESCRIPTION	PARTS / SUPPLIES NEEDED									
		Item No.	Qty.	Unit	ITEM DESCRIPTION (DPR: date)	Part No.	Estimated Cost	FAILURE			%R
								Mode	Mechanism	End Effect	
	A C K N O W L E D G M E N T										
	This is to acknowledge that Materials, Parts, Oil and lubricants listed above shall be taken from BOE-MOOE. Maintenance services shall be done by Crew onboard and concerned EMD personnel, unless specified under LOT category which require Parts and Servicing from accredited private shop or supplier.										
					SUMMARY OF MAINTENANCE EXPENSES:						
					2015						
					2016						
					2017						
	HEAD OF IMPLEMENTING OFFICE										

PREPARED BY:

JOVALE E. DELGADO
BOE Inspector

CHECKED & VERIFIED BY:

VICTOR J. JAVIER
Chief, Maintenance and Dry-docking Service Section

RECOMMENDING APPROVAL:

FERDINAND R. FUGABAN
Chief, Floating Equipment Division

APPROVED:

TORIBIO NOEL L. ILAO
Director IV, Bureau of Equipment

PARTS/SUPPLIES
OIL/ LUBE
LABOR
TOTAL

REMARKS:

Republic of the Philippines

Department of Public Works and Highways

DPWH Regional Office No. ____

(Implementing Office)

Annex "F"

CM MAIN WORK ORDER

NAME OF DREDGE:	ENGINE MAKE & MODEL	DPWH NO.	Date of ARE	Date Started	Date Completed	NATURE OF WORK (PM Interval)

CAPACITY:		**LABOR**			**MECHANIC/ ELECTRICIAN/ WELDER/ SERVICEMAN**	WORK ORDER NO.	DATE
UNIT SERIAL NO.:		Rate / Hour	Service Hours	COST	NAME		
LOCATION:							

Item No.	WORK DESCRIPTION											
		PARTS / SUPPLIES NEEDED										
		Item No.	Qty.	Unit	ITEM DESCRIPTION (DPR: __date__)	Part No.	Estimated Cost	FAILURE			%R
								Mode	Mechanism	End Effect	
	Copy furnished:										
	BOE, Manila										
					SUMMARY OF MAINTENANCE EXPENSES:						
					2015						
					2016						
					2017						

Page 1 of

REQUESTED BY:

_____

Dredge Master III

RECOMMENDING APPROVAL:

_____

Chief, Equipment Management Division

APPROVED:

_____

Regional Director

PARTS/SUPPLIES P

OIL/ LUBE

LABOR

TOTAL

CERTIFIED WORK ACCOMPLISHED:

_____

Dredge Master III

REMARKS:

Materials, Parts, Oil and lubricants needed shall be taken from BOE-MOOE and maintenance shall be done by the Dredge Crew onboard and concerned EMD personnel. Unless specified under LOT category which require Parts and Servicing from accredited supplier.

REQUEST FOR POST-REPAIR INSPECTION

Annex "G"

_____
Date

ENGR. _____
Chief, Equipment Management Division
This Region

Sir:

This pertains to the repair made by *(name of private shop)* with postal address at *(exact address of private shop)* on the dredge (*name of dredge*) presently located at *(exact location of the dredge)* consisting of the following Materials, Parts and some Work Activities, to wit:

Item #	QTY.	UNIT	PARTS SUPPLIED/INSTALLED	FAILURE MODE	OR/CR #	DATE	UNIT COST	TOTAL COST

Relative hereto, may I respectfully request your team to conduct a Post-Repair Inspection on the said dredge for the above-mentioned Materials, Spare Parts and other Work Activities at your most convenient time.

Further, we are pleased to conduct an actual operation of the dredge to have you attest its functional condition, reliability, and environmental compliant.

For your information and appropriate action.

_____
Dredgemaster III

ASSIGNMENT ORDER

_____
Date

TO: _____
Regional Equipment Inspector
This Region

You are hereby directed to inspect and conduct equipment operation test regarding the Emergency Maintenance made on the above-mentioned Dredge and shall promptly submit to this Office your Post-Repair Inspection Report (PRIR), Waste Material and Disposal Report (WMADR) and Inspection and Acceptance Report (IAR), taking into consideration the existing accounting and auditing rules and regulations.

_____
Chief, Equipment Management Division

NOTED:

_____
Regional Director

DPWH Regional Office No. ____

(Implementing Office)

Annex "H"

Post-Repair Inspection Report (PRIR)

DREDGE NAME	WORK DESCRIPTION OF REPAIRED SYSTEM or COMPONENT	SERIAL NO. (if any)	DPWH NO.	Date of Repair	WORK ORDER NO.	DATE

ASSIGNED TO				**NAME & ADDPRESS OF REPAIR SHOP/STORE:**							REQUESTED BY:
DATE OF PAR											
ITEM #	QTY.	UNIT	PARTS SUPPLIED/INSTALLED (PR: date)	PART NO.	OR / CR No.	DATE	COST	Failure Mode	%R		Dredgemaster III
											INSPECTED BY:
											Equipment Inspector
											Recommending Approval:
											Chief, Equipment Management Division
											APPROVED:
						TOTAL:					Regional Director
				SUMMARY OF EXPENSES FOR MAINTENANCE & REPAIR:							ACKNOWLEDGEMENT:
	Copy furnished:			C.Y. 2012-							I hereby acknowledge that the above components/materials/parts was installed.
				C.Y. 2013-							
		BOE Manila		C.Y. 2014-							
				C.Y. 2015-							
				C.Y. 2016-							Dredgemaster III

Annex "I"

BUREAU OF EQUIPMENT

Floating Equipment Division

Manila

HISTORY OF MAINTENANCE

DREDGE NAME:							SIZE AND CAPACITY:	MAKE & MODEL:		Year Acquired	SOURCE of FUNDS		DPWH NO.:		ACQUISITION COST:
AREA OF OPERATION:							DPE SNO:	MGE SNO:		AE SNO:		REGION:	BOE-PAR NO.		DATE OF PAR:
							END-USER:	REG'L DIRECTOR:							
WORK ORDER		INVOICE / PURCHASE ORDER			MATERIALS USED					FAILURE			Serviceman assigned	Service Hours	% R	REMARKS
No.	Date	No.	Date	SUPPLIER	QTY	UNIT	DESCRIPTION	PART NO.	TOTAL COST	Mode	Mechanism	End Effect				(Status of Disposal)
							TOTAL COST :									

Prepared By:

JOVALE E. DELGADO

Engineer III

Checked and Verified By:

FERDINAND R. FUGABAN

Chief, Floating Equipment Division

NOTED:

TORIBIO NOEL L. ILAO

Director IV, Bureau of Equipment

Annex "J"

Implementing Office

DATE: _____

MONTHLY CHECKLIST FOR CUTTER SUCTION DREDGE

DREDGE NAME: _____ MAKE & MODEL: _____

DPWH NO.: _____ ENGINE SERIAL NO.: _____

LOCATION: _____ HOURMETER READING: _____

PARTICULARS	FINDINGS	REMARKS	PARTICULARS	FINDINGS	REMARKS
A. HULL:			**F. TANK:**		
a. Fender, Half-round			a. Ballast (salt water balancer)		
b. Fender, Split-pipe			b. Fresh water tank		
c. Frame, Bottom Hull			c. Fuel tank		
d. Frame, Side Shell			d. Hydraulic tank		
e. Head, buld			e. Lubrication oil (Dredge Pump)		
f. Plate, AFT			f. Sump, LO (DPE)		
g. Plate, Bottom Hull			**G. SUPPLY PIPELINES:**		
h. Plate, Forward			a. Elbows, Tees & Fussets		
i. Plate, Portside			b. Gate valves		
j. Plate, Starboard			c. Heat Exchanger		
k. Paint			d. Sea water lines		
l. Zinc Anodes, Hull			e. Fresh water lines		
B. HATCH & COAMING:			f. Fuel lines		
a. Bunkhouse			g. Hydraulic oil lines		
b. Engine Room			h. Gear Oil lines		
c. Hold / Storage room			**H. SUPPLY PUMPS:**		
d. Main Deck			a. Ballast Pump		
e. Mess Room			b. Bilge Pump		
f. Pilot House			c. Cooling Fresh Water Pump		
g. Toilet			d. Sea water pump		
C. DREDGING SIDE:			e. Fuel Transfer Pump		
a. Hose, Flexible Rubber			f. Lubrication Oil Pump		
b. Joint, Expansion			g. Service Pump		
c. Liner, Back			**I. DRIVE MOTORS:**		
d. Liner, Front			a. Motor for Cutter		
e. Oil seal, dredge pump			b. Motor for Ladder Winch		
f. Packing gland			c. Motor for Spud		
g. Impeller			d. Motor for Swing Winch		
h. Sleeve			**J. MACHINERY SIDE:**		
i. Pipe, Suction			a. Air Compressor		
j. Pipe, Discharge			b. Engine, Auxiliary Generator		
k. Pipe, Floater			c. Engine, Dredge Pump		
D. MAIN DECK:			d. Engine, Main Generator		
a. Plate, Main Deck			e. Gear, Reduction		
b. Ladder for crew			f. Generator, Auxiliary		
c. Deck House Plates			g. Generator, Main		
d. Engine Room					
e. Winch Room			**K. ELECTRICAL SIDE:**		
f. Floor, winch room			a. Panels (generator/Feeder)		
g. Horn cleats			b. Breakers		
h. Manhole covers			c. Fuses		
i. Mooring bitts			d. Electrical wirings		
j. Paint			e. Lighting Fixtures		
k. Stiffener			f. Magnetic Contactor		
l. Towing bitts			g. Battery		
E. SUPER STRUCTURE:			**L. CRANE AND HOIST:**		
a. Steel Columns			a. Jib Crane		
b. Steel Trusses			b. Winch / Hoist		
c. C-Purlins			c. Chain block		

PARTICULARS	FINDINGS	REMARKS	PARTICULARS	FINDINGS	REMARKS
M. PILOT HOUSE:			**Q. CUTTER:**		
a. Air-conditioning system			a. Bearings		
b. Ceiling			b. Head		
c. Control panel			c. Teeth		
d. Dashboard			**R. "A" FRAME:**		
e. Electrical System			a. Anchors		
f. Flooring			b. Base		
g. Glass			c. Bushing		
h. Hourmeter			e. Cable Roller		
i. Interior wall			f. Frame		
j. Ladders and Rails			g. Liner		
k. Mast			h. Propeller		
l. Operation levers			i. Reduction Gear		
m. Operation Manual			**S. CABLES AND SLINGS:**		
n. Safety Gauges/instruments			a. Anchor sling		
o. Winch control levers			b. Ladder swing (horizontal)		
p. Windshield			c. Ladder swing (vertical)		
N. BUNK HOUSE:			d. Spud Cylinder, L/R		
a. Air conditioning system			**T. SPUD:**		
b. Beds			a. Cylinder		
c. Cabinets			b. Frame and Ladder		
d. Ceilings			c. Keeper		
e. Flush Door			d. Ring		
f. Interior Wall			e. Roller		
g. Kitchen			**U. BALANCE in TANK (%):**		
h. Lightings & Wirings			a. FUEL		
i. Mess Room			b. GEAR OIL		
j. Toilets			c. GREASE		
k. Windows			d. HYDRAULIC OIL		
O. NAVIGATIONAL EQUIPMENT:			e. LUBE OIL		
a. Visual Signals			f. WATER TANK		
b. Navigation Lights			**V. SAFETY:**		
c. Warning and Safety Devices			a. Fire Fighting Equipment		
d. Working Lights			b. First Aid Kit		
P. UPPER DECK:			c. Personal Protective Eqpt		
a. Safety Railings			d. Certificate of Fitness for Purpose		
b. Plate, Floorings			e. Environment Clearance Certificate		
c. Mushroom vents, Fans, etc.			**W. OTHERS (Pls. specify):**		
d. Ladder for crew			a.		
e. Plate, Deck House			b.		
			c.		

OBSERVATION:

RECOMMENDATION:

LEGEND:
5 - GOOD
4 - FAIR
3 - POOR (FOR REPAIR)
2 - CROP-OUT & RENEW
1 - MISSING
NA - NOT APPLICABLE

Inspected By:

1

2

3

Checked & Submitted By:

Dredge Master III

Concurred:

Chief, EMD

N O T E D :

Regional Director

Annex "K"

BUREAU OF EQUIPMENT

Manila

PM Sticker Compliance Guide CY-

Name of Dredge:	DPWH No.:	Location:	CY-2017:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	REMARKS
			PM STAGE SCHEDULE:													
			PM PERFORMED:													
			CY-2018:	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**REMARKS**
			PM STAGE SCHEDULE:													
			PM PERFORMED:													

Status: A- Idle, Ready to operate
B- Operational
C- Under Corrective Maintenance

TORIBIO NOEL L. ILAO
Director IV, Bureau of Equipment