M.O.G.E.

MPRL E&P

Environmental Monitoring Report

for Redevelopment and Enhanced Oil Recovery (EOR) Programme

October 2021 – March 2022

MPRL E&P Pte Ltd.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

Acronym	Definition
ALARM	Advancing Life and Regenerating Motherland
ALARP	As Low as Reasonably Practicable
API	American Petroleum Institute
ASRs	Air Sensitive Receivers
BMI	Body Mass Index
CSR	Corporate Social Responsibility
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EOR	Enhanced Oil Recovery
EPA	United States Environmental Protection Agency
FOM	Field Operations Manager
GAP	Good Agricultural Practices
GOCS	Gas and Oil Collection Station
GoCs	Group of Companies
HSE	Health, Safety and Environment
HSEO	Health, Safety and Environment Officer
IFC	International Finance Corporation
ISO	International Organization for Standardization
JSA	Job Safety Analysis
KAP	Knowledge, Attitude and Practice
LPG	Liquefied Petroleum Gas
MEDEVAC	Medical Evacuation
MFO	Mann Field Office
MOGE	Myanma Oil and Gas Enterprise
NDWG	National Drinking Water Guidelines
NEBOSH	National Examination Board in Occupational Safety and Health
NEQEG	National Environmental Quality (Emission) Guidelines
NSRs	Noise Sensitive Receivers
OGM	Operational Grievance Mechanism
OHSAS	Occupational Health and Safety Assessment Series

Acronym	Definition
PME	Powered Mechanical Equipment
PPE	Planning and Production Engineering
RE	Reservoir Engineering
RTA	Road Traffic Accident
SCBA	Self-contained Breathing Apparatus
SOP	Standard Operating Procedure
SP	Special Project
UN	United Nations
VDC	Village Development Committee
WBG	World Bank Group
WHO	World Health Organization

1. Executive Summary

MPRL E&P is a leader in the upstream energy sector in both the onshore and offshore regions of Myanmar. Since its establishment in 1996, MPRL E&P has amassed over a decade of experience and a solid proven track record within the oil and gas sector.

At MPRL E&P, we conduct business to the highest ethics, legitimacy, and transparency standards, guided by a clear sense of social and environmental responsibility. We believe the growth of our organization is dependent on the empowerment of our employees. We strive to develop a thriving environment ensuring employees become involved in a process of continuous improvement.

This fourth environmental monitoring report covers the activities and progress of the performance of environmental implementation and monitoring during the six months from October 2021 to March 2022. It includes all the data from the monitoring activities, the progress of the environmental measures under the Environmental Management Plan (EMP), correct actions based on comments from ECD, and challenges in actual operations. EMP together with its Eight sub-plans are implemented as per schedule.

Key Highlights within the monitoring periods (October 2021 to March 2022)

Environmental Activities

- MPRL E&P submitted the notification letter of the Fourth Environmental Monitoring Survey Plan, our reference MPRL E&P/Mann/LET-123/2021 dated 23 June 2021, was postponed due to the political crisis, COVID-19 pandemic situation, and the current unforeseeable circumstances, and report to ECD will be delayed for Twelve (12) months to April 2022.
- As of March 2022, the monitoring activities of the air quality, noise quality, soil quality, groundwater quality, and surface water quality which are monitored by third-party cannot be conducted due to the recent security conditions in the field and COVID-19 related restrictions.
- During the monitoring period, regular self-monitoring activities for the Drinking Water Quality, Discharged Water from the Base Camp, Domestic Water from the Downhole and Mobile Workshop, and the Hydro-test Water from Warehouse were conducted as per the planned schedule. Detail Monitoring Activities are described in Article 7.3 and 7.5.
- Regarding the monitoring result, some parameters are slightly exceeding their allowable ranges such as total coliform and the total chlorine. These slight variations are potentially due to impact of surrounding environmental factors such as changes in weather and are not related to the operations. MPRL E&P will continue monitor these parameters and will provide update in our next monitoring report.

- Regardless of the current security conditions in the area and impact of COVID, MPRL E&P continue to maintain zero discharge of produced water which was achieved since 24 August 2017.
- Most all parameters are available for analysis and measure as per commitment in the EIA report except Uranium which was not available in the labs within Myanmar. We will measure that parameter if the lab situations are permitted to be capable to analyze with their facilities in the Country.
- MPRL E&P will continue monitor the security conditions in the field operations area and will communicate regularly with the third party services for the measurement of air quality, noise quality, soil quality, groundwater, and surface water quality. MPRL E&P will conduct third party services as soon as security situations allow in the field.

Operational Grievance Mechanism and Corporate Social Responsibility (CSR)

In this reporting period, MPRL E&P's CSR Program implemented several of strategic community investment initiatives: Community Infrastructure Development, Community Livelihood Development, Educational Partnership Program, Community Healthcare Program, Community-led Waste Management Program, Stakeholder Engagement, Corporate Philanthropy, and Operational Grievance Mechanism.

During these six months, (13) OGM cases have been received and total number of (156) OGM cases since 2014. All the reported cases were inspected and repaired by Mann Field Operator (MOGE) and MPRL E&P Field Operations Team, and closed by the CSR Team, keeping all KPIs met.

The CSR Program carried out (12) Community Infrastructure Development Initiatives, which included providing school furniture, renovating school buildings, establishing Green Schoolyards Program, and monitoring maintenance on previous infrastructure projects.

For community livelihood development, the CSR Program focused on investing in agriculture, livestock, and vocational skills development initiatives, implementing with the collaboration of the government agencies and private institutions. Providing hands-on trainings of making organic fertilizer and pesticide, providing agricultural knowledge sharing sessions and workshops, establishing Farmer Field School Program, providing sunflower hand-pollination demonstration, promoting animal husbandry and healthcare knowledge, facilitating for animal vaccination and nutrition, providing Basic First Aid Training and monitoring visit to tomato farms for farmers' Success Stories were implemented by the CSR Team in this reporting time.

As soon as COVID-19 restrictions were lifted and training centers became reopened, MPRL E&P's CSR Program resumed trainee recruitment to provide scholarship to community youths in Mann Field. Under the Scholarship Program, a total of (7) community youths were attending at No.5 ITC (Magway) and (5) youths at Ayeyarwaddy Training Center (Minbu).

MPRL E&P reopened Mobile Clinic Program in Mann Field Communities on 21st February 2022 and received (957) patients in (20) Mobile Clinic sessions. The program is currently running four clinic sessions per week in four centrally located villages around Mann Field,

The CSR Program provided necessary supports to Community-led Waste Management Program, which has collected (2,635) waste metric tons, and also organized (16) cleanup sessions of Trash Hero Minbu.

MPRL E&P's CSR Program engaged stakeholders at field level, community level, local and regional levels. In this Fiscal Year, the CSR Program organized (241) stakeholder engagement meetings with (1,236) participants and published "Doh Mann Myay" Quarterly CSR Bulletin.

The CSR & Communications Department conducted the impact assessment survey in Mann Field Communities from 28th March to 1st April 2022, and also led focus group discussions and key informant interviews with Village Administrators, Village Development Committees, Community-based Volunteers, Women Group, Farmer Group, Vocational Trainees, Scholarship Students, and other related stakeholders who are beneficiaries of Community Investment Initiatives from 14 surrounding communities of Mann Field. The CSR Program also offered contributing funds as part of Corporate Philanthropy.

M.O.G.E.

MPRL E&P

Environmental Monitoring Report

for Redevelopment and Enhanced Oil Recovery (EOR) Programme

October 2021 – March 2022

2. Project Description and Production Information

The Mann Field, discovered in 1970 by MOGE, currently includes 674 wells of which 301 were producing as of February 2022 while the remaining wells were shut-in. The total produced oil and associated gas from the Production Enhancement Project is 15.08 MMbbls, including 9.38 MMbbls above the normal decline curve, and 17.1 Bcf gas as of February 2022.

2.1 Mann Field Operations Status

Under the PCC, MPRL E&P is undertaking a re-development operations activity of the Mann Field to improve the environmental performance of the operations.

The operation activity includes:

Infill well drillings – due to the current decline of the field, MOGE and MPRL E&P have been drilling infill wells in main Mann Field areas close to currently producing wells and outside of surrounding communities, however no infill well activity since 2018.

Deepening Wells – to deepen tens to hundreds of feet from existing wellbore by drilling, no activity of deepening well since 2018.

Chemical Treatment – In Mann Field Operation, chemicals are vitally important to the production enhancement project and stored in the chemical storage warehouse. Chemicals such as paraffin dispersant, paraffin inhibitor, and non-chemical GreenZyme are used in the project to improve production, economics and extend the life of the production equipment. GreenZyme is a biological liquid enzyme that is not only harmless to any individual's health but also an environmentally friendly product.

Remedial and workover operations – maintain oil production by servicing such as swabbing, scraping and bailing of producing wells;

Improvement of Pumping Unit – pumping units had been repaired to reduce the likelihood of spills in the surrounding areas.

Refurbishments of the Gas and Oil Collecting Stations (GOCS), Flow Pipes and Drain Pits – to ensure the health and safety to surrounding communities and reduce the risk of spills.

Rehabilitation of Shut-in Wells – sealing off shut-in wells to avoid contamination of surrounding and restoring surrounding areas to resemble their original state.

Re-perforations had not been done since 2020.

Development of Produced Water Management System – produced water had been injected into the shut-in wells.

2.2 Current Operations Summary

In Mann Field, the aim of remedial and workover operations is to restore and maintain oil production. These operations perform an average of 42 wells per month by a variety of activities with minimal environmental impact.

2.2.1 Remedial and Workover Operations Within Six Months (October 2021 to March 2022)

The following table shows the monitoring and tracking of the remedial and workover operations activities.

Table 1: Remedial and Workover Operation Activities

No.	Service	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Total
		Frequency of Activities						
1	Bailing	1	1	1			2	5
2	Bailing & Change Tubing	6	3	2	8	3	1	23
3	Change Tubing		3	2	1	2	1	9
4	Check BHA & Change Tubing		1	1	1	2	1	6
5	Clean Out Button		1		3	3	1	8
6	Fishing & Pump Service	3	1		2			6
7	Pump Service	12	15	23	20	23	30	123
8	Raise up PSD & Pump Service	5				1		6
9	Recover BHA		1			1		2
10	Re-space Out Pump & Bump Value	4	6	5	2	6		23
11	Scraping & Bailing	1		4		1	5	11
12	Scraping, Swabbing & Bailing	2		2				4
13	Swabbing, Bailing & Change Tubing	2	6	5	4	2	9	28
Total Serviced Wells (Monthly)		36	38	45	41	44	50	254

2.2.2 Mobile Power Generator Register Lists in Mann Field

The following Plants/Equipment are being used in Mann Field.

Table 2: Mobile Power Generator Lists

No.	Unit Name	Engine Type	Qty	Generated Power	Energy Sources	Status (Operations/ Under Maintenance)
1	P-100	3408 CAT	1	365 HP	Diesel	Operations
2	P-82	3306 CAT	1	270 HP	Diesel	Operations
3	P-75	Cummins N855-P235	1	235 HP	Diesel	Operations
4	P-70	Cummins N855-P250	1	250 HP	Diesel	Operations
5	P-69	Cummins N855-P250	1	250 HP	Diesel	Operations
6	P-65	Detroit 6V71	1	260 HP	Diesel	Operations
7	Tractor		4	50 HP	Diesel	Operations
8	35T mobile crane	Nissan RD8	1	365 HP	Diesel	Operations
9	Loader	CAT	1	85 HP	Diesel	Operations
10	Forklift	CAT	1	160 HP	Diesel	Operations
11	Wheel Loader	CAT	1	200 HP	Diesel	Operations
12	Grader	CAT	1	200 HP	Diesel	Operations
13	Bull Dozer	CAT	1	275 HP	Diesel	Operations
14	Circulation Mud Pump	CAT	1	350 HP	Diesel	Under Maintenance
15	OPI Mud Pump	Detroit	1	365 HP	Diesel	Under Maintenance
16	Main Mud Pump	Detroit	1	439 HP	Diesel	Under Maintenance
17	King Power Swivel	CAT	1	173 HP	Diesel	Under Maintenance
18	Power Pack	F6L912	2	63 HP	Diesel	Under Maintenance

No.	Unit Name	Engine Type	Qty	Generated Power	Energy Sources	Status (Operations/ Under Maintenance)
19	Welding Machine	Deutz	2	25 HP	Diesel	Operations
20	Compressor	CAT	1	85 HP	Diesel	Operations
21	Vehicle		30		Fuel	Operations

3. Environmental Management Organization

MPRL E&P is committed to providing resources essential to the implementation and control of the EMP. Resources include the appropriate human resources and specialized skills. The structure of the organization responsible for environmental management and implementation of the EMP is depicted in Table 3.

Table 3: Environmental Management Organization Roles and Responsibility

Position	Responsibility
MPRL E&P	
General Manager	Oversee and coordinate all activities on the Project; ultimately responsible for environmental issues. Ensure delivery by the asset of its environmental, and operational targets. Ensure effective communication with all stakeholders.
Field Operations Manager	Technical aspects of the Project include contractor supervision during operations. Responsible for the execution of the Emergency Response Plan including the Oil Spill Contingency Plan. The Field Operations Manager has control over strategic project aspects and interaction with subcontractor staff where project activities take place.
Construction Manager	Technical aspects of the Project including subcontractor supervision during Project implementation.
HSE Officer (HSE Coordinator)	Ensuring that the Project and subcontractors operate following applicable regulatory environmental requirements and plans. Monitor implementation of environmental protection measures, and assist with technical input into oil spill requirements.

Position	Responsibility
	The HSE Officer is monitoring the implementation of Health, Safety, and Environmental protection measures, including tracking, inspection, reporting, and assisting with technical input into emergency response procedures and implementation as per the EMP.
Environmental Officer	Responsible for the implementation of EMP and ensuring that environmental regulatory requirements are met with the National Environmental Quality Emission Guidelines (NEQEG). Monitor implementation of environmental protection measures. Ensures environmental monitoring and inspections/ audits are undertaken as per the requirements of the EMP. The Environmental Officer is responsible for implementing the EMP and supervising contractors during the monitoring activities in the operations and preparing the environmental monitoring report.
CSR Field Coordinator (Community Liaison Officer)	Liaise with local communities, farmers and government regulators on the Project's behalf. Implement environmental awareness and education programmes with communities.
HSE Manager	Ensure that environmental regulatory requirements are met and that EMP requirements are properly implemented. HSE Manager is to ensure that environmental regulatory requirements are met and that EMP requirements are properly implemented.

4. Highlights on HSE Key Performance Indicators

Upon the agreement between the HSE department and the field management team, HSE KPIs had been set for the field team as part of achieving continual improvement and integrating HSE as part of the business.

Achievement Vs. Failure based on Set KPIs

In this regard, the HSE department had reviewed the actual performance of the field against the set and targeted KPIs at the end of the fiscal year to find out the successes and the failures (or) the achievements and the areas that need improvement.

Based on the review, the successes or achievements are as below:

For Fiscal Year 2020 – 2021

As reactive performances, there was no lost time accident throughout the fiscal year. The number of total recordable cases was the same as the KPI set, meaning that it was an achievement and it did not exceed the targeted number.

As proactive performances, the field team received (7,422) CARE Cards, which is remarkable as it exceeded the targeted quantity, 4,800 Ea per year. The permit to work audits by using a checklist completed 100% as per plan. Moreover, the in-house technical training such as SOPs and JSAs refresher training program was implemented 100% compared with the planned schedule by pulling unit team, production measurement, workshop, warehouse, pumping unit, down-hole, and SP team respectively. As part of the HSE inspection, several inspections for SCBA and Portable Gas Detector, Lifting Gears and Color Coding, etc. were conducted and achieved 100% of the target. As part of developing positive HSE culture within the organization, the CARE Card Award program had been ongoing to motivate the crews from MOGE and casual labourers. Moreover, to alert the Covid-19 pandemic, the field team successfully implemented the “COVID-19 Awareness Campaign” as per the plan. As part of follow-up actions on previous audit and investigation reports, flare posts were installed at vent gas wells according to the plan and also the refurbishment of TC 8 pumping units was done 100%. As part of the environmental action plan implementation, the field team successfully maintain the disposal of produced water 100% back to the shut-in well. Moreover, the construction of concrete pads and additional cellars at well sites, renovation of the pumping units’ fencing, zero discharge in the down whole workshop, and renovation of the sewage system for the basecamp are successfully implemented.

We also had failures (or) areas still need to be improved. The majority of the failure / suspended actions were due to the restrictions of COVID-19 and political crises across the country. The KPIs we did not successfully achieve were summarized below.

1. Periodic inspection of certain emergency equipment such as fire extinguishers, eyewash stations, spill kits, etc.
2. HSE training
3. HSE meetings such as weekly safety meetings and round up safety meetings
4. Some emergency drills & muster drills at base camp
5. HSE day and HSE campaign i.e., BMI campaign
6. Environmental monitoring survey

For Fiscal Year 2021 – 2022

As reactive performances, there was no lost time accident in the fiscal year. The number of total recordable cases was the same as the KPI set, meaning that it was an achievement and it did not exceed the targeted number.

As proactive performances, the field team received (3,523) CARE Cards, which is remarkable as it exceeded the targeted quantity, 900 Ea per year. The permit to work audits by using a checklist was completed 100% as per plan. Moreover, the in-house technical training such as SOPs and JSAs refresher training program was implemented 100% compared with the planned schedule by pulling unit team, production measurement, workshop, warehouse, pumping unit, down-hole, and SP team respectively. As part of the HSE inspection, several inspections for SCBA and Portable Gas Detector, Lifting Gears and Color Coding, etc. were conducted and achieved 100% of the target. As part of developing positive HSE culture within the organization, the CARE Card Award program had been ongoing to motivate the crews from MOGE and casual labourers. Moreover, to alert the Covid-19 pandemic, the field team successfully implemented the “COVID-19 Awareness Campaign” as per the plan. As part of the environmental action plan implementation, the field team successfully maintain the disposal of produced water 100% back to the shut-in well.

We also had failures (or) areas still need to be improved. The majority of the failure / suspended actions were due to the restrictions of COVID-19 and political crises situations across the country. The KPIs we did not successfully achieve were summarized below.

1. HSE meetings such as weekly safety meetings and round up safety meetings
2. Some Level 1 Emergency Drill at worksites
3. HSE day and HSE campaign i.e., BMI campaign
4. Environmental monitoring survey

4.1 Actioned Status on ECD Comment

Bi-Annual Environmental Monitoring Report was submitted to Environmental Conservation Department – ECD regularly and a total of three (3) reports have been successfully reported. Regular environmental monitoring was planned to conduct and there was an unforeseeable situation that occurred and was difficult to monitor with the third party team. However, keep continues the self-monitoring activities were

conducted as far as is practicable and tried to fulfill the commitments and planned monitoring schedule within the timeframe.

MPRL E&P is closely collaborating with ECD Regional Office and continues to engage with the related departments and implement the actions required.

MPRL E&P submitted a Notification Letter (Referring to the Letter: MPRL E&P/Mann/ LET-123/2021), dated 23 June 2021, to ECD Magway Region about the notification of the fourth Environmental Monitoring Survey Plan was postponed due to both the COVID-19 restriction and political crisis. MPRL E&P needs to submit the Bi-Annual Monitoring Report to the ECD. This reporting shall be delayed for twelve (12) months until April 2022 concerning unforeseeable circumstances.

Nowadays, MRPL E&P commits to continue to submit the Environmental Monitoring Report that includes the self-monitoring activities and implantation of environmentally relevant activities during difficult periods. MPRL E&P maintains the ECD comments from the previous reports and shall continue to perform in the next monitoring reports.

5. Environmental Management Plan

The Environmental Management Plan (EMP) is to ensure full compliance with the Project's Policies and with mitigation, monitoring, and other commitments made in the EIA Report. While the EMP was treated as a high-level framework document, it was linked to several detailed management plans as described below which were developed to lay out the specifications for compliance with specific environmental elements.

These management plans mention in detail the management and mitigation measures required to be implemented, the time frame and responsibilities for their implementation, and reporting requirements in the EIA report. These management plans are presented below with details mentioned in the EIA report. MPRL E&P is implementing and monitoring as per the schedule planned.

- Waste Management Plan
- Emergency Response Plan (including Fire Risk Management Plan)
- Spill Response Plan
- Health and Hygiene Management Plan
- MEDEVAC Procedures
- Transportation Management Procedures
- Contractor's Environmental Management(s) Plan
- Environmental Monitoring Plan

5.1 Environmental Management System Framework

MPRL E&P's Environmental Management System Framework is guided by ISO 14001 framework and integrates internal policies, existing national rules and regulations and other applicable best practices from international guidance. Continuous environmental analysis and monitoring to achieve minimize the adverse impacts or consequences on the natural environment and people affected by the business activities.

Figure 1: MPRL E&P Environmental Management System Framework

5.2 Waste Management Plan

Waste Management Plan is ensuring of managing waste in the Mann field and applies to any material that is surplus to requirements of the construction and operations work over phases.

The objectives of the waste management plan are to:

- Ensure waste is managed in a controlled and environmentally sound manner.
- Comply with all statutory and contractual requirements concerning the management of the waste
- Ensure resources are recovered where possible and safe to do so, for re-use and recycling; and
- Ensure appropriate recording and tracking for all waste generated.

The waste management plan has been implemented during the operation phases. Waste streams are divided into four categories:

1) Hazardous Recyclable;
2) Hazardous Non-Recyclable;
3) Non-Hazardous Recyclable; and
4) Non-Hazardous Non-Recyclable.

The key steps in the waste management process are;

- Waste is segregated into hazardous, general and recyclable waste within suitable bins that are clearly labelled;
- Bins/drums are sent to the approved disposal location. Each bin/drum is labelled with the waste typewritten;
- Each waste bin/drum sent is included on the backload manifest; and
- Waste transportation is recorded in the waste database.

Brief Waste Management Process is described as follows:

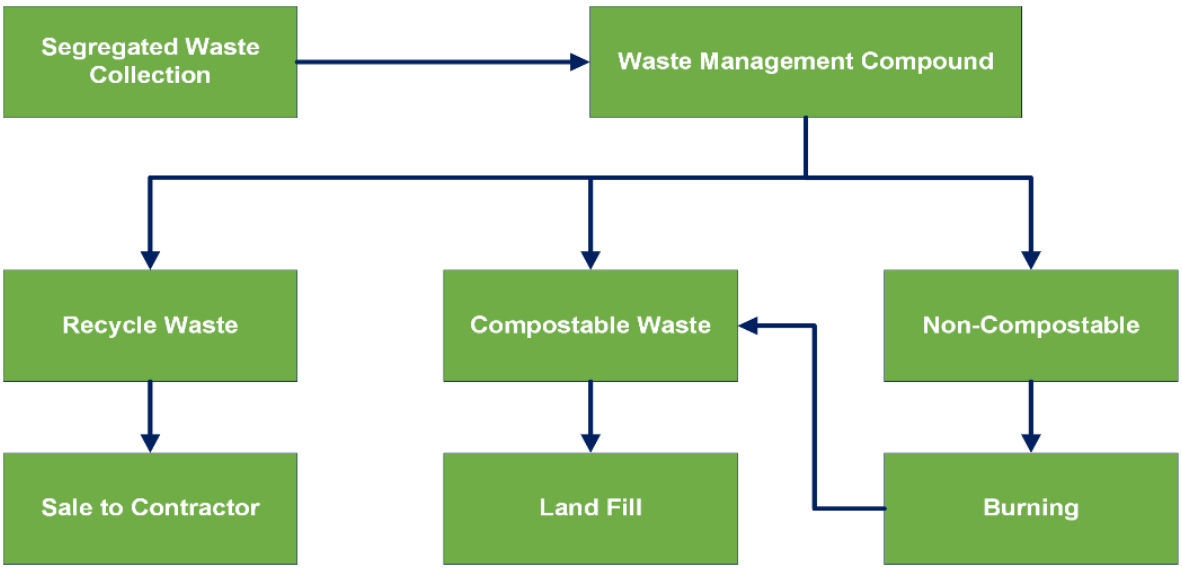


Figure 2: Waste Management Flowchart

5.2.1 Monitoring on Waste Management Status

During the monitoring period from October 2021 to March 2022, the waste management compound facilities are the same as in previous monitoring periods, and the current waste management compound situation is as below;

Existing Solid Waste Management System

The solid waste management system in MPRL E&P mainly includes waste collection, segregation, and recycling continues to play a minimum role at present 3Rs (Reduce, Reuse, Recycle) were developed.

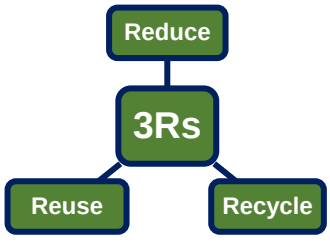


Figure 3: 3Rs Model

In Mann Field, waste segregation was implemented involving sorting and separating waste based on its characteristics. Waste materials were segregated at the source by providing coloured and marked (with universal symbols and writing in English and Burmese) bins for storing waste as follows;

- **Green** – General Wastes
- **Yellow** – Recycle Wastes
- **Red** – Hazardous Wastes
- **Black** – Non-Hazardous Wastes
- **Blue** – Paper

Bins were placed in all GOCS, offices, warehouses, workshops, construction sites, base camps, and clinics. No waste collection bin would be allowed to overflow before it is emptied, and waste storage receivables would be replaced promptly, in the event of damage. A sufficient number of bins were placed for each type of waste at waste collection points, depending on the variety and quantity of the waste expected from the location.

Waste of any description will not be stored permanently or for prolonged periods at the Waste Management Compound. The following procedure has been applied to the temporary storage arrangements for all waste;

- The wastes are properly stored in the designated area and separated from other materials/substances storage.
- The facilities are identified with each identified area such as Recycle Area, Hazardous Area, etc.

5.2.2 Solid Waste Management in MPRL E&P

The management of waste is a key component in business. All the waste produced is recorded. MPRL E&P is monitoring and implementing compliance with the National Environmental Quality (Emission) Guidelines and Industry Best Practices.

Composting

According to our six-months self-monitoring records, from October 2021 to March 2022, the composting process is produced about 1540 kg. This process is very fast in the summer but in the rainy season, the composting bacteria do not properly work best under neutral conditions.


Figure 4: Composting Waste Used in Plantation Process at WMC

Recycling

Recycling materials such as glass, paper and cardboard, plastic bottles, and metals, are collected and sold out to the third party. Recycling materials are collected and separated from general waste.

General Waste collection from all areas in the Mann Field Operations and temporary storage at Waste Management Compound. The field team managed cleaning and disposing of the general waste by using Jambo Bags and dispensing to designated area.

Figure 5: Recycle Waste Storage Area

General Waste Storage in WMC

The wastes have been re-selected, packed and stored at the Waste Recycle Storage Area. Recycle Waste is disposed of by an approved third party.

Recycle waste has been registered using the 'Waste Register' form including specific details as to the type and quantity of waste.

Recycle waste that is going to be sent to a selected third party for adequate disposal has to be monitored using the "Waste Disposal Contractor Approval' form which was approved by the Field Operations Manager and or Site HSE Officer.

Figure 6: Waste Management Compound (WMC)

Figure 7: Hazardous Waste Storage Area

Hazardous Waste, 1303 kg is collected from all work-related areas and is proper storage at Waste Management Compound. Now preparing work order processes with GOLDEN DOWA ECOSYSTEM for adequate disposal method.

5.2.3 Monitoring Data and Statistics

Waste Statistics within the monitoring period, October 2021 to March 2022 as follows:

Table 4: Monthly Waste Monitoring Records

Month	Hazardous Waste (kg)	Non-hazardous Waste (kg)	Composting (kg)
October-21	15	254	290
November-21	0	490	255
December-21	0	553	265
January-22	11	507	290
February-22	0	469	270
March-22	1277	623	170
Total (kg)	**1303**	**2896**	**1540**

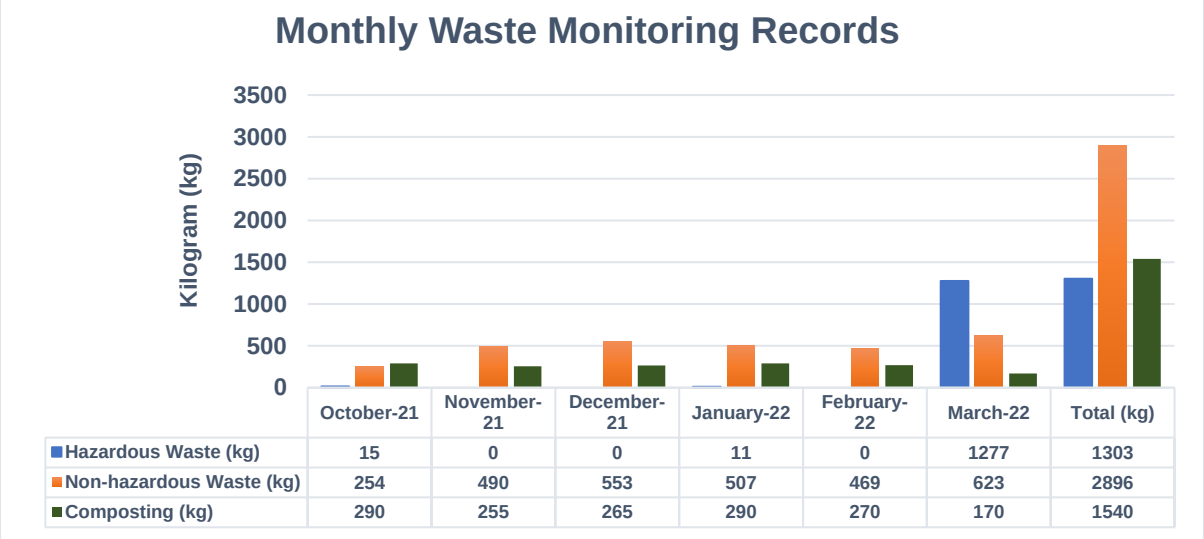


Figure 8: Monthly Waste Monitoring Records from Oct-21 to Mar-22

Table 5: Yearly Waste Monitoring Records

Month	Hazardous Waste (kg)	Non-hazardous Waste (kg)	Composting (kg)
2020	1470	16267	1204
2021	96	5369	1901
2022	1288	1599	730

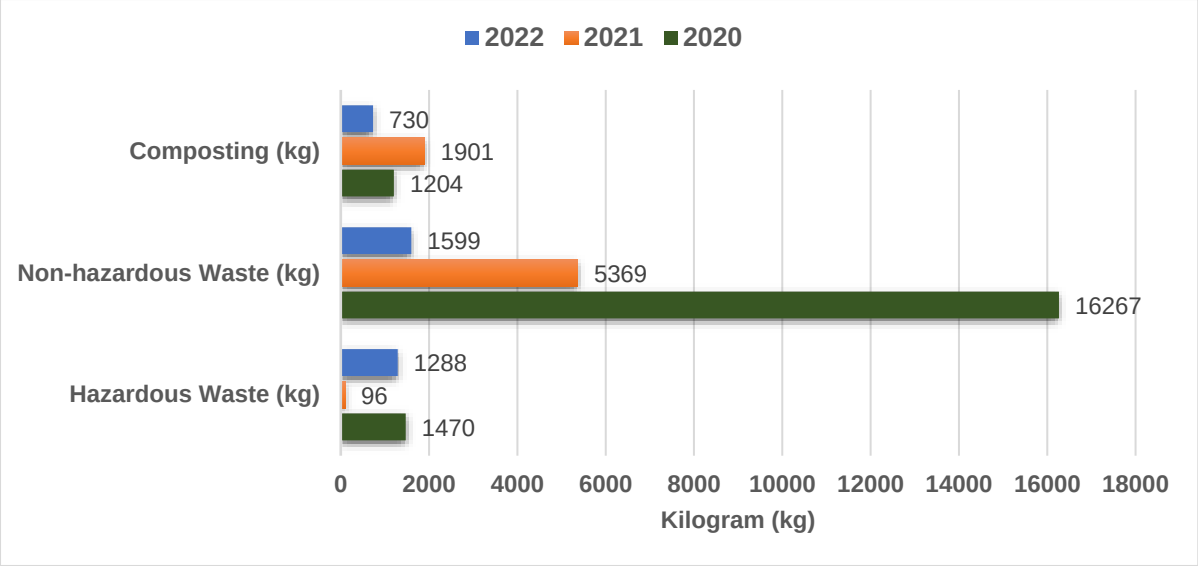


Figure 9: Yearly Waste Monitoring Records from 2020 to 2022

5.3 Emergency Response Plan

MPRL E&P will develop plans and procedures to identify the potential for and respond to environmental accidents and health and safety emergencies and for preventing and mitigating any potentially adverse environmental and social impacts that may arise. The plans include but are not limited to;

- Notification procedures
- An emergency response organization with personnel properly trained on their roles and responsibilities
- Having adequate and appropriate emergency response equipment readily available to respond to minor incidents; and
- Having the capability to quickly request additional assistance.

MPRL E&P is implementing and managing the response to emergencies from the Project activities in Mann Field. The emergency response plan (ERP), which also covers fire risk management, includes;

- Hierarchy of protection;
- Preparedness and planning for emergencies;
- Employee responsibilities;
- Emergency response procedures;
- Medical emergencies including medevac procedures;
- Natural Disasters (eg. floods, cyclones, earthquakes) related emergencies;
- Fire and electrical related emergencies; and
- Any other emergency response plan is required by the Republic of the Union of Myanmar Authorities.

5.3.1 Emergency Response Plan Implementation and Progress

MPRL E&P prepared to dedicate emergency response plans for possible scenarios which can face field operation. All emergency response plans effectively communicate with staff at all levels of the operation and allocate responsibilities based on their respective roles in the operation. MPRL E&P reviews and revises the emergency response plans within each predefined timeframe. In the event of an incident, the related emergency response plan is reviewed and revised as necessary.

Due to the severe COVID-19 pandemic, sociopolitical conditions and operations are suspended, Level – 1 emergency drills at worksites are adjourned in the fiscal year 2020 – 2021.

Figure 10: Fire Drill at MFO Warehouse (27 November 2021)

To get all employees familiar with fire outbreak situations, to be able to handle the planned fire emergency response procedure and to strengthen relationships with local authority bodies, a fire drill was conducted at the Warehouse (MFO) on 27 November 2021.

5.4 Spill Response Plan

MPRL E&P developed plans and procedures to identify the potential for and response to the spill and for preventing and mitigating any potentially adverse environmental and social impacts that may arise. The plans include but are not limited to;

- Spill control hierarchy
- Control measures to prevent spills such as proper engineering design, handling, storage and transportation guidelines on hazardous materials;
- Spill response training;
- Spill response organization and procedures as well as spill response PPE and drill requirements.

5.4.1 Spill Response Plan Implementation and Progress

MPRL E&P created a spill response plan and also arrange the control measure. As per the plan, risk control measures like using a consolidated, impermeable base for all facilities with the permanent drainage system, segregating drainage systems for process water and domestic water set up oil sumps and interceptors are in place. MPRL E&P also practice a zero discharge wastewater recycling system in field operation. To reduce the potential for a spill, secondary containments are added to well sites and the sludge compound is ready to respond to a spill.

Spill response drills are planned to understand spill response procedures and emergency response. It also targeted to clear and breakdown respective team responsibilities and practices and to be more aware in spill cases and efficiently respond in the actual case. Due to the severe COVID-19 pandemic, political crisis conditions and operation suspended spill response drills are adjourned.

5.5 Health & Hygiene Management Plan

MPRL E&P developed and continually assesses the risk related to personal health and hygiene as well as preventative measures which need to be implemented.

MPRL E&P identified hazards as well as developed preventive and mitigation measures related to the health and hygiene of personnel working at Mann Field. The plan includes but is not limited to;

- Responsibility for implementation of the Health and Hygiene Management Plan
- Identification, prevention, and responses to illnesses such as health-related illnesses and diseases such as those transmitted by insects and parasites;
- Pre-assignment immunization and health screening requirements
- Preventive measures to avoid snake bites as well as sickness arising from general hygiene issues and travel to and from the Mann Field.

5.5.1 Health & Hygiene Management Plan Implementation and Progress

MPRL E&P developed and continually assesses the risk related to personal health and hygiene as well as preventative measures which need to be implemented. MPRL E&P provide advice and resources through an onsite Doctor. The plan includes

diseases that are highly favourable in operation, operational area and control measures to mitigate the risk.

Figure 11: Camp Weekly Inspections

Figure 12: Safety Equipment Inspection

To mitigate risk, enhance safety, and anticipate challenges, camp inspections are conducted weekly. The reports are documented, communicated, and taken action accordingly.

Although the pandemic spread intolerably, MPRL E&P performed safety equipment inspections even during the operation suspended period. Safety equipment is

maintained in healthy condition to protect properties and workers' safety round the clock.

5.6 MEDEVAC Procedures

MPRL E&P developed the procedures that must be followed in the event of a medical evacuation (MEDEVAC) of an injured or ill person from the Mann Field. Given the remoteness of the Mann Field and the time taken to medivac a patient to a hospital with appropriate standards, all rotating personnel has to undergo a thorough medical examination before being engaged to work at the Mann Field, and this should be repeated at 2 years intervals.

MPRL E&P will continue to describe the conditions and remoteness of the Mann Field to the medical examiner. The medical examiner will be required to assess whether the person is suitable for working in the Mann Field. Information will remain confidential between the employee and the medical examiner unless express written permission is given by the employee to make available this information to MPRL E&P.

MPRL E&P undertakes to provide medivac facilities to all staff working on the MPRL E&P project in Mann Field. This facility is extended to sub-contracted personnel. This includes a field clinic at the worker base camp. Emergency treatment can be provided by MPRL E&P's medical staff at the field clinic, backed up by MEDEVAC support, if necessary.

5.6.1 MEDEVAC Procedure Implementation and Progress

MPRL E&P developed the procedures that must be followed in the event of a medical evacuation (MEDIVAC) of an injured or ill person from the Mann Field. MPRL E&P undertakes to provide medivac facilities to all staff working on the project in Mann Field which include a field clinic with a site doctor at the worker base camp, an ambulance and medical stocks for readiness. The procedure also tailored to achieve minimum time taken to medivac a patient to a hospital with appropriate standards.

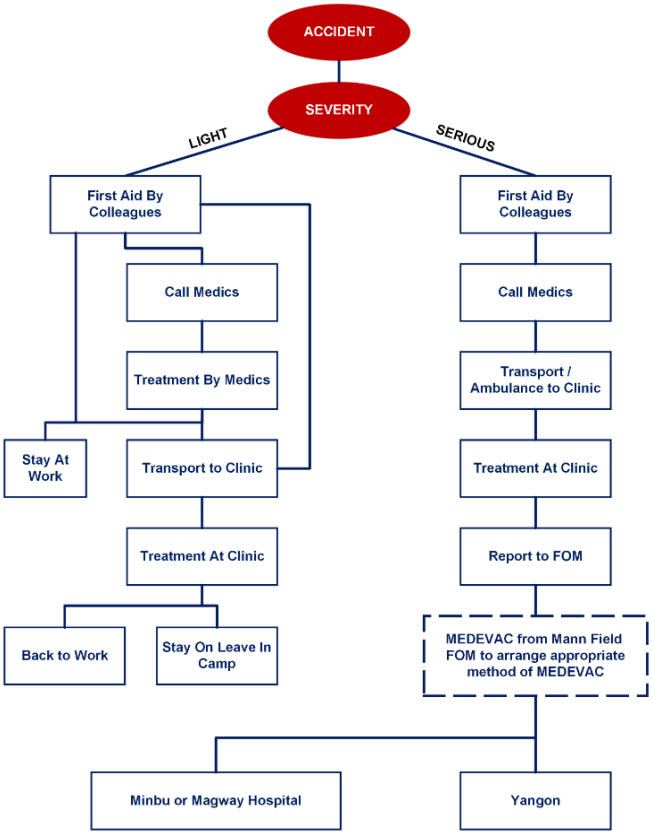


Figure 13: Medical Evacuation Flowchart

To get all employees familiar with the medical emergency condition and to be able to handle per the set procedure, MEDEVAC drills are planned and conducted in the fiscal year 2021 – 2022.

Figure 14: Medical Evacuation Drill (29 March 2022)

5.7 Transportation Management Procedures

The objectives of the Transportation Management Procedures are to define controls over traffic routes, speed restrictions, appropriate road safety requirements, vehicle loading and maintenance measures, and response procedures to traffic-related emergencies.

The following management actions are covered under Transportation Management Procedures;

- Good practices on rest regime, timing routes and speed of driving
- Safety rules related to MPRL E&P vehicles usage;
- Procedures for road risk assessment; and
- Procedures to rescue the driver and passenger(s) who fail to get to their check calls or destination by the ETA designated on the Journey Management Plan.

5.7.1 Transportation Management Procedure Implementation and Progress

MPRL E&P has set up a transport management procedure to control traffic routes, speed restrictions, appropriate road safety, vehicle loading, and maintenance measures. It also contains procedures for responding to traffic emergencies. To achieve such a high standard, MPRL E&P outsourced transportation to sister company M&AS. M&AS also follows the safety rules related to MPRL E&P vehicle usage and preform good practices like road risk assessments, and best practices on rest regime, timing routes, speed of driving and alcohol testing.

MPRL E&P perform safe crews change activities to achieve maximum reliability and safety. The vehicles are inspected whether safe to use and a test drive is performed if needed. Driver behaviour assessment is performed on vehicle operators. Defensive driving training and refresher training are conducted twice each year. During the pandemic, MPRL E&P also performs COVID-19 antigen testing for vehicle operators and passengers to prevent infections. In addition, the sitting plan was established according to the guidelines of the Ministry of Health.

Figure 15: Safe Crew Change Activities

Figure 16: COVID-19 Antigen Testing for Vehicle Operators and Passengers

Figure 17: Vehicles Disinfection Activities

5.8 Contractor Environmental Management Plan(s)

The Project will sometimes require to engage contractors to carry out Project activities. The contractors are responsible for performing all work;

- In compliance with relevant national and international HSE legislation and regulations, and with other requirements to which the project subscribes;
- In conformance with the Project's EMP; and
- By contractual technical and quality specifications.

The Project will also provide a specification for environmental compliance and performance (through approved EIA and EMP and the associated plans) and, as a contractual requirement, the contractor will develop and provide to the Project its specific management plans demonstrating how they intend to comply with the stipulated requirements.

Contractors must also provide documentation detailing their plans for;

- Implementing the measures required in the EIA and this EMP;

- Local content;
- Logistics; and
- Community relations.

The contractor management plans must conform to the requirements of the Project's overarching plans. Contractor plans will be reviewed and approved by MPRL E&P and incorporated into, and form part of, the Project's overall EMP.

Contractors will be required to self-monitor against their plan and the contractor's compliance with the plan will be routinely monitored by MPRL E&P directly or by third parties. Contractors will be required to submit regular reports of monitoring activities and the Project will review these regularly. An external assurance process will be conducted on an annual basis the results of which will be disclosed after the process.

As a contractual requirement, the subcontractors are required to provide sufficient resources to manage HSE aspects of the work to be performed. This includes providing resources to ensure compliance of next-tier subcontractors and a process for emergency stop-work orders in response to monitoring triggers.

5.8.1 Contractor Environmental Management Plan(s) Implementation

In Mann Field, there are no other contractors working activities and the only contractor, M&AS, provides MPRL E&P for Manpower Services, Logistic Services, and Catering services for the field operations team. M&AS is involved in the MPRL E&P camp rules and fulfilled the environmental-related management plans including waste management procedures. If there is any contractor or third-party monitoring team working in the Mann Field, also required to respect and obey MPRL E&P HSE rules and policies.

6. Environmental Monitoring Plan

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts.

As a minimum, the following monitoring of the physical environment will be undertaken:

Physical Environmental Monitoring

- Ambient Air Quality
- Noise
- Groundwater quality
- Surface-water quality
- Soil Quality

Monitoring will be taken during the following periods of the EOR and re-development program activities:

- At least two weeks before the construction activities for baseline data collection.
- Monthly monitoring for the first three months during both the construction and operation phases. After the three months, a review should be conducted to determine whether the collected data indicates an impact has occurred beyond what has been predicted within the EIA. Should no higher impacts be observed, monitoring can be reduced to a six-monthly or yearly program. Should higher impacts be observed, monitoring should continue, and appropriate actions are taken to alleviate the impacts to prevent any further impacts from occurring.

After the first monitoring report with a three-month survey during the six months, no higher impacts are observed from the existing operations, however after conducting the air quality and the results showed some monitoring points occurred CO, $PM_{2.5}$ and SO_2 value is still higher than based line value compared with May 2015 survey results.

As per EIA commitments, MPRL E&P was conducting Environmental Monitoring Activities regularly and submitted the monitoring report to ECD Bi-Annually. Now, this is the fourth time monitoring report and the committed monitoring plan from EIA Report as stated in Table 7 (Environmental and Social Monitoring Programme, from Table 8.3 EIA Report). There was monitoring with the Third Party and Self-Monitoring activities covered in this report.

In addition, self-monitoring activities are involved depending on the management plans and operational control. Based on the activities, the following are stated in Table 6 as MPRL E&P's self-monitoring activities scheduled from Mann Field:

- Vent Gas Monitoring
- Drinking-Water Monitoring
- Discharged from Sewage Treatment System
- Hydrotest Water Quality
- Monitoring on Wastes

Table 6: MPRL E&P's Self-Monitoring Plan and Schedule

No.	Self-Monitoring Activities	Purpose of Monitoring	Locations	Parameters to be monitored	Frequency
1.	Vent Gas Monitoring	Regular monitor the amount of vent gas connection line, measuring with Echo meter.	All Vent Gas Wells	Methane, CH_4	Monthly and Bi-Annual

No.	Self-Monitoring Activities	Purpose of Monitoring	Locations	Parameters to be monitored	Frequency
2.	Hydrogen Sulfide (H_2S) Monitoring	To fulfill the obligation from the ECC and ensure the safety of operations & personnel living nearby.	All Operating Wells	H_2S(ppm), CO(ppm), O_2(%), and LEL%	Monthly and Bi-Annual
3	Drinking-Water Monitoring	Ensuring Safe Drinking Water for the health of personnel	MPRL E&P Base Camp	pH, Turbidity, Apparent Color, Hardness, Arsenic, Chloride, Lead, Total Dissolved Solids, Iron, Electrical Conductivity, Sulphate, Calcium, Magnesium, Nitrate-Nitrogen	Bi-Annual
4.	Discharged of Sewage Treatment System	To mitigate the pollution of soil and ground water, and environment	MPRL E&P Base Camp	pH, Temperature, TSS, BOD_5, COD, Total Phosphorous, Oil & Grease, Total Nitrogen, Turbidity, Electrical Conductivity, Total Coliforms	Bi-Annual
5.	Hydrotest Water Quality	To monitor the quality of water	Warehouse	BOD_5, COD, Chloride, Heavy Metals (Total), pH, Phenols, Sulfides, Total hydrocarbon content, Total suspended solids	Annual
6.	Domestic Water	To monitor the quality of water	Downhole Workshop & Mechanical Workshop	BOD_5, COD, Ammonia, Arsenic, Cadmium, Chlorine (Total residual), Chromium (hexavalent),Chromium (total), Copper, Cyanide (free), Cyanide (total), Fluoride, Heavy Metals (Total), Iron, Lead, Mercury, Nickel, Oil & Grease, pH, Phenols, selenium, Silver, Sulfides, Temperature increase, Total coliforms, Total	Bi-annual

No.	Self-Monitoring Activities	Purpose of Monitoring	Locations	Parameters to be monitored	Frequency
				phosphorous, Total suspended solids, Zinc	
7.	Ground water (Tube-well)	To monitor the quality of groundwater near wells of chemical treatment for EOR	Ko Win Maung & Ma Nyein (near #132)	pH, DO, Turbidity, Apparent Color, Alkalinity, Hardness, BOD_5,COD, total Nitrogen, total Phosphorous, Oil & Grease, TSS, E. coli, Total coliforms, Arsenic, Barium, Boron, Total Chromium, Flouride, Selenium, Uranium, Electrical Conductivity	Bi-annual
8.	Produced Water Monitoring	Zero discharge by injecting 100% to shut-in wells	All Operating Wells	produced volume and disposal volume	Daily
9.	Monitoring on Wastes	Implementing as per Waste Management Procedure	Waste Management Compound and Sludge Management Compound	General, Recyclable, Organic, Hazardous	Weekly

Table 7: Environmental and Social Monitoring Programme (Construction and Operation Phase)

Project Stage	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
At least two weeks before the construction activities for baseline data collection. Construction and Operation	Air Quality	NOx, SO_2, $PM_{2.5}$, PM_{10}, CO. Check compliance with Myanmar National Environmental Quality (Emission) Guidelines (2015).	Z1AQN, Z2AQN, Z3AQN and Z4AQN, locations indicated on Table 5.1 and Figure 5.10	Sampling and analysis of ambient air pollutants to be conducted accordingly to the guidelines of Myanmar NEQEG. Haz-Scanner EPAS Wireless Environmental Perimeter Air Station to be used for measurement.	Monthly monitoring for the first three months during both the construction and operation phase. After the three month period, a review should be conducted to determine whether the collected data indicates an impact has occurred beyond what has been predicted within the EIA. Should no higher impacts be observed, monitoring can be reduced to a six-monthly or yearly programme. Should higher impacts be observed, monitoring should continue and appropriate actions be taken to alleviate the impacts with an aim to prevent any further impacts from occurring.	MPRL E&P HSE Coordinator

Project Stage	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
At least two weeks before the construction activities for baseline data collection. Construction and Operation	Noise	Check compliance with Myanmar National Environmental Quality (Emission) Guidelines (2015)	Z1AQN, Z2AQN, Z3AQN and Z4AQN, locations indicated on Table 5.1 and Figure 5.10	24-hour noise monitoring using the portable sound meter (Lutron, SL-0423SD, unit: dB). Noise level (LAeq) measured and recorded at a ten-minute interval and averaged at an hourly and daily (i.e. 24-hour) interval.	As above	MPRL E&P HSE Coordinator
At least two weeks before the construction activities for baseline data collection. Construction and Operation	Groundwater Quality	In-situ measurements for transparency, temperature, pH, DO, turbidity, colour, alkalinity and hardness. Laboratory analysis of BOD5, COD, Total Nitrogen, Total Phosphorus, Oil and grease, TSS, E. coli, Arsenic, Barium, Boron, Total Chromium, Floride, Selenium, Uranium	Z1GW, Z2GW, Z3GW and Z4GW, locations indicated on Table 5.11and Figure 5.14	In-situ measurements for transparency, temperature, pH DO, turbidity, colour, alkalinity and hardness. Laboratory analysis of BOD5, COD, Total Nitrogen, Total Phosphorus, Oil and grease, TSS, E. coli, Arsenic, Barium, Boron, Total Chromium, Floride, Selenium, Uranium	As above	MPRL E&P HSE Coordinator

Project Stage	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
At least two weeks before the construction activities for baseline data collection. Construction and Operation	Surface Water Quality	In-situ measurements for transparency, temperature, pH DO, turbidity, colour, alkalinity and hardness. Laboratory analysis of BOD5, COD, Total Nitrogen, Total Phosphorus, Oil and grease, TSS, E. coli, Arsenic, Barium, Boron, Total Chromium, Floride, Selenium, Uranium	Z1SW, Z2SW, Z3SW and Z4SW, locations indicated on Table 5.7 and Figure 5.12	In-situ measurements for transparency, temperature, pH DO, turbidity, colour, alkalinity and hardness. Laboratory analysis of BOD5, COD, Total Nitrogen, Total Phosphorus, Oil and grease, TSS, E. coli, Arsenic, Barium, Boron, Total Chromium, Floride, Selenium, Uranium	As above	MPRL E&P HSE Coordinator
At least two weeks before the construction activities for baseline data collection. Construction and Operation	Soil Quality	pH; Arsenic (As); Lead (Pb); Cadmium (Cd); Copper (Cu); Zinc (Zn); Manganese (Mn); and Iron (Fe). Comparison with the Dutch Standard 2000.	Z1S, Z2S, Z3S and Z4S, locations indicated on Table 5.13 and Figure 5.16	Follow sampling procedure, sample preservation and sample analysis recommended in Myanmar NEQEG. Laboratory analysis of pH; Arsenic (As); Lead (Pb); Cadmium (Cd); Copper (Cu); Zinc (Zn); Manganese (Mn); and Iron (Fe).	As above	MPRL E&P HSE Coordinator

Project Stage	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
Construction and Operation	Discharge of treated wastewater and runoff	Check compliance with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (for BOD, COD, TSS, oil and grease, pH, total coliform bacteria, total nitrogen, total phosphorus) during construction. Check compliance with Myanmar National Environmental Quality (Emissions) Guidelines for Onshore Oil and Gas Development during operation.	Treated wastewater discharge points at discharge points such as worker camps, GOCS, shut in wells.	In-situ measurements for pH, temperature, dissolved oxygen (DO), electrical conductivity (EC), and turbidity. Laboratory analysis of BOD5, COD, Total Suspended Solids, Total Nitrogen, Total Phosphorous, Oil and Grease	As above	MPRL E&P HSE Coordinator

Project Stage	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
Operation	Vented gas	Check compliance with Myanmar National Environmental Quality(Emissions) Guidelines for Onshore Oil and Gas Development during operation (H2S)	Three vented gas location (randomly selected)	Real-time measurement	Monthly monitoring for the first three months during operation phase. After the three month period, a review should be conducted to determine whether the collected data indicates an impact has occurred beyond what has been predicted within the EIA. Should no higher impacts be observed, monitoring can be reduced to a six-monthly or yearly programme. Should higher impacts be observed, monitoring should continue and appropriate actions be taken to alleviate the impacts with an aim to prevent any further impacts from occurring	MPRL E&P HSE Coordinator

7. Monitoring Survey & Activities

During the monitoring periods from October 2021 to March 2022, the conducted monitoring survey and activities are presented in each article. The summary of the conducted monitoring activities is as below:

Figure 18: Summary of Conducted Monitoring Activities

MPRL E&Ps conducted self-monitoring activities and were not able to conduct with the third party due to the recent political crisis and COVID-19 pandemic situation. Monitoring activities are conducted as much as possible during these situations and MPRL E&P remains highly committed to monitoring as the obligation and commitment from the ECC and EIA if the situations are permits.

7.1 Monitoring on Sludge Management Status

Produced water generated from everyday production of about 1400 BBL per day in the Mann Field. Produced water typically contains a mixture of inorganic (dissolved salts, trace metals, suspended particles) and organic (dispersed and dissolved hydrocarbons, organic acids) compounds. Produced water generates sludge due to the compound sediments, and improper discharge of sludge may cause potential impacts on the receiving environment (i.e. soil, surface water, and groundwater) and community health as well as terrestrial and aquatic ecological resources.

Dried sludge, 43,930 Kg (estimated weight) is temporary storage at Waste Management Compound and we have planned to construct the temp storage area in the Sludge management compound and also will perform a pilot test with the bioremediation process. Currently, all sludge is proper storage in concrete pits.

Figure 19: Sludge Storage Pits

Figure 20: Sludge Management Compound

All sludge collected is in proper storage in concrete pits to meet the guideline levels in NEQEG for Onshore Oil and Gas Development.

7.2 Monitoring on Produced Water Management Status

MPRL E&P to minimize environmental impact to Zero Discharge in produced water management. The team recording milestones on achievements of Zero Discharge on produced water management was implemented on 24 August 2017.

MPRL E&P is undertaking to inject all produced water (100%) into the shut-in wells by using 5 units of injection pumps to meet guideline levels in NEQEG for Onshore Oil and Gas Development.

Figure 21: Produced Water Injection Process

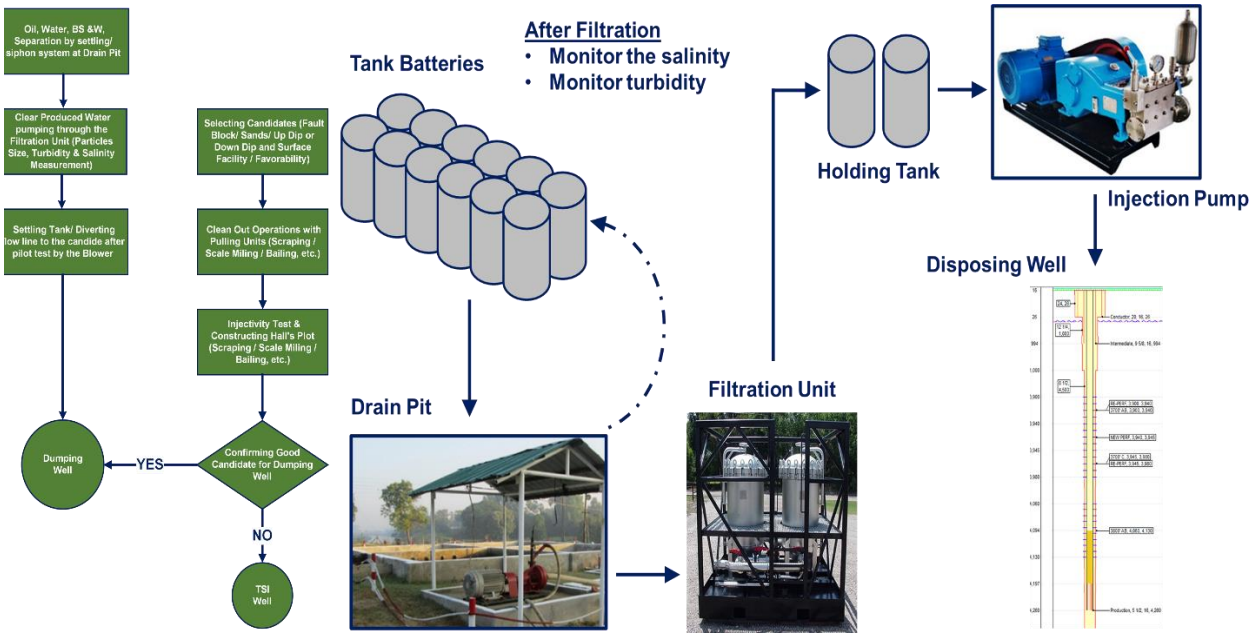


Figure 22: Produced Water Management Process

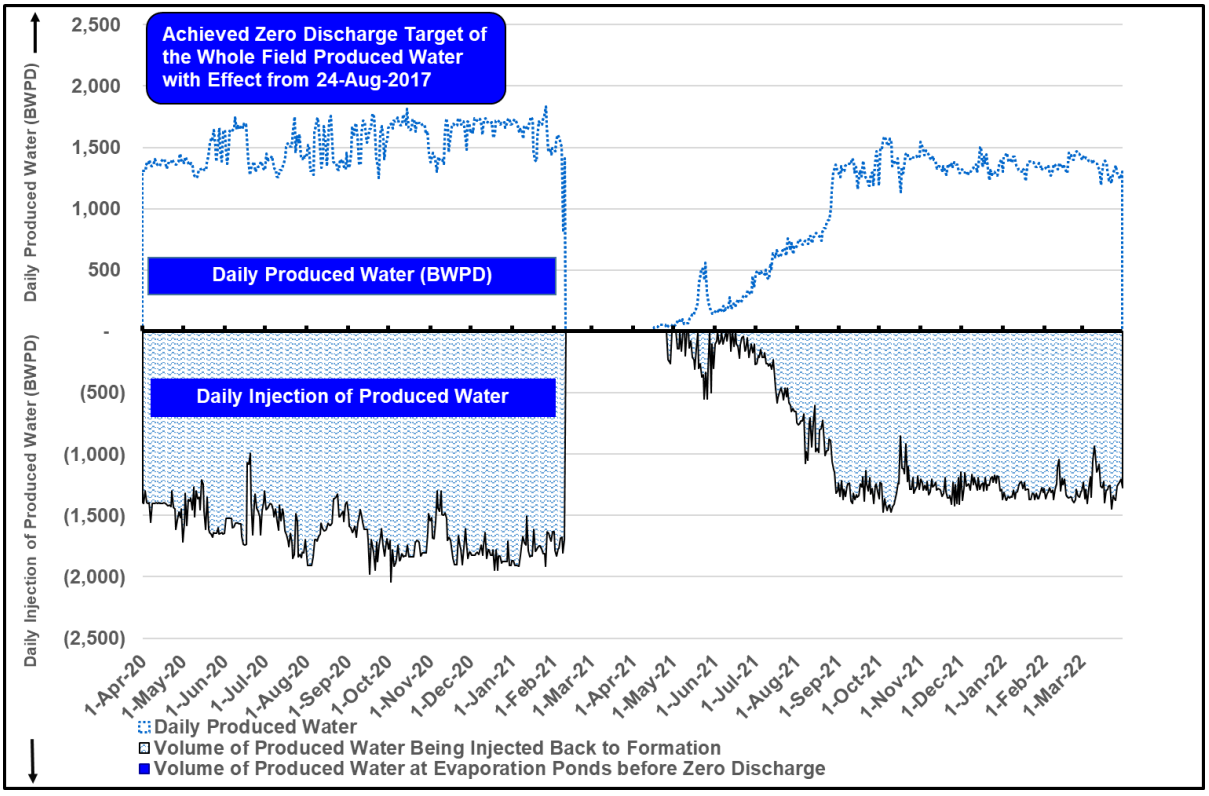


Figure 23: Produced Water Management

According to Table 7 in this report, as per table 8.3 Environmental and Social Monitoring Program of the approved EIA report, it is committed to testing the wastewaters from the discharged points. However, all the produced water from the GOCs is being disposed of back into the formation and thus there is no discharge to the environment. Again, there is no discharge from the hydro test activities and also from shut-in wells.

Therefore, wastewater monitoring will be continued with the parameters committed in table 8.3 of the approved EIA report on the treated discharged water of the base camp.

7.3 Monitoring on Discharge of Treated Wastewater and Runoff

MPRL E&P monitored the discharged water quality on the domestic wastewater treated from Bio-filter water, hydro test water from Warehouse, Drinking Water Quality, Domestic Wastewater Quality from Downhole and Mobile Workshop ZERO Discharged Tank, and the Groundwater Quality near the chemical treatment well. These monitoring activities are self-monitoring activities and are conducted as per the planned schedule.

7.3.1 Base Camp Water Discharge

Domestic-type wastewater and sewage are under management in the existing operational phase. Based on the camp water consumption monitoring results, the sewage and wastewater generation rate is up to about 10,000 litres per day of sanitary wastewater is generated from the base camp within the Mann Field which can accommodate 80 – 100 workers.

Water consumption is monitored by using the water flow meter in the base camp, workshop, warehouse, and downhole workshop. In the meantime, the team is fully aware of the consumption of water to reduce the volume of water consumption.

Figure 24: Bio Filter Treatment System

Sanitary wastewater and domestic wastewater are implemented as per the mitigation plan.

- Sanitary wastewater is collected in the septic holding tanks in the main camp and a retained licensed firm periodically cleans and services the septic holding tanks. Currently, sanitary wastewater is collected in the concrete pit and there is no discharge outside.

- MPRL E&P has installed the wastewater treatment unit to treat sanitary wastewater properly to meet NEQEG guidelines. The field team is implementing monitoring of the discharge water parameter quarterly basics.
- Storm water run-off is routed to a pond to remove silt particles before discharge via a storm drain.
- Surface runoff from potential sources of contamination was prevented.
- All discharge facilities and sediment control structures are inspected regularly and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit were removed regularly.
- Runoff from areas without potential sources of contamination minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate will be reduced (e.g. by using vegetated swales and retention ponds).
- Oil-water separators and grease traps have been constructed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage, and containment areas.
- The discharged point of treated sewage effluent to surface water (location not confirmed based on existing project design) will be located where there is adequate assimilative capacity of the surface waters.

Monitoring of Bio-filter outlet water quality from Sewage Treatment System

During the monitoring periods from October 2021 to March 2022, there was one-time monitoring conducted for the bio-filter water quality from the sewage treatment system. In December 2021, a total of eight (8) parameters were monitored the rest of the parameters were within the NEQEG except the total coliform bacteria parameter.

The monitoring result is described in the following table – 8 Bio-filter outlet water quality monitoring (Sewage Treatment System).

Figure 25: Checking the Bio-filter Treatment from Supplier

Table 8: Bio-filter outlet water quality monitoring (Sewage Treatment System)

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
1	BOD_5	mg/l	16	5	29	30
2	COD	mg/l	35	< 30	78	125
3	Oil and Grease	mg/l	8	2	3	10
4	pH	S.U	7.6	7.7	7	6 - 9

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
5	Total Coliform Bacteria	MPN/100 ml	-	-	1100	400
6	Total Nitrogen	mg/l	< 5	< 5	0.7	10
7	Total Phosphorous	mg/l	< 0.02	0.5	1.8	2
8	Total Suspended Solids (TSS)	mg/l	4	1	5	50

The sewage discharge water was treated with bio-filter in Base Camp and we collected that discharge water into the concrete tank. That collected water is reused for watering the plants and spraying the ground as dust control.

The sewage discharge water of the bio-filter outlet was collected and tested in December 2021 and apart from total coliform bacteria results, other shows within the NEQEG (2015). In February 2022 test results, only total coliform bacteria results were also higher than NEQEG (2015).

As the monitoring results, the total coliform parameter was exceeded NEQEG. Total Coliform may be exceeded due to the Service Maintenance required and the surrounding environment's effect on the outlet of water quality from the Bio-filter System. Concerning this, MPRL E&P shall be rechecked and ensured with the supplier for service maintenance and service maintenance was completed on 20 March 2022.

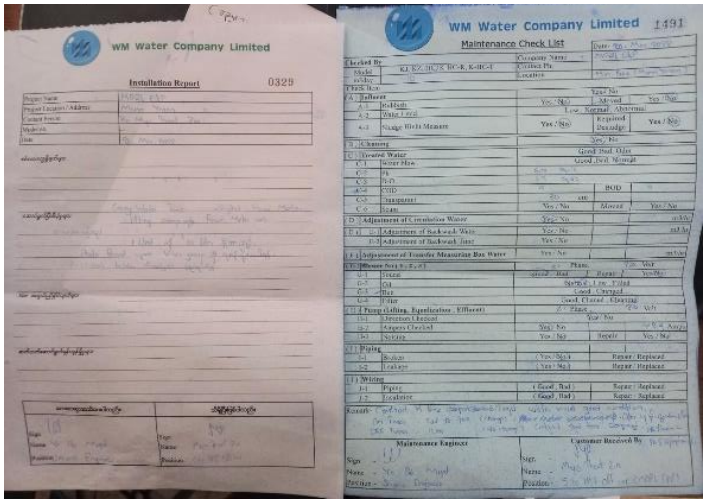


Figure 26: Maintenance Service Record

Figure 27: Maintenance Service at Bio filter Treatment

7.3.2 Hydro-test Water and Domestic Water

In the Mann field warehouse, the team used to perform the hydro test for the tubing in the designated pressure test area. The field team reduced and minimized the usage of water volume by using recycled water with zero discharge.

Figure 28: Recycle Water Usage System with Zero Discharge in Warehouse

During the monitoring periods from October 2021 to March 2022, there was no monitoring activities for the Hydrotest Water. This Hydrotest Water is planned as Bi-Annually Monitoring Programme and will monitor on coming Bi-Annually Periods.

Downhole Workshop: Downhole tools servicing, cleaning, inspection, pressure testing and the cleaning process with steam are carried out in the Downhole Workshop. The used water is disposed of at the zero discharge pits to preserve the environment.

Figure 29: Water Tank Condition

Figure 30: Recycle Water Usage System with Zero Discharge in Downhole Workshop

Mechanical Workshop: Pulling units, workover rigs, trucks, bulldozers, backhoe, tractors and pumps are serviced in the workshop. Large amounts of water are used in car washes and general cleaning. Water reclaim systems are applied in the workshop.

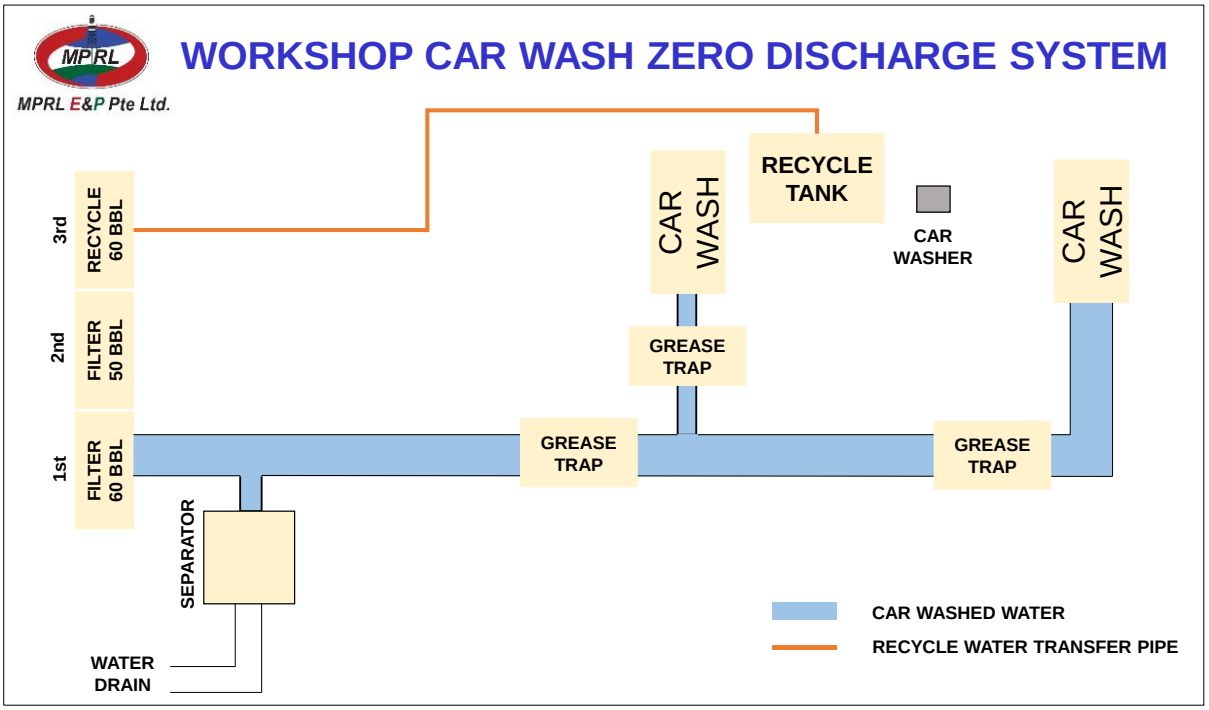


Figure 31: Recycle Water Usage System with Zero Discharge in Mechanical Workshop

Monitoring of Discharge Water from Equipment Maintenance Workshop (Mobile Workshop)

During the monitoring periods from October 2021 to March 2022, there was one-time monitoring conducted for the discharge of water from the Equipment Maintenance Workshop (Mobile Workshop) of the ZERO Discharge Tank. In December 2021, a total of eight (8) parameters were monitored the rest of the parameters were within the NEQEG except the total coliform bacteria parameter.

The monitoring result is described in the following table – 9 Discharge water from Equipment Maintenance Workshop (Mobile Workshop).

Table 9: Discharge Water from Equipment Maintenance Workshop (Mobile Workshop)

No	Quality Parameter	Units	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
1	BOD_5	mg/l	12	36	50
2	Ammonia	mg/l	< 0.02	< 0.02	10
3	Arsenic	mg/l	0	0	0.1
4	Cadmium	mg/l	ND	ND	0.1
5	COD	mg/l	< 30	81	250

No	Quality Parameter	Units	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
6	Chlorine (Total Residual)	mg/l	0.02	0.04	0.2
7	Chromium (Hexavalent)	mg/l	2	0	0.1
8	Chromium (Total)	mg/l	-	< 0.02	0.5
9	Copper	mg/l	0.02	ND	0.5
10	Cyanide (Free)	mg/l	< 0.01		0.1
11	Cyanide (Total)	mg/l	-	< 0.01	1
12	Fluoride	mg/l	0.46	0	20
13	Heavy Metals (Total)	mg/l	-		10
14	Iron	mg/l	0.12	0.11	3.5
15	Lead	mg/l	ND	ND	0.1
16	Mercury	mg/l	-	0	0.01
17	Nickel	mg/l	ND	< 0.2	0.5
18	Oil and Grease	mg/l	12	6	10
19	pH	S.U	7.7	6.9	6 - 9
20	Phenols	mg/l	< 0.1	< 0.1	0.5
21	Selenium	mg/l	-	≤ 0.01	0.1
22	Silver	mg/l	-	≤ 0.002	0.5
23	Sulfide	mg/l	< 0.04	< 0.04	1
24	Temperature increase	mg/l	24	25	< 3
25	Total coliform bacteria	MPN/100 ml	-	460	400
26	Total phosphorous	mg/l	0.3	< 1.5	2
27	Total suspended solids	mg/l	2	0	50
28	Zinc	mg/l	< 0.02	0.02	2

The vehicles and machine parts are doing maintenance and repairing jobs at the mobile workshop. The water used in the daily operation of the workshop was collected in a concrete tank and reused that water again.

The water sample collected from the mobile workshop in December 2021 shows under the guideline but only the Total coliform bacteria result shows higher than NEQEG (2015). The reason may be the cover of the collecting tank was made with iron rod mesh and that the bird feces and other transmissions through the drain line may became affected water quality.

In February 2022 test results, total coliform bacteria results were also higher than NEQEG (2015). As the monitoring results, the total coliform parameter was exceeded NEQEG. Zero Discharged Tank used in the Mobile workshop and Total Coliform may be exceeding due to the surrounding environment and accumulate effect due to storage condition.

Monitoring of Discharge Water from Equipment Maintenance Workshop (Downhole Workshop)

During the monitoring periods from October 2021 to March 2022, there was one-time monitoring conducted for the discharge of water from the equipment maintenance workshop (Downhole Workshop) of the ZERO Discharge Tank. In December 2021, a Total of Twenty Eight (28) parameters were monitored the rest of the parameters were within the NEQEG except the total coliform bacteria parameter.

The monitoring results are described in the following table – 10 Discharge water from Equipment Maintenance Workshop (Mobile Workshop).

Table 10: Discharge Water from Equipment Maintenance Shop (Downhole Workshop)

No	Quality Parameter	Units	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
1	BOD_5	mg/l	14	34	50
2	Ammonia	mg/l	< 0.02	< 0.02	10
3	Arsenic	mg/l	0	0.025	0.1
4	Cadmium	mg/l	ND	ND	0.1
5	COD	mg/l	< 30	76	250
6	Chlorine (Total Residual)	mg/l	0.14	0.38	0.2
7	Chromium (Hexavalent)	mg/l	12	0	0.1
8	Chromium (Total)	mg/l	-	< 0.02	0.5
9	Copper	mg/l	ND	ND	0.5
10	Cyanide (Free)	mg/l	< 0.01		0.1
11	Cyanide (Total)	mg/l	-	< 0.01	1
12	Fluoride	mg/l	0.33	0	20
13	Heavy Metals (Total)	mg/l	-		10
14	Iron	mg/l	0.24	0.26	3.5
15	Lead	mg/l	ND	ND	0.1
16	Mercury	mg/l	-	0	0.01
17	Nickel	mg/l	ND	< 0.2	0.5

No	Quality Parameter	Units	Results (Dec 2020)	Results (Dec 2021)	NEQEG (2015)
18	Oil and Grease	mg/l	14	4	10
19	pH	S.U	7.4	7	6 - 9
20	Phenols	mg/l	< 0.1	< 0.1	0.5
21	Selenium	mg/l	-	≤ 0.01	0.1
22	Silver	mg/l	-	≤ 0.002	0.5
23	Sulfide	mg/l	0.04	< 0.04	1
24	Temperature increase	mg/l	24	25	< 3
25	Total Coliform Bacteria	MPN/100 ml	-	> 1100	400
26	Total Phosphorous	mg/l	0.18	< 1.5	2
27	Total Suspended Solids	mg/l	11	3	50
28	Zinc	mg/l	< 0.02	0.02	2

The water uses in the daily operation of the downhole workshop were collected in a concrete tank via a drain line and reused that water again as recycling and avoiding discharge to the environment.

The water samples collected and tested in December 2021 show all are under NEQEG but total chlorine and total coliform bacteria results are over the NEQEG (2015). So, tested that water again in February 2022 and the test result of total chlorine is under NEQEG (2015) and total coliform is still higher than NEQEG (2015).

As the monitoring results, the total coliform parameter was exceeded NEQEG. Zero Discharged Tank was used in the Mobile workshop and Total Coliform may be exceeding due to the surrounding environment and accumulate effect due to storage condition.

7.4 Use of Chemicals for EOR

During the EOR operation, chemicals were injected into the wells to alter the property of oil for enhanced recovery. The chemicals that may be used for the Project included alkaline and polymers. The injection of chemicals into the well may cause groundwater contamination and indirectly affect community health.

In Mann Field, MPRL E&P applied the GreenZyme® to inject the formation that does not expose nor discharge to the environment. There is no environmental issue since the injection project had been conducted according to the standard operating procedure by protecting not spilling into the environment. According to the work program, MPRL E&P did not conduct the GreenZyme® treatment operation during this fiscal year 2021-22 and observed the result of the previous year's GreenZyme® treatment wells.

GreenZyme® is not a chemical but a biological liquid enzyme which is a kind of environmentally friendly fluid. It is a protein-based non-living catalyst, which facilitates the completion of biological reactions, to enhance crude oil recovery from most oil wells, both onshore and offshore. EOR GreenZyme® is produced by a proprietary process, which involves impregnating a high protein nutrient soup, with the DNA of selectively cultured microbes. The final product contains enzymes associated with the oil-eating microbe's DNA. Nearly all-living microbes are made inert at the end of the manufacturing process.

7.5 Monitoring of Camp Water Quality (Drinking Water Quality)

In the base camp, MPRL E&P installed a purified drinking water machine (Reverse Osmosis – RO System) for drinking and food preparation to cover enough consumption for all staff who are living in the base camp. The team is monitoring water quality quarterly and performing hygiene inspections and audits by the site doctor and HSE team as per the planned schedule.

Figure 32: Reverse Osmosis (RO) Treatment at Base Camp

The purified drinking water RO System was installed at the Base Camp for drinking and cooking purposes. In December 2021, the tested water from the RO outlet of purified drinking water system at Base Camp shows that total coliforms and fecal coliform are higher than NDWG (2019). Trying to identify the main cause of the results and plan to test again to ensure the results as per the sampling procedure. So, tested again raw water of purified drinking water.

Monitoring Results of Drinking Water Quality

Table 11: Drinking water quality monitoring from Base Camp (RO outlet)

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NDWG (2019)
1	pH	S.U	7.7	7.1	7.1	6.5 - 8.5
2	Turbidity	NTU	<5	1	<5	5
3	Colour	TCU	4	Nil	0	15
4	Hardness	mg/l as $CaCO_3$	55	28	6	500
5	Arsenic	mg/l	0	-	0	0.05
6	Chloride	mg/l	6.2	7	<0.5	250
7	Lead	mg/l	0	-	ND	0.01
8	Total Dissolved Solids (TDS)	mg/l	76	72	101	1000
9	Iron	mg/l	<0.1	0.07	<0.1	1
10	Sulphate	mg/l	4.5	12	10.6	250
11	Calcium	mg/l	18	20	52	200
12	Manganese	mg/l	-	Nil	< 0.2	0.4
13	Nitrate-Nitrogen	mg/l	0.9	-	1.4	50
14	Total Coliform Count	MPN/100 ml	-	-	>1100	0
15	Total Fecal Coliform Count	MPN/100 ml	-	-	>1100	0

The purified drinking water RO system was installed at the Base Camp for drinking and cooking purposes. In December 2021, the tested water from the RO outlet of the purified drinking water system at the Base camp shows that total coliforms and fecal coliform are higher than NDWG (2019). Trying to identify the main cause of the results and planned to test again to ensure the results as per the sampling procedure. So, tested again both raw water of purified drinking water system and RO outlet of purified drinking water in December 2021, the results show under NDWG (2019).

ISO TECH LABORATORY

WTL-RE-001
Issue Date - 01-1-2016
Effective Date - 01-1-2016
Issue No - 1.0/Page 1 of 1

M0322 034

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client: MPRL E & P Co,Ltd.
Nature of Water: RO Water
Location: Minbu
Date and Time of collection: 23.3.2022
Date and Time of arrival at Laboratory: 24.3.2022
Date and Time of commencing examination: 24.3.2022
Date and Time of completing: 25.3.2022

Results of Water Analysis — WHO Drinking Water Guideline (Geneva - 1993)

Total Coliform Count	Not detected (<1)	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	Not detected (<1)	CFU/100ml	Not detected
pH			6.5 - 8.5
Turbidity		NTU	5 NTU
Colour (True)		TCU	15 TCU
Free Chlorine		mg/l	
Total Chlorine		mg/l	

Remark : Satisfactory for drinking purpose.
: This certificate is issued only for the receipt of the test sample.
: < - Less than

Tested by
Signature:
Name: Zaw Hein Oo
ISO Tech Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
Assistant Technical Officer
ISO Tech Laboratory

(a division of WEG Co.,Ltd.)

Figure 33: RO Water Result of Micro Parameters Result

Required some upgrading to the RO system of the purified drinking water system at base camp. After upgrading of RO system, tested the RO outlet of the drinking water system in a different lab and the results show it was fit to drink and under NDWG (2019).

As a monitoring result, total coliform and total fecal coliform was exceeded than NDWG and Reverse Osmosis (RO) treatment was temporarily suspended and MPRL E&P takes action for Safe Water of the drinking water purposes as the Camp base was using the purified water from the supplier and engaging with the supplier for root cause analysis. The supplier inspected that the RO membranes were required to replace and the treatment was necessarily required to upgrade. The newly RO treatment system was replaced and the service maintenance was completed on 24 March 2022 and the result shows there is no significant effect on the Drinking Water.

7.6 Monitoring of Ground Water Quality

The groundwater was monitoring as bi-annually and the purpose of this monitoring is to consider the contamination or any impact on ground water due to the chemical treatment of EOR. Mostly, chemical treatment using near well No.132. Closed to well No.132, there were two tube wells from the community area named Ko Win Maung and Ma Nyein Wells. The monitoring was conducted as regularly every six months per one time and conducted in December 2021. The monitoring result is stated in tables 12 and 13.

Table 12: Groundwater Quality Monitoring Near Injection Well #132 (Ko Win Maung)

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NDWG (2019)
1	pH	S.U	7.4	7.2	7.3	6.5 - 8.5
2	DO	mg/l	3.89	5.8	5.2	-
3	EC	mS/cm	2.1	1	0.1	-
4	Turbidity	FAU/NTU	< 5	< 5	< 5	5
5	Colour	HU	4	16	14	15
6	Alkalinity	mg/l	880	200	230	-
7	Hardness	mg/l as $CaCO_3$	225	41	23	500
8	BOD_5	mg/l	< 3	< 3	< 3	-
9	COD	mg/l	< 30	< 30	< 30	-
10	Total Nitrogen	mg/l	7.7	< 5	< 0.5	-
11	Total Phosphorous	mg/l	< 0.02	0.07	< 1.5	-
12	Oil and Grease	mg/l	4	2	1	-
13	TSS	mg/l	1	2	3	-
14	E.coli	CFU/100 ml	-	-	1	0

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NDWG (2019)
15	Total Coliforms	MPN/100 ml	-	-	460	0
16	Arsenic	mg/l	0.05	0	0	0.05
17	Barium	mg/l	0.018	-	0.004	0.7
18	Boron	mg/l	0.9	0.7	0.3	2.4
19	Total Chromium	mg/l	≤ 0.002	-	< 0.02	-
20	Fluoride	mg/l	0.95	1.7	0	1.5
21	Selenium	mg/l	≤ 0.01	-	≤ 0.01	0.04
22	Uranium	mg/l	TBA	TBA	TBA	0.03

Table 13: Groundwater quality monitoring near injector well # 132 (Ma Nyein)

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NDWG (2019)
1	pH	S.U	-	7.1	7.5	6.5 - 8.5
2	DO	mg/l	-	6.3	4	-
3	EC	mS/cm	-	0.09	1	-
4	Turbidity	FAU/NTU	-	< 5	< 5	5
5	Colour	HU	-	3	10	15
6	Alkalinity	mg/l	-	280	520	-
7	Hardness	mg/l as $CaCO_3$	-	147	47	500
8	BOD5	mg/l	-	< 3	< 3	-
9	COD	mg/l	-	< 30	< 30	-
10	Total Nitrogen	mg/l	-	< 5	< 0.5	-
11	Total Phosphorous	mg/l	-	0.06	< 1.5	-
12	Oil and grease	mg/l	-	2	1	-
13	TSS	mg/l	-	1	0	-
14	Total E.coli count	CFU/100 ml	-	-	0	0
15	Total Coliform count	MPN/100 ml	-	-	23	0
16	Arsenic	mg/l	-	0	0	0.05
17	Barium	mg/l	-	-		0.7
18	Boron	mg/l	-	0.5	0.1	2.4
19	Total Chromium	mg/l	-	-	< 0.02	-
20	Fluoride	mg/l	-	0.7	0	1.5
21	Selenium	mg/l	-	-	≤ 0.01	0.04

No	Quality Parameter	Units	Results (June 2020)	Results (Dec 2020)	Results (Dec 2021)	NDWG (2019)
22	Uranium	mg/l	-	TBA	0.006	0.03

Remarks – No water samples were taken in June – 2020 due to the lack of water.

MPRL E&P conducted the groundwater near well 132 (Ko Win Maung) in December 2021 and all the results show under National Drinking Water Guideline (2019) except Total coliforms and E.coli. These two parameters are over the NDWG (2019). As the observation on that well, the tube well is almost 20 feet in depth and is normally used to bathe and wash. The discharge of water from animal farms, toilets, fertilizers, animal faeces can cause pollution to groundwater as well as tube-well. In summer that tube well is no more able to use as dried up. During the water test in February 2022, the results of total coliform is still higher.

At the Ma Nyein Well, all the results shown under the National Drinking Water Guideline except total coliforms result in shows higher than the NDWG (2019). That tube-well is about 20 feet in depth and is mainly used for washing and bathing purposes. As a result of the observation on that the discharge of water from animal farms, fertilizers, and nearness to toilets may cause pollution to the groundwater source as the well is not enough in-depth. We planned to collect water samples to test in February 2022, but the tube well cannot produce water as it became draught in summer.

7.7 Monitoring on Gas Venting

As per the gas venting monitoring program, MPRL E&P's technical team is monitoring and measuring by using an Echo Meter to check for gas volume. Based on the results, if the gas volume is significantly higher than the previous measurement volume, use the orifice meter to confirm the gas volume measured within 24 hours. The team connected to the gas line after confirming gas volume is enough to collect to the existing facility of the gas supply lines to the LPG plant.

Location of the Gas Venting Wells

As per the planned monitoring program, the team randomly selected the six wells and measured by using an orifice meter on the wells as follows;

Table 14: Selected Gas Venting Wells Locations

Well No.	Location	Gas Volume	Date
M 205	N 20°13'9.12" E 94°51'17.9"	0 - MMCFD	10 November 2021
M 525	N 20°12'26.57" E 94°51'55.22"	0 - MMCFD	02 February 2022

Well No.	Location	Gas Volume	Date
M 567	N 20°12'39.85" E 94°51'51.21"	0 - MMCFD	03 January 2022
M 575	N 20°12'15.48" E 94°52'1.15"	0 - MMCFD	03 January 2022
M 605	N 20°12'57.22" E 94°51'17.26"	0 - MMCFD	05 December 2021
M 630	N 20°12'39.36" E 94°51'18.97"	0 - MMCFD	08 October 2021

Location : Well – 205
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 10 November 2021
Gas Volume : 0 MMCFD

Location : Well – 525
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 02 February 2022
Gas Volume : 0 MMCFD

Location : Well – 567
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 03 January 2022
Gas Volume : 0 MMCFD

Location : Well – 575
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 03 January 2022
Gas Volume : 0 MMCFD

Location : Well – 605
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 05 December 2021
Gas Volume : 0 MMCFD

Location : Well – 630
Measurement : Gas Volume Measurement by using Orifice Meter
Date : 08 October 2021
Gas Volume : 0 MMCFD

7.7.1 Monitoring of Hydrogen Sulphide (H_2S)

Hydrogen Sulphide (H_2S) monitored as the Bi-Annual at the randomly selected potential gas venting well and the Six (6) wells were conducted by HSE Team Members in this monitoring period.

Table 15: Monitoring Results on the Gas Venting Wells

Sr. No:	Location	Date	Measurement time	H_2S (PPM)	CO (PPM)	O_2 %	LEL %
1	M-310	24-March-22	14:40 Hrs	0	0	20.7	0
2	M-254	24-March-22	14:55 Hrs	0	0	20.9	0
3	M-224	24-March-22	15:14 Hrs	0	0	20.9	0
4	M-608	24-March-22	15:36 Hrs	0	0	20.9	0
5	M-355	24-March-22	15:47 Hrs	0	0	20.9	0
6	M-567	24-March-22	16:03 Hrs	0	0	20.9	0

This is monitored with the In-house portable gas detector (VENTIS MX4 Gas Detector) which have been calibrated equipment as attached in Annex – 2 Equipment Calibration Certificate and Four (4) parameters able to monitor with this equipment. As the monitoring result, there is no detective of the H_2S parameters and the result of each wells are listed as above table 15.

H_2S Monitoring Activities

Figure 34: Monitoring at M-310 near MaeBaeKone Village

Figure 35: Monitoring at M-254 near MaeBaeKone Village (Beside Mann Creek)

Figure 36: Monitoring at M-224 beside Field Public Road

Figure 37: Monitoring at M-608 beside Field Public Road

Figure 38: Monitoring at M-567 Beside of Auk Kyaung Public Road and Infront of GOCS-3

Figure 39: Monitoring at M-355 beside of G-20 Field Main Road

8. Occupational Health and Safety Performance

Occupational Health and Safety System Framework

The current arrangement of health and safety management within MPRL E&P one of the flagship oil and gas exploration and production companies are carried out by fulfilling the international health and safety management system standards and requirements such as HSG 65 and ISO 45001:2018, as well as local applicable laws and international standards and industry best practices such as API requirements.

Occupational Health and Safety Activities

At a glance at the HSE performance within the last six-month period, October 2021 to March 2022, we can summarize both positive and negative outcomes as an overview as follows.

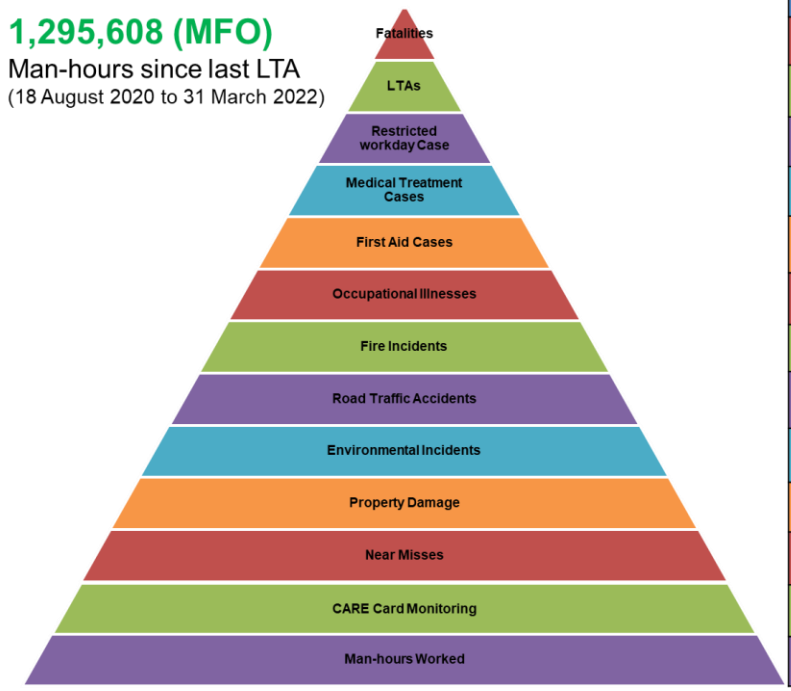
There was one crude oil spill case in December 2021 due to a pilfering case. Pilfering is the most significant factor of the crude oil spill and its frequent recurrences have shown the negligence of field security management by the operator. This factor caused not only production loss but is also a threat to our resources such as operational assets, human resources as well as our environment. Therefore, strengthening security measures by the operator, the MOGE, for any threat caused by external parties is crucial in the prevention of recurrences.

In March 2022, there was a property damage occurrence with a major loss in terms of monetary value and which had also a high potential for fatal injuries. This was a vital sign of weakness or area for improvement in the preventive maintenance program. To resolve this, management to decide on further investment for the replacement of critical and essential operational assets (or) increase the frequency & scope of preventive maintenance on the existing system along with the recertification process which is least preferred as there will be an increase in maintenance costs and manpower requirement. A careful cost-benefit analysis and cost-effective analysis must be carried out by the field management and technical team before proposing options to management.

As positive outcomes, the organization had managed well, especially during the outbreak of the pandemic to minimize all the negative impacts to individuals including their family members, and the organization as a whole and also to maximize and achieve operational sustainability throughout the pandemic. Along with the COVID-19 restrictions and unstable political situations, the HSE department always looks for opportunities to achieve a continual improvement in HSE management and to develop positive HSE culture against the barriers, the ground situations. There was an emphasis on the COVID-19 precautionary measures, the level of awareness and the compliance of employees with the guidelines and regulations. HSE department conducted training online and performed HSE activities, such as hazard hunt

inspections, equipment inspection, toolbox talk, etc. with their best whenever the situation permits.

8.1 HSE Statistics Pyramid



March 2022	Year 2022	Mann Field Project Life
NIL	NIL	NIL
NIL	NIL	29
NIL	NIL	1
NIL	NIL	6 (*)
NIL	NIL	115 (MPRL E&P)
NIL	NIL	NIL
NIL	NIL	30 (*)
NIL	NIL	38
NIL	NIL	40 (*)
1	1	83
NIL	NIL	52
650	1,906	40,979 (*)
86,784	255,648	30,464,698

Figure 40: HSE Statistics Pyramid from 18 August 2020 up to 31 March 2022 Status

8.2 Incidents Status

In the fiscal year of 2020 – 2021, there were a total of 12 incident occurrences in the Mann field operation. It is obvious that the oil spill (environmental incident) case has the highest frequency, four times, followed by medical treatment cases, fire Incidents, property damage with 2-time occurrences respectively, and 1 lost-time accident and 1 high potential near miss.

In the fiscal year of 2021 – 2022, there were a total of 5 incident occurrences in the Mann field operation, fire Incident 2 time followed by the oil spill (environmental incident), property damage and road traffic accident with one-time occurrences respectively.

8.3 HSE Audits

HSE bi-annual Audit for the fiscal year of 2020-21 was conducted from 11th to 15th September 2020. This audit was conducted remotely due to the global outbreak pandemic situation. To carry out the HSE audit more efficiently and remotely, the HSE team prepared a checklist by referring to the MPRL E&P's HSE management system, approved procedures and policies, industrial best practices, and local applicable legal

requirements. This audit is quite significant to the previous ones as it more emphasis on the system, procedures, policies, and practices rather than day-to-day unsafe conditions and unsafe actions which are easier to be identified on-site. Moreover, as the HSE management system of the MPRL E&P is solely based on the HSG 65, ISO 45001:2015 (previously known as OHSAS 18001:2007 and ISO 14001:2015 standard frameworks, these standards were also used as references.

The objectives of the HSE audit are:

- To identify the areas where the top management can make further improvements to their involvement and reinforcement on HSE
- To review the current work practices and methods in the oil field to determine whether they meet with the MPRL E&P's HSE management system, approved procedures and policies, industrial best practices, and local applicable legal requirements
- To access the current level of the organization's HSE performance by benchmarking with that of other similar organizations
- To identify the areas for improvement for the workers by learning past incidents and lessons learned
- To ensure all the physical arrangements and practices in place are aligned with the established standards and approved procedures
- To implement a gradualist approach to developing positive HSE culture within the organization, particularly with effective utilization of the HSE committee

Due to severe COVID-19 pandemic and sociopolitical conditions, HSE bi-annual audit for the fiscal year of 2021-22 is postponed and will conduct if saturation is permitted and higher management approved.

8.4 HSE Training

In the fiscal year 2020-2021, there was a total of (2,747) HSE training hours achieved. In the fiscal year 2021-2022, there was a total of (2,041) HSE training hours achieved.

The topics covered are described below. All of the topics were conducted internally mainly by the HSE department and RE and PPE* departments one session each. Due to the operation nature and conditional prolonged shift during the pandemic, fatigue management plays a vital role in the health and safety of operation workers.

Due to the nature of operations and conditional extended shifts during a pandemic, fatigue management is critical to the health and safety of operating workers. To know and be aware of fatigue, to understand common causes of fatigue, signs & symptoms of fatigue and to manage fatigue risk, the site doctor conducted fatigue management training in Mann Field via the Microsoft team.

Since the Mann field is located in a tropical region, temperature plays an important role in the health and safety of crew members. To raise awareness and prevent heat stress and heat stroke, site HSE staff and doctor conducted heat stress awareness campaigns and shared their knowledge.

From the beginning of the pandemic, MPRL E&P has worked hard to raise awareness of COVID-19 among workers by providing them with accurate information. Training is provided progressively and up-to-date information is also shared proactively.

Year 2020 – 2021 HSE training as per follow

- COVID-19 Prevention Plan and Heat Stress
- Defensive Driving
- Return to Work Procedure
- Environmental Awareness
- Back Safety
- Incident Investigation
- Fatigue Management
- Updated OHS Policy and Environmental Policy
- GoCs' Golden HSE Rules
- High-Rise Building Fire Protection and Detection
- Personal Protective Equipment
- Save Biodiversity, Save Life
- Office Safety
- Lessons Learned from Historical Disastrous Events
- Seven Basic General Industries Safety Rule
- Epidemiology of COVID-19, Testing and Prevention of COVID-19
- NEBOSH Sharing Knowledge Sharing Sessions

Year 2021 – 2022 HSE training as per follow

- HSEO conducted HSE Induction and OHS & Environmental Awareness refresh Training
- Defensive Driving Training
- Emergency Evacuation Refresh Training
- Minimum Requirement Drugs at Home for COVID-19 Awareness Session
- How to use oxygen concentrator and cylinder (Theory)
- How to use oxygen concentrator and cylinder (Demo)
- CARE Cards Refresher Training
- Basic First Aid Training
- Fire Extinguisher Training
- Basic Protection for COVID 19 and Daily Lifestyle During COVID-19 Positive Condition Session-1
- Emergency Evacuation Refresher Training
- Heat stress awareness campaigns

Figure 41: Basic First Aid Training and Stretcher Training (4 February 2022)

Figure 42: OHS Policy and Environmental Policy Awareness Training in Mann Field (30 November 2021)

Figure 43: Fire Extinguisher Training at Warehouse (15 January 2022)

Figure 44: Defensive Driving Training at Mann Field (30 November 2021)

Figure 45: CARE Card Refresher Training in Mann Field (16 January 2022)

Figure 46: How to use Oxygen Concentrator and Cylinder at Yangon Office (12 January 2022)

Figure 47: COVID-19 Prevention Plan and Heat Stroke Campaign in Mann Field (16 March 2022)

8.5 Effective Worker's Participation Towards HSE

To promote positive safety culture among operation teams, award programs were used as driving forces. To promote HSE Culture "Outstanding HSE Best Performance" award program has been developed. To stimulate good behavior changes, "Recognition of safe driver" awards and "Best contribution" awards are given to the nominated drivers and personnel. The Best Quality Care Card Award is aimed at promoting the ownership and reducing property damage and loss.

Figure 48: Best Quality CARE Card Award" presented to the winner crews for the month of October to December 2021

Figure 49: Appreciation Certificates awarded for voluntary participation towards HSE activities

Operational Grievance Mechanism & Corporate Social Responsibility

MPRL E&P Pte Ltd.

9. Operational Grievance Mechanism OGM

MPRL E&P values the importance of engagement with its host communities and sees disclosing information and providing platforms to promote two-way communications as important factors to establishing a partnership, building a mutual trust and maintaining a social license to operate.

At MPRL E&P, Operational Grievance Mechanism (OGM) is an important pillar of the stakeholder engagement process, which creates opportunities for the company and the communities to identify problems and discover solutions together. It is a significant mechanism for systematically receiving, investigating, responding to, and closing out complaints or grievances from affected communities in a timely, fair and consistent manner.

We have developed a multi-stakeholder approach in designing an Operational Grievance Mechanism (OGM) in Mann Field and worked closely with respective stakeholders to solve all grievances quickly and to complete the Mann Field Social Management Plan.

During these six months, (13) OGM cases have been received and total number of (156) OGM cases since 2014. All the reported cases were inspected and repaired by Mann Field Operator (MOGE) and MPRL E&P Field Operations Team, and closed by the CSR Team, keeping all KPIs met.

There were three OGM cases from Mei Bayt Kone, Ywar Thar and Kyar Kan Villages for the month of October 2021.

- The reported oil pipeline leakage from Well (254) in Mei Bayt Kone Village was inspected and repaired by MPRL E&P Field Operations Team. The case was closed on 13th October 2021 with all KPIs met.
- The reported fallen utility pole near Well (33) in Ywar Thar Village was inspected and repaired by MOGE Electrical Department. The CSR Team closed the case on 16th October 2021, meeting all KPIs.
- The reported old pipeline at the farm of U Nyan Maung from Kyar Kan Village was inspected and removed by MPRL E&P Field Operations Team. The case was closed on 19th October 2021, meeting all KPIs.

In November 2021, there were four new OGM cases received from Mann Kyoe, Mei Bayt Kone and Makyee Chaung Villages. The reported cases were inspected and repaired by MOGE Engineering Department and MPRL E&P Field Operations Team, and closed by the CSR Team, keeping all KPIs met.

- The reported oil leakage from Well (175) in Mann Kyoe Village was inspected and repaired by MPRL E&P Field Operations Team. The case was closed on 2nd November 2021 with all KPIs met.

- The reported oil leakage from Well (493) in Mei Bayt Kone Village was inspected and repaired by MPRL E&P Field Operations Team. The case was closed on 11th November 2021 with all KPIs met.
- The reported removal of two oil pipelines in Makyee Chaung Village was inspected and removed the unused one by MPRL E&P Field Operations Team. The CSR Team closed the case on 14th November 2021, meeting all KPIs.
- The reported water pipeline leakage in front of GOCS-4 was inspected and repaired by MOGE Engineering Department. The case was closed on 18th November 2021, meeting all KPIs.

During the month of December 2021, three new OGM cases were received from Mei Bayt Kone, Makyee Chaung and Mann Kyoe Villages. The reported cases were inspected and repaired by MOGE Engineering Department and MPRL E&P Field Operations Team, and closed by the CSR Team, keeping all KPIs met.

- The reported oil leakage near Well (449) in Mei Bayt Kone Village was inspected and repaired by MPRL E&P Field Operations Team. The case was closed on 4th December 2021 with all KPIs met.
- The reported case about the removal of unused oil pipeline in a farm of Makyee Chaung Village was inspected by MPRL E&P Field Operations Team and noticed the pipeline was still in used. The CSR Team explained the complainant and closed the case with his satisfaction on the explanation.
- The reported case of water pipeline leakage near the junction of Mann Kyoe and Chin Taung was repaired by MOGE Engineering Department. The case was closed on 21st December 2021 with all KPIs met.

In January 2022, there were three new OGM cases of “Repair Oil Pipelines” received from Mei Bayt Kone and Chin Taung Villages. The reported cases were inspected and repaired by MPRL E&P Field Operations Team, and closed by the CSR Team, keeping all KPIs met.

- The reported oil leakage between Well (24) and (309) in Mei Bayt Kone Village was inspected and repaired by MPRL E&P Field Operations Team. The case was closed on 28th December 2021 with all KPIs met. *(Note: As the cutoff date for the data used in OGM reporting process was 25 of every month, the case has been registered under January 2022.)*
- The reported case of gas pipeline leakage near South of Pauk Chaung Monastery was inspected and repaired by MPRL E&P Field Operations Team. The CSR Team closed the case with the complaint’s satisfaction on 9th January 2022.
- The reported case of an oil pipeline leakage near Well (395) in Chin Taung Village was checked and repaired by MPRL E&P Field Operations Team. The case was closed on 24th January 2021 with the complaint’s satisfaction.

There was no OGM case received for the months of February and March in 2022.

OGM At-A-Glance: Key Performance Indicators

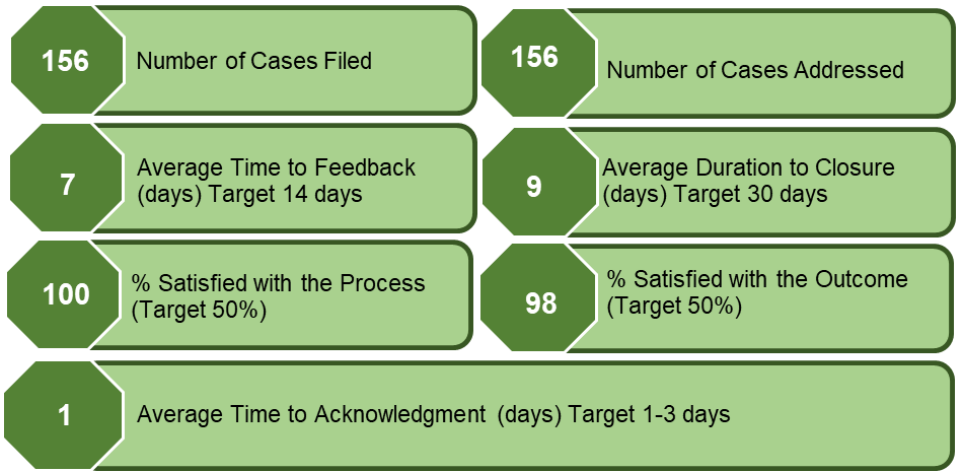


Figure 50: Key Performance Indicators of OGM (September 2014 – March 2022)

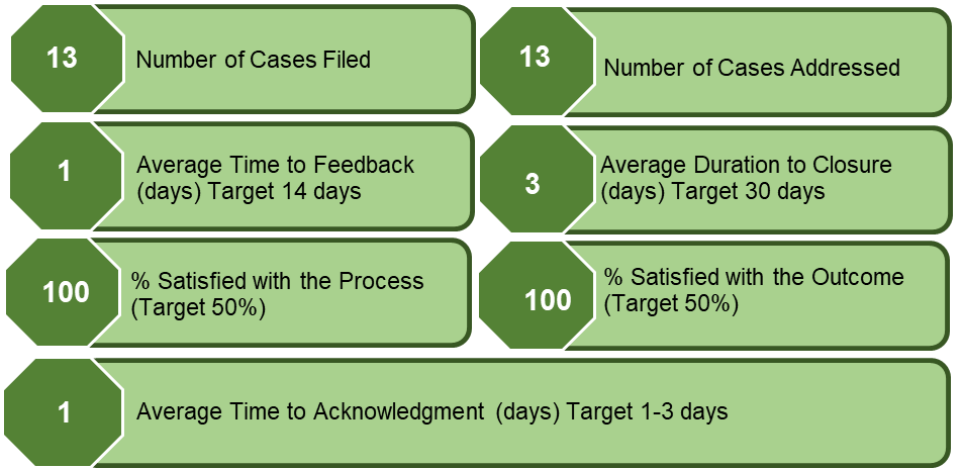


Figure 51: Key Performance Indicators of OGM (October 2021 – March 2022)

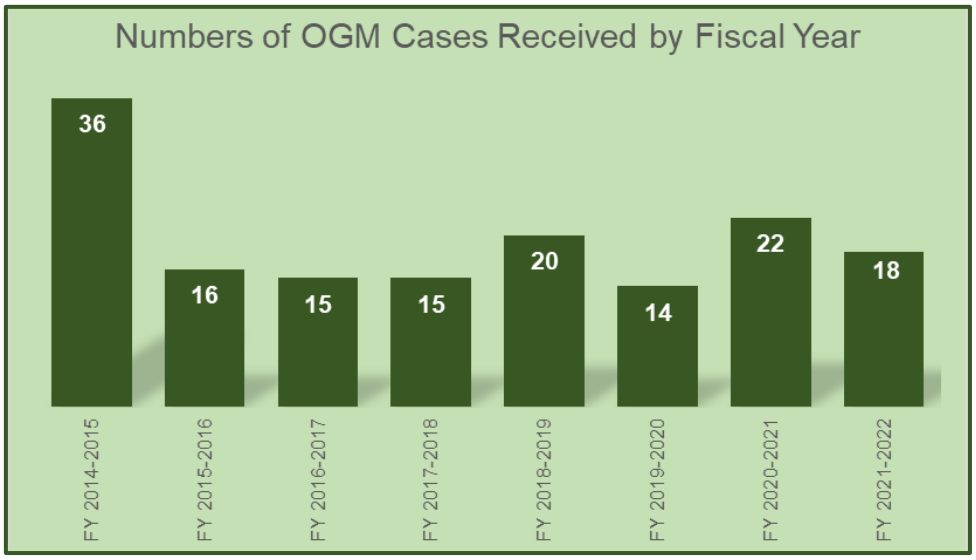


Figure 52: Grievance Cases Received by Fiscal Year

Table 16: Grievances Addressed (Oct 2021 – Mar 2022)

Case no.	Date Received	Concerns	Category	Action Taken	Satisfaction with Process
202110/01	6/10/2021	U Tin Thaung from Mei Bayt Kone Village reported about a 2-inch oil pipeline from well #254 that connected to GOCS-2 was leaking into his farm.	Remove/bury old pipelines / repair oil pipelines	MPRL E&P Field Operations Team took inspection immediately and cleaned the spilled area on 9th October. The case was closed on 13th October.	The complainant was satisfied with the process and the result.
202110/02	15/10/2021	U Aye Thaung from Ywar Thar Village reported that the utility pole near well #33 is on the ground and can cause electrical hazards.	Fire hazard/electricity hazard	CSRFC reported the case to the MPRL E&P Field Operations Team immediately and then to MOGE Electrical Department. The representatives from MOGE Electrical Department inspected the case and resolved the issue on the same day.	The case was closed on 16th October. The complainant was satisfied with the process and the outcome.
202110/03	18/10/2021	U Nyan Maung from Kyar Kan Village requested to remove an old pipeline in his farm that causes difficulties in cultivation.	Remove/bury old pipelines / repair oil pipelines	CSRFC reported the case to MPRL E&P Field Operations Team. The team made an inspection and removed the old pipe on 19th October and the case was closed on that day.	All the KPIs were met and the complainant was satisfied with the process and outcome.

Case no.	Date Received	Concerns	Category	Action Taken	Satisfaction with Process
202111/01	02/11/2021	U Aye Min, a farmer from Mann Kyoe Village, reported about an oil leakage in his farm near well #175. He requested to inspect and repair the case as needed.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator reported the case to MPRL E&P's Field Operations Team immediately. The team inspected and then cleaned the spilled area and repaired the pipeline on the same day.	The complainant was satisfied with the process and the outcome.
202111/02	04/11/2021	Daw Theingi Wann, the volunteer from Mei Bayt Kone Village, reported about an oil leakage occurred in Daw Nwet Yee's farm near well #493. She requested to inspect and repair the case as necessary.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator reported the case to MPRL E&P's Field Operations Team. The team made an inspection and cleaned the spill area. Backhoe was needed for the deep cleaning and new soil replacement. The farm owner requested to continue the deep cleaning process only after the crops were harvested. MPRL E&P team agreed to the request and closed the case on 11th November.	The complainant was satisfied with the process and the result.
202111/03	11/11/2021	U Kyaw Min, the volunteer from Makyee Chaung Village, reported about the two pipelines crossing his farm which caused difficulties in cultivation. He requested to remove if they were not in use.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator informed Field Operations Team and the team inspected the pipelines on 12th November and found out that one of the pipelines is still in use. The complainant agreed the team removed only the unused one. The team removed the pipeline on 14th November.	The case was closed, and the complainant was satisfied with the result and the outcome.

Case no.	Date Received	Concerns	Category	Action Taken	Satisfaction with Process
202111/04	18/11/2021	U Kyaw Min, the volunteer from Makyee Chaung Village, reported about water pipeline leakage in front of GOCS-4, and requested to inspect and repair it as necessary.	Repair water pipeline/ water supply	CSR Field Coordinator reported the case to AFOM, U Zaw Thet, and then the AFOM reported the case to MOGE. MOGE's Engineering Department inspected the water pipeline and fixed it on the same day.	The case was closed, and the complainant was satisfied with the process and outcome.
202112/01	04/12/2021	U Nyunt Win, a farmer from Mei Bayt Kone village reported about an oil leakage in his farm near well #449. He requested to inspect and clean the spilled area as needed.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator reported the case to MPRL E&P's Field Operations Team immediately. The team inspected and then cleaned the spilled area and repaired the pipeline on the same day. The complainant was satisfied with the process and the outcome.	The complainant was satisfied with the process and the outcome.
202112/02	19/12/2021	U Tint Lwin, a farmer from Makyee Chaung reported about an oil pipeline crossing his farm that caused difficulties in cultivation. He requested to remove if they are not in use.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator informed Field Operations Team and the team inspected the pipelines on 21st December and found out that the pipelines is still in use. The CSRFC explained to the complainant that the pipeline could not be removed because the pipeline is still in use.	The case was closed, and the complainant was agreed and satisfied with the feedback and explanation.
202112/03	19/12/2021	U Htun Hla Aung, the Village Administrator from Mann Kyoe reported about water pipeline leakage near the junction of Mann Kyoe and Chin Taung road and	Repair water pipeline/ water supply	CSR Field Coordinator reported the case to AFOM, U Zaw Thet, and then the AFOM reported the case to MOGE. MOGE's Engineering Department inspected the water pipeline and fixed it on 21st December.	The case was closed, and the complainant was satisfied with the result and the outcome

Case no.	Date Received	Concerns	Category	Action Taken	Satisfaction with Process
		requested to inspect and repair it as necessary.			
202201/01	28/12/2021	U Tin Maung Win from Mei Bayt Kone Village reported that an oil pipeline between well #24 and #309 that crossed his yard was leaking. He requested to inspect and repair it as necessary.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator reported the case to MPRL E&P's Field Operations Team immediately. The Pipe Gang Team inspected and repaired the pipeline on the same day. The complainant was satisfied with the process and the outcome.	The complainant was satisfied with the process and the outcome.
202201/02	08/01/2022	Ma Theingi Wann, a volunteer from Mei Bayt Kone Village reported a gas pipeline leakage that occurred near south of Pauk Chaung Monastery. She requested to inspect the case and repair as necessary.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator immediately reported this case to AFOM and MPRL E&P's Field Operations Team inspected the case and repaired the gas pipeline on the same day. The case was closed on 9th January and the complainant was satisfied with the process and the outcome.	The case was closed, and the complainant was satisfied with the result and the outcome
202201/03	21/01/2022	U Thein Than from Chin Taung Village reported that an oil pipeline that connected to well #395 was leaking in his yard. He requested to inspect and repair it as necessary.	Remove/ bury old pipelines/ repair oil pipelines	CSR Field Coordinator reported the case to MPRL E&P's Field Operations Team immediately. The Pipe Gang Team inspected and repaired the pipeline on the same day. The case was closed on 24th January.	The complainant was satisfied with the process and the outcome.

10. Corporate Social Responsibility

At MPRL E&P, Corporate Social Responsibility (CSR) is our responsible and ethical commitment to contribute to the sustainable development of economic, environmental and social imperatives, while running business operations. We make great efforts to improving the lives of the communities around Mann Field where the business operates, and also helping these communities achieve their self-reliance. Since 2014, MPRL E&P's CSR approach has transitioned from a philanthropic mindset to a strategic community investment. We strive to increase opportunities for the sustainable development of the communities through strategic investments.

The CSR & Communications Department has produced "A Year in Review" infographic to check out a snapshot of our social investment milestones in the Fiscal Year 2021 – 2022. In this Fiscal Year, we spent most of our budgets on strategic community investment initiatives: Community Infrastructure Development, Community Livelihood Development, Educational Partnership Program, Community Healthcare Program, Community-led Waste Management Program, Stakeholder Engagement, Corporate Philanthropy, and Operational Grievance Mechanism. The visual infographic presents key highlights of CSR Work Program on what we have contributed to sustainable development of Mann Field Communities in this Fiscal Year.

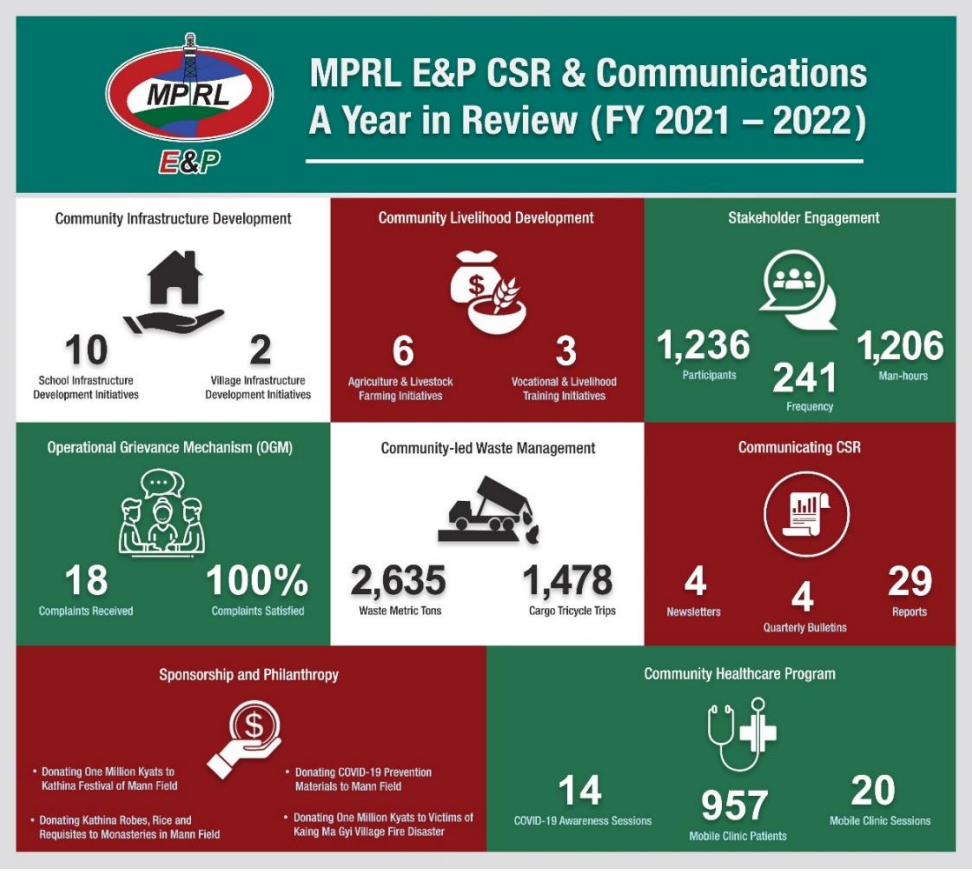


Figure 53: Key Highlights of MPRL E&P's CSR Work Program (FY 2021 – 2022)

10.1 Community Infrastructure Development

MPRL E&P's holistic approach to sustainable development lies at the heart of the CSR & Communications Department's community development program which aims to raise the living standards of Mann Field Communities through strategic investments in infrastructure. This development program plays an instrumental role in creating better lifestyles for the low-income communities with the most pressing needs because it improves the living conditions of communities by creating a sustainable, inclusive, and self-sufficient environment.

Our community investment initiatives have been going strong and steady for the past eight years and only recently, these projects have been put under the resilience budget plan during the Fiscal Year 2020 – 2021 due to the COVID-19 pandemic.

However, after recovering from this hiatus and passing several Coronavirus waves with resilience and diligence, MPRL E&P's CSR & Communications Department began carrying out the planned initiatives. During this Fiscal Year 2021 – 2022, we successfully completed both school and village infrastructure development initiatives:

- Provision of 16 sets of desks and benches for Basic Education High School in Mei Bayt Kone Village on 3rd June 2021
- Construction of school gate and sliding door for Basic Education Middle School in Mann Kyoe Village on 27th August 2021
- Provision of two cabinets (6 x 3 ft), two glass cupboards (4 x 4 ft), and two bookshelves (4 x 3 ft) for Basic Education Middle School in Kyar Kan Village on 22nd September 2021
- Construction of concrete road (50 x 10 ft) and drainage (15 x 8 ft) for Nan U Village on 2nd October 2021
- Provision of four chairs, four tables (8 x 4 ft), two tables (4 x 2 ft), two shelves (6 x 3 ft), two cabinets (6 x 3 ft), eight benches (1 x 1.5 ft) and sixteen benches (4 x 1 ft) for laboratory rooms at Basic Education High School in Mei Bayt Kone Village on 22nd December 2021
- Renovation of the building (50 x 20 ft) for Basic Education Middle School in Kyar Kan on 5th January 2022
- Provision of library room ceiling and renovation of the main building corridor and floor for Basic Education Middle School in Lay Eain Tan Village on 10th February 2022
- Construction of school gate for Basic Education Primary School in Chin Taung Village on 25th March 2022
- Provision of two cabinets (6 x 3 ft), one book shelf (3 x 4 ft) and two bag shelves (4 x 7 ft) for KG Classroom at Basic Education Primary School in Auk Kyaung Village on 22nd March 2022

In this reporting period, MPRL E&P's CSR Program also initiated Green Schoolyards Program at Mei Bayt Kone and Let Pan Ta Pin Schools and Community Center Pilot

Project in Aye Mya Village as part of our community infrastructure development initiatives of Fiscal Year 2021 – 2022.

These all infrastructure and community development projects have to go through the initial phases of site assessments and surveys and they are conducted with the help and support from Mann Field's Special Project Team. The needs assessment is discussed by all parties before any project development commences thus serving as the basis for determining which project should be prioritized.

Figure 54: Site Assessment for School and Village Infrastructure Development Projects

Figure 55: Provision of Classroom Furniture to Mei Bayt Kone School

Figure 56: Completion of Mann Kyoe School Gate Construction

Figure 57: Provision of School Furniture to Kyar Kan School

Figure 58: Construction of Road Concrete Slab and Drainage in Nan U Village

Types of Furniture	Quantities
Table (8' x 4')	4
Table (4' x 2')	2
Chair	4
Bench (4' x 1')	16
Bench (1' x 1.5')	8
Shelf (6' x 3')	2
Cabinet (6' x 3')	2
Total Cost : 3,885,000 Kyats	

Figure 59: Provision of Furniture to Laboratory Rooms of Mei Bayt Kone School

Figure 60: Completion Stage of Kyar Kan School Renovation

Figure 61: Completion of Renovating Main Building Corridor and Installing Ceilings at Main Building Corridor and Library of Lay Eain Tan School

Figure 62: Fencing and Gate Construction at Chin Taung School

Figure 63: Furniture Provision to KG Classroom of Auk Kyaung School

Maintenance on Community Infrastructure Projects

With all-inclusive growth and sustainable development, the CSR Program recognizes the importance of careful maintenance on community infrastructure provided by the company. In February 2022, the CSR Team performed maintenance check and provided technical assistance on water filtration units, provided by the CSR Program as part of community infrastructure development projects around Mann Field Communities. The Team also organized meeting with School and Village Development Committee members and discussed action plans for long-term maintenance on community infrastructure projects.

Figure 64: Monitoring Maintenance on Water Purifiers and Tanks in Schools and Villages

Establishing Green Schoolyards Program

MPRL E&P, an innovative community leader, always strives to provide any support to the communities where we work. In this reporting period, our CSR Team has begun an initiative of having an outdoor learning program, also known as the “Green Schoolyard Movement”, to promote a healthy lifestyle, environmental awareness and overall development among the children in Mann Field Communities.

MPRL E&P’s CSR Program initiated the pilot project of Green Schoolyards Program in Mei Bayt Kone and Let Pan Ta Pin Schools after conducting several meeting and discussion with the school principals. In January 2022, the CSR Team kicked off implementation process of Green Schoolyards Program, and wrapped up implementation process of the Program that included flower gardens, raised bed vegetable gardens, trees, nature play areas, playground equipment with recycled materials, and more, at both Mei Bayt Kone and Let Pan Ta Pin Schools in February. The Team handed over these pilot projects to the schools and continued to monitor the maintenance on the projects regularly.

In February and March, the CSR Team introduced Green Schoolyards Program to the students at Let Pan Ta Pin and Mei Bayt Kone Schools by organizing outdoor learning activities of gardening and reading at the schoolyards. MPRL E&P believes this Green Schoolyards Program will play an important role in the overall development of children and also contribute to environmental sustainability.

Figure 65: Implementing Process of Green Schoolyards Program

Figure 66: Wrapping Up Implementing Process of Green Schoolyards Program in Mei Bayt Kone and Let Pan Ta Pin Schools

Figure 67: Outdoor Learning Activities at Green Schoolyards of Let Pan Ta Pin and Mei Bayt Kone Schools

10.2 Community Livelihood Development

For community livelihood development in this Fiscal Year, MPRL E&P's CSR & Communications Department focused on investing in agriculture, livestock and vocational skills development initiatives, implementing with the collaboration of the government agencies and private institutions. The strategic partnership effectively enhances community livelihoods development in 14 surrounding villages around Mann Field. The initiatives are developed through regular stakeholder engagement and needs assessment meetings.

Figure 68: Meeting with Government Agencies in Minbu for Collaboration of Community Livelihood Development Program

Providing Hands-on Trainings of Making Organic Fertilizer and Pesticide

MPRL E&P, as a responsible investor in Mann Field, encourages local communities to practice sustainable farming – a system that is an alternative to industrial agriculture. It is important because it provides a sustainable solution to the problems caused by the way most of our food is grown today, in terms of social, economic, and environmental impacts.

With the aim of developing sustainable agricultural practices in Mann Field Communities, MPRL E&P's CSR & Communications Department came up with hands-on trainings on how to make organic, easy-to-use fertilizer and pesticide. Under the agricultural development initiatives, the CSR & Communications Department held three sessions of practical training on making Fish Amino Acid and two sessions on making natural pesticide.

Fish Amino Acid is a liquid made from either small-sized fish or fish waste and is a great fertilizer for soil, plants, and microorganisms because it contains an abundant amount of nutrients and various types of amino acid. Rich in nitrogen, Fish Amino Acid helps enhance the growth of crops during the vegetative period. In regards to making natural pesticide, easily-accessible products like ginger, chili, tobacco, water, alcohol, and EM liquid are used and they are also locally available, and affordable for horticulture farmers.

As of 30th December 2021, Fish Amino Acid trainings were conducted at Mann Kyoe, Kywe Cha, and Let Pan Ta Pin Villages with a total of 47 attendees. Natural pesticide

trainings were organized at Mann Kyoe and Auk Kyaung Villages with a total of 44 attendees. Those sessions were practically demonstrated by in-house trainer U Win Ko, Community Liaison from MPRL E&P's CSR Field Team. With the supervision of the CSR Field Team, Horticultural Farmer Committee is currently selling liquid bottles of natural fertilizer and pesticide. These products are available for purchase at MMK 2,000 per liter bottle.

Figure 69: Hands-on Trainings of Making Organic Fertilizer (Fish Amino Acid)

Figure 70: Hands-on Trainings of Making Organic Pesticide

Providing Agricultural Knowledge Sharing Sessions and Workshops

Most locals in Mann Field make their living from farming and MPRL E&P recognizes their hard work, motivation, and hunger for improving their standard of living through limited resources and knowledge. One important way of fulfilling the needs of these farmers is through promoting sustainable agricultural knowledge and increasing access to resources.

Throughout the third quarter of the Fiscal Year 2021 – 2022, MPRL E&P's CSR & Communications Department conducted knowledge sharing sessions and reflection workshops to help further agricultural knowledge among the local farmers. Those initiatives were jointly accomplished by MPRL E&P and the Department of Agriculture (DoA - Minbu) in November 2021.

With the collaboration of the DoA (Minbu), we organized four knowledge sharing sessions on good agricultural practices of sunflower and chickpea cultivation. The two-day sessions at Mann Kyoe and Auk Kyaung Villages received a total of 98 attendees and shared knowledge of good agricultural practices, pest control, soil preparation, and harvesting methods while cultivating sunflower and chickpea. These effective knowledge sharing sessions were delivered by the Field Extension Staff from the DoA (Minbu) and the necessary preparation was arranged by our CSR Field Staff making sure MoH's health guidelines were being followed.

The strategic partnership between MPRL E&P and the DoA (Minbu) was a success and to further our efforts, we conducted a reflection workshop on GAP sesame cultivation at a monastery in Lay Eain Tan Village on 25th November 2021. The workshop reflected on the GAP sesame cultivation that was implemented at the beginning of the Fiscal Year. A total of 16 farmers took part in the workshop by reviewing their strengths and weaknesses based on cultivation and production results and discussing the way-forward plans. The group discussion was wrapped up with the requests to provide seed moisture meter tools and pesticide training for future implementation.

Figure 71: Knowledge Sharing Sessions on Sunflower Cultivation

Figure 72: Knowledge Sharing Sessions on Chickpea Cultivation

Figure 73: Monitoring Harvesting Progress of Chickpea and Sunflower Farms

Figure 74: Reflection Workshop for GAP Sesame Trainers

Establishing Farmer Field School Program

As part of agricultural development initiative, MPRL E&P's CSR Program launched a Farmer Field School (FFS) Program with the collaboration of the Department of Agriculture (DoA - Minbu) in this Fiscal Year 2021 – 2022. The FFS Program consists of three key areas – Sunflower Seeds Production, Integrated Pest Management, and Making Natural Pesticide.

Under the FFS Program, the Sunflower Seeds Production was initiated at the 2.5 acres farmland of farmer U Thein Naing in Kywe Cha Village, as a very first pilot project. The objects of this initiative are to help smallholder farmers in Mann Field acquire new skills and knowledge in agricultural science and assist them in problem solving in accordance with local context and conditions, and to introduce farmers to self-produced good quality sunflower seeds program and to enable the communities to access the seeds with reasonable price. The Extension Staff from DoA (Minbu) conducted monitoring visits to sunflower seeds production pilot farm regularly and provided technical assistance in farming.

Figure 75: Meeting with DoA (Minbu) for Farmer Field School Program and Sunflower Seeds Production Pilot Project

Figure 76: Initial Stage of Sunflower Seeds Production Pilot Project Farm

Providing Sunflower Hand-pollination Demonstration

On 29th December 2021, the CSR Program organized "Sunflower Hand-pollination Demonstration" at the pilot project farm as part of the FFS Program's learning by doing activity. The DoA (Minbu) Staff demonstrated sunflower hand-pollination practically by touching the pollen from a male flower with a gentle paintbrush and carrying it to the female flowers. A total (30) local farmers joined the demonstration session, conducted self-practice and raised agricultural questions about the project.

In February 2022, the DoA (Minbu) Staff and the CSR Field Staff conducted monitoring visit to the harvesting area of sunflower pilot project farm and recorded total yield data of about (183) kg of seeds from female rows, and about (105) kg of seeds from male rows. Upon harvest, seeds from the male rows can be utilized to produce cooking oil while seeds from the female rows will become seeds for the next growing season, clean and dried thoroughly in the sun and applied with fungicides before storing in line with advice and instructions from the DoA (Minbu).

Figure 77: Sunflower Hand-pollination Demonstration at Pilot Project Farm

Figure 78: Monitoring Harvesting Progress of Sunflower Seeds Production Pilot Project

Promoting Animal Husbandry and Healthcare Knowledge

MPRL E&P makes every effort to improve good husbandry practices in Mann Field Communities with the sustainable livelihoods goals. Animal health is just as important as human health, especially in rural communities where livestock farming plays a key role in the local economy and sustainable livelihoods of the community. Animal diseases must be prevented as they have a huge impact on securing a safe, nutritious, and sufficient food supply. Therefore, we have promoted knowledge and practices on animal husbandry and healthcare in Mann Field Communities, and also invested in tools like vaccination and nutrition to improve animal husbandry and livestock farming.

From 14 December to 16 December 2021, with the collaboration of Livestock Breeding and Veterinary Department (LBVD - Minbu), MPRL E&P's CSR Program organized three-day training of "Animal Husbandry and Healthcare Advance Course" for 10 former trainees at Auk Kyaung Damayone. The training program enhanced livestock breeders' knowledge of animal selection, weight calculation, healthcare, artificial insemination, medication, nutrition, vaccination food security, and food safety.

Figure 79: Animal Husbandry and Healthcare Advance Training

Facilitating for Animal Vaccination and Nutrition

MPRL E&P's CSR Field Team focused on delivering necessary resources and support between the community and LBVD (Minbu) as the main facilitator to ensure farm animals have good nutrition and suitable vaccination. The CSR Field Team contacted the LBVD (Minbu) officers in person or over the phone to discuss community needs for their livestock's nutrition and vaccination. The Team also organized meetings for treatment instruction, collecting farm animal lists, distributing vaccines to cure Newcastle disease in poultry and Blackleg disease in cattle, and lastly, delivering Napier grass provided by LBVD (Minbu) for animal nutrition.

To ensure continuous improvements, the Team tracked progress and conducted review or evaluation meetings with beneficiary stakeholders. As of 28th February 2022, a total number of 3,020 poultry and 1,500 cattle have received vaccination under the collaborative support of the company and the LBVD (Minbu). Besides, Napier grass cultivation, which has been implemented as the pilot program for animal food security in the community, has been recorded with positive feedback and good results from farm owners.

Figure 80: Facilitating for Animal Vaccination and Nutrition, and Monitoring Progress

Success Stories of Tomato Farmers

MPRL E&P, with the ultimate goal of contributing to the inclusive growth at the area where the business operates, undertakes focused interventions in agricultural management and also initiates sustainable agriculture practices at 14 surrounding villages in Mann Field.

During these years since July 2019, MPRL E&P's CSR Program has empowered horticulture farmers with sustainable farming practices by organizing horticulture training, delivering hands-on trainings on making natural fertilizer (Fish Amino Acid) and making natural pesticide, providing seeds and plastic mulch through Horticulture Farmer Committee, and facilitating for agricultural experts' technical assistance as needed.

Figure 81: Monitoring Visit to Tomato Farms for Farmers' Success Stories

In this Fiscal Year 2021-2022, 18 farmers from Mann Kyoe, Kyar Kan, and Kywe Cha Villages were growing 7.25 acres of tomato with new cultivation techniques they had learned from horticulture training. Among them, tomato growers from Mann Kyoe Village revealed how much they had benefited from adopting sustainable horticulture practices at their lands as of 28th February 2022.

Success Story (1)

Daw Win Khaing (Mann Kyoe Village)

"This is my very first time sowing tomatoes using sustainable horticulture practices initiated by MPRL E&P's CSR Program. Last year, I couldn't sow using horticulture training techniques and so ended up trying only traditional methods, as I couldn't afford any huge investment costs. But this year, I could grow 0.35 acres of tomato farm because the CSR Program provided necessary tomato seeds and plastic mulch to horticulture farmers like us. I have invested a total cost of MMK 750,000 and harvested 4,500 visses as of 28th February 2022. Nearly two-thirds of the land has been harvested and until now I have gained a sale amount of MMK 8,000,000. My tomatoes are large in size and pretty in color. I am very happy with the return on investment and I would like to thank MPRL E&P for providing such knowledge and resources. I would like to kindly request this kind of support for the upcoming year as well."

Success Story (2)

U Aung Myint San (Mann Kyoe Village)

"It has been over two years that I have been growing tomatoes using modern training methods introduced and supported by MPRL E&P's CSR Program. Currently, I am growing tomatoes on 0.55 acres of land. Although I want to grow more vegetables, I don't have enough space to sow. The advantages of sowing tomatoes using modern techniques include awesome crop yield, more harvesting time, and longer plant life. I am earning about MMK 7,000,000 with a total yield of 3,800 visses from my farm. Last year, the sale amount was MMK 3,200,000, and the gross profit was MMK 2,400,000. There are some crops left in the field and harvesting is still in progress. I want to thank MPRL E&P's CSR Program for its continuous support of our agricultural needs. Because of MPRL E&P, farmers who couldn't cultivate before can now make earnings using modern agricultural techniques. In the coming years, please continue supporting us as we look forward to implementing new practices that promote sustainable agriculture and food security. Thank you again."

Success Story (3)

Daw Mar Mar Aye (Mann Kyoe Village)

"I have 0.45 acres of farmland and I am currently growing tomatoes on this land. The systematic cultivation method provided by the MPRL E&P's CSR program has a higher cost than the traditional one, however, it has a lesser frequency of irrigation and cheaper wedding cost. Furthermore, not many pesticides are needed due to the low disease incidence and good resistance. These days, my tomato farm is getting a sale amount of about MMK 6,300,000 with a yield amount of 3,700 visses and harvesting is still in progress. This year, total investment cost is about MMK 570,000. But last year, a sale amount was only MMK 1,899,700 with total investment cost of MMK 300,000. This year, 10 more farmers have participated in sowing tomatoes with MPRL E&P's modern methods after seeing our previous farming progress. I am pleased to see our neighbors sharing good agricultural practices. This is because of MPRL E&P's great support! I wish MPRL E&P would continue to support farmers who cannot afford to cultivate with new plantation methods."

Success Story (4)

U Tun Hla Aung (Mann Kyoe Village)

"Just like my peers, I have been cultivating tomatoes using the horticulture training method since 2019. I attended all agricultural trainings and knowledge sharing sessions conducted by MPRL E&P's CSR Program and apply that newly acquired knowledge when I work on my farm. My tomato farm is 0.45 acres wide and I have plans to expand it. I am getting a sale amount of MMK 5,000,000 with a yield amount of 3,300 visses and harvesting is still in progress. This year, I invested a total amount of MMK 850,000 in this farmland while last year was it was about MMK 800,000. Furthermore, I noticed that our community farmers prefer to use Fish Amino Acid, the fertilizer that we learned to produce on our own. It is useful for us as it helps produce better quality and healthy crops. Besides, it is more affordable than other chemical fertilizers and is much safer to use. Because of MPRL E&P's benevolence and training sessions, most of us are now cultivating more and at the same time, our livelihoods are getting better. Special thanks to the Company and its generous support to our farming community!"

Providing Basic First Aid Training

MPRL E&P always focuses on enabling all members of the community to develop skills and competencies and also contributes to inclusive local development. Not only can communities be more cohesive, but they can also be more resilient and better placed to confront economic and social challenges.

In this reporting period, the CSR Team paid a visit to the Head of Myanmar Red Cross Society (MRCS - Minbu) and discussed for the collaboration of providing Basic First Aid Training in Mann Field Communities. The training program aims to enhance knowledge of health and well-being and to promote community volunteerism among Mann Field Communities. The Team prepared necessary arrangements for training and met with training applicants on 23rd February 2022.

On 1st March 2022, the CSR Program organized three-day session of Basic First Aid Training with (19) number of participants who are interested and passionate in social work around their communities. The training curriculum includes:

- Introduction to the Red Cross Movement
- First Aid concept
- Victim assessment
- Burns and scalds
- Wounds and bleeding control
- Shock
- Basic Life Support and Chocking
- Musculoskeletal injuries and RICE procedure
- Poisoning: animal bites and stings
- Dressing and bandaging skill
- Head injuries and spinal injuries
- Cause and care of the unconscious patient and recovery position
- Handling and transportation of the injured

The training course focused on theoretical components with much greater emphasis on anatomy, physiology, greater explanations of potential injuries caused during common emergencies - e.g. car and motorbike injuries. At the conclusion of the training, participants are required to complete a written examination and awarded for Top 3 ranks for their best answers.

Figure 82: Basic First Aid Training in Collaboration with Myanmar Red Cross Society (MRCS - Minbu)

10.3 Partnership in Technical and Vocational Education

MPRL E&P's CSR Program helps the young community members acquire vocational and livelihood skills, and enhance employment opportunities through Educational Partnership Program, working closely with the government agencies and training institutes. MPRL E&P introduced Educational Partnership Program in Fiscal Year 2019 – 2020, but temporally suspended due to the COVID-19 pandemic restrictions.

As soon as COVID-19 restrictions were lifted and training centers became reopened, MPRL E&P's CSR Program resumed trainee recruitment. In October 2021, The CSR Team conducted discussion with training centers, scholarship program announcement in community and interview with applicants for trainings at No. (5) Industrial Training Center (ITC - Magway) and Ayeyarwaddy Training Center (Minbu).

In November, the CSR Program held a knowledge sharing session of a former graduate for No.5 ITC (Magway) entrance exam candidates. The alumnus shared training experiences and advantages of attending at No.5 ITC School and the knowledge sharing session hoped to help entrance exam preparation of candidates. Under the CSR Program's support, (19) applicants sat for entrance exam at No.5 ITC (Magway) on 9th November 2021.

Under MPRL E&P's Scholarship Program, a total of (7) youths from Mann Field Communities started one-year training at No.5 ITC (Magway) in December 2021. Among them, (5) men chose to attend Automobile Maintenance Course and (2) women for CAD/CAM Course. In addition, (5) local youths started two-month learning for Nurse Aide Course at Ayeyarwaddy Training Center (Minbu) on 27th December 2021. All the trainees had to pass the entrance exam and interview session for the scholar reward. The CSR Team regularly monitored the training status, shared the vision of MPRL E&P's Scholarship Program and provided enrollment fees, monthly stipends, and meal allowances to the trainees to ensure the best of their studies without financial burden.

Figure 83: Knowledge Sharing for No.5 ITC (Magway) Entrance Exam Candidates

Figure 84: Entrance Exam Day Memory at No.5 ITC (Magway)

Figure 85: Entrance Exam Day Memory at Ayeyarwaddy Training Center (Minbu)

Figure 86: Meeting with (7) Scholarship Trainees at No.5 ITC (Magway) and (5) Scholarship Trainees at Ayeyarwaddy Training Center (Minbu)

Figure 87: Meeting with Scholarship Trainees at No.5 ITC (Magway)

10.4 Community Healthcare Program

In the month of February 2022, MPRL E&P has resumed its Mobile Clinic Program, which had to be closed down for twenty-two months due to the coronavirus pandemic. Before program resumption, there was an assessment survey of the communities' perception on Mobile Clinic reopening. In the survey session, a total of 83 respondents provided their feedbacks of general satisfaction on Mobile Clinic Program, effectiveness of having this program and difficulties during Mobile Clinic closing period. All respondents answered they were happy and grateful for Mobile Clinic Program, and several of them requested to reopen the Mobile Clinics.

On 12th January 2022, the CSR Team conducted location assessment to old Mobile Clinic areas in Mann Field Communities to start necessary preparation for reopening Mobile Clinic, to prepare proper installation for social distancing as per MoH guidelines, and to clean the clinic areas. Before resuming the program, as a COVID-19 precaution movement, the Team organized antigen tests for all participants in Mobile Clinic Program including the medical doctor, two healthcare assistants and community volunteers. There was a meeting with all participants to get familiar with each other, to inform individual responsibilities, to remind strict compliance on MoH guidelines and to discuss medicine stock for Mobile Clinics. The community stakeholders were informed about Mobile Clinic Program resumption on community noticeboards and in person.

MPRL E&P reopened Mobile Clinic Program in Mann Field Communities on 21st February 2022. The program is currently running four clinic sessions per week in four centrally located villages around Mann Field: Kywe Cha, Kyar Kan, Lay Eain Tan and Lat Pan Ta Pin Villages. Within one month period, the program received 957 patients from the surrounding communities of Mann Field. MPRL E&P's CSR Program is running Mobile Clinic Program with the objective to increase access to basic healthcare and health education for the medically underserved, which include the elderly, women and children in the communities.

Figure 88: Informing Community Stakeholders about Mobile Clinic Reopening

Figure 89: Location Assessment to Old Mobile Clinic Areas in Mann Field Communities

Figure 90: Meeting with Doctor, Healthcare Assistants and Community Volunteers

Figure 91: Conducting Antigen Tests for Volunteers and Healthcare Assistants before Resumption of Mobile Clinics

Figure 92: Reopening Mobile Clinics in Mann Field Communities

Figure 93: Announcement Posters of Mobile Clinic Program

Figure 94: Announcement Posters of COVID-19 Prevention Measures

10.5 Community-led Waste Management

Since early 2019, MPRL E&P's CSR Program has launched Community-led Waste Management Program in Mann Field Communities, with the aim to raise awareness on the importance of proper waste management for a better environment and sustainable development, and to motivate all concerned to take collective actions on proper waste management.

It is now running in 13 villages of Mann Field, except Ma Kyee Chaung Village, where has access to municipal waste collecting service. Up to date, the program has collected 2,635 metric tons of waste and 1,478 trips of dump truck. Each household pays MMK 300 to MMK 500 monthly as waste management service fees.

In this reporting period, the CSR Field Team conducted regular engagement with waste collecting service provider and community volunteers to follow up the program updates and to monitor any need for the program progress. The Team also delivered waste management awareness sessions to Mann Field Communities in November 2021 and January 2022.

During the stakeholder engagement trip in December 2021, the CSR Team met with Let Pan Taw Village Administrator, Village Development Committees and Volunteer to discuss the waste service resumption in their Village. The meeting informed the household survey results of September 2021, which indicated community satisfaction on waste collecting service and perception on resumption of service as before, and decided to resume waste collecting system in Let Pan Taw Village on 16th December 2021.

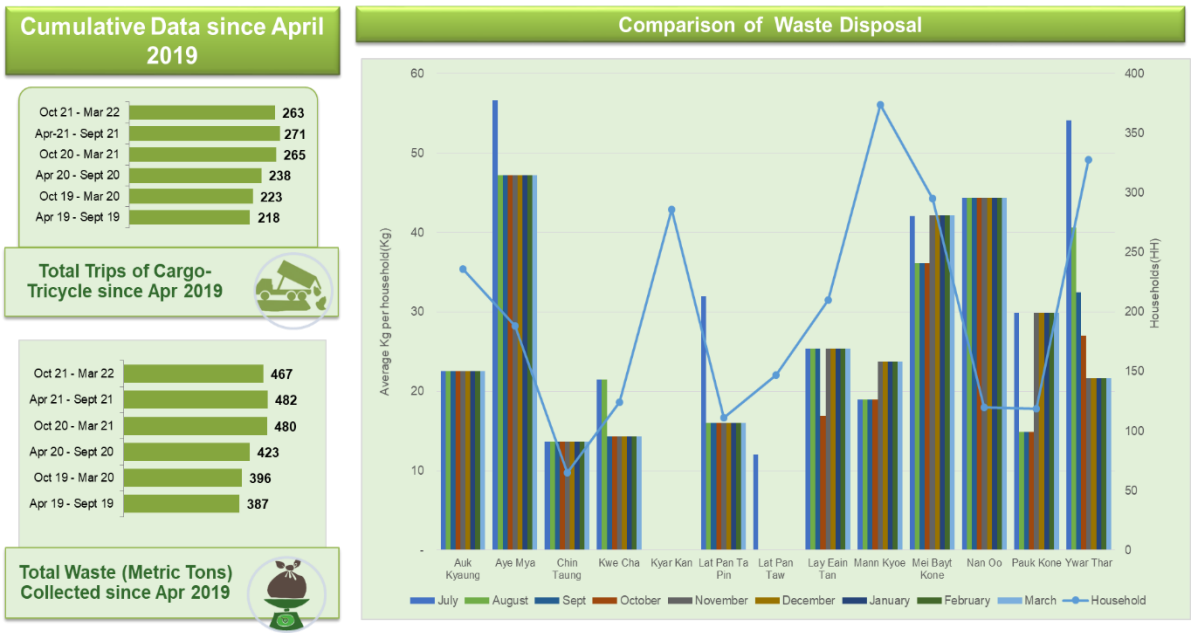


Figure 95: Comparison of Waste Disposal (Quarterly)

Figure 96: Meeting for Waste Collection Resume at Let Pan Taw Village

Figure 97: Meeting with Waste Collecting Service Provider

Figure 98: Regular Waste Collecting Service in Mann Field Communities

Figure 99: Waste Management Awareness Sessions in Mann Field Communities

Trash Hero Minbu Cleanups

MPRL E&P initiated Trash Hero Minbu in September 2017 to keep Minbu area clean and pleasant, and to develop sustainable environment around Mann Field Communities. Trash Hero Minbu cleanups were conducted with active participation from local communities and continuous support from the CSR Program. In this reporting time, the CSR Team organized a total number of (16) Trash Hero Minbu cleanups, where a total of (172) heroes participated and collected 452.5 kg (90.5 bags) of trash in Pauk Kone, Kyar Kan, Aye Mya, Auk Kyaung, Nan U, Mann Kyoe, Let Pan Ta Pin and Lay Eain Tan Villages.

Figure 100: Trash Hero Minbu Cleanup Activities in November

Figure 101: Trash Hero Minbu Cleanup Activities in December

Figure 102: Trash Hero Minbu Cleanup Activities in January

Figure 103: Trash Hero Minbu Cleanup Activities in February and March

10.6 Stakeholder Engagement and Information Disclosure

MPRL E&P recognizes the importance of successful stakeholder engagement because we believe in creating impactful change that further reinforces sustainability programs and organizational capabilities. Whether implementing a small-scale initiative or a more comprehensive program across the organization, engaging different groups to help identify opportunities and develop solutions is vital to our long-term corporate goals.

One of the most efficient ways to engage with stakeholders is by having a two-way communication channel. MPRL E&P's CSR & Communications Department works closely with the stakeholders to understand their views and concerns on various issues. We also report and disclose how we came up with the resolution and how we went about working as a team to acknowledge and tackle their concerns and suggestions.

Timely and regular engagement with our key stakeholders is a cornerstone in MPRL E&P's CSR Program. We engage our stakeholders at field level, community level, local and regional levels to ensure a two-way communication channel exists. We like to work together with our key stakeholders towards implementing a fruitful meeting or initiative and ensure to integrate feedback where appropriate.

Conducting First Biannual CSR Progress Update and Review Meetings

During this reporting period, MPRL E&P's CSR Program conducted CSR Progress Update and Review Meetings with MOGE (Nay Pi Taw) and the Host Community around Mann Field. In the meetings, the representatives from the CSR & Communications Department presented the performance progress of CSR initiatives that were implemented during the first biannual period (April to September) of the Fiscal Year 2021 – 2022.

The first Biannual CSR Progress Update and Review Meeting between MOGE (Nay Pi Taw) and MPRL E&P CSR & Communications Department were held via video conferencing on 18th October 2021. The same meeting with the community was organized at Auk Kyaung Village on 9th December 2021 and the meeting received total attendees of 34 community members including Village Administrators, Village Development Committees, and Community Volunteers from 14 Mann Field Communities.

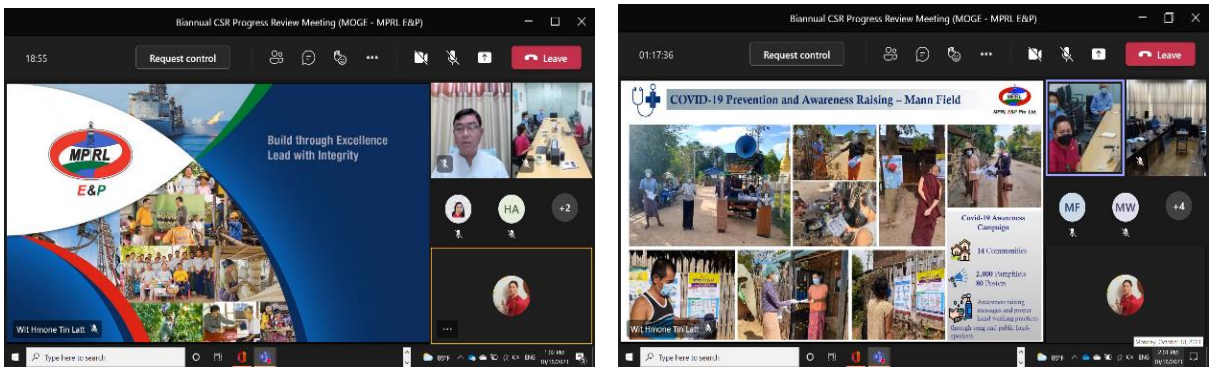


Figure 104: Biannual CSR Progress Review Meeting with MOGE

Figure 105: Biannual CSR Progress Review Meeting with Mann Field Communities

Publishing "Doh Mann Myay" Quarterly CSR Bulletin

It is really important to communicate the performances on sustainable development transparently and effectively. MPRL E&P's CSR & Communications Department published Doh Mann Myay Newsletter, Quarterly CSR Bulletin, as a vital communications tool to present the internal and external stakeholders about the company's social investment activities and CSR success stories in Mann Field and surrounding communities.

Before publishing Doh Mann Myay Newsletter, the CSR & Communications Department informed the updates of CSR activities and efforts in Mann Field Communities via monthly CSR Bulletins from 1st April 2018 to 31st March 2021. In this Fiscal Year 2021 – 2022, we improved the monthly bulletin by changing it into a more presentable and informative newsletter "Doh Mann Myay". The publication is aimed to provide a platform for the primary stakeholders to understand and recognize the company's social management activities and systemic implementation of CSR activities in Mann Field Communities.

Doh Mann Myay, the localized newsletter, showcases the quarterly updated information of social investment initiatives: Community Livelihoods Development, Community Infrastructure Development, Community Capacity Building, Stakeholder Engagement, Community Healthcare, Educational Partnership, Community-led Waste Management, Operational Grievance Mechanism, Communicating CSR and Corporate Philanthropy. The newsletter is made available in both print and digital editions and distributed to the primary stakeholders including Magway Regional Government, Minbu District Government Office, Township Administration Office, Village Administration Office, Village Development Committee, community libraries, and school libraries. One-year old Doh Mann Myay creates a strong internal line of communication between Mann Field Communities and MPRL E&P.








Figure 106: Publishing and Distributing of Doh Mann Myay Newsletters for Stakeholder Engagement

Stakeholder Engagement Activities (October 2021)

MPRL E&P's CSR Team met with the Head of DoA (Minbu) for agricultural knowledge sharing sessions.

The CSR Team introduced MPRL E&P's Educational Partnership Program and discussed about school fees and other expenses in the meetings with the Heads of No.5 ITC (Magway) and S.A.I (Pwint Phyu).

The first Biannual CSR Progress Update and Review Meeting was held between MOGE (Nay Pyi Taw) and MPRL E&P CSR Department.

U Khun Myo Thant, MOGE General Manager (Mann), paid a site visit to MPRL E&P CSR project areas.

Figure 107: Meeting with the Head of DoA (Minbu) for Knowledge Sharing Sessions

Figure 108: Meeting with Head of S.A.I (Pwint Phyu)

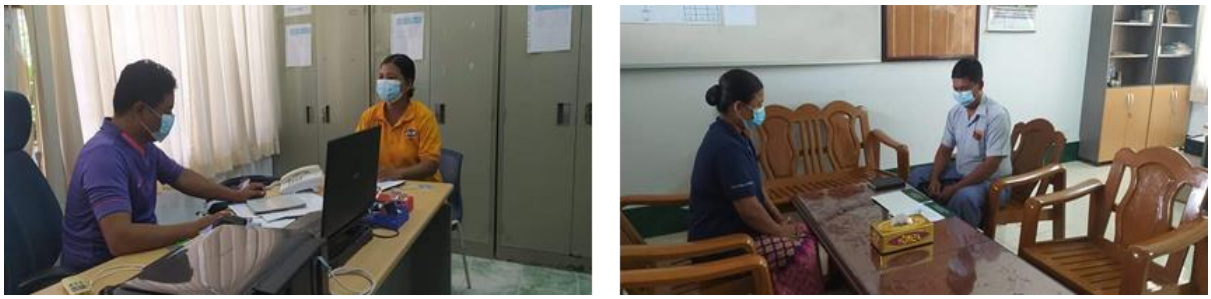


Figure 109: Meeting with Head of No.5 ITC (Magway)

Stakeholder Engagement Activities (November 2021)

The CSR Field Team met with the Principals to receive information of attendance rate at 11 schools in Mann Field Communities.

The team met with the Head of LBVD (Minbu) to discuss Animal Husbandry and Healthcare Advance Course and the training cost.

Figure 110: Meeting with School Principal and Meeting with Head of LVBD (Minbu)

Stakeholder Engagement Activities (December 2021)

The first Biannual CSR Progress Update and Review Meeting was held between MPRL E&P CSR Department and the community members at Auk Kyaung Damayone.

The CSR Team discussed Community Center Pilot Project with Village Elders, Village Development Committees, and youths of Aye Mya Village. The CSR Team observed library management system of Aye Mya Village and informed future plan of upgrading the library to the Community Center.

The Team also met with the Principals of Mei Bayt Kone and Let Pan Ta Pin Schools and scouted locations for Green Schoolyards Program.

In the meeting with the Head of DoA (Minbu), the Team discussed upcoming plans and trainings under Farmer Field School Program.

The CSR Team also paid a visit to the Head of Myanmar Red Cross Society (Minbu) and discussed to collaborate in providing First Aid Training to Mann Field Communities.

Figure 111: Meeting for Community Centre Pilot Project in Aye Mya Village

Figure 112: Meeting with Head of DoA (Minbu)

Figure 113: Meeting with Head of Myanmar Red Cross Society (Minbu)

Figure 114: Meeting with Mei Bayt Kone Headmistress for Green Schoolyards Program and Lab Room Furniture

Figure 115: Meeting with Nurse Aide Training Scholarship Applicants

Stakeholder Engagement Activities (January 2022)

The CSR Field Staff met with the Head of Myanmar Red Cross Society (Minbu) to discuss necessary preparation for Basic First Aid Training. The Team also met with applicants for the training and shared training information and objectives.

The CSR Team met with the Head of Small-Scale Industries Department (Magway). The meeting discussed customized training programs and products making trainings of value-added tomato jam, sauce and dried tomato in Mann Field Communities.

The Team facilitated the monthly field visit of Mann General Manager to the CSR project areas.

Figure 116: Facilitating Mann GM's Monthly Field Visit to CSR Project Locations

Figure 117: Meeting with the Head of Small-Scale Industries Department (Magway)

Figure 118: Meeting with the Head of Myanmar Red Cross Society (MRCS - Minbu)

Stakeholder Engagement Activities (February 2022)

The CSR Team prepared necessary arrangements for Basic First Aid Training in collaboration with Myanmar Red Cross Society (MRCS - Minbu) and met with training applicants.

The Team met with the Head of Livestock Breeding and Veterinary Department (LBVD - Minbu) to receive I-2 eye drop vaccines for chicken vaccination in Mann Field Communities.

There was a meeting with the representatives of Byamaso Funeral Service Society (Minbu) to assess their services, oxygen plant, current functioning process, and their challenges in lending a helping hand to the needy.

Figure 119: Meeting with Byamaso Free Funeral Service Society (Minbu)

Figure 120: Meeting with Basic First Aid Training Applicants

Stakeholder Engagement Activities (March 2022)

In March, MPRL E&P's CSR Program organized monthly meeting with Community Volunteers to update them about CSR Work Programs, to receive information about the general situation updates and the (14) communities' concerns and opinions on CSR Program and the Company.

The CSR Team met with the Head of MRCS (Minbu) to discuss and prepare necessities IECs for Basic First Aid Training and to discuss about forming a first-aider group in Mann Field Communities.

The Team also met with the Basic First Aid Trainees to form a core group of first-aiders in Mann Field Communities to provide necessary assistance to MRCS (Minbu) and the Communities and to discuss if they are interested in volunteering activities and things to aware and follow as a first-aider.

Figure 121: Meeting with Head of MRCS (Minbu) and Basic First Aid Trainees

Figure 122: Monthly Meeting with Community Volunteers

Impact Assessment Survey for Integrating Shifting Focus/ Interests of Key Stakeholders in Key Discussion-making Processes

MPRL E&P's CSR & Communications Department conducted the impact assessment survey in Mann Field Communities from 28th March to 1st April 2022. The CSR & Communications Team conducted 15% of household surveys which assessed about 422 community members for community perception on CSR Projects. The Team also led focus group discussions and key informant interviews with Village Administrators, Village Development Committees, Community-based Volunteers, Women Group, Farmer Group, Vocational Trainees, Scholarship Students, and other related stakeholders who are beneficiaries of Community Investment Initiatives from 14 surrounding communities of Mann Field. The impact assessment survey is to integrate shifting focus/ interests of key stakeholders in our key decision-making processes in the coming years.

Figure 123: Impact Assessment Survey in Mann Field Communities

10.7 Corporate Philanthropy

Corporate philanthropy at MPRL E&P involves donating funds, goods, or services to another organization or cause. During this reporting period, MPRL E&P's CSR Program offered donating a total of 350,000 kyats worth of 14 sets of Shwe Thway cartoon books to the schools and community libraries around Mann Field in October, donating one million kyats to Mann Field's 52nd Kathina Festival in November, donating Kathina robes, rice and requisites to (12) Monasteries around Mann Field in December and donating one million kyats to victims of Kaing Ma Gyi Village fire disaster in March.

Figure 124: Donating One Million Kyats to Mann Oil Field's 52nd Kathina Festival

Figure 125: Donating One Million Kyats to Victims of Kaing Ma Gyi Village Fire Disaster

Figure 126: Donating Kathina Robes, Rice and Requisites to Monasteries around Mann Field Communities

Figure 127: Shwe Thway Journals to Schools and Community Libraries

11. Conclusion

When we count back the period from attaining the ECC in April 2019, this is the fourth time submission of the Environmental Monitoring Report and it includes all our encountering from October 2020 to March 2022. During the period, there were many challenges to our project sustainability mainly due to the political crisis and COVID-19 pandemic. During the COVID-19 pandemic, there was a delay in submitting the Environmental Monitoring Report for 12 months, and we pledged and informed the Regional ECD of the delay. We had to postpone our plan for a third-party Environmental monitoring survey trip that was supposed to be taken place in January 2022 and a community awareness session together with MOGE and ECD. However, in other ways, we did self-monitoring activities, CSR activities, some HSE activities, and awareness training under favourable conditions. During the period of temporary suspension of the Mann Field operations, the HSE activities were still ongoing with a minimum workforce to preserve a safer and better environment. By adhering to our commitments in ECC prescribed, MPRL E&P is actively complying with all statements, implementing established plans to meet our goals, and striving to achieve continual improvement.

12. Annex

Annex – 1 Laboratory Results

Annex – 2 Equipment Calibration Certificate

Annex – 1

Laboratory Results

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2015 Cert. No. 688600

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 1

W1220 006

WATER QUALITY TEST RESULTS FORM

Client	MPRL
Nature of Water	Raw Water
Location	Minbu
Date and Time of collection	31.11.2020
Date and Time of arrival at Laboratory	1.12.2020
Date and Time of commencing examination	2.12.2020
Date and Time of completing	4.12.2020

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.7		6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity	2	NTU	5 NTU
Conductivity	566	micro S/cm	
Total Hardness	162	mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness	110	mg/l as $CaCO_3$	
Magnesium Hardness	52	mg/l as $CaCO_3$	
Total Alkalinity	256	mg/l as $CaCO_3$	
Phenolphthalein Alkalinity	Nil	mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)	Nil	mg/l as $CaCO_3$	
Bicarbonate (HCO_3)	256	mg/l as $CaCO_3$	
Iron	0.22	mg/l	0.3 mg/l
Chloride (as CL)	16	mg/l	250 mg/l
Sodium Chloride (as NaCL)	26	mg/l	
Sulphate (as SO_4)	84	mg/l	500 mg/l
Total Solids	286	mg/l	1500 mg/l
Total Suspended Solids	3	mg/l	
Total Dissolved Solids	283	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate	Nil	mg/l	
Phenolphthalein Acidity	2	mg/l	
Methyl Orange Acidity	Nil	mg/l	
Salinity	0.2	ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Office
ISO TECH Laboratory

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2015 Cert. No. 688600

W1220 007

WATER QUALITY TEST RESULTS FORM

Client	MPRL
Nature of Water	Purified Drinking Water
Location	Minbu
Date and Time of collection	31.11.2020
Date and Time of arrival at Laboratory	1.12.2020
Date and Time of commencing examination	2.12.2020
Date and Time of completing	4.12.2020

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.1		6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity	1	NTU	5 NTU
Conductivity	144	micro S/cm	
Total Hardness	28	mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness	20	mg/l as $CaCO_3$	
Magnesium Hardness	8	mg/l as $CaCO_3$	
Total Alkalinity	62	mg/l as $CaCO_3$	
Phenolphthalein Alkalinity	Nil	mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)	Nil	mg/l as $CaCO_3$	
Bicarbonate (HCO_3)	62	mg/l as $CaCO_3$	
Iron	0.07	mg/l	0.3 mg/l
Chloride (as CL)	7	mg/l	250 mg/l
Sodium Chloride (as NaCL)	12	mg/l	
Sulphate (as SO_4)	12	mg/l	500 mg/l
Total Solids	73	mg/l	1500 mg/l
Total Suspended Solids	1	mg/l	
Total Dissolved Solids	72	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate	Nil	mg/l	
Phenolphthalein Acidity	2	mg/l	
Methyl Orange Acidity	Nil	mg/l	
Salinity	0.1	ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Officer
ISO TECH Laboratory

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-20-01037 **Date : 22-12-20**

Client Information

Client Name : **MPRL E&P Pte Ltd**
Organization : **MPRL E&P Pte Ltd**
Client ID : **LC-12-001**
Registration Date & Time : **08-12-20**
Contact : **9449001927**
Testing Purpose : **For Standard**

Sample Information

Sample ID : WS-20-00980
Sample Name : **Ground Water (Ko Win Mg)**
Sample Type / Source : **Well**
Sampling Date & Time : **07-12-20** 10:16 AM
Sample Location : မယ်ဘော့ကုန်းရွာ၊ မင်းဘူးမြို့နယ်၊ မကွေးတိုင်း။
Latitude :
Longitude :

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH	7.2	S.U	6.5 – 8.5 (c)	Normal
2	Dissolved Oxygen	5.8	mg/L	-	-
3	Conductivity	1	mS/cm	≤2.5 (b)	Normal
4	Turbidity	<5	FAU	≤5 (b)	Clear
5	Apparent Colour	16	HU	-	-
6	Alkalinity	200	mg/L	-	-
7	Hardness	41	mg/L	≤500 (c)	-
8	BOD5	<3	mg/L	-	-
9	COD	<30	mg/L	-	-
10	Total Nitrogen	<5	mg/L	-	-
11	Total Phosphorous	0.07	mg/L	-	-
12	Oil & Grease	2	mg/L	-	-
13	TSS	2	mg/L	-	-
14	Arsenic	0	mg/L	≤0.05 (c)	Normal
15	Boron	0.7	mg/L	≤2.4 (c)	Normal
16	Fluoride	1.7	mg/L	≤1.5 (c)	Above DW limit

"ND"= Not Detected "LOD"= Lower limit of detection "-" = No Reference Standard

Tested by	Checked by	Approved by
Daw Ma Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Tsp, Yangon. Tel: 01-503301, 01-503302, 09 407496078
Email: aelab@alarmmyanmar.org, alarm.myanmar@gmail.com, Website: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-20-01038 **Date : 22-12-20**

Client Information

Client Name : **MPRL E&P Pte Ltd**
Organization : **MPRL E&P Pte Ltd**
Client ID : **LC-12-001**
Registration Date & Time : **08-12-20**
Contact : **9449001927**
Testing Purpose : **For Standard**

Sample Information

Sample ID : WS-20-00981
Sample Name : **Ground Water (Ma Nyein)**
Sample Type / Source : **Well**
Sampling Date & Time : **07-12-20** 10:08 AM
Sample Location : **Min Buu, Magway**
Latitude :
Longitude :

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH	7.1	S.U	6.5 – 8.5 (c)	Normal
2	Dissolved Oxygen	6.3	mg/L	-	-
3	Conductivity	0.09	mS/cm	≤2.5 (b)	Normal
4	Turbidity	<5	FAU	≤5 (b)	Clear
5	Apparent Colour	3	HU	-	-
6	Alkalinity	280	mg/L	-	-
7	Hardness	147	mg/L	≤500 (c)	-
8	BOD5	<3	mg/L	-	-
9	COD	<30	mg/L		-
10	Total Nitrogen	<5	mg/L	-	-
11	Total Phosphorous	0.06	mg/L	-	-
12	Oil & Grease	2	mg/L	-	-
13	TSS	1	mg/L	-	-
14	Arsenic	0	mg/L	≤0.05 (c)	Normal
15	Boron	0.5	mg/L	≤2.4 (c)	Normal
16	Fluoride	0.7	mg/L	≤1.5 (c)	Normal

"ND"= Not Detected "LOD"= Lower limit of detection "-" = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Tsp, Yangon. Tel: 01-503301, 01-503302, 09 407496078
Email: aelab@alarmmyanmar.org, alarm.myanmar@gmail.com, Website: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-20-01039 **Date : 22-12-20**

Client Information

Client Name : **MPRL E&P Pte Ltd**
Organization : **MPRL E&P Pte Ltd**
Client ID : **LC-12-001**
Registration Date & Time : **08-12-20**
Contact :
Testing Purpose : **For Standard**

Sample Information

Sample ID : WS-20-00982
Sample Name : **Mobile Workshop**
Sample Type / Source : **Raw**
Sampling Date & Time : **07-12-20** 10:38 AM
Sample Location : **Mann Field, Base Camp, Min Buu, Magway**
Latitude :
Longitude :

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standard	Remarks
1	BOD5	12	mg/L	≤50 (d)	Normal
2	Ammonia	<0.02	mg/L	≤10 (d)	Normal
3	Arsenic	0	mg/L	≤0.1 (d)	Normal
4	Cadmium	ND	mg/L	≤0.1 (d)	LOD=0.01
5	COD	<30	mg/L	≤250 (d)	Normal
6	Total Chlorine	0.02	mg/L	-	-
7	Chromium (Hexavalent)	2	mg/L	≤0.1 (d)	Above the limit
8	Copper	0.02	mg/L	≤ 0.5 (d)	Normal
9	Free Cyanide	<0.01	mg/L	≤0.1 (d)	Normal
10	Fluoride	0.46	mg/L	≤20 (d)	Normal
11	Iron	0.12	mg/L	≤3.5 (d)	Normal
12	Lead	ND	mg/L	≤ 0.1 (d)	LOD=0.1
13	Nickel	ND	mg/L	≤0.5 (d)	LOD=0.2
14	Oil & Grease	12	mg/L	≤10 (d)	Normal
15	pH	7.7	S.U	6.0 - 9.0 (d)	Normal
16	Phenol	<0.1	mg/L	≤0.5 (d)	Normal
17	Sulfide	<0.04	mg/L	≤1 (d)	Normal
18	Temperature	24	°C	< +3 (d)*	-
19	Total Phosphorous	0.3	mg/L	≤ 2 (d)	Normal
20	TSS	2	mg/L	≤50 (d)	Normal
21	Zinc	<0.02	mg/L	≤2 (d)	Normal

"ND"= Not Detected	"LOD"= Lower limit of detection	"-" = No Reference Standard
Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Tsp, Yangon. Tel: 01-503301, 01-503302, 09 407496078
Email: aelab@alarmmyanmar.org, alarm.myanmar@gmail.com, Website: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-20-01040 **Date** : 22-12-20

Client Information

Client Name : **MPRL E&P Pte Ltd**
Organization : **MPRL E&P Pte Ltd**
Client ID : **LC-12-001**
Registration Date & Time : **08-12-20**
Contact :
Testing Purpose : **For Standard**

Sample Information

Sample ID : WS-20-00983
Sample Name : **Downhole Workshop**
Sample Type / Source : **Raw**
Sampling Date & Time : **07-12-20** 10:49 AM
Sample Location : **Mann Field, Base Camp, Min Buu, Magway**
Latitude :
Longitude :

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standard	Remarks
1	BOD5	14	mg/L	≤50 (d)	Normal
2	Ammonia	<0.02	mg/L	≤10 (d)	Normal
3	Arsenic	0	mg/L	≤0.1 (d)	Normal
4	Cadmium	ND	mg/L	≤0.1 (d)	LOD=0.01
5	COD	<30	mg/L	≤250 (d)	Normal
6	Total Chlorine	0.14	mg/L	-	-
7	Chromium (Hexavalent)	12	mg/L	≤0.1 (d)	Above the limit
8	Copper	ND	mg/L	≤ 0.5 (d)	LOD=0.02
9	Free Cyanide	<0.01	mg/L	≤0.1 (d)	Normal
10	Fluoride	0.33	mg/L	≤20 (d)	Normal
11	Iron	0.24	mg/L	≤3.5 (d)	Normal
12	Lead	ND	mg/L	≤ 0.1 (d)	LOD=0.1
13	Nickel	ND	mg/L	≤0.5 (d)	LOD=0.2
14	Oil & Grease	14	mg/L	≤10 (d)	Above the limit
15	pH	7.4	S.U	6.0 - 9.0 (d)	Normal
16	Phenol	<0.1	mg/L	≤0.5 (d)	Normal
17	Sulfide	0.04	mg/L	≤1 (d)	Normal
18	Temperature	24	°C	< +3 (d)*	-
19	Total Phosphorous	0.18	mg/L	≤ 2 (d)	Normal
20	TSS	11	mg/L	≤50 (d)	Normal
21	Zinc	<0.02	mg/L	≤2 (d)	Normal

"ND"= Not Detected	"LOD"= Lower limit of detection	"-" = No Reference Standard
Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Tsp, Yangon. Tel: 01-503301, 01-503302, 09 407496078
Email: aelab@alarmmyanmar.org, alarm.myanmar@gmail.com, Website: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-20-01041 **Date : 22-12-20**

Client Information

Client Name : **MPRL E&P Pte Ltd**
Organization : **MPRL E&P Pte Ltd**
Client ID : **LC-12-001**
Registration Date & Time : **08-12-20**
Contact :
Testing Purpose : **For Standard**

Sample Information

Sample ID : WS-20-00984
Sample Name : **Bio Filter Outlet**
Sample Type / Source : **Sewage Discharged**
Sampling Date & Time : **07-12-20** 10:55 AM
Sample Location : **Mann Field, Base Camp, Min Buu, Magway**
Latitude :
Longitude :

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.
This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standard	Remarks
1	BOD5	**5**	**mg/L**	≤50 (d)	Normal
2	COD	**<30**	**mg/L**	≤250 (d)	Normal
3	Oil & Grease	**2**	**mg/L**	≤10 (d)	Normal
4	pH	**7.7**	**S.U**	6.0 - 9.0 (d)	Normal
5	Total Phosphorous	**0.5**	**mg/L**	≤ 2 (d)	Normal
6	TSS	**1**	**mg/L**	≤50 (d)	Normal
7	Total Nitrogen	**<5**	**mg/L**	-	-

"ND"= Not Detected | "LOD"= Lower limit of detection | "-" = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Tsp, Yangon. Tel: 01-503301, 01-503302, 09 407496078
Email: aelab@alarmmyanmar.org, alarm.myanmar@gmail.com, Website: www.alarmmyanmar.org

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအဓိမြေမွှန်.ပြိုးတိုးတက်ရေးအသင်း(Advancing Life and Regenerating Motherland, ALARM)

531-D, MarlarMyaingYeikThar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 518

နေ့စွဲ/Date:6th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင်/Sample Profile

နမူနာအမည် /Sample Name	Mobile Workshop	နမူနာအမှတ် / Sample ID	518	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့ နာရီ) Sampling Time (Date, Time)	24.11.2021	11:00 AM
အဖွဲ့အစည်း /Organisation	MPRL E&P PteLtd.			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည်ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	460	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count(CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count(CFU/ml)		3M Pate count method	0	

Note: The target sample needs to testsome additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး	စစ်ဆေးပြီး	တာဝန်ခံ
Tested by	Checked by	Approved by
May Zaw	Thet Hmue Htet	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ပတ်ဝန်းကျင်ဂေဒရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအသစ်ပြန်ဖွံ့ဖြိုးတိုးတက်ရေးအသင်း(Advancing Life and Regenerating Motherland, ALARM)

531-D, MarlarMyaingYeikThar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 519

နေ့စွဲ/Date:6th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင်/Sample Profile

နမူနာအမည် /Sample Name	Downhole Workshop	နမူနာအမှတ် / Sample ID	519	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာစောက်ယူချိန် (နေ့ နာရီ) Sampling Time (Date, Time)	24.11.2021	11:20 AM
အဖွဲ့အစည်း /Organisation	MPRL E&P PteLtd.			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည်ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	>1100	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count(CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count(CFU/ml)		3M Pate count method	0	

Note: The target sample needs to testsome additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး	စစ်ဆေးပြီး	တာဝန်ခံ
Tested by	Checked by	Approved by
May Zaw	Thet Hmue Htet	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအသစ်ပြန်ဖွံ့ဖြိုးတိုးတက်ရေးအသင်း(Advancing Life and Regenerating Motherland, ALARM)

531-D, MarlarMyaingYeikThar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 520

နေ့စွဲ/Date:6th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင်/Sample Profile

နမူနာအမည် /Sample Name	Bio Filter Outlet (Sewage Discharge)	နမူနာအမှတ် / Sample ID	520	
နေရာ (မြို့နယ်) Location (Township)	Base Lamp (Mann Field)	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့ နာရီ) Sampling Time (Date, Time)	24.11.2021	12:20 AM
အဖွဲ့အစည်း /Organisation	MPRL E & P Pte Ltd.			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည်ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	**1100**	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count(CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count(CFU/ml)		3M Pate count method	0	

Note: The target sample needs to testsome additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Zaw	Thet Hmue Htet	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01388 Date: December 3, 2021

Client Information			Sample Information		
Client Name	:	-	Sample ID	:	7470
Organization	:	MPRL E & P Pte Ltd	Sample Name	:	Mobile Workshop
Client ID	:	-	Sample Type / Source	:	Waste
Registration Date & Time	:	25.11.2021	Sampling Date & Time	:	24.11.2021; 11:00 AM
Contact	:	095177819	Sample Location	:	Mann Field
Testing Purpose	:	For Monitoring	Latitude	:	-
			Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	pH[1]	6.9	S.U	6.0 – 9.0[d]	Normal
2	Temperature[2]	25	°C	±3*[d]	-
3	TSS[3]	0	mg/L	≤50[d]	Normal
4	Ammonia[3]	< 0.02	mg/L	≤ 10[d]	Normal
5	BOD_5[6]	36	mg/L	≤ 50[d]	Normal
6	COD[3]	81	mg/L	≤ 250[d]	Normal
7	Total Chlorine[3]	0.04	mg/L	-	-
8	Total Phosphorous[3]	< 1.5	mg/L	≤2[d]	Normal
9	Arsenic[8]	0	mg/L	≤ 0.1[d]	Normal
10	Cadmium[7]	ND	mg/L	≤ 0.1[d]	LOD = 0.01 mg/L
11	Copper[7]	ND	mg/L	≤ 0.5[d]	LOD = 0.02 mg/L
12	Iron[7]	0.11	mg/L	≤ 3.5[d]	Normal
13	Lead[7]	ND	mg/L	≤ 0.1[d]	LOD = 0.1 mg/L
14	Zinc[3]	0.02	mg/L	≤ 2[d]	Normal
15	Nickel[3]	< 0.2	mg/L	≤ 0.5[d]	Normal
16	Sulfide[3]	< 0.04	mg/L	≤ 1[d]	Normal
17	Phenol[3]	< 0.1	mg/L	≤ 0.5[d]	Normal
18	Fluoride[3]	0	mg/L	≤ 20[d]	Normal
19	Oil & Grease [9]	6	mg/L	≤ 10[d]	Normal
20	Chromium (Hexavalent)[3]	0	mg/L	≤ 0.1	Normal
21	Mercury	0	mg/L	≤ 0.01	Normal

"ND" = Not Detected "LOD" = Lower limit of detection " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeikThar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01389

Date: December 3, 2021

Client Information

Client Name	:	-
Organization	:	MPRL E & P Pte Ltd
Client ID	:	-
Registration Date & Time	:	25.11.2021
Contact	:	095177819
Testing Purpose	:	For Monitoring

Sample Information

Sample ID	:	7471
Sample Name	:	Downhole Workshop
Sample Type / Source	:	Waste
Sampling Date & Time	:	24.11.2021; 11:20 AM
Sample Location	:	Mann Field
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	pH[1]	7	S.U	6.0 – 9.0[d]	Normal
2	Temperature[2]	25	°C	±3*[d]	-
3	TSS[3]	3	mg/L	≤50[d]	Normal
4	Ammonia[3]	< 0.02	mg/L	≤ 10[d]	Normal
5	BOD_5[6]	34	mg/L	≤ 50[d]	Normal
6	COD[3]	76	mg/L	≤ 250[d]	Normal
7	Total Chlorine[3]	0.38	mg/L	-	-
8	Total Phosphorous[3]	< 1.5	mg/L	≤2[d]	Normal
9	Arsenic[8]	0.025	mg/L	≤ 0.1[d]	Normal
10	Cadmium[7]	ND	mg/L	≤ 0.1[d]	LOD = 0.01 mg/L
11	Copper[7]	ND	mg/L	≤ 0.5[d]	LOD = 0.02 mg/L
12	Iron[7]	0.26	mg/L	≤ 3.5[d]	Normal
13	Lead[7]	ND	mg/L	≤ 0.1[d]	LOD = 0.1 mg/L
14	Zinc[3]	0.02	mg/L	≤ 2[d]	Normal
15	Nickel[3]	< 0.2	mg/L	≤ 0.5[d]	Normal
16	Sulfide[3]	< 0.04	mg/L	≤ 1[d]	Normal
17	Phenol[3]	< 0.1	mg/L	≤ 0.5[d]	Normal
18	Fluoride[3]	0	mg/L	≤ 20[d]	Normal
19	Oil & Grease[9]	4	mg/L	≤ 10[d]	Normal
20	Chromium (Hexavalent)[3]	0	mg/L	≤ 0.1	Normal
21	Mercury	0.2	ppb	-	-

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeikThar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01390

Date: December 3, 2021

Client Information

Client Name	:	-
Organization	:	MPRL E & P Pte Ltd
Client ID	:	-
Registration Date & Time	:	25.11.2021
Contact	:	095177819
Testing Purpose	:	For Monitoring

Sample Information

Sample ID	:	7472
Sample Name	:	Biofilter Outlet (Sewage Discharge)
Sample Type / Source	:	Treated
Sampling Date & Time	:	24.11.2021; 12:20 PM
Sample Location	:	Base Camp (Mann Field)
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	pH[1]	7	S.U	6.0 – 9.0[d]	Normal
2	TSS[3]	5	mg/L	≤50 [d]	Normal
3	BOD_5 [6]	29	mg/L	≤ 50 [d]	Normal
4	COD[3]	78	mg/L	≤ 250 [d]	Normal
5	Total Phosphorous[3]	1.8	mg/L	≤2 [d]	Normal
6	Oil & Grease [9]	3	mg/L	≤ 10 [d]	Normal
7	Total Nitrogen[3]	0.7	mg/L	-	-

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Ayar Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeikThar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01391 | Date: December 3, 2021

Client Information

Client Name	:	-
Organization	:	MPRL E & P Pte Ltd
Client ID	:	-
Registration Date & Time	:	25.11.2021
Contact	:	095177819
Testing Purpose	:	For Monitoring

Sample Information

Sample ID	:	7473
Sample Name	:	Ground Water (Ko Win Mg) 132
Sample Type / Source	:	Ground
Sampling Date & Time	:	24.11.2021; 12:30 PM
Sample Location	:	Near Well 132
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH[1]	7.3	S.U	6.5 – 8.5[c]	Normal
2	Colour[3]	14	HU	≤15 [c]	Normal
3	Turbidity[3]	< 5	FAU	≤5 [c]	Clear
4	TSS[3]	3	mg/L	-	-
5	Conductivity[5]	0.1	mS/cm	≤2.5 [b]	Normal
6	Hardness[3]	23	mg/L	≤500 [c]	-
7	Dissolved Oxygen[2]	5.2	mg/L	-	-
8	BOD_5 [6]	< 3	mg/L	-	-
9	COD[3]	< 30	mg/L	-	-
10	Total Phosphorous[3]	< 1.5	mg/L	-	-
11	Arsenic[8]	0	mg/L	≤0.05[a]	Normal
12	Alkalinity[3]	230	mg/L	-	-
13	Boron[3]	0.3	mg/L	≤2.4 [c]	Normal
14	Fluoride[3]	0	mg/L	≤1.5 [c]	Normal
15	Oil & Grease [9]	1	mg/L	-	-
16	Total Nitrogen[3]	< 0.5	mg/L	-	-

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeik Thar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01392 | Date: December 3, 2021

Client Information

Client Name	:	-
Organization	:	MPRL E & P Pte Ltd
Client ID	:	-
Registration Date & Time	:	25.11.2021
Contact	:	095177819
Testing Purpose	:	For Monitoring

Sample Information

Sample ID	:	7474
Sample Name	:	Ground Water (Ma Nyein) 132
Sample Type / Source	:	Ground
Sampling Date & Time	:	24.11.2021; 10:30 AM
Sample Location	:	Near Well 132
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH[1]	7.5	S.U	6.5 – 8.5[c]	Normal
2	Colour[3]	10	HU	≤15 [c]	Normal
3	Turbidity[3]	< 5	FAU	≤5 [c]	Clear
4	TSS[3]	0	mg/L	-	-
5	Conductivity[5]	1	mS/cm	≤2.5 [b]	Normal
6	Hardness[3]	47	mg/L	≤500 [c]	-
7	Dissolved Oxygen[2]	4	mg/L	-	-
8	BOD_5 [6]	< 3	mg/L	-	-
9	COD[3]	< 30	mg/L	-	-
10	Total Phosphorous[3]	< 1.5	mg/L	-	-
11	Arsenic[8]	0	mg/L	≤0.05[a]	Normal
12	Alkalinity[3]	520	mg/L	-	-
13	Boron[3]	0.1	mg/L	≤2.4 [c]	Normal
14	Fluoride[3]	0	mg/L	≤1.5 [c]	Normal
15	Oil & Grease [9]	1	mg/L	-	-
16	Total Nitrogen[3]	< 0.5	mg/L	-	-

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeik Thar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-21-01393 | Date: December 3, 2021

Client Information

Client Name	:	-
Organization	:	MPRL E & P Pte Ltd
Client ID	:	-
Registration Date & Time	:	25.11.2021
Contact	:	095177819
Testing Purpose	:	For Monitoring

Sample Information

Sample ID	:	7475
Sample Name	:	Drinking Water (RO Outlet)
Sample Type / Source	:	Treated
Sampling Date & Time	:	24.11.2021; 10:15 AM
Sample Location	:	Base Camp (Mann Field)
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Drinking Standards	Remarks
1	pH[1]	7.1	S.U	6.5 – 8.5[c]	Normal
2	Colour[3]	0	HU	≤15 [c]	Normal
3	Turbidity[3]	< 5	FAU	≤5 [c]	Clear
4	TDS[4]	101	mg/L	≤1000 [c]	Normal
5	Hardness[3]	6	mg/L	≤500 [c]	-
6	Chloride[3]	< 0.5	mg/L	≤250 [c]	Normal
7	Nitrate-Nitrogen[3]	1.4	mg/L	≤50 [c]	Normal
8	Iron[7]	< 0.1	mg/L	≤1[c]	Normal
9	Lead[7]	ND	mg/L	≤0.01 [c]	LOD = 0.1 mg/L
10	Manganese[3]	< 0.2	mg/L	≤0.4 [c]	Normal
11	Sulfate[3]	10.6	mg/L	≤ 250 [c]	Normal
12	Calcium[3]	52	mg/L	≤200 [c]	Normal

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Nyat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeik Thar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)
531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 537

နေ့စွဲ/Date: 27th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Raw Water of RO System	နမူနာအမှတ် / Sample ID	537	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	Mann Field	လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	U Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	22.12.2021	1:41 PM
အဖွဲ့အစည်း /Organisation	MPRL E&P			
ဆက်သွယ်ရန် /Contact	09-5177819	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	23.12.2021	11:22 AM

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	0	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)	0	Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Zaw Research Assistant ALARM	May Myat Nyein Research Assistant ALARM	Ni Tar Nwe Research Scientist ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖို့.ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)
531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 538

နေ့စွဲ/Date: 27th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Purified Drinking Water (RO Outlet)	နမူနာအမှတ် / Sample ID	538	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	Mann Field	လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	U Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	22.12.2021	1:43 PM
အဖွဲ့အစည်း /Organisation	MPRL E&P			
ဆက်သွယ်ရန် /Contact	09-5177819	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	23.12.2021	11:22 AM

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	0	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)	0	Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Zaw Research Assistant ALARM	May Myat Nyein Research Assistant ALARM	Ni Tar Nwe Research Scientist ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)
531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 521

နေ့စွဲ/Date: 13th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Ground Water(Ko Win Maung)	နမူနာအမှတ် / Sample ID	521	
နေရာ (မြို့နယ်) Location (Township)	Near Well	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.11.2021	12:30 PM
အဖွဲ့အစည်း /Organisation	MPRL E&P Pte.Ltd.			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	460	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)	128	3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)	1	3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein Research Assistant ALARM	May Zaw Research Assistant ALARM	Ni Tar Nwe Research Scientist ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအမိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)
531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 522

နေ့စွဲ/Date: 13th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Ground Water (Ma Nyein)	နမူနာအမှတ် / Sample ID	522	
နေရာ (မြို့နယ်) Location (Township)	Near Well	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.11.2021	10:30 AM
အဖွဲ့အစည်း /Organisation	MPRL E&P Pte.Ltd			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	23	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)	136	3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)	0	3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein Research Assistant ALARM	May Zaw Research Assistant ALARM	Ni Tar Nwe Research Scientist ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအသိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 523

နေ့စွဲ/Date: 13th December, 2021

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Drinking Water (RO outlet)	နမူနာအမှတ် / Sample ID	523	
နေရာ (မြို့နယ်) Location (Township)	Base Camp (Mann Field)	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name	Han Myo Aung	နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	24.11.2021	10:15 AM
အဖွဲ့အစည်း /Organisation	MPRL E&P Pte.Ltd.			
ဆက်သွယ်ရန် /Contact	095177819	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	25.11.2021	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	>1100	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)	>1100	Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein Research Assistant ALARM	May Zaw Research Assistant ALARM	Ni Tar Nwe Research Scientist ALARM

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1. Thilawa SEZ Zone A, Yangon Region, Myanmar.
Phone No Fax No: (+95) 1 2309051

Report No. : GEM-LAB-202112060
Revision No. : 1
Report Date : 10 December, 2021
Application No. : 0064-C001

Analysis Report

Client Name : MPRL E & P Pte Ltd.
Address : 623, Pyay Road , Vantage Tower, Kamayut.
Project Name : Mann Field Project
Sample Description
Sample Name : Mobile Workshop
Sample No. : W-2111115
Waste Profile No. : -

Sampling Date : 26 November, 2021
Sampling By : Customer
Sample Received Date : 26 November, 2021

No.	Parameter	Method	Unit	Result	LOQ
1	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.010	0.010
2	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :

Ni Ni Aye Lwin
Assistant Manager

LAB Dec 10, 2021 GEM

Approved By :

Hideki Yomo Dec 10, 2021
Managing Director

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1. Thilawa SEZ Zone A, Yangon Region, Myanmar.
Phone No Fax No: (+95) 1 2309051

Report No. : GEM-LAB-202112061
Revision No. : 1
Report Date : 10 December, 2021
Application No. : 0064-C001

Analysis Report

Client Name : MPRL E & P Pte Ltd.
Address : 623, Pyay Road , Vantage Tower, Kamayut.
Project Name : Mann Field Project
Sample Description
Sample Name : Downhole Workshop
Sample No. : W-2111116
Waste Profile No. : -

Sampling Date : 26 November, 2021
Sampling By : Customer
Sample Received Date : 26 November, 2021

No.	Parameter	Method	Unit	Result	LOQ
1	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.010	0.010
2	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :

Ni Ni Aye Lwin
Assistant Manager

LAB
Dec 10, 2021
GEM

Approved By :

Hideki Yomo Dec 10, 2021
Managing Director

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1. Thilawa SEZ Zone A, Yangon Region, Myanmar.
Phone No Fax No: (+95) 1 2309051

Report No. : GEM-LAB-202112062
Revision No. : 1
Report Date : 10 December, 2021
Application No. : 0064-C001

Analysis Report

Client Name : MPRL E & P Pte Ltd.
Address : 623, Pyay Road , Vantage Tower, Kamayut.
Project Name : Mann Field Project
Sample Description
Sample Name : Groundwater (Ko Win Mg)
Sample No. : W-2111117
Waste Profile No. : -
Sampling Date : 26 November, 2021
Sampling By : Customer
Sample Received Date : 26 November, 2021

No.	Parameter	Method	Unit	Result	LOQ
1	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.010	0.010
2	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :

Ni Ni Aye Lwin
Assistant Manager

LAB
Dec 10, 2021
GEM

Approved By :

Hideki Yomo Dec 10, 2021
Managing Director

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1. Thilawa SEZ Zone A, Yangon Region, Myanmar.
Phone No Fax No: (+95) 1 2309051

Report No. : GEM-LAB-202112063
Revision No. : 1
Report Date : 10 December, 2021
Application No. : 0064-C001

Analysis Report

Client Name : MPRL E & P Pte Ltd.
Address : 623, Pyay Road , Vantage Tower, Kamayut.
Project Name : Mann Field Project
Sample Description
Sample Name : Groundwater (Ma Nyein)
Sample No. : W-2111118
Waste Profile No. : -
Sampling Date : 26 November, 2021
Sampling By : Customer
Sample Received Date : 26 November, 2021

No.	Parameter	Method	Unit	Result	LOQ
1	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.010	0.010
2	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :

Ni Ni Aye Lwin
Assistant Manager

LAB
Dec 10, 2021
GEM

Approved By :

Hideki Yomo Dec 10, 2021
Managing Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1, Thilawa SEZ Zone A, Yangon Region, Myanmar.
Phone No Fax No: (+95) 1 2309051

motivate our planet
Doc No: GEM-LB-R003E/00
Page1of1

< Analysis Application Form >

Date: 26 . 11 . 2021

Client's information (to be described in the tax invoice)		Client's information to be described in the analysis report (if it should be specified)
Client name: MPRL E&P PTE LTD.		Client name:
Address of client: Vantage Tower, 623 Pyay Road, Kamayut Township, 11041		Address of client:
Project name: - Mann Field		Project name: -
Tel No. / Email: 09 51 77819, han.myo.aung@		Tel No. / Email: mprl.exp.com
Contact person/Position: Mr. Han Myo Aung.		Contact person/Position:
Sample information	Sampling date: 24/11/2021	Sample bottle(s): ☐Need to be returned, ☐Not need
	Sampling by: MPRL	Expected analysis report due date :
*To be filled by GEM Lab	Sampling Service: ■No Use, ☐Use (Sampling date:	Sampling by:)

Sample details	No.	Example	1	2	3
	Sample name	Mobile workshop	Downhole workshop	Groundwater (Ko Oo's Mg)	Ground water (Ma Nyein)
Sample information	Type of water	■Drinking water	☐Drinking water	☐Drinking water	☐Drinking water
		☐Surface water (river, lake etc.)	☐Surface water (river, lake etc.)	☐Surface water (river, lake etc.)	☐Surface water (river, lake etc.)
		☐Ground water	☐Ground water	☐Ground water	☐Ground water
		☐Saline/sea water	☐Saline/sea water	☐Saline/sea water	☐Saline/sea water
		☐Wastewater	■Wastewater	■Wastewater	■Wastewater
		■Others ( )	☐Others ( )	☐Others ( )	☐Others ( )
	Volume of sample container	500 mL/bottle			
	Q'ty of container	Total 2 bottles			
Analysis parameter	BOD_5	■	☐	☐	☐
	Total Suspended Solid (SS)	■	☐	☐	☐
	pH	☐	☐	☐	☐
	COD_{Cr}	■	☐	☐	☐
	Oil and Grease	■	☐	☐	☐
	Temperature	■	☐	☐	☐
	Color	☐	☐	☐	☐
	Total Nitrogen (T-N)	☐	☐	☐	☐
	Ammonia (NH_3)	☐	☐	☐	☐
	Total Phosphorous (T-P)	☐	☐	☐	☐
	Total Dissolved Solids (TDS)	☐	☐	☐	☐
	Sulphide (S^{2-})	☐	☐	☐	☐
	Total Cyanide	☐	☐	☐	☐
	Cyanide (Free, CN^-)	☐	☐	☐	☐
	Formaldehyde (CH_2O)	☐	☐	☐	☐
	Phenols (Phenol)	☐	☐	☐	☐
	Free Chlorine (Cl_2)	☐	☐	☐	☐
	Zinc (Zn)	☐	☐	☐	☐
	Chromium (Cr)	☐	☐	☐	☐
	Hexavalent Chromium (Cr6+)	☐	☐	☐	☐
	Arsenic (As)	☐	☐	☐	☐
	Copper (Cu)	☐	☐	☐	☐
	Mercury (Hg)	☐	☐	☐	☐
	Cadmium (Cd)	☐	☐	☐	☐
	Barium (Ba)	☐	☐	■	■
	Selenium (Se)	■	■	■	■
	Lead (Pb)	☐	☐	☐	☐
	Nickel (Ni)	☐	☐	☐	☐
	Fluoride(F-)	☐	☐	☐	☐
	Iron (Fe)	☐	☐	☐	☐
	Silver (Ag)	■	■	☐	☐
	Tin (Sn)	☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐
	Other request (if any)				
*To be filled by GEM Lab	Sample No.	W-2111115	W-2111116	W-2111117	W-2111118
Remark(if any):		12060	12061	12062	12063

LAB GEM

*To be filled by GEM lab		
Application Received by:	Sample Received by:	Application No: (*our administration section)
Date: 26 . 11 . 21	Date: 26 . 11 . 21	0064 - C001

Green Myanmar

Environmental Services Co., Ltd

No.115, Kanaung Min Thar Gyi Road, Industrial Zone (1), Hlaing Thar Yar Industrial City, Yangon, Myanmar

Tel: 09 897 978 296,09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: MPRL E&P Pte Ltd.

Name of Person: -

Contact: -

Date of Sample Collection: 24.11.2021

Date of Sample Arrival to Lab: 25.11.2021

Date of Issued of Result: 1.12.2021

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Value	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
Downhole Workshop – Cleaning Water					
1.	Total Chromium	mg/l	<0.02	**0.02**	**0.1**
2.	Total Cyanide	mg/l	<0.01	**0.01**	**1**

Analyzed By

Daw Tun Eaindra Soe
Technician (Laboratory)

Approved By

U Thet Min Paing
In-Charge (Laboratory)

Green Myanmar

Environmental Services Co., Ltd

No.115, Kanaung Min Thar Gyi Road, Industrial Zone (1), Hlaing Thar Yar Industrial City, Yangon, Myanmar

Tel: 09 897 978 296,09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: MPRL E&P Pte Ltd.

Name of Person: -

Contact: -

Date of Sample Collection: 24.11.2021

Date of Sample Arrival to Lab: 25.11.2021

Date of Issued of Result: 1.12.2021

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Value	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
Ma Nyein – Tube well					
1.	Total Chromium	mg/l	<0.02	**0.02**	**0.1**

Analyzed By

Daw Tun Eaindra Soe
Technician (Laboratory)

Approved By

U Thet Min Paing
In-Charge (Laboratory)

Green Myanmar
Environmental Services Co., Ltd

No.115, Kanaung Min Thar Gyi Road, Industrial Zone (1), Hlaing Thar Yar Industrial City, Yangon, Myanmar
Tel: 09 897 978 296,09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: MPRL E&P Pte Ltd.

Name of Person: -

Contact: -

Date of Sample Collection: 24.11.2021

Date of Sample Arrival to Lab: 25.11.2021

Date of Issued of Result: 1.12.2021

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Value	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
Ko Win Maung – Tube well					
1.	Total Chromium	mg/l	<0.02	**0.02**	**0.1**

Analyzed By

Daw Tun Eaindra Soe
Technician (Laboratory)

Approved By

U Thet Min Paing
In-Charge (Laboratory)

Green Myanmar

Environmental Services Co., Ltd

No.115, Kanaung Min Thar Gyi Road, Industrial Zone (1), Hlaing Thar Yar Industrial City, Yangon, Myanmar

Tel: 09 897 978 296,09-5081451 E-mail: gmescompany@gmail.com, info@gmes-mm.com

WASTEWATER QUALITY TEST RESULT FORM

Name of Customer: MPRL E&P Pte Ltd.

Name of Person: -

Contact: -

Date of Sample Collection: 24.11.2021

Date of Sample Arrival to Lab: 25.11.2021

Date of Issued of Result: 1.12.2021

WASTEWATER QUALITY ANALYSIS RESULT

Sr. No.	Parameters	Unit	Analysis Value	Minimum Measurement Range of Methods	National Environmental Quality (Emission) Guidelines General Application
Mobile Workshop – Cleaning Water					
1.	Total Chromium	mg/l	<0.02	**0.02**	**0.1**
2.	Total Cyanide	mg/l	<0.01	**0.01**	**1**

Analyzed By

Daw Tun Eaindra Soe
Technician (Laboratory)

Approved By

U Thet Min Paing
In-Charge (Laboratory)

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

ဓိမ်းလန်းအဓိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 559

နေ့စွဲ/Date: 3rd March , 2022

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Ground Water (Ko Win Mg)	နမူနာအမှတ် / Sample ID	559	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	27.2.2022	8:33 AM
အဖွဲ့အစည်း /Organisation	MPRL E & P Pte Ltd.			
ဆက်သွယ်ရန် /Contact	09-959482123	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	28.2.2022	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	93	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)	30	3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)	0	3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး	စစ်ဆေးပြီး	တာဝန်ခံ
Tested by	Checked by	Approved by
May Myat Nyein	May Zaw	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအဓိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 560

နေ့စွဲ/Date: 3rd March , 2022

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Waste Water Mobile Work shop	နမူနာအမှတ် / Sample ID	560	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	27.2.2022	8:51 AM
အဖွဲ့အစည်း /Organisation	MPRL E & P Pte Ltd.			
ဆက်သွယ်ရန် /Contact	09-959482123	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	28.2.2022	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	460	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး	စစ်ဆေးပြီး	တာဝန်ခံ
Tested by	Checked by	Approved by
May Myat Nyein	May Zaw	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအဓိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 561

နေ့စွဲ/Date: 3rd March , 2022

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Waste Water Down hole Work shop	နမူနာအမှတ် / Sample ID	561	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	27.2.2022	9:01 AM
အဖွဲ့အစည်း /Organisation	MPRL E & P Pte Ltd.			
ဆက်သွယ်ရန် /Contact	09-959482123	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	28.2.2022	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	>1100	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး	စစ်ဆေးပြီး	တာဝန်ခံ
Tested by	Checked by	Approved by
May Myat Nyein	May Zaw	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

ဖိမ်းလန်းအဓိမြေဖွံ့ပြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

531-D, Marlar Myaing Yeik Thar Street, 8 Ward, Kamayut Township, Yangon. Telephone: +95 1 503301

စာအမှတ်/Reference Number: EL (M)-R / 562

နေ့စွဲ/Date: 3rd March , 2022

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Waste Water Biofilter Outlet	နမူနာအမှတ် / Sample ID	562	
နေရာ (မြို့နယ်) Location (Township)	Mann Field	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)		လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	27.2.2022	9:09 AM
အဖွဲ့အစည်း /Organisation	MPRL E & P Pte Ltd.			
ဆက်သွယ်ရန် /Contact	09-959482123	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	28.2.2022	

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	ရလဒ် အဖြေ Results	နည်းစဉ် Method	စံသတ်မှတ်ချက် Drinking Standard	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	0	
2	Total coliform count (MPN/100 ml) (Presumption test)	1100	Most Probable Number method	0	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	0	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	0	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Pate count method	0	
7	Total *E.coli* count (CFU/ml)		3M Pate count method	0	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein	May Zaw	Ni Tar Nwe
Research Assistant	Research Assistant	Research Scientist
ALARM	ALARM	ALARM

ALARM Ecological Laboratory

Water Testing Result Report

Report Number : EL-WR-22-00096 | Date : March 7, 2022

Client Information

Client Name	:	MPRL E & P
Organization	:	-
Client ID	:	-
Registration Date & Time	:	28.2.2022
Contact	:	09-959482123
Testing Purpose	:	For Standard

Sample Information

Sample ID	:	7726
Sample Name	:	Wastewater Downhole Workshop
Sample Type / Source	:	Waste
Sampling Date & Time	:	27.2.2022 ; 9:01 AM
Sample Location	:	Mann Field
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Total Chlorine[3]	0.07	mg/L	-	-

"ND" = Not Detected | "LOD" = Lower limit of detection | " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory (ALARM)

531 (D), MarlarMyaingYeikThar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

ALARM Ecological Laboratory

Water Testing Result Report

Laboratory Testing Methods		
Index	**Instrument / Method**	**References / Descriptions**
1	pH Meter	Electrode method (Approved by EPA, ISO, ASTM), Hanna electrode meter Certified by 2014 EMS, Certified by QMS
2	DO Meter	Electrochemical probe method, Dissolved Oxygen Probe Measurement (Approved by EPA, ISO, ASTM) Horiba DO electrode certified with IP67 standards and measures
3	SpectroDirect Methods	Lovibond brand reagent testing methods, precision of the methods are identical to the precision specified in the standard literature of AWWA and ISO
4	TDS Meter	Electrode method (Approved by EPA, ISO, ASTM), Hanna electrode meter Certified by 2014 EMS, Certified by QMS
5	Conductivity Meter	Electrode method, conductivity cell (Approved by EPA, ISO, ASTM), Hanna electrode meter Certified by 2014 EMS, Certified by QMS
6	BOD Testing Method	Method 405.1, USEPA Method for Chemical Analysis of Water and Waste water
7	Atomic Adsorption Spectrophotometer	Shimadzu AA-6200, which is based on the Japan Water Standard Testing Method also approved by EPA and ASTM
8	Arsenic Test Kit	Lovibond brand Arsenic Test kit certified by DIN ISO 1997/ Follow Procedure: Meets WHO requirements:
9	Liquid-Liquid Partition Gravimetric Method	Test Method for Oil and Grease (Solvent Extractable Substances) in Water (EPA 1664)by using n-Hexane

Standards References		
Index	**Standard Names**	**References**
a	WHO Standard for Drinking Water (2011)	Guidelines for Drinking-water Quality 4rd edition, World Health Organization, 2011.
b	US EPA Drinking Water Standard 2018	2018 Edition of the Drinking Water Standards and Health Advisories, EPA 822-F-18-001, Office of Water, USEPA, Washington, DC, March 2018
c	Myanmar National Drinking Water Quality Standard	Myanmar National Standard Department, Department of Research and Innovation, Ministry of Education
d	Myanmar Emission Guideline (2015)	National Environmental Quality (Emission) Guidelines, Order No. (615/2015) MOECAF, 2015, December 29.
*	At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge.	

Quality Parameters Descriptions

pH: Although pH usually has no direct impact on consumers, it is one of the most important operational water quality parameters. Water generally becomes more corrosive with decreasing pH; however, excessively alkaline water also may be corrosive. **Temperature:** will have an impact on the acceptability of a number of other inorganic constituents and chemical contaminants that may affect taste. High water temperature enhances the growth of microorganisms and may increase problems related to taste, odor, color and corrosion. **Color:**Drinking-water should ideally have no visible color. Color in drinking-water is usually due to the presence of colored organic matter (primarily humic and fulvic acids) associated with the humus fraction of soil. Color is also strongly influenced by the presence of iron and other metals, either as natural impurities or as corrosion products. It may also result from the contamination of the water source with industrial effluents and may be the first indication of a hazardous situation.**Turbidity:** Turbidity in water is caused by suspended particles or colloidal matter that obstructs light transmission through the water. It may be caused by inorganic or organic matter or a combination of the two. Microorganisms (bacteria, viruses and protozoa) are typically attached to particulates, and removal of turbidity by filtration will significantly reduce microbial contamination in treated water. **Total Dissolved Solid (TDS):** The total of all dissolved mineral constituents, usually expressed in milligrams per liter. The concentration of dissolved solids may affect the taste of water. Water that contains more than 1,000 mg/L is unsuitable for many industrial uses. Some dissolved mineral matter is desirable, otherwise the water would have no taste. The dissolved solids concentration commonly is called the water's salinity and is classified as follows: fresh, 0–1,000 mg/L; slightly saline, 1,000–3,000 mg/L; moderately saline, 3,000–10,000 mg/L; very saline, 10,000–35,000 mg/L; and briny, more than 35,000 mg/L. **Total Suspended Solid (TSS):** Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration. These solids include anything drifting or floating in the water, from sediment, silt and sand to plankton and algae. TSS are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. **Total Solid:** Total solids are dissolved solids plus suspended solids in water. **Conductivity:** Conductivity is nothing but the measure of the capability of water to pass the flow of electric current. This ability of conductance is said to be directly proportional to the concentration of the ions present in the water. **Chloride:** Large concentrations increase the corrosiveness of water and, in combination with sodium, give water a salty taste. **Hardness:** Related to the soap-consuming characteristics of water; results in formation of scum when soap is added. May cause deposition of scale in boilers, water heaters, and pipes. Hardness contributed by calcium and magnesium, bicarbonate and carbonate mineral species in water is called carbonate hardness; hardness in excess of this concentration is called noncarbonate hardness. Water that has a hardness less than 61 mg/L is considered soft; 61–120 mg/L, moderately hard; 121–180 mg/L, hard; and more than 180 mg/L, very hard. **Dissolved Oxygen:** Required by higher forms of aquatic life for survival. Depletion of dissolved oxygen in water supplies can encourage the microbial reduction of nitrate to nitrite and sulfate to sulfide. It can also cause an increase in the concentration of ferrous iron in solution. **Biological/Chemical Oxygen Demand (BOD & COD):** BOD is similar in function to chemical oxygen demand (COD), in that both measure the amount of organic compounds in water. However, COD is less specific, since it measures everything that can be chemically oxidized, rather than just levels of biologically active organic matter. **Aluminium:** No known necessary role in human or animal diet. Nontoxic in the concentrations normally found in natural water supplies. Elevated dissolved aluminum concentrations in some low pH waters can be toxic to some types of fish. **Manganese:** Causes gray or black stains on porcelain, enamel, and fabrics. Can promote growth of certain kinds of bacteria that clog pipes and wells. **Sodium & Potassium:** Large concentrations may limit use of water for irrigation and industrial use and, in combination with chloride, give water a salty taste. Abnormally large concentrations may indicate natural brines, industrial brines, or sewage. **Zinc:** Essential and beneficial in metabolism; its deficiency in young children or animals will retard growth and may decrease general body resistance to disease. Seems to have no ill effects even in fairly large concentrations (20,000–40,000 mg/L), but can impart a metallic taste or milky appearance to water. Zinc in drinking water commonly is derived from galvanized coatings of piping. **Iron:** Forms rust-colored sediment; stains laundry, utensils, and fixtures reddish brown. Objectionable for food and beverage processing. Can promote growth of certain kinds of bacteria that clog pipes and well openings. **Arsenic:** is toxic. A cumulative poison that is slowly excreted. Can cause nasal ulcers; damage to the kidneys, liver, and intestinal walls; and death. Recently suspected to be a carcinogen. **Chlorine:** Chlorine is added to water supplies to kill bacteria. Short term exposure to chlorine comes primarily from bathing and other activities that use hot water rather than from drinking. Short term exposure irritates the eyes and lungs, and within 15 minutes of exposure victims experience coughing, shortness of breath and headaches. Regular exposure to chlorine in the home has been associated with asthma and other respiratory diseases. **Cyanide:** Cyanide is highly acutely toxic. It is detoxified in the liver by first-pass metabolism following oral exposure. As a consequence, exposure to a dose spread over a longer period, through a day, for example, will result in lower toxicity, or higher tolerance, than the same dose given in a single bolus dose. **Nitrite:** Commonly formed as an intermediate product in bacterially mediated nitrification and denitrification of ammonia and other organic nitrogen compounds. An acute health concern at certain levels of exposure. Nitrite typically occurs in water from fertilizers and is found in sewage and wastes from humans and farm animals. Concentrations greater than 1.0 mg/L, as nitrogen, may be injurious when used in feeding infants. **Nitrate & Nitrate-N:** Concentrations greater than local background levels may indicate pollution by feedlot runoff, sewage, or fertilizers. Concentrations greater than 10 mg/L, as nitrogen, may be injurious when used in feeding infants. **Phosphorus &ortho-phosphate:** Dense algal blooms or rapid plant growth can occur in waters rich in phosphorus. A limiting nutrient for eutrophication since it is typically in shortest supply. Sources are human and animal wastes and fertilizers. **Ammonia:** Plant nutrient that can cause unwanted algal blooms and excessive plant growth when present at elevated levels in water bodies. Sources include decomposition of animal and plant proteins, agricultural and urban runoff, and effluent from waste-water treatment plants. **Lead:** A cumulative poison, toxic in small concentrations. Can cause lethargy, loss of appetite, constipation, anemia, abdominal pain, gradual paralysis in the muscles, and death. **Copper:** Essential to metabolism; copper deficiency in infants and young animals results in nutritional anemia. Large concentrations of copper are toxic and may cause liver damage. Moderate levels of copper (near the action level) can cause gastro-intestinal distress. **Cadmium:** A cumulative poison; very toxic. Not known to be either biologically essential or beneficial. Believed to promote renal arterial hypertension. Elevated concentrations may cause liver and kidney damage, or even anemia, retarded growth, and death. **Nickel:** Very toxic to some plants and animals. Toxicity for humans is believed to be very minimal. **Sulfide:** The "rotten eggs" odor of hydrogen sulfide is particularly noticeable in some ground waters and in stagnant drinking-water in the distribution system, as a result of oxygen depletion and the subsequent reduction of sulfate by bacterial activity. Sulfide is oxidized rapidly to sulfate in well-aerated or chlorinated water, and hydrogen sulfide levels in oxygenated water supplies are normally very low. **Sulfate:** Sulfates of calcium and magnesium form hard scale. Large concentrations of sulfate have a laxative effect on some people and, in combination with other ions, give water a bitter taste. **Alkalinity:** A measure of the capacity of unfiltered water to neutralize acid. In almost all natural waters alkalinity is produced by the dissolved carbon dioxide species, bicarbonate and carbonate. **Phenol:** The presence of phenol in drinking water probably results from using contaminated surface water or groundwater as a source. Its presence in groundwater is probably the result of release to soil, often industrial releases or leachate from waste dumps, and the subsequent leaching of phenol through the soil to the groundwater. Chlorophenols are present in drinking-water as a result of the chlorination of phenols, as by-products of the reaction of hypochlorite with phenolic acids, as biocides or as degradation products of phenoxyherbicides.IARC has classified 2,4,6-trichlorophenol in Group 2B (possibly carcinogenic to humans).**Boron:** Essential to plant growth, but may be toxic to crops when present in excessive concentrations in irrigation water. Sensitive plants show damage when irrigation water contains more than 670 µg/L and even tolerant plants may be damaged when boron exceeds 2,000 µg/L. The recommended limit is 750µg/L for long-term irrigation on sensitive crops. **Fluoride:** To produce signs of acute fluoride intoxication, minimum oral doses of about 1 mg of fluoride per kilogram of body weight were required. Concentrations above this guideline value (1.5mg/L) carry an increasing risk of dental fluorosis and that progressively higher concentrations lead to increasing risks of skeletal fluorosis. **Oil & Grease:** Organic toxic waste (oil and grease (O&G)) causes ecology damages for aquatic organisms, plant, animal, and equally, mutagenic and carcinogenic for human being. They discharge from different sources to form a layer on water surface that decreases dissolved oxygen.

~ ~ ~ Thank you so much for using our testing services ~ ~ ~

531 (D), MarlarMyaingYeik Thar Street, Kamayut Tsp., Yangon, Myanmar Tel: 01-503301, 01-503302, 09-407496078

Email: aelab@alarmmyanmar.org , websites: www.alarmmyanmar.org

Annex – 2

Equipment Calibration Certificate

Calibration Certificate

Instrument SN: 17091JZ-001
Calibration Date: 12/15/2021
Part Number: VTS-K1232110111
Job Number: 17091J
Setup Date: 9/19/2017
Setup Technician: MB
Created By: iNet
Battery: Dual-cell lithium-ion battery pack
Assigned User: MPRL E&P PTE LTD.

Sensor SN	Sensor Type	Gas Type	Span Gas	Span Reserve	Passed/Failed	Gas Alert	Alarm Low	Alarm High	Alarm TWA	Alarm STEL
17090Q1049	CO	Carbon Monoxide	100.00	200.00%	Passed	0.00	35.00	70.00	35.00	200.00
20030CT081	H2S	Hydrogen Sulfide	25.00	106.00%	Passed	0.00	10.00	20.00	10.00	15.00
20030JL068	LEL	Pentane	25.00	184.00%	Passed	0.00	10.00	20.00	N/A	N/A
200236W340	O2	Oxygen	20.90	157.89%	Passed	0.00	19.50	23.50	N/A	N/A

Sensor SN	Sensor Type	Cal Date/Time	Cylinder ID	Cylinder Exp	Zero Cylinder Id	Zero Cylinder Exp
17090Q1049	CO	12/15/2021 12:59:41 PM (GMT+06:30)	236817BC318096	2/26/2022	Fresh Air	N/A
20030CT081	H2S	12/15/2021 12:59:11 PM (GMT+06:30)	236817BC318096	2/26/2022	Fresh Air	N/A
20030JL068	LEL	12/15/2021 1:00:11 PM (GMT+06:30)	236817BC318096	2/26/2022	Fresh Air	N/A
200236W340	O2	12/15/2021 12:57:51 PM (GMT+06:30)	Fresh Air	N/A	Fresh Air	N/A

: MPRL E&P Pte Ltd. Next Calibration Due Date is JUNE 2022. Contact number: 01-667159,09-401624520. Email: saikhinnyunt@pangolin.com.mm
Remark: H2S Sensor and LEL Sensor Changed.

Build through Excellence
Lead with Integrity

MPRL E&P Pte Ltd.

Vantage Tower, 623 Pyay Road
Kamayut Township 11041, Yangon, Myanmar
Tel : +95 1 230 7733 Fax : +95 1 230 7744
Email : mprlstaff@mprlexp.com
www.mprlexp.com mprlep
mprlep myanmar_mprlexp